

# RODRIGUES REGIONAL ASSEMBLY



**REHABILITATION WORKS  
AT  
GRAND LA FOUCHE CORAIL PRIMARY SCHOOL  
AT  
GRAND LA FOUCHE CORAIL, RODRIGUES**

**Procurement Reference No: - RRA/EDU/OAB/W/41/2021/2022**

**OPEN NATIONAL BIDDING**

**BIDDING DOCUMENT**

**PUBLIC BODY**

**Rodrigues Regional Assembly**  
**Commission for Education (Administration) and Others**  
Antoinette Prudence Human Resource Development Centre  
Malabar, Rodrigues  
*Tel: (230) 831-5630*  
*Fax: (230) 832-4906*  
E-mail: -dbceducation@rragov.mu

**ISSUED ON MAY 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](mailto:pposecretariat@govmu.org)**

**Rehabilitation Works**  
**at**  
**Grand La Fouche Corail Primary School, Rodrigues**

*Procurement Reference No:-RRA/EDU/OAB/W/41/2021/2022*

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**DRAWINGS**

## Section I: Instruction to Bidders

### 1. Introduction

The **Rodrigues Regional Assembly**, through ***Commission for Education (Administration) and Others*** 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: ***Rehabilitation Works at Grand La Fouche Corail Primary School at Grand La Fouche Corail, Rodrigues***

**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 Departmental Head**

**Rodrigues Regional Assembly**

**Commission for Education (Administration) and Others**

Antoinette Prudence Human Resource Development Centre

Malabar, Rodrigues

Tel: (230) 831-5630

Fax: (230) 832-4906

E-mail: - dbceducation@rragov.mu

Request for clarification should be made not later than 14 days prior to the deadline for submission of bids. Reply to any request for clarification received **will be made 7 days prior** to the deadline 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 **Ninety (90)** days from the date of bid submission deadline or up to **27<sup>th</sup> September 2022** whichever is later. The deadline date being counted as day one of the validity period.

### 3. Works Completion Period

The Intended Completion period is **180 calendar days** from start date of works.



## *Section 1 – Instruction to Bidders*

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### **4. Site Visit**

Bidders or their designated representatives are invited to attend a pre-bid meeting on **10<sup>th</sup> June 2022, 10.00 hrs** (local time) on site. 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: **RRA/EDU/OAB/W/41/2021/2022**, 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 Quotation/Tender Box located at **Chief Commissioner's Office, Commission for Education (Administration) and Others, Antoinette Prudence Human Resource Development Centre, Malabar, Rodrigues**, not later than **30<sup>th</sup> June 2022 at 13:00 hrs (local time)** at latest. Bids by post or hand delivered should reach **Chief Commissioner's Office, Commission for Education (Administration) and Others, Antoinette Prudence Human Resource Development Centre, Malabar, Rodrigues** by the same date and time at latest. Late bids will be rejected.

### **7. Bid Opening**

Bids will be opened on **30<sup>th</sup> June 2022** as from **13.30 hours** (local time) at the following address: -

***The Conference Room***

**Commission for Education and (Administration) Others**

Antoinette Prudence Human Resource Development Centre

Malabar, Rodrigues

Tel: (230) 831-5630

Fax: (230) 832-4906

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): **Building Construction Works**
- (b) experience in two works of a similar nature over the last 5 years, each of value not less than **MUR Seven Million**;
- (c) Site Manager having as minimum qualification: A diploma in construction related field and 5 years' experience in the construction sector.
- (d) minimum amount of liquid assets and/or credit facilities net of other contractual commitments of the Bidder of **MUR 2,500,000/-**
- (e) Mechanical, Plumbing and Electrical Works (In case the work cannot be met by the Bidder/JV, for which a specialist Sub-Contractor has to be retained, scanned copy showing the experience of the Sub-Contractor must be submitted).

## *Section 1 – Instruction to Bidders*

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### **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 Site Manager;
- (g) Documentary evidence of liquid assets and/or credit facilities (Note 1);
- (h) 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.

## *Section I – Instruction to Bidders*

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### **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 provided further that the Bidder is determined to be qualified to perform the Contract satisfactorily 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**

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**

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 **Rodrigues Regional Assembly**, through **Commission for Education and Others** reserves the right 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 Public body.

**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 Departmental Head**  
**Rodrigues Regional Assembly**  
**Commission for Education and (Administration) Others**  
 Antoinette Prudence Human Resource Development Centre  
 Malabar, Rodrigues  
 Tel: (230) 831-5630  
 Fax: (230) 832-4906  
 E-mail: - dbceducation@rragov.mu

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

**The Chairperson**  
**Independent Review Panel,**  
 5<sup>th</sup> Floor, Belmont House  
 Intendence Street  
 Port Louis  
**Tel : (230) 260-2228**  
**Fax : (230) 214-9252**  
**Email : [irp@govmu.org](mailto: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: RRA/EDU/OAB/W/41/2021/2022**

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 **Ninety (90)** days from the date fixed for the bid submission deadline in accordance with the Bidding Documents or up to **27<sup>th</sup> September 2022**, 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 9;
- (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:

## *Section II – Bidding Forms*

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- 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.
- 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.
- 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 two 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**

### **Instructions to Contractors for preparing the Bill of Quantities**

Bidders shall also submit one soft copy of the Priced Bill of Quantities in excel sheet on CD. The hard and soft copies shall be identical to the original one.

### **NOTE FOR THE SUBMISSION OF A SOFT COPY OF RATES**

- a. The items and the quantities in the excel sheets have been locked. You are required to insert your rate and amount in the appropriate column and submit same in a CD along with your bid.
- b. Please note that the rates inserted in the soft copy should be the same as filled in the BOQ (Hard copy) of the bid. No modification whatsoever of any item shall be made;
- c. If ever, there are discrepancies in the rates and amount in the bidder's CD submitted along with the bid, as compared to the rates and amount in the hard copy, the rates and amount quoted in the hard copy will prevail.

# BILL NO. 1

*PRELIMINARIES*

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT / MUR
	<b>BILL NO. 1 - PRELIMINARIES</b>				
<b>1.1</b>	<b>PRICING</b>  The contractor shall include in this Bill for all costs he considers attributable to preliminary items necessary for the proper completion of the works which have not been included in the unit rates.  Items are listed below for convenience of pricing. However, the Contractor is responsible for ensuring all costs are included whether or not an item is given.  Full details of the mark up of all items priced in this Bill shall be given on the pages provided at the end of the Bill in order that interim payments may be equitably valued.	Sum			.....
<b>1.2</b>	<b>CONDITIONS OF CONTRACT</b>  The Conditions of Contract shall be General Conditions of Contract (GCC), (Ref: W/GCC10/12-21 dated December 2021), for the Procurement of Works (available on website ppo.govmu.org) with amendments and additions as set out in the Particular Conditions annexed to the bid Document.  The Contractor is to allow hereunder or in his price whatever costs or charges he may consider necessary for the carrying out, complying with and due observance in respect of any or all of the clauses of the Conditions and of the said notes and amendments.  <b>The name of the project is 'Rehabilitation Works at Grand La Fouche Corail Primary School'</b>  The works comprise the rehabilitation works to existing buildings namely:  Upgrading Works to Block C Conversion of Toilet Block into Cloakroom External Drainage and Site Works Mechanical, electrical and plumbing installations	Sum			.....
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT / MUR
1.3	<b>DRAWINGS</b>  The drawings which were used in the preparation of the Tender Documents will form part of the Contract and a copy of each is issued with the Tender Documents. The drawings used in the preparation of the Tender Documents are listed in the Tender Documents.	Sum			.....
1.4	<b>BILL OF QUANTITIES</b>  The method of measurements are generally based on the Principles of Measurement (International) for Works of Construction - July 1979 edition issued by the Royal Institution of Chartered Surveyors.  The rates quoted for items in the Bill shall be deemed to be fixed rates. No adjustment whatsoever will be made thereto whatever be the change in the quantity of the items. All quantities measured in the Bill are firm quantities unless otherwise specified.  The tenderer is advised that the quantities, sizes, etc. contained in the Bill of Quantities should not be used for the purpose of ordering materials, goods, etc. without checking from the working drawings or from site, as no claim will be entertained for costs incurred in over-or under-ordering of materials, goods etc.  "Take delivery and Fix/Install" wherever stated shall mean unloading on site, taking possession, storing, unpacking, distributing to the required position on site, assembling and fixing, and returning packing cases to consignor if required.	Sum			.....
1.5	<b>VISIT TO SITE</b>  The Contractor shall be required to visit the site for which he is tendering prior to the submission of the tender and shall ascertain himself as to its nature, means of access to and from site, working space available, proximity of adjacent properties, etc. No claims will be allowed on the grounds of ignorance or misapprehension of the site condition.	Sum			.....
<b>CARRIED TO COLLECTION</b>				<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT / MUR
1.6	<b>RESTRICTIONS</b>	Sum			.....
	Allow for the cost of restrictions including but not limited to the followings:				
(a)	<u>Limitation of workmen</u> The Contractor shall keep all persons including those employed by sub-contractors under control and within the boundaries of the area allocated to him.				
(b)	<u>Limitation of construction activity</u> The Contractor shall be required to limit the construction activity, temporary buildings, storage of equipment and materials, etc within the boundaries of the area allocated to him.				
1.7	<b>CONTRACTORS ADMINISTRATIVE ARRANGEMENTS</b>	Sum			.....
	Allow for the cost of the Contactor's administrative arrangements including but not limited to the following:				
	(a) Site administration				
	(b) Supervision				
	(c) Safety, health and welfare of work people				
	(d) Transport and accommodation of work people				
1.8	<b>LABOUR ON COSTS</b>	Sum			.....
	Allow for all costs in respect of workmen but not limited to the following:				
	(a) National Pensions Scheme				
	(b) Annual and Public Holidays				
	(c) Travelling time, expenses, fares and transport				
	(d) Non-productive time and other expenses in connection with overtime				
	(e) Incentive and bonus payments				
	(f) End of year bonus				
	(g) Any other disbursements arising from employment of labour				
<b>CARRIED TO COLLECTION</b>				<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT / MUR
1.9	<b>CONSTRUCTION PLANT</b>  Allow for the cost of constructional plant and equipment including but not limited to the following:  (a) Small plant and tools (b) Scaffolding (c) Cranes and lifting plant (d) Site Transport (e) Plant required for specific trades	Sum			.....
1.10	<b>TEMPORARY WORKS</b>  Allow for the cost of temporary works but not limited to the following:  (a) Temporary Roads: The Contractor shall provide for making temporary access road, tracks and hardstandings, crossings, etc and for the removal before handing over of works.  (b) Pumping and Dewatering: The Contractor shall provide for all necessary pumping and dewatering and for keeping all excavations free from surface water.	Sum			.....
1.11	<b>PROTECTION</b>  Allow for protection requirement but not limited to the following:  (a) Maintenance of roads etc: The Contractor shall protect and maintain all public and private roads, foot-paths, kerbs, existing fences etc and keep the approaches of the site clear of mud. The Contractor is to make good any damage caused by his own or subcontractor's transport, equipment and labour at his own expense or pay all costs and charges in connection herewith.  (b) Services: The Contractor shall protect, uphold, and maintain all pipes, ducts, sewers, water mains, overhead cables etc during the execution of the works. The Contractor is to make good any damage due to any cause within his control, at his own expense or pay all costs and charges in connection therewith.	Sum			.....
<b>CARRIED TO COLLECTION</b>				<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT / MUR
<b>1.12</b>	<b>SERVICES</b>	Sum			.....
	Allow for the cost of services to be required for the execution of the works but not limited to the following:				
(a)	Water: Provide clean fresh water for use in the works. Allow for payment of all charges in connection therewith, provide all necessary temporary storage, plumbing services, connections and clear away and make good after completion. The Contractor shall make his own arrangements for the supply of regular and adequate quantity of water and shall pay all necessary fees and charges in connection therewith.				
(b)	Lighting and Power: Provide for all artificial lighting and power for use in the works. Allow for all installation cost and running cost for use in the works and for security purposes and provide all necessary temporary connections, fittings etc and remove after completion of works.				
(c)	Telephone: Provide and maintain a temporary telephone service in the foreman's office for the full period of the contract and pay all necessary fees and charges in connection therewith				
	The Contractor shall make his own arrangement for the supply of regular and adequate power connection and pay all fees and charges.				
<b>1.13</b>	<b>CONTRACTOR'S FACILITIES</b>	Sum			.....
	Allow for the cost of Contractor's facilities on site but not limited to the following:				
(a)	Temporary store : Provide and maintain a temporary watertight shed for the storage of materials, tools etc.				
(b)	Temporary office : Provide and maintain a temporary office for the Contractor's own use.				
(c)	Temporary Toilet : Provide and maintain a temporary toilet accommodation for the use of the Contractor's employees				
	All temporary buildings shall be demolished and cleared way from site before completion of the works.				
<b>CARRIED TO COLLECTION</b>				<b>MUR</b>	



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT / MUR
1.14	<b>ARCHITECT'S FACILITIES</b>  Allow for the cost of facilities on site by not limited to the following:  (a) Temporary office: Provide a temporary office and attendance  (b) Survey and testing equipments	Sum			.....
1.15	<b>SECURITY</b>  Allow for cost of security of workman and works on site but not limited to the following:  (a) Temporary hoarding and gantries: Provide and maintain all necessary fencing, hoardings, planked footways, guardrails, gantries and the like for the proper execution of the Works, for the protection of occupiers of adjoining premises and workmen and alter, shift and adapt from time to time as necessary.	Sum			.....
1.16	<b>PROTECTION, DRYING AND CLEANING OF THE WORKS</b>  Allow for the cost of protection and cleaning of the works but not limited to the following:  (a) Protection of completed works: The Contractor shall be entirely responsible for all completed works and shall take all necessary precautions to protect all completed works. In the event of any damage caused to any part of the works or the materials on site, the Contractor shall make good, at his own expense, all damages and dav costs which may be levied.  (b) Cleaning: Provide for removing all rubbish from site both as it accumulates from time to time and at completion. Provide for the cleaning of the buildings inside and out, removing and touching up paintwork and polished work and leaving the whole of the works clean and to the satisfaction of the Architect on completion.	Sum			.....
<b>CARRIED TO COLLECTION</b>				<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT / MUR
1.17	<b>SIGN BOARD</b>  Provide and maintain 2 No. sign board in position to be agreed with the Architect for the display of:  1. The name of the Employer 2. The title of the Project 3. The name of the Project Manager 4. The name of the Architect 5. The name of the Quantity Surveyor 6. The name of the Engineer 7. The name of the Contractor and Sub-contractors  The sign board shall be in accordance with the drawings to be prepared by the Architect.	Sum			.....
1.18	<b>SEQUENCING OF WORKS</b>  The Contractor shall allow for close co-ordination of works with named, nominated and domestic subcontractors. Thus shall include inter-alia convening and chairing meetings at regular intervals for the purpose of co-ordination, progress of works, queries and the like and submitting minutes and reports thereof at Site Meetings.	Sum			.....
1.19	<b>SITE MEETINGS</b>  Allow for attendance at periodic site meetings as may be called upon by the Architect. The contractor will be required to issue progress reports, resources, schedule of information required etc. and report on all subcontract work at these meetings.	Sum			.....
1.20	<b>SUNDRY ITEMS</b>  Allow for the cost of sundry items including but not limited to the following:  1. Testing of materials 2. Testing of the works 3. Production of samples of materials 4. Production of samples of quality of works 5. Slump test apparatus 6. Steel cube moulds 7. Graduated glass cylinder for slit tests 8. Health and safety risk assessment before start of works and updated during construction stage 9. Monthly health and safety reports	Sum			.....
<b>CARRIED TO COLLECTION</b>				<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT / MUR
1.21	<b>BAR BENDING SCHEDULES</b>  Prepare bar bending schedules in accordance with BS 4466 (1969) from the reinforcement drawings and seek and obtain Engineer's approval in advance and before cutting and bending of reinforcement. The Contractor shall submit a copy of the approved bending schedule to the Quantity Surveyor for his interim certification and final account.	Sum			.....
1.22	<b>DIRECT WORKS</b>  <u>Employer's Direct Contractors</u>  The Employer will employ his own direct contractors to execute any special or other works during the execution of this contract.  The Contractor shall not be entitled to any percentage, profit, or discount on the value of any work executed by "Direct Contractors" but shall nevertheless allow these direct Contractors and the Employer's Employees to have access to the works, allocate reasonable storage space for their materials, tools and equipment, and co-ordinate the work of and provide attendance upon direct Contractors as necessary, all to the satisfaction of the Engineer. The Contractor shall provide all necessary facilities such as water and power supply on site, and shall not in any way hinder or prevent execution of their work.  The following is a list of works which may be carried out by the Employer but not limited to the following:  <i>Any other installations carried out by the Employer in the normal course of his business.</i>	Sum			.....
<b>CARRIED TO COLLECTION</b>				<b>MUR</b>	

ITEM	DESCRIPTION	AMOUNT/MUR
	<b><u>BILL NO. 1 - PRELIMINARIES</u></b>	
	<b><u>COLLECTION</u></b>	
	Brought forward from Page 1:1	.....
	" " " " 1:2	.....
	" " " " 1:3	.....
	" " " " 1:4	.....
	" " " " 1:5	.....
	" " " " 1:6	.....
	" " " " 1:7	.....
	" " " " 1:8	.....
	<b>TOTAL CARRIED TO MAIN SUMMARY</b>	<b>MUR</b>

# BILL NO. 2

*ALTERATION WORKS TO BLOCK C*

<b><u>GENERAL PREAMBLES TO BILLS OF QUANTITIES</u></b>																																																												
<b>A</b>	<b><u>Abbreviation and meaning</u></b>																																																											
	<table> <tr> <th><u>Abbreviation</u></th><th><u>Meaning</u></th></tr> <tr> <td>BS</td><td>British Standard</td></tr> <tr> <td>MS</td><td>Mauritius Standard</td></tr> <tr> <td>CP or COP</td><td>British standard code of practice</td></tr> <tr> <td>m<sup>3</sup> or m3 or cum</td><td>cubic meter</td></tr> <tr> <td>m<sup>2</sup> or m2 or sqm</td><td>square meter</td></tr> <tr> <td>m</td><td>linear meter</td></tr> <tr> <td>mm</td><td>millimeter</td></tr> <tr> <td>Nr or nr or No. or no.</td><td>Number</td></tr> <tr> <td>Pr</td><td>Pair</td></tr> <tr> <td>St</td><td>Set</td></tr> <tr> <td>Lt</td><td>Lot</td></tr> <tr> <td>m/s</td><td>measured separately in these bills of quantities</td></tr> <tr> <td>exc</td><td>exceeding</td></tr> <tr> <td>n.e</td><td>not exceeding</td></tr> <tr> <td>a.b</td><td>as described before in these bills of quantities</td></tr> <tr> <td>E.D</td><td>External diameter</td></tr> <tr> <td>I.D</td><td>Internal diameter</td></tr> <tr> <td>N.S</td><td>Nominal size</td></tr> <tr> <td>p.c</td><td>precast concrete</td></tr> <tr> <td>n.g.l</td><td>natural ground level</td></tr> <tr> <td>r.g.l</td><td>reduced ground level</td></tr> <tr> <td>c.p</td><td>chromium plated</td></tr> <tr> <td>max</td><td>maximum</td></tr> <tr> <td>min</td><td>minimum</td></tr> <tr> <td>avge or ave</td><td>average</td></tr> <tr> <td>thk or th</td><td>thickness or thick</td></tr> <tr> <td>r.c or rc</td><td>reinforced concrete</td></tr> <tr> <td>&lt;</td><td>less than</td></tr> <tr> <td>&gt;</td><td>greater than</td></tr> </table>	<u>Abbreviation</u>	<u>Meaning</u>	BS	British Standard	MS	Mauritius Standard	CP or COP	British standard code of practice	m <sup>3</sup> or m3 or cum	cubic meter	m <sup>2</sup> or m2 or sqm	square meter	m	linear meter	mm	millimeter	Nr or nr or No. or no.	Number	Pr	Pair	St	Set	Lt	Lot	m/s	measured separately in these bills of quantities	exc	exceeding	n.e	not exceeding	a.b	as described before in these bills of quantities	E.D	External diameter	I.D	Internal diameter	N.S	Nominal size	p.c	precast concrete	n.g.l	natural ground level	r.g.l	reduced ground level	c.p	chromium plated	max	maximum	min	minimum	avge or ave	average	thk or th	thickness or thick	r.c or rc	reinforced concrete	<	less than	>
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<b>B</b>	<p><b><u>General Preamble for Earthworks and Excavations</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow for the following:</p> <ul style="list-style-type: none"> <li>(i) maintaining the sides, planking and strutting as may be required</li> <li>(ii) additional excavation for working space. The quantities of excavation for basement, bases and trenches have been measured net and no allowance has been made for working space and the work will be remeasured on this basis irrespective of the actual additional work carried out by the Contractor. The latter must also allow for necessary formwork to concrete column bases and footings unless otherwise specified</li> <li>(iii) entirely removing all white ant's nests, termite nests or other parasites over the area of the site and filling holes</li> <li>(iv) treating surfaces of earth work under expansion joint in ground floor slab etc. with approved anti-termite protection</li> <li>(v) keeping excavations free from ground or surface water, mud and the like</li> <li>(vi) compliance of materials and workmanship to BS 6031</li> <li>(vii) excavation work has been measured net herein as before digging and the Contractor is to allow in his billed rates for increase in bulk in relation to backfilling and disposal of excavated materials</li> <li>(viii) excavation works shall be deemed to include excavation in all types of materials including <u>rock strata, soft spots</u> or fill materials</li> <li>(ix) permits from relevant authorities for carting away excavated materials from site and to a location as advised by the local authorities</li> </ul>
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<b>C</b>	<p><b><u>General Preamble for Concrete Works</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow for the following:</p> <p><u>Concrete works</u></p> <p>(i) Rates for concrete shall include for batching, mixing, transporting, placing, compacting and curing the concrete and forming all constructional joints; preparation of existing surfaces, treatment with appropriate epidermix compound and for finishing top of slabs to receive screed or paving</p> <p><u>Reinforced concrete works</u></p> <p>(ii) All workmanship, materials, tests and performance in connection with concrete shall be in conformity with relevant British Standards and Codes of Practice.</p> <p>Reinforced concrete shall be of mix giving minimum cube crushing strength as stated by the Engineer respectively filled into formwork, vibrated and packed around reinforcement (formwork and reinforcement measured separately)</p> <p><u>Formwork</u></p> <p>(iii) Rates for formwork shall include for narrow widths and small quantities, all cutting and waste rebates and groove formers, splayed edges, scribbling, notching, overlaps and passing at angles, battens, striking bolting, wedging, easing, striking and removal</p> <p><u>Steel Reinforcement</u></p> <p>(iv) Mild and high tensile steel rod reinforcement to concrete members shall be to MS 10 and as described by the Engineer generally cut to lengths, bent and hooked as required and bound at intersections with stout gauge mild steel tying wire. Rates to allow for all wastage.</p> <p><u>Tie columns and tie beams</u></p> <p>(v) Tie columns and tie beams in structural member shall include for all necessary dowelling and grouting as per engineer's specifications and instructions</p>
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<b>D</b>	<p><b><u>General Preamble for Masonry</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow in his rates the following:</p> <ul style="list-style-type: none"><li>(a) For walling, for plumbing angles, waste, split courses necessary bond, bonding at angles, intersections, forming solid tops under beams, cutting and pinning to beams, lintels and columns and other structural members, forming openings and reveals for doors and windows, reinforcement as per Structural Engineer's specifications</li><li>(b) Polysulphide mastic filling at junction of concrete and block walls</li><li>(c) Provide all necessary protection during wall erection against rainwater penetration inside block work by using cover or other means</li><li>(d) All blocks shall be well wetted with a hose prior to laying</li></ul>
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<b>E</b>	<p><b><u>General Preamble for Wall Finishes</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow in his rates the following:</p> <ul style="list-style-type: none"> <li>(a) For forming all arrises, fair edges, concrete nibs to windows and to returns.</li> <li>(b) Hacking concrete and raking out joints of walling to form key and fir any necessary dubbing out.</li> <li>(c) All surfaces for rendering shall be well wetted with a hose before rendering is applied and rendered surfaces shall be kept damp for at least two days after the final coat has been applied.</li> <li>(d) All defects to be filled and with appropriate filler so that the finished surfaces appear without visible joints or patches.</li> <li>(e) Reinforcing all joints between concrete and block work with chicken wire mesh/seal strips or other approved products.</li> <li>(f) All temporary rules fair edges and fair joints, V and drip grooves to windows and door frames, around pipes, holder bats etc.</li> <li>(g) Any extra labour involved in working to projection columns and beams on wall face, all of which have been included in the general term of walls.</li> <li>(h) All surfaces that will receive paint shall be thoroughly sanded with a sanding brick to a smooth surface, washed and cleaned from dust, oil and other contaminants and allowed to dry; if necessary primer or sealer can be used depending on nature of substrate.</li> <li>(i) All paints and varnish shall be from an approved manufacturer and shall be applied strictly in accordance with the manufacturer's printed instructions.</li> <li>(j) The preparation of sample panels with paint names and colour codes as directed until the quality texture and finish required is obtained and approved by the Architect.</li> </ul>
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F	<p><b><u>General Preamble for Floor Finishes</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow in his rates the following:</p> <ul style="list-style-type: none"> <li>(a) Preparation of concrete floor and pointing with cement grout as described and any extra thickness consequent upon the concrete surfaces not being finished to true levels.</li> <li>(b) Tiles should be laid with approved cement based adhesive mortar, laid strictly to manufacturer's specifications.</li> <li>(c) Rate for tiling works shall include for all necessary cutting, fitting, polishing, laying to patterns and inlays.</li> <li>(d) Jointing and pointing for tiling works shall be with coloured grout and adhesive to be approved by the Architect.</li> <li>(e) All horizontal and vertical edges shall have aluminium tile edging and trim.</li> <li>(f) At expansion joints and interface with fixed vertical elements such as columns, walls, etc. and at interface with different finishes, allowance shall be made for solvent free silicone of matching colour as per layout.</li> <li>(g) All work shall be as per specified markup plans, detailed schedules or/and to Architect's approval.</li> <li>(h) Prime cost rate shall be for the net price of the material in a showroom in Mauritius. The Contractor to allow in his rate for transport, careful loading and unloading, delivery and storage on site. The Contractor to also allow for approval of samples and early procurement.</li> </ul>
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<b>G</b>	<p><b><u>General Preamble for Ceiling Finishes</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow in his rates the following:</p> <ul style="list-style-type: none"> <li>(a) Hacking concrete and raking out joints of walling to form key and fir any necessary dubbing out.</li> <li>(b) All surfaces for rendering shall be well wetted with a hose before rendering is applied and rendered surfaces shall be kept damp for at least two days after the final coat has been applied</li> <li>(c) All defects to be filled and with appropriate filler so that the finished surfaces appear without visible joints or patches.</li> <li>(d) Any extra labour involved in working to projection concrete elements, all of which have been included in the general term of walls.</li> <li>(e) All surfaces that will receive paint shall be thoroughly sanded to a smooth surface, washed and cleaned from dust, oil and other contaminants and allowed to dry; if necessary primer or sealer can be used depending on nature of substrate.</li> <li>(f) All paints and varnish shall be from an approved manufacture and shall be applied strictly in accordance with the manufacturer's printed instructions.</li> <li>(g) The preparation of sample panels with paint names and colour codes as directed until the quality texture and finish required is obtained and approved by the Architect.</li> <li>(h) All necessary temporary floor protection and cleaning after completion.</li> </ul>
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H	<p><b><u>General Preamble for Aluminium openings and partitions</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow in his rates the following:</p> <ul style="list-style-type: none"> <li>(a) Powder coated aluminium extruded sections, profiled system with suitable reinforcement designed to withstand wind speed of 280 km/hr to latest update of BS 4873</li> <li>(b) Powder coating shall be to a minimum thickness of 80 microns complying to BS 6496 (to be certified by manufacturer)</li> <li>(c) All ironmongery should be 3-point locking system, stainless steel hinges and pull handles, compass and fittings of superior grade; doors to be fitted with double mortice lock; minimum 3 set of keys to be provided</li> <li>(d) Submission of design calculations, shop drawings and samples of ironmongery for approval prior to manufacture</li> <li>(e) Treatment of joints and junctions between aluminium openings and reveals of structural openings against water ingress with appropriate mastic sealant and backing rods both internally and externally to aluminium openings</li> <li>(f) Carrying out of water test on openings under Project Manager's supervision prior to delivery of the works; allow for attendance</li> <li>(g) All necessary scaffolding, hoardings and safety measures for carrying out of the works</li> <li>(h) Checking of dimension on site and allowance for minor variance</li> <li>(i) All design of openings as per Architect's drawings, schedules and specifications</li> </ul>
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I	<p><b><u>General Preamble for Timber works</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow in his rates the following:</p> <p>(a) Submission of samples and shop drawings as required by Architect for approval, prior to procurement and fabrication of any element.</p> <p>(b) All timber works shall be Grade A type wrot finish, well seasoned, treated and having moisture content of 12 to 14% or as per specifications.</p> <p>(c) All back surfaces of timber shall be treated with "Pentachlorophenol" dissolved in heavy mineral oil or other equally approved colourless chemical wood preservative with no effect on paint or other finishes of timber.</p> <p>(d) Checking of dimension on site and allowance for minor variance.</p> <p>(e) Rates for woodworks shall include for cutting to lengths, cutting to shapes, mouldings, forming rebates, chamfering, making grooves, making all necessary joints, assembling and fixing in position with brass or stainless steel sheradised screws and plugs. Provision shall be made for Meranti timber founds, door opening templates and packing pieces as required. Rates shall include for drilling, countersinking and flush pelling with matching timber plugs and silicon joints all as per drawings and to Architect's approval.</p> <p>(f) Rates for painting and varnishing shall include for surface preparation and painting as per Architect's approval and methodology.</p>
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J	<p><b><u>General Preamble for Metal works</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow in his rates the following:</p> <ul style="list-style-type: none"> <li>(a) Metal structure shall comprise of fabricated steel work not limited to hot rolled sections, angles, plates, flats, hollow sections inclusive of connections such as bolts, nuts and washers; all to BS EN 10210 Part 2</li> <li>(b) Hoisting and fixing in position of metal structures, including drilling, countersinking, bolting, screwing and other associated works</li> <li>(c) Compliance to safety regulations in the fabrication and installation of the steel structure</li> <li>(d) Testing of the complete metal structure as specified by the Structural Engineer</li> <li>(e) All metal structure shall be hot dipped galvanised after manufacture. Hot dipped galvanizing shall be to BS 729 with minimum coating of 600g/sqm. All site welds shall be subject to prior approval by the Structural Engineer and to approved methodology.</li> <li>(f) Welding shall be in 6mm thick continuous fillet weld unless otherwise specified. On site welding, when authorised, shall be treated with galvafruid, one coat yellow chromate primer, one coat undercoat and two coats of hard gloss enamel paint. All welding shall comply with EN 1011.</li> </ul>
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<b>K</b>	<p><b><u>General Preamble for Road and Paving works</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow for the following:</p> <ul style="list-style-type: none"> <li>(i) Filling under roads or paving works shall of approved material free from large stone and debris, levelled and compacted in layers as described</li> <li>(ii) Sub-grade shall be scarified for a minimum depth of 150mm prior to level grading and compaction</li> <li>(iii) Sub-grade shall be treated with an approved herbicide prior to laying of base course</li> <li>(iv) Surface of base shall be clean from all dust, dirt and loose particles prior to laying of premix asphaltic concrete</li> <li>(v) The bituminous premix asphaltic concrete shall be of an approved mix and laid only after the tack coat has set. Laying shall be done with an approved pneumatic tyred roller. Both operations shall be carried out on same day.</li> <li>(vi) Contractor to allow for protection of the base course and finished road surface against vehicular traffic and other damages</li> <li>(vii) Contractor to allow for protection of concrete kerbs and other annexed elements with plastic during execution of the works. The finished road surface and paving works shall be kept clean from debris and dirt up to final completion</li> <li>(viii) Contractor to allow for all necessary tests with respect to sub-grade, base course and asphaltic concrete</li> <li>(ix) Permits from relevant authorities for carting away excavated materials from site and to a location as advised by the local authorities</li> </ul>
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L	<p><b><u>General Preamble for Services and Drainage installations</u></b></p> <p>Notwithstanding anything contained in the Architect's and Structural Engineer's specifications, the contractor must allow for the following:</p> <ul style="list-style-type: none"><li>(i) Excavation work has been measured net herein as before digging and the Contractor is to allow in his billed rates for increase in bulk in relation to disposal.</li><li>(ii) Maintaining the sides, planking and strutting as may be required</li><li>(iii) Additional excavation for working space. The quantities of excavation for trenches have been measured net and no allowance has been made for working space and the work will be re-measured on this basis irrespective of the actual additional work carried out by the Contractor. Latter must also allow for necessary formwork to concrete jackets / surrounds</li><li>(iv) Marking and cutting through existing surface beds, breaking into existing pipes, ducts, existing cables, equipment and control gear.</li><li>(v) Keep all excavation free from all types of water until other constructional work such as basement and retaining walls are able to resist leakages, ingress of water, water pressure and flotation</li><li>(vii) Compliance of all works with Local Authorities requirements</li></ul>
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<b>M</b>	<b><u>Demolition and Alterations</u></b>
(i)	A demolition plan of the structure to be demolished is enclosed and is only indicative. The contractor should inspect the site and let himself satisfied about the quantum of demolition works to be disposed etc before quoting the rates.
(ii)	Before commencement of the works, the contractor shall submit a proposal detailing the manner and the sequence on which the demolition shall be carried out and get the same approved.
(iii)	The dismantling/demolition work shall commence only after temporary hoardings are fixed all around the structure proposed to be demolished and approved by Architect in charge. Hoardings can be removed only after completion of the proposed construction works.
(iv)	All efforts should be taken to control noise and dust nuisance.
(v)	All useable materials (dressed stones) should be removed from site or stored on site as directed by the Architect for re-use.
(vii)	Debris should be get disposed as per direction of the Architect in charge
	<u>Generally</u>
(viii)	<p>If the Client wish to retain some fittings, fixtures and fittings, the tenderer should dismantle the items with care to avoid damages and the same should be stacked at a place properly as per instructions of Architect or handover to the Employer. The detail of such items are as follows:</p> <p>(a) Doors and windows</p> <p>(b) Electrical accessories and lighting</p>
(ix)	All sanitary pipe lines manholes, water pipe, gas lines, electrical and telephone cables should be dismantled/demolished and removed. The main service lines for these items outside the existing blocks should not be disturbed.

<b>M</b>	<b><u>Demolition and Alterations</u></b>
(i)	Provide all necessary dust or waterproof screen, tarpaulins, barriers etc to render the existing building, other than the sections alerted, entirely dust and weather proof and properly protected to the satisfaction of the Architect and remove when directed
(ii)	Provide suitable shoring or strutting screen, scaffolds etc necessary to ensure the stability of the structure and all the works during the breaking down, alterations or building up of the works
(iii)	Allow for providing special care so as not to interfere unnecessarily with any services installations that may be met with
	<u>Generally</u>
(iv)	Allow for providing all boarding and coverings to protect the existing structure where necessary including protecting all floors, finishes, windows, doors, roofs, etc during first stage demolition works.
(v)	The Contractor must at his own expense make good in all trades to existing work (other than that required to be altered) which is damaged or disturbed during the alterations with all necessary new materials to match and generally as specified for new work and leave complete and perfect in every respect where existing stone boundary wall is to be preserved.
(vi)	Where only a portion of a building is required to be demolished, special care to be exercised to prevent damage to remaining portions. Any necessary making good in all trades due to such damage will be at the Contractor's own expense and prices must include, temporary supports, making good etc.
(vii)	The Contractor shall carry a thorough survey and examination of buildings or structures to be demolished
(viii)	The Contractor shall locate and mark the position of existing services affected by the demolition work
(ix)	Disconnect temporarily existing electrical installations and handover luminaries and equipment to others
(x)	Disconnect temporarily and remove existing telephone installation and handover equipment to others

	<p><u>Generally</u></p> <p>(i) The Contractor shall carry out a thorough survey of all apparent or buried existing services, divert of those services likely to interfere with construction works, provide and maintain connection/supply to other areas during construction works</p> <p>(ii) Disconnect, blank off and remove existing plumbing and waste installation</p> <p>(iii) Allow for inventory of all existing fittings, furniture, furnishings, fixtures etc including transporting and placing in temporary location</p> <p>(iv) Allow for remove from site remainder of all materials arising from demolitions not handed over to others or set aside for re-use as directed</p> <p>(v) Allow for protection of existing aerial poles with power and telephone lines feeding the existing blocks and other buildings in the vicinity</p> <p>(vi) Allow for preservation of all existing structures to be demolished at later stage all as per Architect's site plan</p> <p>Disconnect, blank off and remove existing electrical and mechanical installation and make safe for work to proceed</p> <p>Allow for inventory of all existing fittings, furniture, furnishings, fixtures etc including transporting and placing in temporary location as directed by Employer</p> <p>Allow to remove from site remainder of all materials arising from demolitions not handed over to others or set aside for re-use as directed</p> <p>Allow for preservation of all existing structures to be demolished at later stage all as per Architect's instruction</p>
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**Sanitary appliances and wares**

Clean all surfaces of urinals together with cisterns, flush pipes and all fittings using an appropriate cloth brush/mop using a germicidal detergent (diluted as necessary). Rinse with clear water to leave a clean surface and dry wipe. If necessary to comply with the definition of clean, the above work may be supplemented with the use of an approved mild abrasive

Clean the inside of the WC pans using a WC brush and germicidal detergent. Particular attention should be paid to the WC traps and flushing rims. Rinse with water to leave the pan in a clean condition. If necessary to comply with the definition of clean, the above works may be supplemented with the use of an approved mild abrasive cleaning cream or paste.

Clean the outside of the WC pans and the seats, cisterns and handles using appropriate cloth/mop, using germicidal detergent (diluted as necessary). Rinse off and give a dry wipe to leave a clean, dry surface. Particular attention must be given to the rear of the WC pan and the seat hinges.

Clean the surfaces and taps of wash basins including splash backs using appropriate cloths/brush using a germicidal detergent (diluted as necessary) using sufficient pressure to assist the cleaning. Rinse off, damp wipe to leave a clean surface. If the detergent is insufficient, then mildly abrasive cleansing cream or paste may be used.

Clean all mirrors using appropriate cleaning material.

Descale, clean and remove all deposits from internal and external parts of the fitment to include flushing rim, seat, seat lids, hinges, S and P traps, domical grating, sparge pipes, and cleaning of exterior of flushing tank.

The contractor should itemise and prepare an inventory list of their survey and submit to Project Consultant and Employer before proceeding with dismantling of sanitary appliances and wares and openings.

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>BILL NO. 2 - UPGRADING WORKS TO BLOCK C</b>				
	<b><u>SECTION 1 - DEMOLITION AND ALTERATION WORKS</u></b>				
	<b><u>Hack up existing waterproofing</u></b>				
	Break up and take up existing waterproofing to roof complete with backing screed include for removal of debris off site; include for making good structures and finishes disturbed, cleaning and preparing surfaces to receive new finishes				
<b>A</b>	Roof level, including upstand beams	m <sup>2</sup>	228		
	<b><u>Hack up existing floor finishes</u></b>				
	<u>Break up and take up existing finishes to floor complete with backing screed include for removal of debris off site; include for making good structures and finishes disturbed, cleaning and preparing surfaces to receive new finishes</u>				
<b>B</b>	Ground floor corridor	m <sup>2</sup>	198		
<b>C</b>	First floor corridor	m <sup>2</sup>	198		
	<b><u>Dismantle existing openings</u></b>				
	<u>Carefully dismantle and preserve on site the following glazed aluminium and metal openings complete with all ironmongeries; allow for making good to jambs and reveals of disturbed block / concrete surface with cement render</u>				
	<u>At ground floor:</u>				
<b>D</b>	Glazed metal door with frame, overall size 880 x 2,200 high, from 150 / 200mm thick block work	nr	4		
<b>E</b>	Glazed metal window with frame, overall size 2,660 x 1,000 high, from 150 / 200mm thick block work	nr	4		
<b>F</b>	Glazed metal window with frame, overall size 1,750 x 1,000 high, from 150 / 200mm thick block work	nr	4		
<b>G</b>	Glazed metal window with frame, overall size 2,660 x 600 high, from 150 / 200mm thick block work	nr	16		
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<p><b><u>Dismantle existing openings</u></b></p> <p><u>Carefully dismantle and preserve on site the following glazed aluminium and metal openings complete with all ironmongeries; allow for making good to jambs and reveals of disturbed block / concrete surface with cement render</u></p> <p><u>At first floor:</u></p> <p><b>A</b>      Glazed metal door with frame, overall size 880 x 2,200 high, from 150 / 200mm thick block work</p> <p><b>B</b>      Glazed metal window with frame, overall size 2,660 x 1,000 high, from 150 / 200mm thick block work</p> <p><b>C</b>      Glazed metal window with frame, overall size 1,750 x 1,000 high, from 150 / 200mm thick block work</p> <p><b>D</b>      Glazed metal window with frame, overall size 2,660 x 600 high, from 150 / 200mm thick block work</p> <p><b><u>Demolition in block work</u></b></p> <p><u>Carefully cut with grinder, demolish block work complete with attached tie columns, beams and tiling works to form opening as described; all debris to be carted away from site; allow for making good to new jambs and reveals of opening with cement render and emulsion paint</u></p> <p>Demolish block wall or part of, 200mm thick</p> <p><b>E</b>      First Floor</p> <p><b><u>Demolition in reinforced concrete structure</u></b></p> <p><u>Carefully take down and remove the following concrete structures complete with block wall, reinforced concrete tie columns, tie beams and floor bed; allow for disconnection of services attached; allow for grubbing up existing foundation, protection shoring, temporary support to existing work, make good to structures and finishes disturbed to match existing</u></p> <p><b>F</b>      Reinforced concrete staircase, overall size 6,000 long x 3,600mm wide x 6,500 high</p>	nr	4		
		nr	4		
		nr	4		
		nr	16		
		m <sup>3</sup>	26		
		nr	1		
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
A	<u>Handing over to Client</u> Allow for transporting of dismantled structures to a site to be located by Client; allow for loading, unloading and proper packing and protection of structures	Sum			
CARRIED TO COLLECTION					MUR



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<p><b>BILL NO. 2 - ALTERATION WORKS TO BLOCK C</b></p> <p><b><u>SECTION 1 - DEMOLITION AND ALTERATION WORKS</u></b></p> <p><b><u>COLLECTION</u></b></p> <p>Brought forward from Page 2:1:1</p> <p>" " " " 2:1:2</p> <p>" " " " 2:1:3</p>				<p>.....</p> <p>.....</p> <p>.....</p>
	<b>CARRIED TO SUMMARY BILL NO. 2</b>				<b>MUR</b>

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>BILL NO. 2 - UPGRADING WORKS TO BLOCK C</b>				
	<b>SECTION 2 - REPAIRS TO CRACKS</b>				
	<b>All as per drawing 16717-TD-3TP01</b>				
	<b><u>Repair works to hairline cracks to existing slab and beams - note 1</u></b>				
	<i><u>Repair to hairline cracks consisting of cleaning of surface with scraping tool, removing of dust and loose debris, opening up of crack and applying non-shrink cementitious concrete repair mortar achieving at least 15MPa at 28 days such as "Sika Pro-11FC® or Inject Nitrofill LV ®" repair mortar or equivalent. Allow for finishes to exposed faces with rendering/slurry and two coats of emulsion paint to match existing</u></i>				
A	Hairline crack not exceeding 2mm to soffit of slab (n.e 3m long in isolated places)	nr	10		
	<b><u>Repair works to damaged concrete slab - note 2</u></b>				
	<i><u>Repairs to damaged concrete slab consisting of removing of delaminated concrete to expose rusted reinforcement (15mm behind concrete) . Cleaning/wire brushing of exposed steel reinforcement. Treat bars with corrosion inhibitor coating such as "Sika Armatec-110-Epocem" or equivalent. Prepare and apply non-shrink cementitious concrete repair mortar achieving at least 15MPa at 28 days such as "Durarep FR®" repair mortar or equivalent. Allow for finishes to exposed faces with rendering/slurry and two coats of emulsion paint to match existing finishes. Allow for supports at every 1.0m c/c properly fixed</u></i>				
B	Slabs, overall size of spalled concrete not exceeding 1,0m x 1,0m	nr	10		
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<p><b><u>Repair to expansion joints - note 3</u></b></p> <p><u>Repair to expansion joints consisting of removal of damaged/deteriorated sealant and compressible filler. Supply and fix new compressible filler, raking out polystyrene joint filler to form groove 25mm x 20mm deep and fill up with approved polysulphide mastic sealant such as "Sika Polysulphide PG or Thioflex 600 ®" or equivalent.</u></p>				
A	Expansion joint consisting of filler and sealant to columns not exceeding 500mm wide	m	14		
B	Expansion joint consisting of filler and sealant to beams and slab not exceeding 600mm deep	m	9		
	<p><b><u>Repair works to damaged concrete columns - note 4</u></b></p> <p><u>Repairs to spalled concrete members consisting of removing of loose concrete to expose rusted concrete. Cleaning/wire brushing of exposed steel reinforcement. Treat bars with corrosion inhibitor coating such as "Epidermix 344" or equivalent. Prepare and apply non-shrink cementitious concrete repair mortar achieving at least 15MPa at 28 days such as "Sika Armatex-110-Epocem®" repair mortar or equivalent. Pouring of new concrete grade 30 to fill up cracks. Rate to include for inclined formwork, additional steel reinforcement where required and finishes to exposed faces with rendering/slurry and two coats of emulsion paint to match existing finishes. Allow for supports at every 1.0m c/c properly fixed and secured prior to carrying of works and supports to be removed 7 days after repairs.</u></p>				
C	Columns (n.e 2m in isolated places)	nr	10		
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<p><b><u>Repair works to hairline cracks to walls and columns - note 5</u></b></p> <p><u>Repair to hairline cracks consisting of cleaning of surface with scraping tool, removing of dust and loose debris, opening up of crack and applying non-shrink cementitious concrete repair mortar achieving at least 15MPa at 28 days such as "Sika Pro-11FC® or Inject Nitrofill LV ®" repair mortar or equivalent. Allow for finishes to exposed faces with rendering/slurry and two coats of emulsion paint to match existing</u></p>				
A	Hairline crack not exceeding 2mm to columns (n.e 3m long in isolated places)	nr	10		
B	Hairline crack not exceeding 2mm to internal and external walls (n.e 3m long in isolated places)	nr	10		
	<p><b><u>Repair works to roof as per drawing 16717-TD-3TP02</u></b></p> <p><u>Repair to existing roof slab consists of propping soffit of slab, removing existing layer of waterproofing and screed to reach structural concrete and opening of cracks to form 5mm x 5mm grooves, cleaning and washing roof, allow to dry, dowelling in concrete roof, provide and fix Y08 Ubars with "Epidermix 372" or equivalent at 400mm c/c, supply and apply "Epidermix 344" or equivalent approved to surface of concrete roof to structural engineer's approval, and casting of reinforced concrete grade 30 of average thickness 100mm</u></p>				
C	Existing roof slab	m²	218		
CARRIED TO COLLECTION MUR					

[illegible]

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>SECTION 3 - WATERPROOFING AND ROOF DRAINAGE</u></b>  <b>Roof screed</b>  <u>Waterproof screed in cement mortar (1:3) mixed with a synthetic rubber latex waterproofing compound such as "Pekay® Jaycocrete P7J Super" or approved equivalent including one layer of non woven polyester cloth laid strictly in accordance with manufacturer's specifications laid on concrete surfaces</u>				
A	40mm thick average screed laid to slope	m <sup>2</sup>	228		
	<b>Liquid roof waterproofing treatment</b>  <u>Polyurethane-based liquid waterproofing treatment "Sikalastic® 614" or approved equivalent complete with floor primers, reinforcement mat and finishing layer as per manufacturer's specifications. Works to be done by specialist offering a decennial warranty on material and labour, with intervention within 12 hours when defect is reported. Contractor to submit for approval sample, manufacturer's specifications and warranty certificate format prior to execution of the works. Contractor to obtain written approval of specialist regarding fitness of surfaces prior to start of works. Contractor to allow for water test by flooding surface for 36 hours at end of waterproofing works. All works strictly to manufacturer's instructions and to the approval of the Architect. Colour to Architect's approval.</u>				
B	On screeded surface of flat roof slab	m <sup>2</sup>	228		
C	On vertical surface of upstand beam	m <sup>2</sup>	30		
	<b>Reinstate existing rainwater outlets</b>				
D	Survey existing rainwater drainage system including roof outlets and PVC downpipes; allow for cleaning, declogging and repairs to damaged brackets and accessories	sum			
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>ROOF DRAINAGE</b>  <u>uPVC rainwater piping system to BS EN 12200-1 with solvent welded joints; allow for all fittings and fixings as per manufacturer's specifications and 3 coats emulsion paint (colour to Architect's approval) to all exposed pipe work and fittings</u>				
A	100mm diameter uPVC surface rainwater downpipes of approved colour fixed to external façade complete with bends and shoe	m	30		
B	Extra for bend 90°	nr	5		
C	Extra for PVC shoe	nr	5		
D	"Nichol" PVC outlet type Fulbora or equivalent laid horizontally with dome grating	nr	5		
	<b>Sundries</b>  <u>Construct the following reinforced concrete items; include for concrete, nominal reinforcement, smooth formwork, dowelling, grouting, cement and sand render and emulsion paint to all exposed faces as desired</u>				
E	Gargoyle in reinforced concrete, overall size 350 x 300 x 400mm high, 100mm thick, including forming holes in kicker / block wall and to bottom of gargoyle for 110mm diameter rainwater pipe; allow for mastic sealant around rainwater pipe (rainwater pipe m/s)	nr	5		
F	Catchpit in reinforced concrete, overall internal size 500 x 500 x depth n.e 1m in 100 mm thick wall and core filled with aggregate 0-20mm	nr	5		
	<b>Coring in slab (Provisional)</b>  <u>Allow for coring of structural members not exceeding 250mm thick for services sleeves of various diameters; include for sealing void with concrete or cement grout and making good to structures and finishes disturbed</u>				
G	Diameter n.e 150mm (roof to receive new rainwater pipes)	nr	4		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<p><b><u>BILL NO. 2 - UPGRADING WORKS TO BLOCK C</u></b></p> <p><b><u>SECTION 3 - WATERPROOFING AND ROOF DRAINAGE</u></b></p> <p><b><u>COLLECTION</u></b></p> <p>Brought forward from Page 2:3:1 .....</p> <p>Brought forward from Page 2:3:2 .....</p>				
	<b>CARRIED TO SUMMARY OF BILL No. 2</b>	<b>MUR</b>			



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>SECTION 4 - FLOOR FINISHES</u></b>				
	<b>Floor screed</b>				
	<u>Cement and sand (1:3) screed as specified on concrete surfaces including preparation of surfaces and application of cement based slurry comprising adhesive prior to screeding. Rate to include forming arrises and fair edges.</u>				
	25mm thick (average) to floor, steps and risers to receive finishes as per Architect's schedule at:				
A	Ground floor	m <sup>2</sup>	198		
B	First floor	m <sup>2</sup>	198		
	<b>Heavy duty anti-skid homogeneous ceramic floor tiles</b>				
	<u>Supply and lay heavy-duty anti-skid homogeneous ceramic floor tiles 300 x 300 x 10mm thick with anti-skid resistance rating of R11; allow for Prime Cost rate for supply of tiles Rs 1,000/- per m<sup>2</sup>. Contractor to produce samples and quote from 3 suppliers.</u>				
C	Ground floor	m <sup>2</sup>	198		
D	First floor	m <sup>2</sup>	198		
	<b>Ceramic tile skirting</b>				
	<u>Supply and lay 150 mm high ceramic tile skirting matching floor tiles, allow for Prime Cost rate for supply of tiles Rs 1,000/- per m<sup>2</sup>. Contractor to produce samples and quote from 3 suppliers.</u>				
E	Ground floor	m	109		
F	First floor	m	109		
	<b>CARRIED TO SUMMARY OF BILL No. 2</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>SECTION 5 - PAINT WORKS</u></b>				
	<b>Paint internally - Emulsion paint</b> <u>Prepare surface and apply one coat of undercoat (clear emulsion binder) and two coats approved acrylic emulsion paint applied strictly in accordance with manufacturer's specifications, colours to Architect's approval</u>				
	To walls, returns, reveals, attached columns, beams and the like internally at:				
<b>A</b>	Ground floor	m <sup>2</sup>	273		
<b>B</b>	First floor	m <sup>2</sup>	273		
	Soffit of ceiling at:				
<b>C</b>	First floor - level +3,000	m <sup>2</sup>	218		
<b>D</b>	Roof - level +6,000	m <sup>2</sup>	218		
	<b>Paint internally - Anti-fungus paint</b> <u>Prepare surface and apply one coat of undercoat (clear emulsion binder) and three coats of approved acrylic paint with a high dosage blend of fungicides and bactericides applied strictly in accordance with manufacturer's specifications; colours to Architect's approval on the following rendered surfaces</u>				
	To walls, returns, reveals, attached columns and the like to a height of 1,1m internally at:				
<b>E</b>	Ground floor	m <sup>2</sup>	109		
<b>F</b>	First floor	m <sup>2</sup>	109		
	<b>Paint externally - Anti-fungus paint</b> <u>Prepare surface and apply one coat of undercoat (clear emulsion binder) and three coats of approved acrylic paint with a high dosage blend of fungicides and bactericides applied strictly in accordance with manufacturer's specifications; colours to Architect's approval on the following rendered surfaces</u>				
	To walls, returns, reveals, attached columns, beams and the like externally at:				
<b>G</b>	Ground floor	m <sup>2</sup>	238		
<b>H</b>	First floor	m <sup>2</sup>	238		
	<b>CARRIED TO SUMMARY OF BILL No. 2</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>SECTION 6 - EXTERNAL OPENINGS</u></b>				
	<b>Aluminium Window</b>				
	<u>Supply and fix in position the following coloured powder coated aluminium openings including ironmongeries as per Architect's schedule. Glazing shall be as described.</u>				
	At ground floor:				
<b>A</b>	Aluminium window ref. W1 comprising jalousie louvers; overall size 2,660 x 1,000 high; in laminated clear glass or tempered glass, minimum 6mm thick	nr	4		
<b>B</b>	Aluminium window ref. W2 comprising of jalousie louvers; overall size 1,200 x 1,000 high; in laminated clear glass or tempered glass, minimum 6mm thick	nr	4		
<b>C</b>	Aluminium window ref. TV1 comprising of jalousie louvers; overall size 2,660 x 450 high; in laminated clear glass, minimum 6mm thick	nr	16		
	At first floor:				
<b>D</b>	Aluminium window ref. W1 comprising jalousie louvers; overall size 2,660 x 1,000 high; in laminated clear glass or tempered glass, minimum 6mm thick	nr	4		
<b>E</b>	Aluminium window ref. W2 comprising of jalousie louvers; overall size 1,200 x 1,000 high; in laminated clear glass or tempered glass, minimum 6mm thick	nr	4		
<b>F</b>	Aluminium window ref. TV1 comprising of jalousie louvers; overall size 2,660 x 450 high; in laminated clear glass, minimum 6mm thick	nr	16		
	<b>Aluminium Door</b>				
	<u>Supply and fix in position the following coloured powder coated aluminium openings including ironmongeries as per Architect's schedule. Glazing shall be as described.</u>				
	Aluminium door ref. D1; overall size 880 x 2,200 high comprising of jalousie louvers and fix panel; in laminated clear float glass, minimum 6mm thick				
<b>G</b>	At ground floor:	nr	4		
<b>H</b>	At first floor:	nr	4		
	<b>CARRIED TO SUMMARY OF BILL NO. 2</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>SECTION 7 - SUNDRIES</u></b>  <b>Contractor design construction</b>  <u>Construct the following reinforced concrete items: include for concrete, nominal reinforcement, smooth formwork, dowelling, grouting, cement and sand render and emulsion paint to all exposed faces as desired</u>				
A	150mm high parapet block with coping  <b>Stainless Steel Grab Rail</b>  <u>Fabricate, supply and fix grab rail comprising 75mm diameter x 3.2mm thick stainless steel tubular railing welded 12mm solid horizontal rods at 1m centres and welded to 6mm thick base plate; the whole structure rawl bolted to concrete elements to Structural Engineer's approval, include for all fittings and fixing accessories; all site welds shall be ground clean, smooth and treated. Rate to include for closure piece to open ends. All as per Architect's drawings and approval</u>	m	25		
B	Horizontal to parapet wall at first floor	m	25		
	<b>CARRIED TO SUMMARY OF BILL NO. 2</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<b>SECTION 8 - EMERGENCY STAIRCASE</b>				<b>MUR CS</b>
<b>1.1</b>	<b><u>EARTHWORKS AND EXCAVATIONS</u></b> <b><u>(All Provisional)</u></b>				
<b>A</b>	Excavate to form pit for column bases, maximum depth not exceeding 2.0m deep and deposit in temporary spoil heaps, backfilling around foundations and carting away surplus from site.	m <sup>3</sup>	4		
<b>B</b>	Excavate to form trenches for stripfooting, maximum depth not exceeding 2.0m and deposit in temporary spoil heaps, backfilling around foundations and carting away surplus from site.	m <sup>3</sup>	4		
<b>1.2</b>	<b><u>FOUNDATION - (All Provisional)</u></b>				
	<b>Surface treatment</b>				
	<u>Levelling and compacting bottom of excavations to receive blinding to:</u>				
<b>C</b>	Column bases	m <sup>2</sup>	4		
<b>D</b>	Stripfooting	m <sup>2</sup>	4		
	<b>Concrete works</b>				
	<u>Concrete grade 15 with minimum crushing strength of 15N/mm<sup>2</sup> at 28 days.</u>				
<b>E</b>	Column bases	m <sup>2</sup>	4		
<b>F</b>	Stripfooting	m <sup>2</sup>	4		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
	<b>Concrete Works</b>				
	<u>Reinforced concrete grade 25 with minimum crushing strength of 25N/mm<sup>2</sup> at 28 days.</u>				
A	300mm thick column bases	m <sup>3</sup>	2		
B	Stripfooting	m <sup>3</sup>	3		
C	Columns - 0,20m <sup>3</sup>	item	1		
D	Plinth beam - 0,20m <sup>3</sup>	item	1		
	<b>Formwork</b>				
	<u>Formwork in Class U2 finish (sawn formwork), strutting at / from any level and including rebates or groove formers, as described to:</u>				
E	Sides of columns	m <sup>2</sup>	4		
F	Sides of plinth beams	m <sup>2</sup>	3		
	<b><u>Reinforcement ( All Provisional )</u></b>				
	<u>Round deformed high tensile rod reinforcement to MS 10 to concrete members generally, cut to length, bent and hooked. Rate to include for steel chairs, tying wire, spacer, wastage etc.</u>				
G	High Tensile Steel - Rods of various diameters	kg	500		
	<u>Hollow concrete blockwalling to BS 6073 type A laid with cement and sand mortar (1:4) mixed with an approved mortar plasticiser. Rate for blockwork shall include for all necessary wall ties, cutting and wastage</u>				
H	150mm thick blockwall	m <sup>2</sup>	18		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
A	<p><b>Finishes to Exposed Faces</b></p> <p><b><u>Rendering</u></b></p> <p><u>Cement and sand (1:3) render mixed with an approved plasticiser laid on concrete or block wall surfaces. Rate to include for arrises, fair edges, returns and the like</u></p> <p>15mm th render to sides of columns, strap beams and the like.</p> <p><b><u>Painting</u></b></p> <p><u>Prepare and apply one coat of undercoat and three coats of anti-fungus based exterior paint strictly to suppliers specifications and to Architect's approval. Rate to include for making good and preparation of surfaces as specified.</u></p>	m <sup>2</sup>	5		
B	Sides of sides of columns, strap beams and the like	m <sup>2</sup>	5		
<b>CARRIED TO COLLECTION</b>				<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
1.3	<b>FLOOR BED</b>				
	<b>Surface treatment</b>				
A	Comprehensive anti-termite chemical soil treatment to ground surfaces below floor slab and to perimeter of building. The works shall be done by an approved specialist and latter shall provide a decennial warranty for the treatment works. Detailed methodology of proposed treatment and products to be approved by Architect prior to start of works. (Footprint area approx. 17m <sup>2</sup> and perimeter 18m)	Sum			
B	Level and compact subgrade to 95% B.S. heavy with 2.5 ton vibrating roller at platform level	m <sup>2</sup>	17		
C	Approved hardcore filling in sound hardstone maximum size not exceeding 100mm graded down to 20mm to make up level under floor laid and compacted in layer not exceeding 450mm deep with 750 kg vibrating roller	m <sup>3</sup>	5		
D	Blind surfaces of hardcore filling with 100mm of crusher run, watered compacted to 98% BS heavy	m <sup>2</sup>	17		
E	500g/m <sup>2</sup> polythene sheeting (preferably ant termite sheeting) in single layer as damp proof membrane laid over crusher run. Allow for overlap and tapping at joints (measured net).	m <sup>2</sup>	17		
	<b>Concrete works</b>				
	<u>Reinforced concrete grade 25 with minimum crushing strength of 25N/mm<sup>2</sup> at 28 days to:</u>				
F	125mm thick floor bed	m <sup>3</sup>	2		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	



<i>ITEM</i>	<i>DESCRIPTION</i>	<i>UNIT</i>	<i>QTY</i>	<i>RATE</i>	<i>AMOUNT</i>
A	<b>Reinforcement (All provisional)</b>  <u>Mesh reinforcement complying with BS 4483 including all necessary chairs waste cutting overlapping and tying with stout gauge mild steel tying wire (measured net).</u>  Mesh reinforcement ref. A142 (2.22 kg/m²)	m <sup>2</sup>	17		MUR      CS
<b>CARRIED TO COLLECTION</b>				<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
1.4	<b><u>STAIR STRUCTURE</u></b>				
	<b><u>Concrete Works</u></b>				
	<u>Reinforced concrete grade 30 with minimum crushing strength of 30 N/mm<sup>2</sup> at 28 days</u>				
A	In isolated columns and tie columns	m <sup>3</sup>	3		
B	Tie beams and coping	m <sup>3</sup>	2		
C	In staircase waist, landings, beams, steps and the like	m <sup>3</sup>	6		
D	150mm thick slab and upstand beams	m <sup>3</sup>	4		
	<b><u>Formwork</u></b>				
	<u>Formwork in Class 2 finish (sawn formwork), strutting at / from any level and including rebates or groove formers, as described to:</u>				
E	Sides of isolated columns and tie columns	m <sup>2</sup>	16		
F	Tie beams and coping	m <sup>2</sup>	17		
G	Soffit of flight	m <sup>2</sup>	9		
H	Soffit of landing	m <sup>2</sup>	5		
J	Edges of landing	m	5		
K	Edges of flight and spandrils n.e 350mm	m	12		
L	Sides of risers to staircase	m	26		
M	Soffit of slab	m <sup>2</sup>	19		
N	Sides of upstand beams	m <sup>2</sup>	13		
P	Edges of slab not exceeding 200mm high	m	21		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
	<b><u>High Tensile Steel</u></b>				
	<u>Mild steel rod reinforcement to MS 10 to concrete members generally cut and bent to shapes and profiles. Rate to include for steel chairs, tying wire, spacer, waste etc.</u>				
A	High Tensile Steel	kg	2100		
	<b><u>MASONRY</u></b>				
	<u>Hollow concrete blockwalling to BS 6073 type A laid with cement and sand mortar (1:4) mixed with an approved mortar plasticiser. Rate for blockwork shall include for all necessary wall ties, cutting and wastage</u>				
	100mm thick blockwall				
B	Ground Floor	m <sup>2</sup>	8		
	150mm thick blockwall				
C	Ground Floor	m <sup>2</sup>	34		
D	Roof Level	m <sup>2</sup>	12		
	<b><u>SUNDRIES</u></b>				
	<u>Construct the following reinforced concrete items: include for concrete, reinforcement, formwork, dowelling, grouting, render and paint to all exposed faces</u>				
E	100 x 100 mm coping at ground floor	m	8		
F	250 x 100 mm coping at ground floor	m	10		
G	Projected L-shaped coping, 200 x 400	m	18		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
	<b><u>STAIR FINISHES</u></b>				
	<b><u>Render to Staircase</u></b>				
	<u>Cement and sand (1:3) render 12mm thick mixed with an approved plasticiser on concrete surfaces. Rate to include for sponge or steel trowel finish, arrises, corners, junctions and grooves.</u>				
<b>A</b>	Sides of isolated columns and tie columns	m <sup>2</sup>	16		
<b>B</b>	Tie beams and coping	m <sup>2</sup>	17		
<b>C</b>	Soffit of flight	m <sup>2</sup>	9		
<b>D</b>	Soffit of landing	m <sup>2</sup>	5		
<b>E</b>	Edges of landing	m	5		
<b>F</b>	Edges of flight and spandrils n.e 350mm	m	12		
<b>G</b>	Sides of risers to staircase	m	26		
<b>H</b>	Soffit of slab	m <sup>2</sup>	19		
<b>J</b>	Sides of upstand beams	m <sup>2</sup>	13		
<b>K</b>	Edges of slab not exceeding 200mm high	m	21		
<b>L</b>	Blockwalling Ground Floor	m <sup>2</sup>	68		
<b>M</b>	First Floor	m <sup>2</sup>	24		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
	<b><u>Painting to Staircase</u></b>				
	<u>Prepare and apply one coat of undercoat and two coats approved emulsion paint strictly in accordance with manufacturer's specifications colour to Architect's approval on the following rendered surfaces.</u>				
A	Sides of isolated columns and tie columns	m <sup>2</sup>	16		
B	Tie beams and coping	m <sup>2</sup>	17		
C	Soffit of flight	m <sup>2</sup>	9		
D	Soffit of landing	m <sup>2</sup>	5		
E	Edges of landing	m	5		
F	Edges of flight and spandrils n.e 350mm	m	12		
G	Sides of risers to staircase	m	26		
H	Soffit of slab	m <sup>2</sup>	19		
J	Sides of upstand beams	m <sup>2</sup>	13		
K	Edges of slab not exceeding 200mm high	m	21		
	Blockwalling				
L	Ground Floor	m <sup>2</sup>	68		
M	First Floor	m <sup>2</sup>	24		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
	<b><u>Screed to Staircase</u></b>				
	<u>25mm thick cement and sand (1:3) mixed with an approved plasticiser laid on concrete. Rate to include for preparation of surfaces.</u>				
A	Treads and risers	m <sup>2</sup>	14		
B	On landing	m <sup>2</sup>	5		
	<b><u>Heavy duty anti-skid homogeneous ceramic floor tiles</u></b>				
	<u>Supply and lay heavy-duty anti-skid homogeneous ceramic floor tiles 300 x 300 x 10mm thick with anti-skid resistance rating of R11; allow for Prime Cost rate for supply of tiles Rs 1,000/- per m<sup>2</sup>. Contractor to produce samples and quote from 3 suppliers.</u>				
C	To landing	m <sup>2</sup>	5		
D	To treads with grooves and bull nosing	m	31		
E	To risers not exceeding 165mm high	m	33		
	<b><u>Ceramic tile skirting</u></b>				
	<u>Supply and lay 150 mm high ceramic tile skirting matching floor tiles, allow for Prime Cost rate for supply of tiles Rs 1,000/- per m<sup>2</sup>. Contractor to produce samples and quote from 3 suppliers.</u>				
F	150mm high skirting	m	19		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
	<b><u>ROOF COVERINGS</u></b>				
	<b><u>Roof Screed</u></b>				
	<i>Cement and sand (1:3) mixed with an approved waterproofing compound laid on concrete slab to falls and cross falls including dishing towards rainwater outlets. Include for 50 x 50 x 2mm thick galvanised mesh type chicken wire mesh or equivalent approved; allow for propping existing slab prior for start to end of works</i>				
A	40mm thick average screed to slope to roof	m <sup>2</sup>	20		
B	25mm thick screed to side and top of upstands	m <sup>2</sup>	10		
	<b><u>Roof waterproofing</u></b>				
	<i>Polyurethane-based liquid waterproofing treatment "Sikalastic® 614" or approved equivalent complete with floor primers, reinforcement mat and finishing layer as per manufacturer's specifications. Works to be done by specialist offering a decennial warranty on material and labour, with intervention within 12 hours when defect is reported. Contractor to submit for approval sample, manufacturer's specifications and warranty certificate format prior to execution of the works. Contractor to obtain written approval of specialist regarding fitness of surfaces prior to start of works. Contractor to allow for water test by flooding surface for 36 hours at end of waterproofing works. All works strictly to manufacturer's instructions and to the approval of the Architect. Colour to Architect's approval.</i>				
C	To roof	m <sup>2</sup>	20		
D	To side and top of upstands	m <sup>2</sup>	10		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<b><u>ROOF DRAINAGE</u></b>  <i>Rainwater installations; PVC pipes and fittings to BS 4576: Part 1 as described with ringseal and solvent welded joints.</i>  <u>Rainwater pipe works cast into concrete or fixed on surfaces with and including standard brackets, plugged to concrete and blockwall.</u>				MUR CS
A	110mm diameter pipe fixed to walls with PVC clips as specified	m	6		
B	Extra over for bend 90°	nr	1		
C	Extra over for PVC shoe (top and bottom)	nr	1		
D	"Nichol" PVC outlet type Fulbora or equivalent laid horizontally with dome grating	nr	1		
E	Concrete gargoyle overall size 450 x 450 x 300 including forming holes in kicker / blockwall and bottom of gargoyle for 110 mm diameter rainwater pipe; allow for sealing around rainwater pipe (rainwater pipe m/s)	nr	1		
F	Extra over for spout in 63mm dia pipe not exceeding 500mm long	nr	2		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MUR CS
	<p><b><u>Wood Composite Panels</u></b></p> <p><u>Design, fabricate, supply and fix plastic wood composite panels made up of plastic wood composite slats fixed to SHS 50 x 50 x 2.5mm thick GMS metal structure hot dipped galvanised after manufacture. Screen is to be fixed within concrete structure and to withstand minimum cyclonic wind of 280 km/hr. Rate to include fixing and fitting accessories, end or edge closure pieces and the like. All as specified and as shown on Architect's drawings and approval</u></p>				
A	<p>100 mm wide x minimum 15mm thick plastic wood composite slats fixed to SHS galvanised metal structure using stainless steel screws with plastic cover; gaps between slats not exceeding 50mm</p> <p><b><u>Connections</u></b></p> <p><u>Allow for Contractor's design for all additional fittings, plates, closing piece, straps, cleats, shoes, brackets, stiffeners, bolts and nuts to BS 4190, grade 8.8, all to be in hot dipped galvanised to BS 729 (minimum coating 600 g/m<sup>2</sup>) after fabrication and 8mm thick continuous welding as described in the Engineer's drawings and specifications, inclusive of anchoring in concrete columns. Include for treatment of welding and drilling sections.</u></p>	m <sup>2</sup>	8		
B	<p>Overall size 2,950 mm x 2,700 mm high</p> <p><b><u>Finish to metal structure</u></b></p> <p><u>Prepare surface and apply one coat of galvanised iron cleaner, one coat of etch primer, one coat of universal undercoat and two coats of hard gloss enamel of approved colour, all spray painted to the complete metal structure.</u></p>	nr	1		
C	Metal surfaces	sum	1		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
	<p><b><u>Stainless Steel Grab Rails</u></b></p> <p><u>Fabricate, supply and fix composite handrail comprising 50mm diameter x 2mm thick stainless steel tubular grabrails in SS 316 fused / welded to brackets in 10mm diameter stainless solid steel rods, all fused / welded to Rate to include for closure piece to open ends, all builder's works in connection, epoxy grouting and finishes to galvanised metal members. All as per Architect's drawings and approval. All fixation on structural concrete members to be done prior to Structural Engineer's approval.</u></p>				MUR CS
A	150mm high stainless steel grab rails	m	15		
	CARRIED TO COLLECTION			MUR	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT
					MURCS
	SECTION 8 - EMERGENCY STAIRCASE				
	COLLECTION				
	Brought forward from Page 2:8:1				.....
	Brought forward from Page 2:8:2				.....
	Brought forward from Page 2:8:3				.....
	Brought forward from Page 2:8:4				.....
	Brought forward from Page 2:8:5				.....
	Brought forward from Page 2:8:6				.....
	Brought forward from Page 2:8:7				.....
	Brought forward from Page 2:8:8				.....
	Brought forward from Page 2:8:9				.....
	Brought forward from Page 2:8:10				.....
	Brought forward from Page 2:8:11				.....
	Brought forward from Page 2:8:12				.....
	Brought forward from Page 2:8:13				.....
	Brought forward from Page 2:8:14				.....
	CARRIED TO SUMMARY OF BILL NO 2			MUR	

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>SECTION 9 - BUILDERS WORKS IN CONNECTION WITH SERVICES</u></b>				
	<u>Work incidental to electrical and / or fire fighting installation; concealed wired</u>				
<b>A</b>	Co-ordination with installations and marking and setting out positions of all work	Item			
<b>B</b>	Cutting or forming all holes, mortices, chases or the like and making good finishing	Item			
<b>C</b>	Building in or cutting and pinning brackets or the like and making good finishing	Item			
<b>D</b>	Protective and decorative painting	Item			
	<u>Work incidental to sanitary equipments, soil and waste, hot and cold water installations; all concealed fixings</u>				
<b>E</b>	Co-ordination with installations and marking and setting out positions of all work	Item			
<b>F</b>	Cutting or forming all holes, mortices, chases or the like and making good finishing	Item			
<b>G</b>	Building in or cutting and pinning brackets or the like and making good finishing	Item			
<b>H</b>	Protective and decorative painting	Item			
	<u>Work incidental to air conditioning, ventilation and / or telephone installation</u>				
<b>J</b>	Co-ordination with installations and marking and setting out positions of all work	Item			
<b>K</b>	Cutting or forming all holes, mortices, chases or the like and making good finishing	Item			
<b>L</b>	Building in or cutting and pinning brackets or the like and making good finishing	Item			
<b>M</b>	Protective and decorative painting	Item			
	<b>CARRIED TO SUMMARY OF BILL NO. 2</b>				

SECTION	DESCRIPTION	PAGE REF	AMOUNT/MUR
	<b><u>BILL NO. 2 - UPGRADING WORKS TO BLOCK C</u></b>		
	<b><u>SUMMARY</u></b>		
1	DEMOLITION AND ALTERATION WORKS	2:1:4	.....
2	REPAIRS TO CRACKS	2:2:4	.....
3	WATERPROOFING AND ROOF DRAINAGE	2:3:3	.....
4	FLOOR FINISHES	2:4:1	.....
5	PAINT WORKS	2:5:1	.....
6	EXTERNAL OPENINGS	2:6:1	.....
7	SUNDRIES	2:7:1	.....
8	EMERGENCY STAIRCASE	2:8:15	.....
9	BUILDERS WORKS IN CONNECTION WITH SERVICES	2:9:1	.....
<b>TOTAL CARRIED TO MAIN SUMMARY</b>		<b>MUR</b>	

# BILL NO. 3

*UPGRADING OF EXISTING TOILET*

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>BILL NO. 3 - EXISTING TOILET BLOCK</b>				
	<b><u>SECTION 1 - DEMOLITION</u></b>				
	<b><u>Demolition in block work</u></b>				
	<i>Carefully cut with grinder, demolish block work complete with attached tie columns, beams and tiling works to form opening as described; all debris to be carted away from site; allow for making good to new jambs and reveals of opening with cement render and emulsion paint</i>				
A	Demolish block wall or part of, 200mm thick	m <sup>2</sup>	41		
B	Demolish block wall or part of, 100mm thick	m <sup>2</sup>	15		
	<b><u>Demolition in concrete worktop</u></b>				
	<i>Carefully cut with grinder, concrete members complete with finishes as described; all debris to be carted away from site; allow for making good to new jambs and reveals of opening with cement render and emulsion paint</i>				
C	Concrete vanity top, 600mm wide	m	8		
	<b><u>Hack up existing floor finishes</u></b>				
	<i>Break up and take up existing finishes to floor complete with backing screed include for removal of debris off site; include for making good structures and finishes disturbed, cleaning and preparing surfaces to receive new finishes</i>				
D	Ceramic floor tiles	m <sup>2</sup>	71		
	<b><u>Hack up existing wall finishes</u></b>				
	<i>Break up and take up existing finishes to wall complete with backing adhesive include for removal of debris off site; include for making good structures and finishes disturbed, cleaning and preparing surfaces to receive new finishes</i>				
E	Ceramic wall tiles	m <sup>2</sup>	55		
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>Dismantle existing openings</u></b>  <i>Carefully dismantle and hand over to Client the following glazed aluminium and metal openings complete with all ironmongeries; allow for making good to jambs and reveals of disturbed block / concrete surface with cement render and emulsion paint</i>				
A	Glazed aluminium / metal door with frame, overall size 1,000 x 2,100 high, from 150 / 200mm thick block work	nr	18		
B	Glazed aluminium / metal window with frame, overall size 600 x 600 high, from 150 / 200mm thick block work	nr	14		
	<b><u>Dismantle public health installations</u></b>  <i>Carefully disconnect, remove and handover to Client's representatives the following sanitary appliances and accessories complete with all drainage installations - soil and waste; allow for making an inventory list of appliances with Client's representative</i>				
C	W.C sets	nr	10		
D	Wash Hand Bassin including taps	nr	10		
	<b><u>Handing over to Client</u></b>				
E	Allow for transporting of dismantled structures to a site to be located by Client; allow for loading, unloading and proper packing and protection of structures	Sum			
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<p><b>BILL NO. 3 - EXISTING TOILET BLOCK</b></p> <p><b>SECTION 1 - DEMOLITION</b></p> <p><b><u>COLLECTION</u></b></p> <p>Brought forward from Page 3:1:1</p> <p>" " " " 3:1:2</p>				<p>.....</p> <p>.....</p>
CARRIED TO SUMMARY BILL NO. 3		MUR			

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ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>BILL NO. 3 - EXISTING TOILET BLOCK</b>				
	<b><u>SECTION 3 - OPENINGS</u></b>				
	<b>Aluminium Windows</b>				
	<u>Supply and fix in position the following coloured powder coated aluminium openings including ironmongeries as per Architect's schedule. Glazing shall be as described.</u>				
<b>A</b>	Aluminium windows ref. LV1; overall size 1,200 x 600 high; in aluminium louvers	nr	14		
<b>B</b>	Aluminium windows ref. LV2; overall size 600 x 600 high; in aluminium louvers	nr	12		
<b>C</b>	Aluminium windows ref. LV3; overall size 600 x 600 high; in aluminium louvers	nr	2		
<b>D</b>	Aluminium windows ref. TV1; overall size 1,800 x 600 high; in aluminium louvers	nr	4		
	<b>Aluminium Doors</b>				
	<u>Supply and fix in position the following coloured powder coated aluminium openings including ironmongeries as per Architect's schedule. Glazing shall be as described.</u>				
<b>E</b>	Aluminium door ref. D1; overall size 900 x 2,100 high; in aluminium louvers	nr	6		
<b>F</b>	Aluminium door ref. D2; overall size 800 x 1,900 high; in aluminium solid panels	nr	18		
<b>G</b>	Aluminium duct door ref. DC1; overall size 700 x 1,900 high; in aluminium solid panels	nr	2		
	<b>Special Ironmongeries</b>				
<b>H</b>	Door closer, heavy-duty type, with rack and pinion projecting arm including parallel arm bracket, fixed to door as per manufacturer's specifications	nr	6		
<b>J</b>	Indicator bolt lock set, such as "Union® IB-8094" or approved equivalent, satin-chrome finish, fixed to door as per manufacturer's specifications	nr	18		
	<b>CARRIED TO SUMMARY BILL NO. 3</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>BILL NO. 3 - EXISTING TOILET BLOCK</b>				
	<b><u>SECTION 4 - FINISHES</u></b>				
	<b>INTERNAL WALL FINISHES</b>				
	<b>Render internally</b>				
	<u>Cement and sand (1:3) render mixed with an approved cement plasticiser laid on concrete and block wall surfaces with a smooth sponge finish</u>				
A	15mm thick to walls, returns, reveals, columns, beams and the like internally	m <sup>2</sup>	143		
	<b>Backing coat to receive wall tiles</b>				
	<u>Cement and sand (1:4) mixed with an approved plasticiser to block wall and concrete surfaces with trowelled finish to receive wall tiles as per Architect's details and schedules.</u>				
B	15mm thick to walls, returns, reveals, columns, beams and the like internally	m <sup>2</sup>	142		
	<b>Ceramic wall tiles</b>				
	<u>Supply and lay 600 x 300 x 10mm thick homogeneous ceramic wall tiles with an approved cement based adhesive. Allow for the Prime Cost rate for supply of tiles Rs 1,000/- per m<sup>2</sup>. Contractor to produce samples and quote from 3 suppliers.</u>				
C	Generally - 2.1m high	m <sup>2</sup>	142		
	<b>Paint internally - Emulsion paint</b>				
	<u>Prepare surface and apply one coat of undercoat (clear emulsion binder) and two coats approved acrylic emulsion paint applied strictly in accordance with manufacturer's specifications, colours to Architect's approval</u>				
D	To new walls, returns, reveals, attached columns, beams and the like internally	m <sup>2</sup>	143		
E	To existing walls, returns, reveals, attached columns, beams and the like internally	m <sup>2</sup>	110		
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

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ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
A	<b>INTERNAL CEILING FINISHES</b>				
	<b>Paint Internally - Emulsion paint</b>				
	<u>Prepare surface and apply one coat of undercoat (clear emulsion binder) and two coats approved acrylic emulsion paint applied strictly in accordance with manufacturer's specifications, colours to Architect's approval</u>				
A	Soffit of ceiling at Roof - level +3,150	m <sup>2</sup>	77		
B	<b>EXTERNAL CEILING FINISHES</b>				
	<b>Paint Externally - Anti-fungus Paint</b>				
	<u>Prepare surface and apply one coat of undercoat (clear emulsion binder) and three coats of approved acrylic paint with a high dosage blend of fungicides and bactericides applied strictly in accordance with manufacturer's specifications; colours to Architect's approval on the following rendered surfaces.</u>				
B	Soffit of ceiling at Roof - level +3,150	m <sup>2</sup>	12		
C	Edges of slab n.e 150mm thick at Roof - level +3,150	m	31		
<b>CARRIED TO COLLECTION</b>		<b>MUR</b>			

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ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>BILL NO. 3 - EXISTING TOILET BLOCK</b>				
	<b><u>SECTION 5 - SUNDRIES</u></b>				
	<b>Contractor design construction</b>				
	<u>Construct the following reinforced concrete items; include for concrete, nominal reinforcement, smooth formwork, dowelling, grouting, cement and sand render and emulsion paint to all exposed faces as desired</u>				
<b>A</b>	Extra over 100/150/200mm thick block wall for filling voids of block work with concrete Class C20 and reinforcing with 10mm diameter high tensile rod reinforcement	m	34		
<b>B</b>	Concrete worktop, 600mm wide	m	6		
<b>C</b>	Tie beams, 100 x 200	m	6		
<b>D</b>	Tie beams, 200 x 200	m	12		
<b>E</b>	Tie columns, 100 x 100	m	8		
	<b>Finishes to Vanity</b>				
	<u>Cement and sand (1:3) as specified on concrete surfaces including preparation of surfaces and application of cement based slurry comprising adhesive prior to screeding. Rate shall include for forming arrises and fair edges</u>				
<b>F</b>	To vanity top	m <sup>2</sup>	4		
	<b>Granite top</b>				
	<u>20mm thick granite sheet fixed using rapid setting adhesive compound. Rate shall include for all necessary cutting, fitting, polishing, laying to patterns and inlays, and jointing and pointing with approved coloured epoxy adhesive. Prime Cost rate for the supply of granite sheet Rs 5,000/- per m<sup>2</sup>. Contractor to produce samples and quote from 3 suppliers.</u>				
<b>G</b>	To sides, underneath edge and top of worktop, size 600mm wide x 100mm thick to vanity top	m <sup>2</sup>	4		
	<b>CARRIED TO SUMMARY OF BILL NO. 3</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>BILL NO. 3 - EXISTING TOILET BLOCK</u></b>				
	<b><u>SECTION 6 -SANITARY APPLIANCES AND WARES</u></b>				
	<u>SUPPLY AND FIX the following sanitary appliances inclusive of all associated builders works in connection including plugging and screwing to ceramic/granite tiled floor or wall and connection to water distribution and soil / waste outlets as per manufacturer's specifications. Rate shall include for making good of all disturbed structures, finishes, etc including filling of voids with approved grout as specified to the approval of the Architect.</u>				
	<b>Water closet (WC)</b>				
A	White vitreous china European WC Suite, "Armitage Shanks Contour 21®" or approved equivalent floor standing with hard polypropylene seat, cover, trap, P-trap outlet (180mm roughing-in) and dual flush type cistern including all fittings and fixings	nr	2		
	<b>Wash hand basin - wall mounted</b>				
B	White vitreous china wall mounted wash hand basin overall size 470 x 290 x 165, "Fair®" or approved equivalent to BS 3402:1969, including chain waste and plug bottle trap with 75mm seal, include for other ancillary fittings or equal approved	nr	6		
	<b>Self-closing tap</b>				
C	Chrome plated anti splash heavy-duty pillar tap with non-hold open feature and flow controller, type "Cobra® KM2 101" or similar approved, fixed to wash hand basin and connected as per manufacturer's specifications	nr	6		
	<b>Shower mixer</b>				
D	"Cobra Stella ® 3351ST-15HQ" wall type mixer with diverter and hand shower attachment fixed to manufacturer's specifications	nr	3		
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<u>SUPPLY AND FIX the following sanitary equipments and accessories inclusive of all associated builders works in connection including plugging and screwing to ceramic / granite tiled floor or wall as per manufacturer's specifications. Rate shall include for making good of all disturbed structures and finishes, all to the approval of the Architect.</u>				
<b>A</b>	<b>Liquid soap dispenser</b> Wall mounted stainless steel 304 refillable liquid soap dispenser type Ideal Standard A9103 or equivalent approved with concealed wall fixings, capacity 800ml, fixed at 1000mm above finished floor level.	nr	6		
<b>B</b>	<b>Mirrors</b> Supply and fix 6mm thick mirror with bevelled edges, to walls with round-headed chrome plated screws, allow for 6mm thick plywood backing on 25 x 25 timber battens; all as per Architect's drawings, overall size 900 x 900	nr	6		
<b>C</b>	<b>Floor drain - PVC</b> PVC floor drain with grating cover connected to waste pipe complete with all ancillary fittings, connections and the like; overall size 150 x 150	nr	20		
<b>D</b>	<b>Anti-vandal stainless steel roll holder</b> Stainless steel 304 surface mounted, toilet paper holder type "Ideal Standard Concept®" or equivalent approved fixed at 600mm above finished floor level.	nr	2		
<b>E</b>	<b>Health Faucet</b> "Grohe Tec 1/2®" or approved equivalent hand spray with trigger control for use with spray combinations Ref. 28017 or approved equivalent complete with all ancillary fittings as per manufacturer's specifications	nr	2		
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<p><u>BILL NO. 3 - EXISTING TOILET BLOCK</u></p> <p><u>SECTION 6 -SANITARY APPLIANCES AND WARES</u></p> <p><u>COLLECTION</u></p> <p>SECTION 6 -SANITARY APPLIANCES AND WARES</p> <p><u>COLLECTION</u></p> <p>Brought forward from Page 3:6:1</p> <p>" " " " 3:6:2</p>				<p>.....</p> <p>.....</p>
CARRIED TO SUMMARY OF BILL NO. 3					MUR

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>BILL NO. 3 - EXISTING TOILET BLOCK</u></b>				
	<b><u>SECTION 7 - BUILDERS WORKS IN CONNECTION WITH SERVICES</u></b>				
	<u>Work incidental to electrical and / or fire fighting installation; concealed wired</u>				
<b>A</b>	Co-ordination with installations and marking and setting out positions of all work	Item			
<b>B</b>	Cutting or forming all holes, mortices, chases or the like and making good finishing	Item			
<b>C</b>	Building in or cutting and pinning brackets or the like and making good finishing	Item			
<b>D</b>	Protective and decorative painting	Item			
	<u>Work incidental to sanitary equipments, soil and waste, hot and cold water installations; all concealed fixings</u>				
<b>E</b>	Co-ordination with installations and marking and setting out positions of all work	Item			
<b>F</b>	Cutting or forming all holes, mortices, chases or the like and making good finishing	Item			
<b>G</b>	Building in or cutting and pinning brackets or the like and making good finishing	Item			
<b>H</b>	Protective and decorative painting	Item			
	<u>Work incidental to air conditioning, ventilation and / or telephone installation</u>				
<b>J</b>	Co-ordination with installations and marking and setting out positions of all work	Item			
<b>K</b>	Cutting or forming all holes, mortices, chases or the like and making good finishing	Item			
<b>L</b>	Building in or cutting and pinning brackets or the like and making good finishing	Item			
<b>M</b>	Protective and decorative painting	Item			
	<b>CARRIED TO SUMMARY OF BILL NO. 3</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>BILL NO. 3 - EXISTING TOILET BLOCK</u></b>  <b><u>SECTION 8 - FIT-OUT</u></b>  The contractor to design, manufacture, supply, install, test and commission the following fit-out and decorations; including for material, labour, design and coordination with consultants for approval, protection of the works during and after completion and commission the works to the satisfaction of the Architect and/or the Engineer  <u>Fit out and furniture made up of with doors, shelves and drawers in galvanised metal frame, high humidity resistant panels boards and anti acid acrylic top with bull-nosing. Rate shall include for all ironmongeries (soft closing), invisible handles, fixing accessories, cutting, mouldings and jointing. Allow for preparation of surface and applying finishes to proposed furniture and for forming/cutting holes for sink and tap. Include for supply and installation of anti acid sinks, graded taps and gas points (all as per Architect's drawings and manufacturer's specifications)</u>				<b>MUR CS</b>
<b>A</b>	Cupboard in pharmacy; overall size 1,750 x 600 x 900mm high with granite top	nr	1		
<b>B</b>	Cupboard in records; overall size 1,750 x 600 x 900mm high with melamine top	nr	1		
	<b>CARRIED TO SUMMARY OF BILL NO. 3</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>SECTION 9 - WATERPROOFING AND ROOF DRAINAGE</u></b>				
	<b>Existing screed</b>				
A	Hack off and remove existing cement and sand screed n.e 50mm thick, clean and prepare existing surface to receive new screed (m/s) include for carting away debris from site	m <sup>2</sup>	147		
	<b>Roof screed</b>				
	<u>Waterproof screed in cement mortar (1:3) mixed with a synthetic rubber latex waterproofing compound such as "Pekay® Jaycocrete P7J Super" or approved equivalent including one layer of non woven polyester cloth laid strictly in accordance with manufacturer's specifications laid on concrete surfaces</u>				
B	40mm thick average screed laid to slope	m <sup>2</sup>	147		
	<b>Liquid roof waterproofing treatment</b>				
	<u>Polyurethane-based liquid waterproofing treatment "Sikalastic® 614" or approved equivalent complete with floor primers, reinforcement mat and finishing layer as per manufacturer's specifications. Works to be done by specialist offering a decennial warranty on material and labour, with intervention within 12 hours when defect is reported. Contractor to submit for approval sample, manufacturer's specifications and warranty certificate format prior to execution of the works. Contractor to obtain written approval of specialist regarding fitness of surfaces prior to start of works. Contractor to allow for water test by flooding surface for 36 hours at end of waterproofing works. All works strictly to manufacturer's instructions and to the approval of the Architect. Colour to Architect's approval.</u>				
C	On screeded surface of flat roof slab	m <sup>2</sup>	147		
D	On vertical surface of upstand beam	m <sup>2</sup>	15		
	<b>Reinstate existing rainwater outlets</b>				
E	Survey existing rainwater drainage system including roof outlets and PVC downpipes; allow for cleaning, declogging and repairs to damaged brackets and accessories	sum			
	<b>CARRIED TO COLLECTION</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b><u>ROOF DRAINAGE</u></b>  <u>uPVC rainwater piping system to BS EN 12200-1 with solvent welded joints; allow for all fittings and fixings as per manufacturer's specifications and 3 coats emulsion paint (colour to Architect's approval) to all exposed pipe work and fittings</u>				
A	100mm diameter uPVC surface rainwater downpipes of approved colour fixed to external façade complete with bends and shoe	m	12		
B	Extra for bend 90°	nr	4		
C	Extra for PVC shoe	nr	4		
D	"Nichol" PVC outlet type Fulbora or equivalent laid horizontally with dome grating	nr	4		
	<b>Sundries</b>  <u>Construct the following reinforced concrete items; include for concrete, nominal reinforcement, smooth formwork, dowelling, grouting, cement and sand render and emulsion paint to all exposed faces as desired</u>				
E	Gargoyle in reinforced concrete, overall size 350 x 300 x 400mm high, 100mm thick, including forming holes in kicker / block wall and to bottom of gargoyle for 110mm diameter rainwater pipe; allow for mastic sealant around rainwater pipe (rainwater pipe m/s)	nr	4		
F	Catchpit in reinforced concrete, overall internal size 500 x 500 x depth n.e 1m in 100 mm thick wall and core filled with aggregate 0-20mm	nr	4		
	<b>Coring in slab (Provisional)</b>  <u>Allow for coring of structural members not exceeding 250mm thick for services sleeves of various diameters; include for sealing void with concrete or cement grout and making good to structures and finishes disturbed</u>				
G	Diameter n.e 100mm (roof to receive new rainwater pipes)	nr	4		
	<b>CARRIED TO COLLECTION</b>			<b>MUR</b>	



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<p><b><u>BILL NO. 3 - EXISTING TOILET BLOCK</u></b></p> <p><b><u>SECTION 9 - WATERPROOFING AND ROOF DRAINAGE</u></b></p> <p><b><u>COLLECTION</u></b></p> <p>Brought forward from Page 3:9:1 .....</p> <p>Brought forward from Page 3:9:2 .....</p>				
	<b>CARRIED TO SUMMARY OF BILL No. 2</b>	<b>MUR</b>			

ITEM	DESCRIPTION	PAGE REF	AMOUNT/MUR
	<b><u>BILL NO. 3 - EXISTING TOILET BLOCK</u></b>		
	<b><u>COLLECTION</u></b>		
3.1	DEMOLITION	3:1:3	.....
3.2	MASONRY	3:2:1	.....
3.3	OPENINGS	3:3:1	.....
3.4	FINISHES	3:4:5	.....
3.5	SUNDRIES	3:5:1	.....
3.6	SANITARY APPLIANCES AND WARES	3:6:3	.....
3.7	BUILDER'S WORKS IN CONNECTION WITH SERVICES	3:7:1	.....
3.8	FIT-OUT	3:8:1	.....
3.9	WATER PROOFING AND ROOF DRAINAGE	3:9:3	.....
	<b>CARRIED TO MAIN SUMMARY</b>	<b>MUR</b>	

# BILL NO. 4

*EXTERNAL WORKS*

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>BILL NO. 4 - EXTERNAL WORKS (ALL PROVISIONAL)</b>  <b>SECTION 1 - EARTHWORKS AND EXCAVATIONS</b>  <b>Clearing of site</b>  <b>A</b> Clear site of all bushes, shrubs vegetation, undergrowth, hedges, loose boulders, all debris and the like including grubbing up roots and removal from site  <b>Excavation</b>  <i>Excavation works shall be deemed to include excavation in all types of materials including rock strata, and working space allowance wherever required. Earthwork support and keeping of excavation free from ground and surface water are also deemed to be included in measured items for excavation.</i>  <u>Excavate top soil average 150mm deep to be preserved on site for re-use</u>				
	<b>B</b> Paving bricks  <b>Excavate to reduce level</b> <u>Excavate in bulk starting from original or stripped level to reduce levels and depositing in temporary spoil heaps at specified locations on site for re-use (say 50%) and carting away surplus (say 50%)</u>	m <sup>2</sup>	502		
	<b>C</b> Excavation depth not exceeding 1,0m deep	m <sup>3</sup>	151		
	<b>CARRIED TO SUMMARY OF BILL NO. 4</b>				<b>MUR</b>

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>SECTION 2 - WALKWAY, DRIVEWAY AND PARKING</b>				
	<b>Interlocking paving bricks</b>				
A	Level grade to falls and compact as described reduced level surfaces to receive sub-base to paving works (excavation to reduce level m/s)	m <sup>2</sup>	502		
B	200mm thick crusher run base filling size 0 to 20mm laid, graded and compacted over hardcore to 98% BS heavy	m <sup>2</sup>	502		
C	Rocksand bedding, 0-4mm, average 50mm thick set level and well compacted and watered	m <sup>2</sup>	502		
D	Precast interlocking concrete paving bricks "Uniloc" type or approved equivalent to BS 6717, size 200 x 100 x 60mm thick, light duty type, colour and pattern to Architect's approval; allow for joints filled with rocksand	m <sup>2</sup>	502		
	<b>Kerbs</b>				
	<u>Precast off shutter concrete kerbs including all holes, chamfers, rebates, handling and transport, hoisting, fixing in position, jointing in cement mortar (1:3), bedding and haunching in 100mm thick concrete layer. Rate to include for all excavation. All as per Structural Engineer's drawings, specifications and approval</u>				
E	Kerb 150 x 180 high x 1000 long, Type K3	m	20		
	<b>CARRIED TO SUMMARY OF BILL NO. 4</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>SECTION 3 - ELECTRICAL NETWORK</b>				
	<b>Trenches for electrical network</b>				
	<u>Excavate in all types of soil including rock starting from original or formation level for trenches for service pipe network and the like pipe n.e 200mm diameter (pipes m/s), trim bottom of excavation regular to falls, backfill with selected sieved materials, allow for 150mm wide x 40 microns warning tapes in two rows, compact as described and remove surplus excavated material from site</u>				
A	For C.E.B cables, 400mm wide x depth n.e 1.5m deep	m	60		
	<b>Warning Slabs</b>				
	<u>Precast concrete warning slabs 500 x 200 x 40mm thick marked "ELECTRIC CABLES" laid to electrical trenches</u>				
B	For C.E.B cables trenches	m	60		
	<b>Electrical Manhole</b>				
	<u>Excavate in any material including rock and construct manhole in 150mm thick reinforced concrete grade 25 base, 150mm thick block walling with all voids filled with concrete grade 25 and 1Y10 at 450 mm centers, bent in base and in slab and finished with 25 mm thick average cement and sand screed to bottom to falls, 20 mm thick cement and sand (1:3) rendering to walls; allow for all necessary formwork reinforcement, holes, backfilling and the like (cover m/s)</u>				
C	Internal dimension 600mm x 600mm x n.e 1,200mm deep (LV)	nr	2		
	<b>Manhole Cover - Electrical</b>				
D	Medium duty cast iron cover and frame to BS 497 bedded in cement mortar (1:3) and cover sealed in grease; clearly labelled "Danger Electricity"; overall clear size 600 x 600	nr	2		
	<b>CARRIED TO SUMMARY OF BILL NO. 4</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
	<b>SECTION 4 - WATER RETICULATION</b>				
	<b>Trenches for water reticulation network</b>				
	<u>Excavate in all types of soil including rock starting from original or formation level for forming trenches for drain pipe, for laying of uPVC pipe network (pipe m/s) and removal from site of surplus excavated material</u>				
A	Water reticulation trenches, 300 wide x depth n.e 1m	m	120		
	<b>Granular fill</b>				
	<u>Backfilling in class B granular bedding (single size 6mm) 50mm thick around pipe network (pipe m/s) laid to regular falls in trench and compact as described</u>				
B	Water reticulation trenches, not exceeding 500 wide x 450 average thickness	m	120		
	<b>Backfilling</b>				
	<u>Haul up from spoil heaps and backfill trenches with selected sieved (12mm) excavated materials compacted in layers not exceeding 200mm thick</u>				
C	Water reticulation trenches, not exceeding 500 wide x 300 average depth	m	60		
	<b>Warning tape</b>				
	<u>Yellow plastic warning tapes 150mm x 40 microns in two rows</u>				
D	For water reticulation trenches	m	60		
	<b>Rainwater harvesting tank base</b>				
	<u>Construct reinforced concrete water tank base comprising of concrete grade 25, mesh A252 reinforcement on 200mm thick compacted hardcore and 150mm thick crusher run 0-20, the whole finished with 25 mm thick average cement and sand screed and render; allow for all necessary formwork, backfilling and carting away excavations, and builder's works in connection to services installations</u>				
E	Base for 4m³ water tank, overall size 5,000 x 2,500 x 200mm thick	nr	1		
F	Base for 9m³ water tank, overall size 2,500 x 2,500 x 200mm thick	nr	1		
	<b>CARRIED TO SUMMARY OF BILL NO. 4</b>	<b>MUR</b>			

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT/MUR
<b>SECTION 5 - SEWER AND WASTE RETICULATION</b>					
<b>Trenching works - Sewer and waste reticulation</b>					
<u>Excavate in all types of soil including rock starting from original or formation level for trenches for service pipe network and the like pipe n.e 200mm diameter (pipes m/s), trim bottom of excavation regular to falls, backfill with selected sieved materials, compact as described and remove surplus excavated material from site</u>					
<b>A</b>	For gravity sewer and waste network, 500mm wide x depth n.e 1m	m	75		
<b>Warning tapes</b>					
<u>Yellow plastic warning tapes 150mm x 40 microns in two rows</u>					
<b>B</b>	For gravity sewer network trenches	m	75		
<b>Excavation works</b>					
<u>Excavate starting from original or formation level, compact bottom of excavation and place polyethylene sewer manhole (manhole m/s); allow for backfilling with selected excavated material, carting away surplus excavated material off site, connection with pipe network; all according to MEP drawings and specifications</u>					
<b>C</b>	For manhole of capacity n.e 400L	nr	4		
<b>D</b>	For gully trap of capacity n.e 400L	nr	3		
<b>E</b>	For septic tank of capacity 4,700L	nr	1		
<b>Absorption Pit</b>					
<b>F</b>	Soakaway, overall size 8,0m x 3,50m x 4,0m deep; allow for excavation in all types of soil and carting away excavated material, approved filling with boulders of sound basalt, aggregate size 40-100 topping, nonwoven geotextile membrane to sides, bottom, in-between and top of aggregates and precast reinforced concrete perimeter kerb size 100 x 200mm high complete with concrete haunching	nr	1		
<b>CARRIED TO SUMMARY OF BILL NO. 4</b>				<b>MUR</b>	



[illegible]

SECTION	DESCRIPTION	PAGE REF	AMOUNT/MUR
	<b><u>BILL NO. 4 - EXTERNAL WORKS (ALL PROVISIONAL)</u></b>		
	<b><u>SUMMARY</u></b>		
1	EARTHWORKS AND EXCAVATIONS	4:1:1	.....
2	WALKWAY, DRIVEWAY AND PARKING	4:2:1	.....
3	ELECTRICAL NETWORK	4:3:1	.....
4	WATER RETICULATION	4:4:1	.....
5	SEWER AND WASTE RETICULATION	4:5:1	.....
6	STORMWATER DRAINAGE	4:6:1	.....
<b>TOTAL CARRIED TO MAIN SUMMARY</b>		<b>MUR</b>	

# BILL NO 5

*MECHANICAL & ELECTRICAL INSTALLATIONS*

## ***Electrical Installations***

TO COLLECTION

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT(Rs)
D.	POWER CABLES				
	Power cables in trenches, ducts, sleeves or onto cable trays, trunking.				
	Allow for proper cable fixation and protection. Include all necessary accessories such as cable glands, terminals, etc.				
	Terminate and connect properly.				
	<b>Note: All quantities indicated are subject to remeasurement.</b>				
D.1	From existing MDB to DB G.F-BLOCK C 3C x 10 mm <sup>2</sup> Cu PVC/SWA/PVC	m	50		
D.2	From DB G.F-BLOCK C to SDB CHANGING ROOM 3C x 4mm <sup>2</sup> Cu PVC/SWA/PVC	m	30		
D.3	From DB G.F-BLOCK C to SDB PUMP ROOM 3C x 6 mm <sup>2</sup> Cu PVC/SWA/PVC	m	45		
D.4	From SDB PUMP ROOM to DOMESTIC TRANSFER PUMP 3C x 2.5 mm <sup>2</sup> Cu PVC/SWA/PVC	m	20		
E.	TRUNKINGS				
E.1	PVC trunking of appropriate dimensions c/w proprietary end caps, junction, angle accessories, joiners etc.for surface mounting of accesso	Lot	1		
F.	CONDUITS & WIRING				
	Include (a) Conduits for concealed or surface installations.				
	(b) wires to connect terminal points below and to their respective electric panels and proprietary boxes for surface or concealed installations.				
	<b>Wiring to be as follows:</b>				
	<b>3X 1C x 1.5mm<sup>2</sup> PVC/PVC cable for lighting.</b>				
	<b>3X1C x 2.5mm<sup>2</sup> PVC/PVC cable for sockets.</b>				
<b>F.1</b>	<b>Ground Floor-Block C</b>				
F.1.1	Light point	No.	13		
F.1.2	Switch point	No.	9		
F.1.3	Socket point	No.	14		
<b>F.2</b>	<b>First Floor-Block C</b>				
F.2.1	Light point	No.	12		
F.2.2	Switch point	No.	7		
F.2.3	Socket point	No.	14		
<b>F.3</b>	<b>Changing Room</b>				
F.3.1	Light point	No.	20		
F.3.2	Switch point	No.	6		
F.3.3	Socket point	No.	3		
F.3.4	Emergency Light Point	No.	2		
<b>F.4</b>	<b>Pump Room</b>				
F.4.1	Light point	No.	1		
F.4.2	Switch point	No.	1		
	<b>TO COLLECTION</b>				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT(Rs)
G.	WIRING ACCESSORIES				
	<b>Similar to Legrand Mallia or Hager Systo</b>				
<b>G.1</b>	<b>Ground Floor-Block C</b>				
G.1.1	Switch 1 gang, 1 way, 10 Amps	No.	4		
G.1.2	Switch 1 gang, 2 way, 10 Amps	No.	2		
G.1.3	Switch 2 gang, 1 way, 10 Amps	No.	1		
G.1.4	Socket 1 gang, 3 Pin, 13 Amps(Wall Mounted Fan)	No.	8		
G.1.5	Socket 1 gang, 3 Pin, 13 Amps(Waterproof)	No.	2		
G.1.6	Socket 2 gang, 3 Pin, 13 Amps	No.	4		
<b>G.2</b>	<b>First Floor-Block C</b>				
G.2.1	Switch 1 gang, 1 way, 10 Amps	No.	4		
G.2.2	Switch 1 gang, 2 way, 10 Amps	No.	3		
G.2.3	Switch 2 gang, 1 way, 10 Amps	No.	0		
G.2.4	Socket 1 gang, 3 Pin, 13 Amps(Wall Mounted Fan)	No.	8		
G.2.5	Socket 1 gang, 3 Pin, 13 Amps(Waterproof)	No.	2		
G.2.6	Socket 2 gang, 3 Pin, 13 Amps	No.	4		
<b>G.3</b>	<b>Changing Room</b>				
G.3.1	Switch 2 gang, 1 way, 10 Amps(Waterproof)	No.	2		
G.3.2	Switch 1 gang, 2 way, 10 Amps(Waterproof)	No.	2		
G.3.3	Socket 1 gang, 3 Pin, 13 Amps(Waterproof)	No.	3		
<b>G.4</b>	<b>Pump Room</b>				
G.4.1	Switch 1 gang, 1 way, 10 Amps(Waterproof)	No.	1		
G.4.2	Socket 1 gang, 3 Pin, 13 Amps(Waterproof)	No.	1		
H.	LUMINAIRES				
	Supply, install, test and commission the following luminaires.				
<b>H.1</b>	<b>Ground Floor-Block C</b>				
H.1.1	Type 1	No.	8		
H.1.2	Type 2	No.	5		
<b>H.2</b>	<b>First Floor-Block C</b>				
H.2.1	Type 1	No.	8		
H.2.2	Type 2	No.	4		
<b>H.3</b>	<b>Changing Room</b>				
H.3.1	Type 3	No.	2		
H.3.2	Type 4	No.	10		
H.3.3	Type 5	No.	8		
<b>H.4</b>	<b>Pump Room</b>				
H.4.1	Type 4	No.	1		
I.	WALL MOUNTED FAN				
I.1	Wall Mounted Fan including thermal cut-off protection	No.	16		
J.	AS MADE DRAWINGS AND O&M MANUALS				
J.1	Allow for submission of all as-built layout, schematic & physical drawings and O&M Manuals in three hard sets and one soft set	Lot	1		
	<b>TO COLLECTION</b>				

Rehabilitation Works at Grand La Fouche Corail  
Primary School

<b>TOTAL COLLECTION</b>
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<b><i>Electrical Installations</i></b>
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Total brought down from collection :-

Page 1

Rs \_\_\_\_\_

Page 2

Rs \_\_\_\_\_

Page 3

Rs \_\_\_\_\_

Total Summary

Rs \_\_\_\_\_

REHABILITATION WORKS AT GRAND LA FOURCHE CORAIL PRIMARY SCHOOL, RODRIGUES					
PUBLIC HEALTH INSTALLATIONS					
ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT(Rs)
	Supply, deliver to site, install, connect, test and commission the following all in accordance with specifications, drawings, conditions of contract, etc.				
	<b>EXTERNAL</b>				
<b>A.</b>	<b>WATER UNIT INLET PIPINGS &amp; ACCESSORIES</b>				
A.1	HDPE pipe (Ø25/20mm) to be laid underground) from existing incoming pipe from water unit network to on site storage tank.	m	100		
A.2	Brass Quarter Turn Valve Ø25/20mm to BS 1010 (at inlet from water unit to site and at inlet of tank)	No.	2		
A.3	Non-return valve Ø25/20mm (BRASS)	No.	1		
A.4	Heavy duty ball cock at water tank, Ø25/20mm, Brass connection ( 1 No. at P.E domestic water tank)	No.	1		
A.5	Electrofusion fittings, elbows, tees for HDPE pipe	Lot	1		
<b>B.</b>	<b>DOMESTIC PE WATER TANKS &amp; MAIN DISTRIBUTION PIPINGS</b>				
B.1	Supply and fix of domestic PE Water Tank, Capacity				
B.1.1	4000L	No.	2		
B.1.2	2000L	No.	1		
B.2	Vertical distribution pipes in uPVC PN 16				
B.2.1	Dia 50/40mm	m	5		
B.2.2	Dia 25/20mm	m	8		
B.3	uPVC pressure pipe PN16, diameter 63/50mm from water tanks to pump room	m	8		
B.4	Stop Valve at outlet of PE water tank				
	dia. 50/40mm	No.	2		
	dia. 63/50mm	No.	1		
B.5	Non-Return valve dia 63/50mm at outlet of PE water tanks.	No.	1		
B.6	Saddles, hangers and other holding accessories to pipes	Lot	1		
	ALL DIMENSIONS FOR COMPLETE INSTALLATION				
	<b>TO COLLECTION</b>				



ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT(Rs)
<b>C.</b>	<b>DOMESTIC WATER PUMPS &amp; ACCESSORIES</b>				
C.1	Domestic water pump set (close coupled) comprising of 1 centrifugal pump with electrical control panel, 2 Nos stop valves, 1 No. non-return valve. Single Phase, 230V, 50Hz Capacity of pump = 3m³/h at 20m Head (Pressure Vessel : 50L)	Set	1		
C.2	Antivibration isolators for pump set	Lot	1		
C.3	Low level float switch for dry running control of pumps - non mercury type c/w power cabling & control cabling	Lot	1		
C.4	uPVC pressure pipe PN16, diameter 40/32mm from pump set to HDPE distribution pipes in pump room	m	3		
<b>D.</b>	<b>EXTERNAL COLD WATER DISTRIBUTION TO ROOF WATER TANK ON TOILET BLOOCK</b>				
D.1	HDPE Pipe rated PN16 (pipes to be laid underground). Diameter 25/20mm	m	45		
D.2	uPVC pressure pipe PN16, diameter 25/20mm from HDPE pipes to roof water tank on toilet block and back to ground	m	15		
D.3	Electrofusion fittings, Reducers, Elbow, Reducing Elbows, Tees, Reducing Tees, Transistion Fittings, etc.	Lot	1		
D.4	Saddles, hangers and all other holding accessories to pipes (COMPLETE INSTALLATION)	Lot	1		
D.5	Isolating Valves in DR Brass, c/w valve chamber 25/20mm	No.	2		
D.6	Non-Return valve dia 25/20mm	No.	1		
<b>E.</b>	<b>BELOW GROUND DRAINAGE</b>				
E.1	uPVC push fit rubber ring type sewer pipes (to be laid underground)				
E.1.1	Diameter 160mm	m	42		
E.2	Polyethylene gully trap, complete with access covers	No.	3		
E.3	Polyethylene manhole, complete with access covers and extenders				
E.3.1	upto 500mm deep	No.	2		
E.3.2	upto 750mm deep	No.	2		
E.4	PE Septic Tank capacity 4700L c/w all extenders/covers	No.	1		
	<b>TO COLLECTION</b>				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT(Rs)
	<b>INTERNAL</b>				
<b>F.</b>	<b>COLD WATER SUPPLY</b>				
F.1	HDPE Pipe rated PN16 (pipes to be laid underground). Diameter				
	25/20mm	m	30		
F.2	uPVC pressure pipe, rated to PN16. Diameter				
	25/20mm	m	15		
	20/15 mm	m	40		
F.3	Quarter Turn Valve in DR Brass on uPVC pipes diameter 25/20mm	No.	1		
F.4	uPVC pressure fittings, rated to PN16. Solvent welded.	Lot	1		
	Reducers, Tees, Elbows, Unions, male adaptors, female adaptors,				
	transition fittings, threaded sockets at all valves and flexible pipes,etc.				
	(ALL DIMENSIONS FOR COMPLETE INSTALLATION)				
F.5	Saddles, hangers and all other holding accessories to pipes	Lot	1		
	(COMPLETE INSTALLATION)				
F.6	Miniball valve ½" connection (High Quality)	No.	11		
F.7	Chrome plated angle valve ½"connection (High Quality) for WCs	No.	2		
F.8	Chrome plated angle valve ½"connection (High Quality) for	No.	2		
	jetwashers				
F.9	Flexible pipes (200mm long) ½" connection (High Quality)	No.	4		
<b>G.</b>	<b>WASTE AND SEWER</b>				
G.1	uPVC pipe, solvent welded, diameter (horizontal pipes)				
G.1.1	40mm PN6	m	12		
G.1.2	50mm PN6	m	15		
G.1.3	50mm PN10 (cast in floor/wall)	m	18		
G.1.4	63mm PN10 (cast in floor/wall)	m	10		
G.1.5	110mm PN 6	m	4		
G.1.6	110mm PN 10 (below slab to Manholes)	m	8		
G.2	uPVC pipe, solvent welded, diameter (vertical pipes for venting)				
G.2.1	110mm PN6 (c/w vent cowls)	m	6		
G.2.2	63 mm PN6 (c/w vent cowls)	m	6		
G.3	uPVC fittings, rated to PN6 and PN10. Solvent welded.	Lot	1		
	Reducers, Tees, Elbows, Y-Tees, Rodding Eyes, etc.				
	(ALL DIMENSIONS FOR COMPLETE INSTALLATION)				
	<b>TO COLLECTION</b>				

4

TOTAL COLLECTION TO SUMMARY

Total brought down from collection:-

Page 1	Rs	
Page 2	Rs	
Page 3	Rs	
Page 4	Rs	
TOTAL	Rs	

# REHABILITATION WORKS AT GRAND LA FOURCHE CORAIL PRIMARY SCHOOL

## Rainwater Harvesting Installations

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT(Rs)
	Supply, deliver to site, connect, test and commission the following in accordance with specification, drawings, conditions of contract, etc.				
	<i>Note: All rates shall be exclusive of VAT.</i>				
<b>A.</b>	<b>INCOMING PIPES TO RAIN WATER HARVESTING TANKS</b>				
A.1	Collection Pipes /Branch pipes from roof collection point to Rainwater tank				
A1.1	Dia 160mm uPVC PN 6 c/w fittings	m	30		
<b>B.</b>	<b>PE WATER TANKS AND ACCESSORIES</b>				
B.1	PE Water Tank each of Capacity 9m <sup>3</sup> - (as per drawing details)	No.	2		
B.2	Integrated filter system in each PE Tanks (As per drawing), from tank manufacturer)	No.	2		
B.3	Stop valve at outlet point Dia 63mm	No.	2		
B.4	Reducer sections, Tees, Elbows, Wyes, Unions, Adaptors, etc. uPVC non pressure fittings, solvent welded (rated to PN6) ALL DIMENSIONS FOR COMPLETE INSTALLATION	Lot	1		
B.5	Saddles, hangers and other holding accessories to pipes ALL DIMENSIONS FOR COMPLETE INSTALLATION	Lot	1		
B.6	Quarter Turn Valves (Brass with s/s lever Handle)				
B.6.1	Dia 40/32 at manual valve	No.	2		
B.6.2	Dia 50/40 at suction to filter system	No.	1		
B.6.2	Dia 50/40 at Filtration pump to UV Sanitizer	No.	1		
B.7	HDPE pressure pipe, rated to PN10, to interconnect the two Rainwater tanks c/w electrofusion & transition fittings as per schematics	m	105		
B.7.1	Ø50/40mm	No.	5		
B.7.2	Ø40/32mm	No.	100		
<b>C.</b>	<b>OVERFLOW PIPINGS AND ACCESSORIES</b>				
C.1	uPVC non pressure pipe, rated to PN6, Ø160mm (overflow pipe to soak away)	m	30		
	<b>TO COLLECTION</b>				

ITEM	DESCRIPTION	UNIT	QTY	RATE	AMOUNT(Rs)
C.2	Reducer sections, Tees, Elbows, Wyes, Unions, Adaptors, etc. uPVC non pressure fittings, solvent welded (rated to PN6) ALL DIMENSIONS FOR COMPLETE INSTALLATION	Lot	1		
C.3	Saddles, hangers and other holding accessories to pipes ALL DIMENSIONS FOR COMPLETE INSTALLATION	Lot	1		
<b>D.</b>	<b>FILTRATION PUMPS, UV TREATMENT AND ACCESSORIES</b>				
<b>D.1</b>	<b>FILTRATION PUMP</b>				
D.1.1	Centrifugal pump with pre-filter, glass reinforced polypropylene construction. SS mechanical seal and axle. Horizontal axis with electrical motor. Self priming type connection 1½", 230V, 50Hz, IP55. Capacity per pump = 5m³/h at 15m head (Side mounted monobloc with sand filter)	No.	1		
D.1.2	Anti-vibration rubber mountings for pumps.	No.	1		
D.1.3	Level sensor / float switch for control of pumps, non- mercury type (230V, 50Hz) c/w power cabling and control cabin <u>Pump starts</u> : When roof tank for Toilet block is below 40% and collection tank is above low level <u>Pump stops</u> : When collection tank is below low level or roof tank is above 95% capacity.	Lot	1		
<b>D.2</b>	<b>SAND FILTER AND ACCESSORIES</b>				
D.2.1	Laminated polyester and fibreglass body with lid and polypropylene base c/w pressure gauge, water drain plug, air vent, multiport valve. Filtration velocity = 50 m³/h/m² Capacity per filter = 6 m³/h Diameter = 400mm (minimum) C/W MULTIPORT VALVE (mounted as monobloc with pump)	No.	1		
<b>D.3</b>	<b>UV STERILIZER</b>				
D.3.1	UV Sterilizer: suitable for flow rate of 6m³/hr average (Lamp Life: Minimum 12,000 hours) (UV-C light) Stainless Steel Body	No.	1		
D.3.2	Spare UV Lamp for Sterilizer	No.	1		
	<b>TO COLLECTION</b>				



**REHABILITATION WORKS AT GRAND LA FOURCHE  
CORAIL PRIMARY SCHOOL**

*Rainwater Harvesting Installations*

**TOTAL COLLECTION**

Total brought down from priced Bill of Quantities

Page 1	Rs	_____
Page 2	Rs	_____
Page 3	Rs	_____
<b>TOTAL (Excluding VAT)</b>		<b>Rs</b> =====



Rehabilitation Works  
at  
Grand La Fouche Corail Primary School, Rodrigues

**MEP SUMMARY**

<b>BILL NO</b>	<b>DESCRIPTION</b>	<b>PAGE NO</b>	<b>AMOUNT (MUR EXCL. VAT)</b>
<b>5</b>	<b>MECHANICAL &amp; ELECTRICAL INSTALLATIONS</b>		
	ELECTRICAL INSTALLATIONS	4	
	PUBLIC HEALTH INSTALLATIONS	5	
	RAINWATER HARVESTING INSTALLATIONS	4	
<b>TOTAL CARRIED TO MAIN SUMMARY</b>		<b>MUR</b>	

# MAIN SUMMARY

Rehabilitation Works  
at  
Grand La Fouche Corail Primary School, Rodrigues

**MAIN SUMMARY**

<b>BILL NO</b>	<b>DESCRIPTION</b>	<b>PAGE NO</b>	<b>AMOUNT (MUR EXCL. VAT)</b>
1	PRELIMINARIES	1:S	
2	UPGRADING WORKS TO BLOCK C	2:S	
3	EXISTING TOILET BLOCK	3:S	
4	EXTERNAL WORKS	4:S	
5	MECHANICAL & ELECTRICAL INSTALLATIONS	5:S	
	<i>Sub Total "A"</i>		
<u>ADD</u>	Allow for the sum of <i>Rupees One Million</i> for Contingencies to be spent under the direction of the Project Manager for the whole project		
	<i>Sub Total "B"</i>		
<u>LESS</u>	Discount		
<b>TOTAL OF BID CARRIED TO LETTER OF TENDER, MUR EXCL. VAT</b>			

**TOTAL OF PRICE BID IN WORDS:** .....

.....

.....

**NAME OF BIDDER:** .....

**SIGNATURE:** .....

**OFFICIAL CAPACITY:** .....

**DATE:** .....

**COMPANY SEAL:**

## Section III: Statement of Requirements

### A. SCOPE OF WORKS

**The works consist of rehabilitation works at Grand La Fouche Corail Primary School:**

- Upgrading of Block C
- Conversion of Existing Toilet Block into Cloakroom
- External drainage and site works
- Mechanical, electrical and plumbing installations

### Contractor's Personnel

The Bidder shall also demonstrate/undertake that it will have the following personnel that meet the following requirements:

No.	Position	Total Work Experience (years)	In Similar Works Experience (years)
1	General Foreman on a full-time basis on site with experience construction sector or any equivalent qualifications acceptable to the Public body	10	5
2	A Health and Safety Officer as required under OSHA 2005 on part time basis on site.	5	3

- **Note:**  
Bidder must submit an undertaking that appropriate personnel listed in the bidding document shall be made available on a full-time basis for the project with their names and duly signed CVs prior to the award.

# **SPECIFICATIONS**

## **B. SPECIFICATIONS**

Architect's Specification

Structural Engineer's Specification

Mechanical & Electrical Engineer's Specification

**ARCHITECTS**

**STANDARD SPECIFICATIONS**

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**GENERAL STANDARD SPECIFICATIONS****CONTENTS**

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3 – EXCAVATION AND EARTHWORK	8-15
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## **SECTION NO 1: GENERAL**

### **1.1 *Clauses/headings***

The clauses or headings to any section, subsection or trade shall apply to all other sections, subsections or trades.

### **1.2 *Materials and Workmanship Generally***

Material are to be new unless otherwise stated and shall be handled, stored and used with care to ensure that they are in perfect condition when incorporated into the Works and thereafter properly protected so as to ensure that they are likewise in a perfect condition when handed over at completion of the Works. All materials shall be examined immediately upon delivery and any damaged or defective items shall be removed from the site. Where a choice of manufacturer of source of supply is allowed for any particular product or material, the whole quantity required to complete the work must be of the same type, manufacture and/or source. Written evidence of sources of supply are to be produced when requested by the Architect.

### **1.3 *Standard of Materials and Workmanship***

The Standard of Workmanship and the quality of the materials to be utilised throughout the whole of this contract are to be the best of their respective kinds and to the Architect's entire satisfaction and are to comply in all respects with the latest relevant South-African Bureau of Standards, British Standards, Codes of Practice and/or Mauritius Standards. The word 'best' shall be taken in its ordinary English sense despite any trade custom to the contrary and all references to Standards or Codes of Practice shall signify the latest relevant Standards or codes. No substitutions whatsoever shall be permitted from those materials specified and any work which in the opinion of the Architect is not of the highest standard or which the Architect condemns as failing to conform to the Contract will be required to be removed and the work redone at the Contractor's expense.

The Contractor shall be deemed to be fully conversant with the 'art' of building construction and execute the whole of the works to the highest possible standards.

Where and to the extent that materials and workmanship are not fully specified or in the absence of detailed descriptions for any item or items they are to be: -

- a) suitable for the intended purpose in the Works stated in or reasonably to be inferred from the Contract Documents.
- b) in accordance with the best building practice including the relevant provisions of applicable current British Standards or Codes of Practice documents whether or not these are specified in respect of a particular item.
- c) handled, stored and incorporated into the Works in accordance with the manufacturer's written recommendations.



**SECTION NO 1: GENERAL [CONT'D]**

**1.4 *Discrepancies***

The Contractor shall notify, in respect of Materials and Workmanship specified herein, where any of the above conflict with each other or any other specified requirements.

**1.5 *Copies of Documents***

The Contractor shall when so requested submit all at his own expense to the Architect copies of:

- a) relevant British Standards or Code of Practice documents for inspection.
- b) Manufacturer's certificate of compliance with standards.
- c) Manufacturer's written recommendations for the use of materials specified herein or arising as a result of a variation or substitution.

**1.6 *Materials of Proprietary manufacture***

All materials specified by a proprietary name, catalogue number or reference are to be either exactly as described or, may be substituted by materials of a different manufacture provided that, in the opinion of the Architect, the substitution is of equal quality, specification and weight in all respects as those described. The written approval of the Architect must be obtained timeously and prior to purchasing orders being placed. The rates and prices shall be based on the materials specified and shall not be subject to adjustment in respect.

**1.7 *Manufacturer's recommendations***

All materials are to be handled, stored, used, applied and/or fixed in strict accordance with the manufacturer's instructions and recommendations. Should these instructions and/or recommendations conflict with other specified requirements the Architect must be notified forthwith.

**1.8 *Samples of materials***

Where approval of materials or samples of finished work are specified or requested the Contractor shall allow for submitting such samples or other evidence of suitability. The approved samples shall be retained on site suitably protected for comparison with materials used in the Works and shall be removed when no longer required at the Contractor's expense.

**1.9 *Approval of Materials and Workmanship***

Where and to the extent that materials and finished work are specified to be approved or the Architect instructs or requires that they are to be approved, the same must be supplied and executed to comply with all other requirements and in respect of the stated or implied characteristics either to the express approval of the Architect or to match a sample expressly approved by the Architect as a standard for the purpose.

## **SECTION NO 1: GENERAL [CONT'D]**

Inspection or any other action by the Architect must not be taken as approval of materials or finished work, unless the Architect so confirms in writing in express terms referring to:-

- a) Date of inspection
- b) Part of the work inspected
- c) Respect(s) or characteristic(s) which are approved
- d) Extent and purpose of the approval
- e) Any associated conditions

### **1.10 Accuracy**

The whole of the Works shall be constructed to achieve levels of accuracy within the permissible deviations recommended in BS 5606 unless specified otherwise.

The Contractor shall ensure that all materials, elements and components of the building fit together as designed. Work which fails to meet the specified levels of accuracy must not be rectified without approval. The Contractor shall submit proposals for such rectifications and meet all costs arising, including effects on other work. However, should approval not be given thereby necessitating removal and replacement of the work, the Contractor shall do so at his own expense.

### **1.11 Setting out**

The Contractor shall set out the Works using methods and measuring instruments described in BS 5606 and shall inform the Architect when overall setting out is complete and before commencing construction.

The Contractor shall allow for providing all necessary instruments and assistance for checking the setting out and levels.

The Contractor shall check all dimensions and levels both on drawings and site, particularly the correlation between components and work in place and shall not order materials or any components or carry out the work until any discrepancies, if any, have been resolved with the Architect.

Details of all grid lines, setting out stations, bench marks and profiles shall be recorded on the site setting out drawing and retained on site throughout the contract and handed over to the Architect on completion.

### **1.12 Preparation and keying of bases and backgrounds**

The Contractor shall ascertain the nature of the surface, after which the backgrounds shall be prepared and keyed where necessary in accordance with :-

- a) the recommendations in any applicable British Standard and Code of Practice documents.
- b) the written recommendation of the manufacturer of the materials to be laid thereon or applied or fixed thereto;
- c) best building practice
- d) so as to be suitable to receive and, where keyed, to ensure adhesion of the materials to be laid thereon or applied and fixed thereto.

1.13 ***Adhesives and fixings generally***

Where and to the extent that adhesives and/or types of adhesives and fixings and/or types, sizes and spacings of fixings are not fully specified they shall be suitable for the intended purpose having regard to the nature of and compatibility with the materials being fixed and fixed to; the size and weight of the fixture and the conditions under which it can reasonably be expected to be used; the written recommendation of the manufacturer of the adhesive or fixing, the material being fixed, the material being fixed to.

Adhesives and fixings shall comply with the requirements therefore in any British Standard or Code of Practice document and be used in accordance with :-

- a. the written recommendations of the aforesaid document
- b. the recommendations in any applicable British Standard or Code of Practice documents
- c. best building practice so as to retain the fixture securely in position.

1.14 ***Plugs***

Only hardwood or proprietary fibre or plastic plugs shall be used.

1.15 ***Rates***

All rates inserted in the Bills of Quantities shall cover all costs, charges and profit that may be considered necessary for the carrying out and observance of the provisions of this Bill of Materials and Workmanship.

1.16 ***Description as Pricing standard***

The description of materials, goods and workmanship included in these Bills of Quantities in respect of those items for which the Architect's approval is hereafter required, are to be read as a pricing standard and not as a specification issued by the Architect.

1.17 ***Quantities***

Where the unit of billing is the metre, quantities shall be billed to the nearest whole unit. Fractions of a unit less than half shall be disregarded and all other fractions shall be regarded as a whole unit. Where this would cause an entire item to be eliminated, such item is given to the next unit classification down i.e. Sq m in lieu of Cum, Lin m in lieu of Sq m or No in lieu of Lin m.

1.18 ***References***

Type references given in description for doors, windows and the like and referred to drawings are to indicate the elevational layout only.

**SECTION NO 2: DEMOLITION/ALTERATION / RENOVATION**

- 2.1 Notwithstanding the provisions of Clause B.5.1 of the principles of measurement (International) for works of construction, June 1979, all materials described as “set aside for re-use and or salvaged materials” shall become the property of the Employer unless otherwise specified. The Contractor shall allow for cleaning, transporting and storing on site unless otherwise specified as directed by the Architect. All other demolition materials shall be understood to become the property of the Contractor and shall be cleared away and disposed off site.
- 2.2 Demolition works comprise of demolition of items, removal with care of components, units as specified, cutting of existing structures, making good to disturbed existing structures, finishes, including shoring and supporting to same, all to Architect’s satisfaction.

### **SECTION NO 3: EXCAVATION AND EARTHWORK**

#### **3.1 *Special Specification issued by the Engineer***

The whole of the Excavation and Earthwork shall be as specified in the Engineer's Specification. The Special Specification issued by the Engineer shall take precedence over these specifications issued by the Architect in so far as they relate to structural or related matters.

#### **3.2 *Original-Ground levels***

The levels shown on the various drawings relate to Ordnance Datum unless otherwise stated.

The Contractor shall be responsible for setting up and maintaining a site datum level accurately ascertained from this work.

Should the Contractor not be satisfied with the accuracy of the levels indicated on the Drawings, he must give written notice thereof to the Architect before any work is commenced, otherwise no claim in respect of inaccuracy of levels will be entertained.

#### **3.3 *Pipe trench excavation***

Excavations for drains, water and other services shall be made so that pipes are laid in straight lines, both in the horizontal and vertical planes, and to the gradients required or to even curves to the radii required.

The bottoms of trenches shall be of sufficient width to permit proper jointing of the pipes, and the clearance between the outside barrel of the pipe and the face of the excavation or trench supports shall be not less than 150mm.

Where a concrete bed is not required, the trench bottom shall be properly shaped to receive the pipes including jointing pockets for making the joints and to allow the barrel of the pipes to rest on solid ground.

Include for cutting through tree roots and for removing and carting away any old drains which may be exposed during the works and which interfere with the carrying out of the Contract.

No tree roots which are over 50mm diameter shall be severed from growing trees on the line of a pipe trench without prior permission from the Architect. Where roots are allowed to be severed, they shall be cut back clean to a smooth surface and treated with a fungicidal sealant.

#### **3.4 *Protection of earthworks***

All earthworks shall be properly protected against the risks of slips, falls, subsidence, flood damage and injury from all causes.

**SECTION NO 3: EXCAVATION AND EARTHWORK (CONT'D)**

**3.5 *Liability for excavations***

Notwithstanding any authorisations, approvals or directions given by the Architect with regard to excavations or any matter of thing connected therewith, the Contractor shall be responsible for taking the necessary safety precautions and for any damage arising from the operations.

Excavations shall be carefully planned and executed to ensure that boundary walls, adjacent property and trees are adequately supported at all times and their safety shall be the Contractor's responsibility. No tree roots shall be left uncovered during excavation.

**3.6 *Topsoil storage***

Topsoil retained on the site shall be segregated in separated spoil heaps and protected from contamination by sub-soil, cement, lime, broken concrete, aggregate or similar material or by petrol diesel and lubricating oil or other substance likely to impair growing qualities. Care shall be taken to avoid compaction of the topsoil by vehicles.

Topsoil shall be stacked in spoil heaps not more than 1250mm high and shall not remain unused for more than 12 months unless work is undertaken to turn the soil over to prevent it becoming stale. Weed growth on topsoil heaps shall be controlled by mechanical or approved chemical means, to prevent soil becoming polluted with weed seeds. No topsoil may be used for backfilling. No soil, whether topsoil or sub-soil, shall be deposited on the root spread of existing trees to be retained.

All temporary spoil heaps of sub or topsoil shall be placed in positions previously agreed with the Architect.

**3.7 *Blasting***

Blasting shall not be carried out without the written consent of the relevant Authorities and the permission of the Architect in writing which permission may not be given. Notwithstanding any approval given by the Architect or the relevant Authorities to blasting or the method of blasting, the Contractor shall be wholly responsible for any damage to property or persons resulting from blasting operations.

**3.8 *Termite Treatment***

All foundations and floors shall be treated as directed by the Architect with an approved anti-termite treatment undertaken by an approved specialist.

**3.9 *Soft spots***

In the event of soft spots or running sand being encountered, the Contractor shall immediately notify the Architect and the extent of the remedial work shall be agreed and recorded.

**SECTION NO 3: EXCAVATION AND EARTHWORK (CONT'D)**

**3.10 Approvals**

All excavations shall be carried down to a sufficient depth to ensure a firm bottom (i.e. a minimum of 150mm into load-bearing strata), and no concrete or other material shall be laid until the bottoms have been approved by the Architect.

At least forty-eight hours notice shall be given as to when excavations and bottoms will be ready for inspection. Any variation from the required depths due to soil bearing conditions shall be approved by the Architect.

Notwithstanding any approvals given, any bottom subsequently becoming waterlogged or otherwise spoilt shall be cleaned out and reformed to the Architect's satisfaction before any further work is placed.

**3.11 Excess Excavations**

Should the dimensions of the excavations for foundations be in excess of those required or approved, the Contractor shall, at his own expense, fill the excess volume with mass concrete (1:10) or other approved material

**3.12 Trimming Excavations**

The lower 150mm of soft material in the bottoms of excavations shall not be removed until immediately before placing concrete.

**3.13 Trimming Excavations in rock**

The faces and bottoms of excavations in rock shall be cleaned of all loose material to the satisfaction of the Architect by brushing or washing with water jets before placing concrete or other permanent works. Any extra concrete required due to the unevenness of the faces and bottoms of such excavations shall be deemed to be included.

**3.14 Disposal of water**

The bottom of excavations shall be kept dry and solid at all times and all water, mud or sewage in the excavations from whatever source shall be pumped away or otherwise removed and disposal must be approved by the Architect - before use.

Adequate precautions must be taken to prevent washing out of cement and concrete or any disturbance to the works.

Care must be taken, especially if ground de-watering equipment is used, that lowering of the ground water table in the vicinity of the excavations or the extraction of fine particles of soil from surrounding ground causes no damage to adjoining property.



**SECTION NO 3: EXCAVATION/EARTHWORK (CONT'D)****3.15    *Planking and Strutting***

Provide and maintain planking and strutting, sheeting and shoring as may be necessary to secure and maintain the sides of all excavations, keep excavations clear of fallen materials and remove when no longer required. Planking and strutting shall be deemed to include anything or any means necessary to uphold the faces of the excavations irrespective of whether the Contractor employs any means of support or not. The onus of deciding to what extent planking and strutting is necessary rests with the Contractor. The process for planking and strutting shall include for any necessary additional excavation for insertion of timber sheeting, etc. or for battering to safe angles or repose in lieu of artificial supports.

**3.16    *Starting levels***

The term "Formation level" shall be deemed to be the surface of the ground after reduced level excavation or after filling to make up levels.

In preparing these Bills of Quantities it has been assumed that, unless otherwise described, the Contractor will carry out the stripping and reduced level excavation before proceeding with any other items of excavation; the Contractor may execute the work in any order he wishes, but no consequent adjustment will be made to the measured quantities and any re-measurement will be carried out on the same basis as the original measurement.

Any excavation through deposited earth from previous excavation will be entirely at the Contractor's own expense.

The term "Original ground level" shall mean the existing ground level or the level after stripping of topsoil.

**3.17    *Trial pits and site conditions***

The Contractor is deemed to have visited the site and to have ascertained the nature of the material to be excavated and shall be responsible for making his own decision as to the nature of the ground and sub-soil and carrying out any trial holes or other site investigations.

The Contractor must however use his own judgement as to whether conditions revealed by the trial pits are consistent over the whole site.

The Contractor is advised to visit the site and ascertain the nature of the soil to be excavated as no claim will be entertained on account of the soil being of a different nature from that for which he allowed in his prices.

**3.18    *Collapse***

Should any ground fall in due to the omission or insufficiency of earthwork support or due to any cause whatsoever, it must be dug out and removed or disposed of as directed and the unrequired volume of excavation made up with concrete as herein described all at the Contractor's own expense.

**SECTION NO 3: EXCAVATION/EARTHWORK (CONT'D)****3.19 Notice**

The Contractor is to give not less than 24 hours notice to the Architect when excavations are complete and no concrete shall be cast until the excavations have been inspected and approved in writing.

**3.20 Notice relating to rock**

If the Contractor considers that any of the excavation encountered is in rock as defined hereafter, he must immediately notify the Architect and Quantity Surveyor in writing in order that the nature of the material and that the correct volume of such rock can be ascertained. Failing such notification, the excavation shall be deemed to be in soil and shall be measured and valued accordingly.

**3.21 Filling and Compaction**

Filling under floors and pavings shall consist of approved broken hard stone basalt not exceeding 150mm in size laid and compacted in layers i.e. 225mm thick and rolled with a vibrating roller (1 ¼ tons) or a ten ton roller.

Filling is measured net and to consolidated volumes, no allowance being made for decrease in bulk after compaction.

Filling and compaction to drain trenches shall comply with recommendations of CP 301.

Backfilling around foundations shall be selected excavated material free from deleterious material laid in layers not exceeding 200mm thick and each layer well rammed and consolidated.

Hand packing of hardcore to form vertical or battering faces and sinkings shall be deemed to be included in the rate for filling, unless otherwise described.

**3.22 Preparation of Ground for surface beds or pavings**

The preparation of the ground or filled surface on which a surface bed, pavings or surfacings shall be constructed shall be done by levelling, filling and compacting to the levels, slopes and falls shown on the Drawings.

**3.23 Measurement of excavations**

Excavations are measured to the net width of the concrete or other foundations required as indicated on the drawings by the depths shown or as directed, no allowance being made for bulking or for battering sides. If the Contractor excavates to any widths or depths greater than shown on the drawings or as instructed by the Architect, he shall, at his own expense fill in such depths or width of excavation beyond that instructed or shown with concrete to the satisfaction of the Architect.

**SECTION NO 3: EXCAVATION/EARTHWORK (CONT'D)****3.24 Dimensions and levels**

The Contractor is to supply the Quantity Surveyor with all necessary dimensions fixed by conditions of the site such as levels of foundations etc.

**3.25 Rates for excavations**

The rates for all excavation including the excavation for drains and service ducts shall include:

1. Excavating in any type of materials including rock and including excavating below ground water levels or below water level.
2. Breaking up and removing any existing foundations, walls, slabs, footings, tarmacadam paving, existing tracks below ground level or any other obstructions encountered during the course of the excavation.
3. Excavating in ground interspersed with boulders, rubble filling or waste material and grubbing up, cutting back and sealing off old service mains, pipes, cables, timber and drains or other obstructions.
4. Excavating next to existing roads, footpaths, existing buildings existing services and around existing services etc. The cost of any necessary measures to be taken in such instances shall be borne by the Contractor.
5. For the disposal of the excavated material to a suitable tip to be provided by the Contractor.
6. For excavating the final 100mm down to formation level by hand immediately prior to concreting.
7. For trimming sides, levelling and ramming bottoms and forming steppings unless otherwise described.
8. For removing all ants, pests, termite nests or other parasites over area of site and backfilling holes.
9. Treating the surfaces of earthwork under expansion joints or constructions joints in ground floor slabs, etc with an approved anti-termite protection in accordance with the manufacturer's instructions where so specified.
10. For keeping excavations free from all surface and ground water, slope or mud until the completion of the Contract, for which an item is provided in the Bills.

11. Multiple handling of excavated material and transporting about the site. Any necessary temporary stock piling of excavated before refilling or removal to other parts of the site or away from the site shall be included in the rates. The Contractor shall be entirely responsible for the proper stocking of such stock piles in order to ensure that it does not obstruct building operations in any way.

**SECTION NO 3: EXCAVATION/EARTHWORK (CONT'D)**

**3.25 *Rates for excavations (cont'd)***

1. For all necessary barricades and watching and warning, lighting and protection.
2. Any additional excavation that may be required beyond the net width of the structure for working space, timbering or other temporary work, formwork to sides of foundations and any consequent refilling.

**3.26 *Earthwork support***

An item is provided in the Bills of Quantities for the Contractor to price Earthwork support which shall be deemed to include the provision of everything necessary for adequately maintaining the sides of all excavations and for keeping excavations clear of all fallen materials, rubbish or debris or for any boards or coverings required. This item shall not be subject to adjustment.

**3.27 *Definition of Rock***

Notwithstanding the provisions of Clause B 8.6 of the Principles of Measurement (International) for Works of Construction June 1979, Rock is defined as any material met with which is of such size or position that in the opinion of the Architect it can only be removed by means of excavator with hammer, special plant or explosives. Decomposed rock, tuff or other hard material which can be removed by picks or requires the use of mechanical means (pneumatic compressors and excavator) for its efficient removal shall not be classed as rock. The decision of the Architect as to the classification of rock shall be final and binding.

Rates for excavating in rock shall include for the removal of the material at whatever depth below ground by whatever method is considered appropriate and for getting out and disposal of any additional material beyond the net sizes of excavations shown on the drawings caused by "overbreak" including filling in the resultant voids with approved materials.

**SECTION 4: CONCRETE WORK**

**4.1 *Special specification issued by Engineer***

The whole of the concrete work shall be as specified in the Engineer's Special Specification included in these Bills. The Special Specification issued by the Engineer shall take precedence over these specifications issued by the Architect in so far as they relate to structural or related matters. The Contractor is to allow in his rates for all items therein. The Contractor will be deemed to have considered that his rates are sufficient to enable him to perform the services and obligations in the Specification.

**4.2 *Concrete surface finish to floors***

Where a tamped finish for concrete surfaces is specified, the surface shall be a levelled and screeded uniform plain or ridged finish, which shall not be disturbed in any way after the initial set and during the period of curing; surplus concrete being struck off immediately after compaction.

Where a wood float finish is specified floating shall be done after the initial set of the concrete has taken place and the surface has hardened sufficiently. The concrete shall be worked no more than is necessary to produce a uniform surface free from screed marks.

Where hard smooth steel-trowelled finish is specified trowelling shall not commence until the moisture film has disappeared and the concrete has hardened sufficiently to prevent excess laitance from being worked into the surface. The surfaces shall be trowelled under firm pressure and left free from trowel marks.

Where the surface is to be power floated smooth it shall be carried out by mechanical means and skilled operatives. On completion the surface shall be checked to ensure the final finish is within 5mm of required levels and shall be smooth and dense and free from marks and imperfections. The finished surface shall be adequately protected against damage by subsequent trades as agreed with the Architect.

**4.3 *Precast concrete***

All precast units shall be laid, bedded, jointed and fixed in accordance with the lines, levels and other details shown on the drawings.

All angles and prominent parts are to be suitably protected from injury during the execution of the works.

**4.4 *Jointing***

All joint surfaces shall be thoroughly cleaned. Butt joints of precast concrete sills, stringers, copings, etc to be filled with cement mortar and "Sealastic" sealing compound.

**4.5 *Cleaning Down***

At completion, the whole of the facings are to be cleaned down with pure water. Spirits of salts should not be used unless definitely approved by the Architect.

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**SECTION 4: CONCRETE WORK [CONT'D]****4.6 *Patching and repairs to concrete***

No patching or repairs to honeycombed or defective surfaces shall be carried out. The Architect may reject the whole or part of the structure if in his opinion the appearance is affected by defective work. Plastering of defective work will not be permitted.

**4.7 *Formwork generally***

Formwork shall conform to the shapes, lines, levels, and dimensions of the concrete as shown on the drawings.

Where the surface of the concrete is intended to remain "off the shutter" or "class F1 finish without further covering, wire ties passing through beams or columns shall not be used. For this purpose, steel rods passing through small tubes shall be used. After striking of forms the steel rods shall be removed and the tubes, which remain embedded in the concrete, shall be tightly filled with cement and sand mortar (1:3) as described herein.

The practice of driving nails into concrete for the purpose of securing timber cleats to support formwork components will not be permitted; where special difficulties arise out of this prohibition, the Contractor may apply to the Architect for permission to nail into the concrete on specific occasions.

**4.8 *Formwork finish***

Formwork may be of steel or timber and will be specified for use in accordance with the following classifications:

Class 0 - Formwork intended for use in forming concrete faces with special surface features which will not be covered by any other finishes and shall be such as to impart to the resultant concrete face as for class 1 formwork. Board marked features shall be achieved with the use of 75mm sawn timber boards to the patterns as shown on the drawings.

Class F1 - Formwork intended for use in forming concrete faces which will not be covered other than by painting, if at all shall be such as to impart to the resultant concrete face a finish equal to that which would result from the use of plywood faced shutter boards or special steel forms which are new when concreting commences and are thoroughly cleaned after each use. The Architect may require that parts of the concrete be rubbed down with a carborundum stone to obtain this finish.

Where this class of formwork is used to form the soffits of slabs or the faces of walls, the arrangement of panels shall be symmetrical, set out from edges or centre lines. Odd dimension fill-in panels shall be cut to size and symmetrically placed in approved positions. All joints between shutter panels shall be straight and tight to approval.

Class F2 - Formwork intended for use in forming concrete faces which will be plastered or covered with tiles, or other similar finishes shall be such as to impart to the resultant concrete face a finish equal to that which would be obtained by the use of sawn timber or ordinary steel plates.

Face groove or rebate formers

**SECTION 4: CONCRETE WORK [CONT'D]**

**4.8 Formwork finish (cont'd)**

Where shown or noted on the drawings, forming strips of approved plastic; timber or similar material shall be inserted in or between formwork elements to soffits or faces in such a manner as to form grooves, rebates in the concrete. The grooves or rebates shall be straight, to true lines and arranged in approved patterns

**4.9 Measurement and Pricing**

All costs incurred by the Contractor for complying with the provisions concerning the preparation and use of graded mixes shall be allowed herein.

All rates for concrete shall include for mixing and depositing at the various levels required throughout the building, and shall also include for forming or hacking a satisfactory key for all faces receiving asphalt and plaster work.

Rates for concrete work shall include for all labour and material for forming all construction and day joints and kickers.

Prices for concrete are to include for all necessary curing.

Concrete in small projections, hoods, nibs, fins and the like unless otherwise described is included in the relevant concrete item to which they are attached.

Concrete poured against faces of excavation and beds laid on earth are measured to net volumes. The Contractor shall allow in his prices for any formwork or extra concrete he may consider necessary for such items.

Prices for precast work must include for the erection and removal of all temporary sheds, plant, tools, tackle, pulley blocks, transport for blocks from place of casting to where required in the building, materials, labour, moulds, castings, setting out, setting up and removing moulds and facing up for each casting, wetting, seasoning, hoisting maintaining in position and propping, bedding, grouting, pointing, covering up and protection from damage, cleaning down at completion and for sufficient wire reinforcement to allow for handling, (steel reinforcement speciality described), iron loops or mortices for handling and hoisting.

Notwithstanding the provisions of Clause C4 1.4 of the Principles of Measurement (International) for works of construction June 1979. Formwork to sides of foundations is not measured and shall be allowed for by the Contractor in his rates for concrete if he so desires.



## SECTION 4: CONCRETE WORK (cont'd)

**4.10 Measurement and pricing of formwork**

The term "formwork" is to be taken to include centering, casing, shuttering and the like. Rates for all formwork shall include for fitting together in the required forms, horsing, strutting, shoring, staging, bracing and wedging, plumbing and fixing to true surface and angles, all straight and raking, cutting, splayed edges, notchings, holes for electric conduits, service pipes, etc., cutting and fitting around projecting pipes and continuity bars and the like, narrow widths and small quantities nails, bolts, clamps, wedges, including waste in cutting, overlaps and passings, and properly fixing at intersections, cleaning out before concreting, maintaining in position for the period directed, easing, striking and removing.

The formwork is measured to the actual net area in contact with the finished face of concrete. The Contractor shall allow in his rates for formwork for forming all grooves or rebates as shown or noted on the drawings and as required at all formwork joints. The cost of the formwork required to form construction joints and the like, which may be necessary to uphold the concrete during the operation and setting is deemed to be included in the rate for concrete.

Notwithstanding the provisions of Clause C4.1 item 3 of the Principles of Measurement (International) for works of construction June 1979, formwork to sides of concrete in foundations for strip footings & bases is not measured.

**4.11 Reinforcement**

Reinforcement is measured by computing its theoretical mass from the nominal sizes and lengths shown on the drawings, no allowance being made for waste, rolling margin, supports, spacers or tying wire or for cutting to lengths.

The Contractor shall also allow in his rates for wire or other material required for binding or supporting the reinforcement as well as that of bending, hooking and all other work in providing and fixing the reinforcement as shown on the drawings or specified.

The Contractor shall allow in his rates for fabric reinforcement for the extra material at laps, for cutting the fabric to the sizes required, and for bends, binding wire, distance blocks and waste.

Notwithstanding the provisions of Clause C 3.2 of the Principles of Measurement (International) for works of construction June 1979, reinforcement bars of differing diameters are grouped together and irrespective of location.

## **SECTION 5: BLOCKWORK**

### **5.1 Concrete blocks**

Concrete blocks shall comply with BS 6073 for strength, drying, shrinkage, moisture movement, curing and mix. Blocks shall be obtained from an approved source and shall be good, hard, well cured and pressed and of a regular size and dimensions.

Loadbearing walls shall be type "A" and non loadbearing walls type "B" all as specified in the Special Specification issued by the Engineer. Samples of blocks shall be submitted to the Architect for approval which approval does not relieve the Contractor from complying with the Engineers Special Specification.

### **5.2 Cement**

Cement used for making mortar and blocks shall be ordinary Portland cement to comply with BS 12.

### **5.3 Sand**

Sand used for making mortar and blocks shall be washed rock sand and comply with the relevant BS standard.

The sand used shall be clean, well graded and hard. It shall be free from organic or other deleterious matter, stone, salt and dust and shall be sieved and washed if so directed by the Architect.

### **5.4 Water**

Water shall be clean, fresh and pure water from the mains and shall be kept free from any impurities.

Water shall be tested in accordance with BS 3148 if so instructed by the Architect.

### **5.5 Joint Fillers**

Expansion joints compressible filler shall be Flexcell as manufactured by Expandite Ltd., Chase Road, London and used in accordance with their written instructions.

### **5.6 Mastic pointing**

Pointing mastic shall be Thioflex 600 or other equal approved polysulphide mastic and used in accordance with their written instructions.

### **5.7 Storage of Materials**

All materials shall be stored in accordance with the recommendations in CP 121 and the manufacturer's written recommendations.

**SECTION 5: BLOCKWORK (CONT'D)**

**5.8     *Mixing platforms***

All mortar shall be mixed on a level, non-absorbent and close jointed timber or steel platform. Platforms are to be kept clean and old mortar removed before any new batch of mortar is prepared for mixing. All materials shall be measured in approved and tested gauge boxes.

**5.9     *Mortar***

Cement mortar shall, unless otherwise specified, be composed of cement and sand (1:3). The specified mix proportions are measured by volume using dry sand in proper gauge boxes and bulking shall be allowed for if the sand is damp.

Mortar shall be made and used in accordance with CP 121. The cement and sand is to be mixed dry on a platform until the mix is uniform in colour and then water added gradually through a fine rose and the mixture turned over until the ingredients are thoroughly incorporated and brought to a proper consistency. Only sufficient water shall be use to obtain a workable mix.

Cement mortar is to be mixed in small quantities and must be used within one hour of mixing and no partially or wholly set mortar shall be reused or remixed.

**5.10    *Setting out***

All walls, partitions, projections, openings, etc., are to be carefully set out in accordance with the drawings, checked up with any reinforced concrete work and overall dimensions. The Architect's attention shall be drawn to any discrepancies or if any doubts occur in the setting out before proceeding.

**5.11    *Workmanship Generally***

Blocks which are misshapen or which have broken arises or are chipped, cracked or otherwise damaged shall not be used.

Workmanship shall be in accordance with CP 212 and unless otherwise specified all blockwork shall be built in stretcher bond.

Blocks shall be well and fully soaked before being laid and top of walling where left off shall be well wetted before recommencing block laying.

**SECTION 5: BLOCKWORK (cont'd)**

**5.11 Workmanship Generally**

All courses shall be kept level and in line, and all wall faces, angles and features shall be accurately plumb and true to the lines and true in vertical plane.

Walls shall be set out carefully to ensure satisfactory junctions and joints with adjoining or built in elements and components. All perpendes and angles are to be plumbed, and jambs and reveals properly formed.

Proper setting out rods shall be provided and all work shall be set out for course, opening, heights etc., to the widths, depths and heights indicated on the drawings and as directed by the Architect.

**5.12 Bonding**

Bonding shall be in accordance with CP 121.

All walls shall be constructed with all materials fully bonded or tied together, and joints filled, to ensure compliance with design requirements for stability, strength and fire resistance.

All walls shall be built entirely solid in blocks, without voids, with alternate courses of walls at all angles and intersections carried through the full thickness of the adjoining wall and shall be properly bonded and secured at such intersections.

All walls of 200mm thickness or less shall be built in single thickness of block.

**5.13 Jointing and pointing**

Jointing and pointing shall be in accordance with CP 121.

Blocks shall be well buttered with mortar and shall be solidly bedded and jointed at each and every course throughout the width of each course in cement mortar as described with beds and joints not more than 12mm or less than 10mm thick, all flushed up and grouted solid as work proceeds.

Walls shall be built in such manner that no vertical joint in any one course shall be within 110mm of a similar joint in the courses immediately above or below.

Walls, which are to receive rendering shall have joints raked out as work proceeds as key for plaster.

**SECTION 5: BLOCKWORK (CONT'D)****5.14     *Staging***

All walls shall be properly protected while mortar is setting and all walls throughout the work shall be carried out up more than 1.0 metre higher at one time than any other part of the wall being built.

All putlog holes shall not be less than one course deep and shall be carefully filled with a block cut to fit the size of the hole with beds and joints filled in solid with mortar and well tamped in after scaffolding is removed.

**5.15     *Curing***

Walls shall be kept thoroughly wet for at least three days or for such longer period of time as the Architect may direct. Walls exposed to the sun shall be protected with a sacking which shall be kept wet.

**5.16     *Sample blockwork panels***

Allow for constructing two sample blockwork panels approximately 2 sq m each 150mm thick and when approved sample panels shall form the standard to be maintained throughout the contract.

**5.17     *Cutting***

All rough cutting, raking cutting, curved cutting or cutting to special architectural profiles shall be executed true to the lines and neatly in accordance with the drawings or as directed.

**5.18     *Building-in***

Cramps, gratings, air blocks, dowels, etc., shall be built in cement mortar.

**5.19     *Building-in, bedding and pointing***

Steel door and window frames and the like shall be built as the work proceeds and shall be set up in positions for building in and securely strutted to prevent distortion whilst the walls are being built.

Pressed steel door frames shall be grouted in solid at back with concrete as specified as the work proceeds.

Where steel windows or pressed steel door frames are built against concrete they are to be plugged and screwed on dovetailed hardwood blocks or proprietary fixings cast into concrete walls, beams, columns, etc.

All door, window and similar frames shall be bedded and carefully pointed all round and made perfectly watertight in cement mortar as described.

**SECTION 5: BLOCKWORK (CONT'D)****5.19 *Building-in, bedding and pointing (Cont'd)***

Where door, window and similar frames are specified to be bedded and pointed with mastic compound, they shall be pointed all round externally and/or internally with an approved waterproof compound of such composition that it will not stain surrounding surfaces, and that it will adhere tenaciously, remain plastic without sagging or running, be capable of accommodating any normal movement of the joint sealed and in the case of steel receiving paint without "bleeding". The pointing material shall be forced into the joints, which shall have previously prepared to receive same, by means of a pressure gun or by other suitable method, all in accordance with the manufacturer's instructions.

**5.20 *Chases and holes***

All chases, recesses, projections, etc. cut or formed for electrical conduits, switch boxes, distribution boards, etc., are to be formed as and where shown on drawings and details.

Pockets and holes for pipes are to be formed or neatly cut as required and properly made good thereafter. The positions of all chases and holes shall be agreed with the Structural Engineer. All chases, recesses, projections, holes, etc., are to be cut or formed neatly and to true lines and levels using suitable power tools to prevent any damage to the blockwork.

**5.21 *Protection***

The whole of the blockwork shall be kept clean and protected as the work proceeds.

**5.22 *Rates and Measurements***

The Contractor shall allow in his rates for walling for all plumbing angles, rough cutting whether straight, raking or splay and waste, split courses necessary for bond, bonding at angles, intersections and junctions of walling of different thickness, forming solid tops under beams and soffits of slabs, forming any split course and cutting and fitting around ends of cills and lintels or other members, cutting and pinning ends of structural timbers, steel sections, forming all door, window or other openings including forming reveals to same and for all cutting and waste to walling in short lengths to mullions or jambs of openings; for hoisting and building off beams and slabs at any level, all necessary scaffolding and for work built overhand and building in of items as described.

**5.23 *Cavity Walls***

Clean off surplus mortar from joints on cavity faces as the work proceeds. Keep cavities and cavity trays free from mortar and debris by any suitable means.

**5.24 *Flexible sheet cavity trays***

To be formed on site using a bitumen based polymer damp proof course materials to BS 6398. Form three dimensional changes of shape in cavity trays carefully and neatly to ensure a fully watertight installation, using folds wherever possible to achieve the required shapes at stop ends and junctions. Seal all laps using adhesive/mastic/torching in accordance with manufacturer's instructions.

## **SECTION 6: STONEWALLER/MASONRY**

### **6.1 *Stones***

All stone for walls shall be approved local fieldstone of blue or yellow basalt stone carefully selected for size, strength, colour and texture. Stones shall be sound and hard throughout, free from any defects.

Stones shall be mixed evenly throughout the work to avoid any inconsistencies in pattern or variation in colour or texture.

### **6.2 *Cement***

Cement used for making mortar shall be ordinary Portland cement to comply with BS 12.

### **6.3 *Sand***

Sand used for making mortar shall be washed rock sand and the relevant BS standard.

The sand used shall be clean, well graded and hard. It shall be free from organic or other deleterious matter, stone, salt and dust, and shall be sieved and washed if so directed by the Architect.

### **6.4 *Water***

Water shall be clean, fresh and pure water from the mains and shall be kept free from any impurities.

Water shall be tested in accordance with BS 3148 if so instructed by the Architect.

### **6.5 *Storage of materials***

All materials shall be stored in accordance with the recommendations in CP 121 and the manufacturer's written recommendations.

### **6.6 *Mixing Platforms***

All mortar shall be mixed on a level, non-absorbent and close jointed timber or steel platform. Platforms are to be kept clean and old mortar removed before any new batch of mortar is prepared for mixing. All materials shall be measured in approved and tested gauge boxes.

### **6.7 *Mortar***

Cement mortar shall, unless otherwise specified, be composed of cement and sand (1:3). The specified mix proportions are measured by volume using dry sand in proper gauge boxes and bulking shall be allowed for if the sand is damp.

**SECTION 6: STONEWALLER/MASONRY (CONT'D)****6.7     *Mortar (cont'd)***

Mortar shall be made and used in accordance with CP 121. The cement and sand is to be mixed dry on a platform until the mix is uniform in colour and then water added gradually through a fine rose and the mixture turned over until the ingredients are thoroughly incorporated and brought to a proper consistency. Only sufficient water shall be used to obtain a workable mix.

Cement mortar is to be mixed in small quantities and must be used within one hour of mixing and no partially or wholly set mortar shall be reused or remixed.

**6.8     *Workmanship***

Walls are to be built to the thickness shown on the drawings and the stones shall be bonded solid for the full width and all voids filled in solid with cement mortar as described. Excessive gaps between adjacent stones shall be filled in neatly with smaller stones as the wall is built. All stones shall be "as found" and laid uncoursed. Mortar joints shall be raked to a depth of 25mm from the face of the wall to give a dry stone wall appearance or flush pointed as described.

All vertical faces, returns and reveals of stone walls dressed to true lines and levels.

Stones shall be soaked before being laid and top of walling where left off shall be well wetted before recommencing of stone laying.

All wall faces, angles and features shall be accurately plumb and true to the lines and true in vertical plane.

Walls shall be set out carefully to ensure satisfactory functions and joints with adjoining or built in elements and components. All perpend and angles are to be plumbed, and jambs and reveals properly formed.

Proper setting out rods shall be provided and all work shall be set out for course, opening, heights etc., to the widths, depths and heights indicated on the drawings and as directed by the Architect.

**6.9     *Bonding***

All walls shall be constructed with all materials fully bonded or tied together, and joints filled, to ensure compliance with design requirements for stability and strength.

**6.10    *Staging***

All walls shall be properly protected while mortar is setting and all walls throughout the work shall be carried up evenly, no part being allowed to be carried out up more than 1.0 metre higher at one time than any other part of the wall being built.

All putlog holes shall not be less than one course deep and shall be carefully filled with a stone cut to fit the size of the hole with beds and joints filled in solid with mortar and well tamped in after scaffolding is removed.



**SECTION 6: STONEWALLER/MASONRY (CONT'D)**

**6.11     *Sample stonework panels***

Allow for constructing two sample stonework panels approximately 2 sq m each 450mm thick and when approved sample panels shall form the standard to be maintained throughout the contract.

**6.12     *Cutting***

All rough cutting, raking cutting, curved cutting or cutting to special architectural profiles shall be executed true to the lines and neatly in accordance with the drawings or as directed.

**6.13     *Copings***

Copings to top of stone walls shall be dressed on all exposed faces.

**6.14     *Protection***

The stone wall shall be properly protected from mortar droppings, etc., and kept clean and neat as the work proceeds and the whole of the stonework shall be wirebrushed and cleaned down to the satisfaction of the Architect on completion. Should the Contractor be unable to clean the wall from mortar drop pings etc., to the satisfaction of the Architect, he will be required to re-execute the work to the extent which the Architect may deem necessary at no extra cost.

**6.15     *Rates and Measurements***

The Contractor shall allow in his rates for walling for all plumbing angles, rough cutting whether straight, raking or splay and waste, split courses necessary for bond, bonding at angles, intersections and junctions of walling of different thickness, forming solid tops under beams and soffits of slabs, forming any split course and cutting and fitting around ends of cills and lintels or other members, cutting and pinning ends of structural timbers, steel sections, forming all door, window or other openings including forming reveals to same and for all cutting and waste to walling to short lengths to mullions or jambs of openings; for hoisting and building off beams and slabs at any level, all necessary scaffolding and for work built overhand and building in of items as described.

Rates for stonewalling shall include for all dressing to external angles.

## **SECTION 7: ROOFING**

### **7.1     *Waterproofing***

The whole of the waterproofing works shall be carried out by a specialist firm approved by the Architect. The work shall be executed strictly in accordance with the manufacturer's instructions and shall carry an irrevocable ten year guarantee with the guarantee conditions as approved by the Architect. The guarantee shall be deposited with the Architect at the end of the defects liability period. The waterproofing treatment shall be applied over all expansion joints, parapets, upstands, flashings and dressed into all rainwater heads.

All surfaces to be waterproof shall be inspected by the Specialist who must satisfy himself that the surfaces are in a perfect state to take the waterproofing. All the surfaces shall be cleaned and prepared as required by the Contractor at his own expense.

### **7.2     *Measurement***

Notwithstanding the provisions of the Principles of Measurement Clauses G 2.2 and G 2.3, eaves, ridges, skirtings, fascias, aprons, roof lights, ventilators, soaker collars, hip, special roofing pieces or sheets shall be deemed to be included in the item for coverings and linings measured under G 2.1 unless otherwise specified.

**SECTION 8: WOODWORK****8.1 Definitions**

The term "(f)" qualifying an expression of size means that the work shall be finished to the sizes given. The term "(f)" means that all dimensions contained in an expression so qualified are finished dimensions.

The term "Plugging" shall mean the provision and fixing of hardwood or approved proprietary plugs, or, at the contractors option fixing by other approved mechanical means to any background e.g. blockwork, concrete, etc.

**8.2 Timber generally**

All timbers shall be suitable for the purpose for which it is intended and is to be well and thoroughly seasoned, sound, free from sap, shakes, large, loose or dead knots, cracks, decay, live insect attacks or other defects.

Timber is to be straight and true and any warped or twisted timbers shall be rejected. Timbers are to be sawn die square and shall hold the full sizes specified. All timbers are to be in one piece.

**8.3 Preservative treatment**

Where described as treated, timber shall be pressure impregnated with Tanalith preservative to a dry salt retention of 5.3 kg of preservative per cubic metre of timber. Timber to be treated shall be machined down to its final dimensions before treatment.

Pressure impregnation shall be carried out in accordance with the preservative manufacturer's recommendations and the recommendations in BS 4072 and BS 5268.

After pressure impregnation the timber shall be dried to the moisture content specified hereinafter. All surfaces of timber which are cut or machined after impregnation shall be treated with preservative as recommended by the manufacturer of the preservative used for the impregnation.

Any metal used to fix or fix to timber which has been treated with preservative shall be compatible with the preservative or be treated so as not to corrode under any conditions.

Adhesives used to fix or fix to timber which has been treated with preservative shall be compatible with the preservatives in accordance with the recommendations of the adhesive and preservative manufacturer's recommendations.

**8.4 Timber for carpentry**

All timber for carpentry shall be as specified and of first grade best quality and treated.

**8.5 Timber for joinery**

All timber for joinery shall be as specified and of first grade, best quality and selected.

**SECTION 8: WOODWORK (CONT'D)****8.6     *Wrought timber for joinery***

The quality of timber shall be in accordance with BS 1186. Timber to receive a clear finish shall comply with the requirements specified therein. Timber to receive a paint finish shall comply with the requirements specified therein. Timber grounds and other concealed framing shall comply with the requirements for "concealed or semi-concealed surfaces".

**8.7     *Hardwood Veneers***

Hardwood veneers shall be as stated.

**8.8     *Plywood***

Plywood shall comply with BS 1455 Grade 2, veneer WBP bonding. Marine plywood shall be as specified.

**8.9     *Plastic laminate***

Plastic laminate shall be matt "Formica".

**8.10    *Moisture content***

All timber for joinery shall be kiln dried to a moisture content which shall not be less than 10% nor exceed 12%.

The Contractor shall ascertain the particular moisture content for doors and other joinery items in respect of their location in the finished building before placing orders. The specified moisture content shall be maintained during the execution of the Works.

**8.11    *Source***

All timber shall be obtained from an approved source of supply and shall be in compliance with the specified requirements.

**8.12    *Exposed Joinery***

All exposed woodwork, unless otherwise specified shall be wrot. All wrot surfaces shall be finished clean, smooth and free from tool marks. For each wrot face 1.5mm and 3mm will be allowed off specified sizes for hard and soft woods respectively except where specified as "(f)" or "(f sizes)" in which case the timbers must hold the full size specified.

**8.13    *Workmanship generally***

The quality of workmanship shall be at least equal to the applicable recommendation in BS 1186.

All joinery shall be scribed to fit perfectly in position and unless otherwise described all joinery shall be slightly rounded on all exposed arrises.

**SECTION 8: WOODWORK (CONT'D)****8.13     *Workmanship generally (cont'd)***

When fixed in position, doors and all other joinery work shall remain free from shrinkage, swelling, twisting, splitting, warping or any other defect which will detract from satisfactory performance or appearance.

**8.14     *Treatment of timbers against pests***

No timbers, whether permanent or temporary, which are or show evidence of being, or have been, infected with borer or any other insects, pests are to be permitted on site, and such timbers are to be removed and replaced.

**8.15     *Carpentry***

All carpentry shall be executed with workmanship of the best quality and be accurately set out and in strict accordance with the Drawings. Constructional carpentry shall be framed together in the best and strongest manner and secured with all the necessary straps, bolts and other ironwork.

All plates and similar items shall be in long lengths, properly halved at joints, etc., all according to the best practice and to approval. The provision of all brads, nails, screws, plates or other fixings as directed or approved by the Architect shall be deemed to be included.

**8.16     *Screwing***

No nails whatsoever shall be used. All timber shall be fixed with brass screws or pins. Screws shall comply with BS 1210 as appropriate. Brass screws or pins shall be of the best quality and of gauge, length and strength suitable for the particular work for which they are used. Screws shall be long enough to enter the second timber by at least one-half their entire length. All screw heads shall be countersunk below the timber surface. All work shall be secret fixed wherever possible.

**8.17     *Pelleting and stopping***

Colour and grain match pellets not less than 6mm thick, cut from matching timber only shall be used and shall be finished off flush with face. The exposed face of the pellets shall be perfectly circular and fit in neatly. Stopping to timber shall match the timber in colour and appearance so as to be indistinguishable from the surrounding woodwork.

**8.18     *Fixing of Joinery***

All joinery works shall be executed in accordance with the Architect's drawings and not from measurements at the building. It shall be the responsibility of the Contractor to ensure that the surrounding or enclosing carcass where joinery works are to be fixed in or inserted in the positions are built accurately to the dimensions shown and true to the lines and levels so that all joinery works to be fixed in or inserted in position fit in accurately and neatly in the surrounding or enclosing carcass.

**SECTION 8: WOODWORK (CONT'D)****8.18     *Fixing of Joinery (cont'd)***

It shall be the responsibility of the Contractor to ensure that the necessary fixings are incorporated in the carcass or surrounding, alternatively, the Contractor shall construct such grounds as are required to provide a suitable base and fixing for the joinery works.

Joinery works shall not be fixed in position until after all floor, wall and ceiling surfaces have been formed or constructed and the building enclosed.

**8.19     *Joinery***

All joinery manufacture shall be put in hand immediately after the order has been given to commence work or upon receipt of details. Joinery must be stacked in an approved manner in a dry place and shall not be wedged or glued until just before fixing in the building. Should the joints of any joiner's work open or give, or any shrinkage take place before payment of the final certificate, such defective work shall be taken down, refitted and redecorated or new joinery put in its place at the Contractor's expense.

Unless otherwise specified, all joinery shall be purpose made and worked to detail drawings and shall be constructed in accordance with approved best standard practice, morticed and tenoned, dowelled, dovetailed, tongued, grooved, glued, pinned, screwed, etc., as is best suited for the particular part. All morticed and tenoned joints shall be pinned with hardwood pins in addition to wedging and glueing. Single lengths of skirtings, rails, architraves and such items of joinery are to be used wherever possible in preference to lengths made up of shorter pieces. Heading joints will not be permitted except where unavoidable. Such heading joints are to be splayed and made invisible. Where there are joints in joinery which are to be finished for waxing or oiling, then the ends must be matched for grain.

All exposed screw-heads shall be covered with wood pellets finished flush.

**8.20     *Defective work***

Any work with defects such as shrinkage, warping, etc., appearing before the expiration of the maintenance period for this Contract is to be removed, refitted and redecorated or replaced by new joinery and any other work disturbed in consequence thereof must also be made good, all at the Contractor's expense.

**8.21     *Doors*****a.     Framed doors**

All framed doors shall have continuous stiles, properly morticed for rails, ledges, braces, etc., as detailed, and all these members shall be properly tenoned to fit neatly and tightly into the mortices and shall be securely glued and dowelled in position, the whole frame being held in a metal clamp during dowelling. Where doors are lined with tongued and grooved boarding, the stiles and heads shall be rebated, grooved and V-joined for the boarding, which shall be properly cramped up, secret bradded and twice screwed at intersections with ledges and bottom rail with galvanised countersunk screws.

**SECTION 8: WOODWORK (CONT'D)****8.21 Doors (cont'd)****b. Framed doors**

All framed doors shall have continuous stiles, properly morticed for rails, ledges, braces, etc., as detailed, and all these members shall be properly tenoned to fit neatly and tightly into the mortices and shall be securely glued and dowelled in position, the whole frame being held in a metal clamp during dowelling. Where doors are lined with tongued and grooved boarding, the stiles and heads shall be rebated, grooved and V-joined for the boarding, which shall be properly cramped up, secret bradded and twice screwed at intersections with ledges and bottom rail with galvanised countersunk screws.

**c. Framed, ledged and Braced Doors**

Unless otherwise described, all "framed and ledged" doors and "frame, ledged and braced" doors are to have the ledges and braces chamfered and are to be filled in with grooved, tongued and V-joined both sides boarding in narrow widths, rebated on outer edges and fixed in grooves in stiles and top rail, flush one side and twice countersunk screwed at each intersection with ledges and braces. The inner edges of framing and abutting edges of boarding are to be chamfered to form a V-joint. All edges of boarding and framing and back of ledges and braces are to be primed before assembling.

**d. Solid, Semi-solid and Hollow-Core Doors**

Solid, semi-solid and hollow-core doors are to be of approved manufacture, of the best quality material and workmanship and are to comply with the requirements of BS 459 unless otherwise specified.

**e. Concealed Edges to Doors**

Doors described as "with one edge concealed" are to have an edge strip of material similar to the veneer tongued or glued to one edge of each door. Doors "with all edges concealed" are to have similar edge strips tongued or glued to all edges of each door or leaf.

**f. Hanging Doors**

Allowance is to be made in rates for hanging and fitting all doors to steel or wood frames.

**8.22 Panelled Work**

All panelled or veneered woodwork, whether stained, varnished or painted, etc., is to be of timber carefully selected for uniformity of grain and colour and all to approval

**SECTION 8: WOODWORK (CONT'D)****8.23     *Priming (cont'd)***

The surfaces of all joinery work shall be prepared and primed to receive a paint finish prior to delivery to the site to receive a paint finish on site.

Preparing and priming shall be in accordance with the specification therefore in "Painting and Decorating" hereinafter. Fill and rub down open grained surfaces to give a smooth even surface suitable for the subsequent site applied finish.

**8.24     *Ironmongery***

All ironmongery shall be either of the make and to the exact specification described or of an approved make and design giving similar action. In the latter case actual samples shall be submitted to the Architect for approval and comparison with the goods specified. All ironmongery shall be fixed with screws to match.

All locks shall be stamped with distinctive consecutive numbers and the keys shall be tagged and referenced to the doors, which they operate the lock of and hand over to the Architect on completion. All locks are to be "*en suite*" and are to be supplied with three keys. All locks are to differ so that the key of any one lock will not open any lock other than that to which it belongs and shall be determined according to the master keying system.

The Contractor shall be responsible for ordering correct "hands" of ironmongery and supplying accurate site dimensions for kicking plates and similar items where required.

**8.25     *Protection***

The whole of the joinery works shall be properly protected as directed by the Architect and kept clean and neat during the course of the works and should any joinery works be damaged or disturbed they shall be made good to the satisfaction of the Architect all at the Contractor's expense.

**8.26     *Measurement and rates***

All timbers are measured the net length and no allowance has been made for joints in the lengths whether lapped, spliced, halved or scarved. All work shall be understood to be fixed, including all waste, labour, nails, spikes, brads, screws, pins, etc., laps, dovetailing, mitres, jointing and glueing all of which shall be allowed for in rates. In addition, prices shall also include for selecting and keeping clean for staining or polishing where so described, cutting and fitting around obstructions, notches, rounded corners, sinking and the like, short lengths ends, returned ends, angles and mitres, holes and countersunk holes for bolts, pipes, tubes, bars, cables, conduits and the like, ordinary, cross grain and stopped labours, all plugging and screwing to any background. Unless otherwise stated all joinery work shall be taken as planted on i.e. fixing with nails, pins or screws as may be required.

The Contractor shall also allow in his rates for all fixings and grounds to which joinery is fixed and for hanging and fitting of doors to steel or wood frames.



**SECTION 8: WOODWORK (CONT'D)**

**8.26     *Measurement and rates (cont'd)***

Rates shall include for fixing to softwood, hardwood or pressed metal door frames and for all screws, etc., of corresponding metal or colour. All ironmongery, locks, etc., are to be oiled eased after fixing and as may be required. Rates shall include for protecting from damage, removing ironmongery for decorations and subsequent refixing and cleaning off on completion.

**SECTION 9: METALWORK**

**9.1     *Steel***

Mild steel shall be of an approved manufacture and comply with BS 4360.

**9.2     *Bolts***

Bolts, nuts and screws shall be of the sizes shown and with hexagonal heads and nuts and washers where required. All bolt holes shall be true and opposite. Bolts and nuts shall comply with BS 916 or BS 1494 as appropriate.

**9.3     *Rivets***

All rivet heads are to be countersunk at all bearings, joints and wherever necessary.

**9.4     *Galvanised metalwork***

Metalwork to be galvanised shall comply with BS 729 Part 1.

**9.5     *Galvanising***

All hot dipped galvanising is to be executed in accordance with BS 990. Where this is impractical because of tolerances on screw threads, the finish shall be electrogalvanised to BS 1706 Class A or BS 3382. The latter process shall be used for making good any damage to hot dipped galvanising if so directed by the Architect.

**9.6     *Stainless steel***

Stainless steel shall comply to BS 1449 or BS 4127.

**9.7     *Generally***

All metalwork shall be delivered to the site quite clean and free from rust, pitting or any corrosion.

**9.8     *Steel windows***

All steel windows shall be from galvanised sections or hot dipped galvanised after manufacture.

A sample window shall be submitted to the Architects for approval before any order is placed. All sectional frames, casements and glazing bars are to be free from flaws and other imperfections.

All steel windows and doors and frames shall be constructed in FX6 and FX8 section with tee glazing bars as specified.

All top, bottom and side-hung opening casements, unless otherwise described or shown on the drawings, are to be hung on stout steel pivot hinges with gunmetal centres.

**SECTION 9: METALWORK (CONT'D)****9.8 *Steel windows (cont'd)***

All top hung opening fanlights and casements, unless otherwise described or shown on the drawings, are to be fitted with brass peg stays with pegs arranged to lock window when closed.

All side-hung casements, unless otherwise described, or shown on the drawings, to be fitted with brass handles and pivot with night ventilating notches to engage with striking plate and adjustable brass sliding stay.

All horizontal and vertical pivot hung sashes are to be fitted with approved bronze friction centres capable of adjustment and fitted with brass fastening, unless otherwise described or shown on the drawings.

Steel doors with frame and sash frame are to be as described. Kicking plates and other solid plates are to be of 5mm mild steel fixed with metal beads screwed on. Locks and furniture to be as described and to have three keys. Each leaf of doors is to be fitted with two 150mm brass square pattern tower bolts.

All large windows are to be provided with temporary braces or stiffeners to prevent coupling screws or sections being strained during transit, hoisting and handling. After windows are built in and prior to glazing, each window must be carefully tested and adjusted to ensure that opening sections are in perfect working order, make good contact and are watertight and that glazing bars are perfectly aligned.

**9.9 *Naco louvers***

Naco louvres shall be in galvanised steel or anodised aluminium with an anodising of not less than 20 microns and shall be obtained from an approved supplier. A sample louver shall be submitted to the Architects for approval before any order is placed.

Naco louvres shall be complete with fixing screws, plugs, weatherstrips at heads and sills and all necessary fixing accessories.

Composite openings of 1000mm high and above shall be provided with aluminium mullions 6mm x 50mm as the manufacturer's recommendations and shall be fixed by means of retaining brackets with 4 screws each head and cill and bolted to the louver channels.

Naco louvres shall be glazed with 152mm x 6mm clear float glass louver blades with two long edges bevelled and polished.

The whole of the naco louvres shall be fixed in accordance with the manufacturer's instructions.

**SECTION 9: METALWORK (CONT'D)****9.10    *Pressed steel door frames***

Pressed steel door frames are to be of 1.60mm (for once rebated frames) and 1.20mm (for twice rebated frames) close annealed and hydraulically flattened galvanised steel sheets, pressed to shape, mitred and welded at angles and provided with six approved steel lugs (three to each jamb) with ends split and flanged for building into walls. Frames described as suitable for fixed or opening fanlights are to have transomes of similar steel with welded seams at edges and ends tenoned into and welded to frames. Frames are to be fitted with solid plates or bracing bars across bottom.

Unless otherwise stated, each frame is to be fitted as described with approved heavy steel butts welded on. Each frame to doors fitted with a mortice lock is to be slotted for bolt, correctly positioned and to have a mortice cap welded on at back of perforation. All necessary drilling for sundry ironmongery such as fanlight openers, bolt sockets, etc., should be executed by the steel frame manufacturers at the works and the Contractor is to undertake to supply the correct information to the manufacturer to ensure that this is done. All frames are to be fitted with a pair of anti-slam buffers.

Fixings for set-screws are to have a solid welded on at back in all cases. All steel frames are to be thoroughly cleaned free from rust, scale, etc., and to be primed prior of delivery to the site.

**9.11    *Roller shutters***

Roller shutters shall be in galvanised mild steel plates of 18 S.W.G sheets and be obtained from an approved manufacturer.

Shutters shall be complete with guides, channels manual gear, gearbox caning, lock and cyclone bars as appropriate.

Roller shutters are to be designed, manufactured and fixed to withstand the worst cyclonic conditions and a written guarantee shall be provided by the manufacturer together with any supporting evidence and samples before any order is placed.

**9.12    *Aluminium openings***

Aluminium screens, doors and windows shall be obtained from an approved manufacturer. Anodising shall not be less than 20 microns and all aluminium shall be anodised or if as specified be finished with a polyester powder coat finish which shall be a synthapulvin polyester powder coat to an approved colour with a minimum thickness of 84 microns.

Aluminium screens shall be complete with all glass and ironmongery as specified.

The whole screen shall be designed, manufactured and fixed to withstand the worst cyclonic conditions and a written guarantee shall be provided by the manufacturer together with any supporting evidence and samples before any order is placed.

**SECTION 9: METALWORK (CONT'D)**

**9.12     *Aluminium openings (cont'd)***

Aluminium extrusions shall be of 6063-T6 alloy and temper. Aluminium sheet and strips shall be of 1200-H4 alloy and temper. Aluminium bars and sections shall comply with the relevant clauses of BS 1476, extruded tube and hollow sections with the relevant clauses of BS 1474 and sheet and strips with the relevant clauses of BS 1470.

Joints in all aluminium members shall be formed in an approved manner so that the joints are practically invisible. Screw heads, pins, rivets, etc. shall be concealed as far as possible. 300 series stainless steel screws and bolts shall be used for jointing and fixing aluminium work.

The surfaces of all aluminium which are in contact with other materials when fixed shall be suitably insulated with a non-absorbent insulating material to prevent corrosion. All aluminium work shall be suitably protected against damage, deterioration or discolouration caused by mortar droppings, paint, etc. by taping with removable tape, covering with temporary casings or by covering with mortar oil all to approval.

Descriptions of aluminium work shall be deemed to include for insulation and protection as described.

**9.13     *Composite items of metalwork***

The fabrication, assembly and erection of all composite items of metalwork shall be executed in accordance with the Architect's drawings.

Metalwork, which is bent or distorted during loading, transporting, off loading or in storage, will be rejected by the Architect.

All composite items of metalwork shall be hot dipped galvanised after manufacture as described.

**9.14     *Fixing and erection***

All metalwork including doors and windows shall be inspected for damage on arrival on site and any damage to hot dipped galvanising or paint shall be made good as described.

All seatings and surrounds shall be checked for line, level and bolt setting before commencement of fixing. Errors, which cannot be accommodated without distortion, shall be brought to the attention of the Architect. Drifting or burning of holes will not be permitted.

**SECTION 9: METALWORK (CONT'D)**

**9.15    *Freedom from surface defects***

All welded fillet or butt joints shall be ground smooth and shall be free from porosity, cavities and entrapped slag before hot dipped galvanising.

Welds which are to be hot dipped galvanised shall be neatly formed and the surfaces shall be acceptably free from cracks in the welds or heat affected zone, from overlap, undercuts, porosity, entrapped slag and spatter in or associated with the welds. The welds shall seal completely the edges of all overlapping or contacting surfaces.

The profile of the weld shall be uniform of approximately equal leg length and free from overlap at the toes of the weld. Unless otherwise specified, the surfaces shall be either flat or slightly convex in the case of fillet welds and with a reinforcement of not more than 3mm in the case of butt welds. The weld face shall be uniform in appearance throughout its length.

**9.16    *Temporary bracing of metalwork***

The Contractor shall be responsible for whatever temporary bracing is necessary. Upon completion of the Works all temporary bracing, brackets, cleats and the like shall be removed and all surfaces made good or painted as specified.

## **SECTION10: FINISHINGS**

### **10.1 *Generally***

The whole of the plasterwork shall be executed to the entire satisfaction of the Architect and in accordance with the following applicable BS and CP documents:

BS 5262 for external rendered finished

BS 5385 for wall tiling and the backings thereto

CP 202 for tile flooring and slab flooring and beds thereto

CP 203 for sheet and tile flooring and beds thereto

CP 204 for insitu floor finishes and beds thereto

All materials and accessories used in connection with finishings shall comply with the above requirements of the above applicable documents.

Any work rejected by the Architect shall be re-executed by the Contractor at his own expense.

### **10.2 *Cement***

Cement shall be ordinary portland cement as described.

### **10.3 *Sand***

Sand used shall be washed rock sand of fine grains screened through a **1.6** mm mesh sieve and shall have three washings.

### **10.4 *Water***

Water used shall be as described.

### **10.5 *Storage of Materials***

All materials shall be stored in accordance with the recommendations in CP 121 and the manufacturer's written recommendations.

### **10.6 *Mixing Platforms***

All render or screed shall be mixed on a level, non-absorbent and close jointed timber or steel platform. Platforms are to be kept clean and old mortar removed before any new batch of mortar is prepared for mixing. All materials shall be measured in approved and tested gauge boxes.

### **10.7 *Render or Screed***

Render or screed shall, unless otherwise specified, be composed of cement and sand (1:3). The specified mix proportions are measured by volume using dry sand in proper gauge boxes and bulking shall be allowed for if the sand is damp.

**SECTION 10: FINISHINGS (CONT'D)****10.7    *Render or Screed (cont'd)***

Render or screed shall be made and used in accordance with CP 121. The cement and sand is to be mixed dry on a platform until the mix is uniform in colour and then water added gradually through a fine rose and the mixture turned over until the ingredients are thoroughly incorporated and brought to a proper consistency. Only sufficient water shall be used to obtain a workable mix.

Cement render or screed is to be mixed in small quantities and must be used within one hour of mixing and no partially or wholly set render or screed shall be revised or remixed.

**10.8    *Preparation of Surfaces***

All surfaces of concrete receiving rendering or similar finishings shall be scabbled or well hacked to form a good key immediately after the formwork is removed. The hacked surfaces shall be wire brushed and well wetted and slushed over with cement slurry (1:2) to form a good key for the finish. The slushing shall be allowed to set hard before any finish is applied.

Concrete floors and roofs receiving screeds shall be hacked or scabbled to form a good key, washed thoroughly cleaned with a wire brushed and thoroughly wetted and a coat of neat cement slurry (1:1) applied before any screeding is commenced.

No traffic shall pass over nor shall any building operations take place on the prepared surface without proper covering and protection.

**10.9    *Thickness of rendering***

Rendering on walls shall be not less than 13 mm or more than 20 mm in thickness and rendering on concrete beams and ceilings or hollow block soffits shall be not less than 13 mm or more than 16 mm in thickness, unless otherwise specified.

Moulds, weathering, projecting or sunk bands, cores and other special architectural features shall be executed in accordance with the drawings to a true finish and are to include for any dubbing out.

Internal angles are to be coved to a radius of not more than 25 mm.

**10.10    *Application of rendering***

All walls shall be well wetted with a hose before rendering is commenced.

**10.11    *Cement and sand rendering***

Cement and sand rendering on walls shall be one coat work composed of 3 parts of sand and 1 part of cement, all by volume, and mixed as described.

The surfaces of internal rendering shall be steel trowelled to a smooth, even and true finish.



**SECTION 10: FINISHINGS (CONT'D)****10.11 Cement and sand rendering (cont'd)**

External rendering shall be finished to a true even surface with a wood float and to a sponge textured finish.

Rendering shall be returned into reveals, soffits of openings, margins and sunk bands and the like and all angles shall be true and straight with salient angles rounded.

All rendered surfaces shall be free from blemish. All cracks, blisters and other defects shall be cut out and made good and the whole left perfect at completion.

All rendered surfaces shall be kept damp and moist for at least two days after the final coat has been applied.

**10.12 Expansion Joints in rendering**

At the intersection of block walls with concrete walls, columns and beams and at straight joints between temporary and permanent block walls, form expansion joints in the render (all types) as follows: -

- a. Coincident with the junctions of the walls with the concrete and coincident with the above mentioned straight joints form a cut through the full thickness of the rendering coat with a steel trowel.
- b. Form a similar cut through the setting coat or finishing coat of render finished with a neat edge to give a thin straight cut in the plaster.
- c. Where concrete beam or column sides and block walls are to be finished with a flush coating of plaster, the two are not to be plastered in the first coat simultaneously but shall be covered separately so that the exact position of the junction between the two bases are properly located and the expansion/contraction joint is made in the correct position.
- d. Where no joint is allowed between concrete and blockwork expanded metal lathing shall be fixed above junctions prior to rendering.

**10.13 Tyrolean rendering**

Tyrolean rendering shall be in two coat work consisting of a 12mm backing coat of render as described of one part cement to four part of sand trowelled up to an even and true surface followed by a tyrolean finishing coat of cement and sand of a suitable mix applied with a special spraying machine to fine grain and built up in three coats to a total thickness of 8mm all as directed and to the approval of the Architect.

Floated tyrolean rendering where specified shall consist of tyrolean rendering as described above but finished neatly to an even and true surface with a steel float.

All grooves, flush bands around openings, joints or returns to reveals, soffits of openings, margins, and sunk bands and the like shall be formed as directed by the Architect.

**SECTION 10: FINISHINGS (CONT'D)**

**10.14    *Rendering on Ceilings***

Cement and sand (1:3) rendering to concrete ceilings shall be as described.

Tyrolean rendering concrete ceilings and beams shall be as described, finished to a fine grain tyrolean render.

**10.15    *Screed to floors and roofs***

Screed to floors, treads of steps, thresholds and similar horizontal surfaces, unless otherwise specified, shall not be less than 25 mm thick composed of 3 parts of sand and 1 part of cement, all by volume, and mixed as described and shall be trowelled to a true, level and smooth surface to final finish or suitable to receive the final finish of tiles or similar finishings.

Screed to stair risers, sides of kerbs and other associated vertical surfaces, unless otherwise specified, shall not be less than 13mm.

Exposed salient angles shall be neatly rounded to approximately 20mm radius, unless otherwise specified.

Screed to roofs and gutters shall be laid to the thickness and falls, crossfalls as shown on the drawings.

All screeds shall be kept and as moist damp until hardening and curing is completed as directed by the Architect.

Any screeding to receive tiles or similar finishings shall be laid in good time to allow it to be perfectly dry when the finishings are laid.

**10.16    *Rocksand screed***

Rocksand screed shall comprise 1 part of cement to 3 parts of washed rocksand of an approved grain, all by volume, and mixed as described and shall be trowelled up to a true, level and smooth surface to final finish or as preparation for further finish whilst unset.

**10.17    *Composite screed and tiling finish***

Tiles shall be laid on cement and sand bed to pattern as described hereafter, then rocksand screed shall be laid as described before in between the tile patterns to a true, level and flush surface.

**10.18    *Brushed rocksand screed***

Rocksand screed shall be laid as described and whilst the surface is unset it shall be finished by lightly wire brushing surface to expose fine aggregate with smooth plain borders or tile patterns as directed.

**SECTION 10: FINISHINGS (CONT'D)****10.19 Bushammered finish**

Rocksand screed shall be laid as described and finished with a light bushammered finish as directed with plain margins, bands, grooves and the like.

**10.20 Tiling**

Screed floors to receive ceramic tiles shall be laid as described and whilst unset ceramic floor tiles shall be laid, with a thin contact layer of cement mortar slurry composed of one part cement to 1-2 parts of sand, grain size 0-1 mm, by volume and mixed as described to provide a true, level and neat surface. Tiles shall be laid to patterns and profiles with continuous joints and shall have all joints rubbed in solid with neat cement as described.

Ceramic wall tiles shall be fixed to a plaster backing with an approved adhesive or fixed direct to walls in (1:3) cement mortar with horizontal and vertical joints continuous and shall have all joints rubbed in solid with neat white Portland cement.

All ceramic tiles shall be well soaked in water for at least 24 hours before fixing and thoroughly cleaned off and protected after fixing.

Tiling shall be returned into reveals of openings and on to window sills and shall be butted at internal angles and provided with special edge tiles to external angles, unless otherwise specified. All necessary cutting to tiles shall be properly performed with mechanical means.

Where rounded angles are not available, corner edges are to be mitred for the full length of the tile. The whole of the ceramic floor and wall tiling shall be cleaned using cleaning materials and methods as recommended by the manufacturer of the materials being cleaned and the applicable CP. In the absence of such recommendations only suitable cleaning materials and methods in accordance with the cleaning material manufacturer's recommendations shall be used.

**10.21 Terrazzo work****10.21.1 Cement**

Cement shall be Portland cement as described.

**10.21.2 Aggregates**

- a. Aggregates for undercoat for floors shall be of one part Portland cement to two parts of washed rock sand as described and one part crushed quartzite, all of which is to pass a 10 mm mesh and to be free of dust and to approval.
- b. Sand for undercoat for walls shall be hard, clean washed rock sand graded from fine to coarse and to approval.

**SECTION10: FINISHINGS (CONT'D)**

**10.21 *Terrazzo work (cont'd)***

**10.21.2 Agg r eg ates ( c ont' d)**

- c. Aggregate for finishing coat of terrazzo shall be marble chippings - granular not flaky - of the kind and colours specified. This aggregate is to be graded from coarse to fine.
- d. All aggregates are to be free from organic or other deleterious matter and samples of the marble aggregate are to be submitted for approval and the aggregate used is to comply with the approved sample or samples.
- e. Mixes: Cement and aggregates to be proportioned by volume

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10.21.3 **Terrazzo**a. General

All terrazzo work is to be executed by artisans specialising in such work and approved by the Architect. Samples of the finished terrazzo work (floors, stairs, walls, etc.) are to be submitted for approval and thereafter all terrazzo work is to be equal to the approved samples and in compliance with the specification. Such samples are to be not less than 600mm x 300mm or, in the case of steps, not less than 400mm in length and shall include the undercoat.

b. Terrazzo floors

Terrazzo floors or pavings unless otherwise specified shall be constructed and laid as follows:

The concrete surface is to be thoroughly cleaned, wire brushed and well sprayed with water.

The undercoat to be of one part cement to three parts of fine aggregate brought to a true and even, but rough, level or face not less than 15mm below the finished surface of the terrazzo floor and not less than 25mm thick.

On this undercoat is to be laid the terrazzo finishing coat not less than 15mm thick, divided into panels, as shown on drawings, with approved brass or white metal strips having approved "keyed" web, embedded into the undercoat and left projecting to suit finishing coat

The terrazzo-finishing coat, except where otherwise specified, is to be of waterproof cement (white or coloured) and marble chippings as described, in the required and approved proportions and to be mixed dry. After this dry mixing, water is to be added to make a paste. The finished surface is to show approximately 85% of marble.

**SECTION 10: FINISHINGS (CONT'D)****10.21 Terrazzo work (cont'd)****10.21.3 Terrazzo (cont'd)****b. Terrazzo floors (cont'd)**

The finishing coat is to be uniform in composition and appearance over the whole surface and throughout its entire thickness.

**c. Brushed Terrazzo**

To be as before described but when the surface is sufficiently hard it is to be brushed with clean water and a hard brush to remove all surplus cement. All finished surfaces of in-situ brushed terrazzo are to match the finished surfaces of precast works.

**d. Polished Terrazzo**

Where polishing is specified, this is to be executed with a fine abrasive stone.

**e. Precast Terrazzo**

All precast terrazzo blocks are to be made and supplied by an approved manufacturer and such manufacturer shall be skilled and experienced in this class of work.

The Contractor is to submit samples of precast terrazzo for approval. Such sample blocks shall consist of the core and the facings (the facings on one side and on edge).

The final sample or samples as approved, to be lodged with the Architect and thereafter all precast terrazzo blocks supplied for the works of this Contract shall be equal to the approved sample or samples.

All precast terrazzo blocks are to be made in accordance with the drawings and details and are to be cast with joggles, housings, frogs, slots, mortices, grooves, rebated joints, throatings, weatherings, etc., as shown on the drawings or as required.

All bottom edges and return bottom edges of sill blocks to be splayed for damp course. No beds or joints are to exceed 5mm in thickness. The Contractor, when making the blocks is to check all figured dimensions given on the drawings and before work is put in hand all dimensions are to be verified from the building. The Contractor will be held solely responsible for ascertaining the exact sizes of all blocks and slabs.

**SECTION 10 FINISHINGS (CONT'D)****10.21 Terrazzo work (cont'd)****10.21.3 Terrazzo (cont'd]****e. P recast Terrazzo (co nt'd)**

Full setting out drawings are to be prepared where necessary and to be submitted for approval before the moulds are made. The Contractor is to indicate, before signing of the Contract, if he is not satisfied with the thickness of slabs detailed and method of fixing and after having the matter resolved, is to take full responsibility for twisting and other defects of slabs.

The blocks are to be finished perfectly straight and true and to be accurately profiled in accordance with details.

Stone is to be clean, sharp, machine crushed granite, free from dust, salt, clay or other deleterious matter and to be graded for concrete work and of a fine texture for finished work. Flat spalls or elongated pieces and crusher screenings to be rejected.

The blocks (core and finishing) are to be adequate in crushing strength, durability and density and free from any tendency to absorb water or moisture and to be free from flaking, crazing and any all other defects.

**1. Core**

The core is to consist of one part by volume of cement; two parts by volume of sand and four parts by volume of 10mm stone chippings. The whole to be distributed uniformly to not more than 15mm from the finished surface and to be deposited into the moulds in a wet state (not dry pressed) while facing is still wet.

**2. Facing**

All precast terrazzo blocks are to be properly cured and matured. The blocks, after casting, are to be cured under continuous moist conditions, but are not to be exposed to free air for at least 10 days after casting.

The "facing" of the blocks is to be 15mm to 20mm thick and the core and facing shall be such that they will form together one consolidated integral mass.

**SECTION 10: FINISHINGS (CONT'D)****10.21 Terrazzo work (cont'd)****10.21.3 Terrazzo (cont'd)****2. Facing (cont'd)**

The facing is to be of one part by volume of Portland cement, tinted to approval, to two parts by volume of marble chips 3mm gauge. The marble and colour is to be approved. No colouring matter is to be used unless sanctioned by the Architect, and if sanctioned, such colouring matter is to be used to the extent as shall be decided upon, is to be mixed dry with the cement and to be uniform throughout the whole thickness of the facing. The facing mixture is to be poured into the moulds in a wet state (not dry pressed) and thoroughly worked up against finished faces and finished clean from the moulds with all arises clean and sharp.

The finish of exposed surfaces is to be kept wet by spraying at regular intervals. All exposed surfaces of blocks to be of even colour, free from blemishes, cracks or other imperfections. All exposed faces externally to be highly polished with a fine abrasive machine.

All precast terrazzo blocks are to be properly cured and matured. The blocks, after casting, are to be cured under continuous moist conditions, but are not to be exposed to free air for at least 10 days after casting.

The making of the blocks is, therefore, to conform with a time schedule prepared by the Contractor so that the blocks will be available in a properly matured condition when they are required to be built in.

Internal corners of blocks are to be splayed and thickened and out at weak spots where shown on drawings.

The Contractor is to provide storage space where the blocks can remain under suitable and proper conditions and without risk of being discoloured or damaged.

Provision is to be made for hoisting and handling the blocks so that they will not be damaged.

All blocks are to be solidly bedded, grouted and jointed in (1:2) cement mortar. Cement mortar to be mixed in small batches as no mortar that has once commenced to set shall be used. Platforms to be well cleaned before mixing each batch.

The joints are to be raked out as the work proceeds and pointed with slightly ruled-in half round joints with 3:1 tinted cement mortar to approval.



**SECTION 10: FINISHINGS (CONT'D)****10.21 Terrazzo work (cont'd)****10.21.3 Terrazzo (cont'd)****2. Facing (cont'd)**

All precast terrazzo blocks are to be kept clean during process of handling, building in and pointing.

Allow for covering up and protecting all work from damage and stains and cleaning off with soft soap and hot water immediately before occupation and finally treating with an approved colour fixing emulsion, all to the satisfaction of the Architect.

All damaged blocks must be removed and replaced at the Contractor's expense.

**3. Non-slip surfaces**

Where so specified terrazzo pavings, etc., to be thoroughly sprinkled with fine "Alundum" or other approved and similar abrasive material of a colour to match the terrazzo in the proportion of 1,22 Kgs of "Alundum" to each square metre of paving, well rolled into the aggregate immediately after the water is extracted.

**4. Damage**

All terrazzo work is to be protected against damage or discolouration until the building is handed over. Should any terrazzo work be damaged during the process of the works, it is to be replaced to the satisfaction of the Architect.

**10.22 Samples**

The Contractor shall prepare samples of all finishings as directed until the quality, texture and finish required is obtained and approved by the Architect after which all work shall conform to the respective approved samples.

**10.23 Measurement and rates**

Rates for plastering and screeds shall include for the preparation of all surfaces as described all temporary rules and grounds, forming all internal and external angles, fair edges, finishing against frames, windows, dishing to outlets, around pipes, holderbats, etc., narrow widths, small quantities, any extra thickness or dubbing out consequent upon the concrete not being finished to true levels, curing, protection and cleaning.

Rates for tiling shall include for narrow widths, small quantities, all cutting and waste, forming internal and external angles, bedding and pointing as described (backings measured separately) and cleaning down on completion.

## **SECTION 11: PLUMBING AND SERVICES INSTALLATIONS**

### **11.1 *Special specification issued by Services Engineer***

The whole of the services installations shall be as specified in the Special Specification issued by the Services Engineer which shall take precedence over these specifications in so far as services installations or related matters are concerned.

### **11.2 *Rainwater installation***

All rainwater pipe drainage is to be arranged or planned out in detail by the Contractor in accordance with the drawings and details and all changes of direction, outlets, inlets, etc., are to be placed at the correct levels and positions as shown on the drawings and details.

Rainwater pipes and fittings shall be unless otherwise specified of PVC to BS 4514 and/or BS 5255 fixed to true lines with straps supplied by manufacturer, plugged and screwed to concrete or blockwork and all in accordance with the manufacturer's instructions. Balloon gratings shall be of galvanised wire.

The whole of the rainwater installation shall be tested with water to the satisfaction of the Architect and the whole system left sound and perfect.

Where rainwater pipes are shown on the drawings or specified as being embedded through reinforced concrete columns, etc., these pipes are to be of PVC pipes as described. They are to be placed in the correct positions shown on drawings and in accordance with the requirements of the Architect or of his drawings.

Before any pipes are concreted in, each run of pipe is to be properly tested with a water test and the test is to be completed and approved before concreting. In this test the bottom end of the pipe is to be closed and the pipe run filled with water to the highest point and so on with each subsequent pipe run, from the bottom, until the full height or length of the pipe is reached. The tests are to be repeated if necessary until all the pipes are perfectly water tight.

As soon as any pipes are placed in position, the top ends of the pipe or any inlets to it are to be adequately protected against the entry of any concrete, mortar, rubbish or dirt.

All rainwater pipes going through columns shall be fitted with a "Y" junction complete with cleaning eye and cover 300mm above the lowest floor level below which the pipe is to discharge into the sump. All rainwater pipe drainage is to be arranged or planned out in detail by the Contractor in accordance with the drawings and details, and all changes of direction, outlets, inlets, etc., are to be placed at the correct levels and positions shown on the drawings and details.

**SECTION 11: PLUMBING AND SERVICES INSTALLATIONS (CONT'D)**

**11.3     *Acts, bye-laws and notices***

All the work shall comply with the requirements of the statutory authorities concerned, the Municipality and/or district council bye-laws and regulations and shall be executed to the satisfaction of the Architect.

**11.4     *Sanitary fittings***

Sanitary fittings shall be supplied by an approved supplier and shall be free from any defects, cracks, chips or scratches.

All sanitary wares shall be protected during and after fixing and shall be fixed in accordance with the manufacturer's instructions with fixings and fastenings supplied by the manufacturer. All sanitary fittings shall be properly connected to waste and soil pipes and cold-water installations. On completion, the whole of the fittings shall be tested to prove that they operate freely and be left in a clean and serviceable condition.

Any sanitary fittings damaged, prior to handing over the works shall be replaced by the Contractor at his own expense.

**11.5     *Workmanship generally***

All work shall be carried out in accordance with the drawings and specifications and in accordance with the best standard practice. All work shall be executed in collaboration with other trades employed in connection with the works so that all trades will result in a neat and workman like job. Working space shall be kept for repairs and cleaning. All holes are to be made good.

The positions of all pipe runs, including joints and connections, shall be agreed with the Architect before work is commenced.

All plumbing work shall be carried out in accordance with the drawings and specification. The Contractor is to provide all materials and labour necessary for the completed work.

Should there be any discrepancy between the drawings or specification and the requirements of any Bye-laws or Regulation the Contractor is to notify the Architect and obtain instructions before proceeding with the work in question.

All plumbers' work is to be executed in accordance with the best standard practice.

All plumbers' work is to be executed in collaboration with any specialists employed in connection with the works – such as Electricians, and other Services Engineer, etc., so that all trades will result in a neat and workman like job, and so that space is conserved and working space obtained for repairs and cleaning.

**SECTION 11: PLUMBING AND SERVICES INSTALLATIONS(CONT'D)**

**11.6 *Builder's Work Drawings***

The Contractor shall provide the Architect, before commencing any plumbing work, all such drawings and details of the builder's work required in connection with these installations.

Pipes passing through walls, beams or slabs shall be done to approval and sleeves are to be provided and built into the correct positions.

All holes are to be properly made good, to the entire satisfaction of the Architect.

Cutting of holes into or through any structural or related works shall only be done with the approval of the Engineer.

Pipes are to be so placed and fixed that there will be at least 25mm clearance between the pipe or pipe fittings and the finished wall or ceiling face. Where this is not possible the Architect is to be consulted before proceeding.

No drains, joints or connections shall be covered in or encased in concrete until they have been approved and have been tested as specified.

All chases, recesses, projections, holes, etc., are to be cut or formed neatly and to true lines and levels using suitable power tools and shall be properly made good thereafter to the satisfaction of the Architect.

**11.7 *Testing***

The Contractor shall from time to time as required to suit the progress of the building work, test the plumbing and internal drainage in sections, to the satisfaction of the Architect, before any such work is covered.

On completion, the whole installation shall be tested as the Architect may direct and any defect made good. The Contractor shall include in his rates for providing everything necessary for these tests and storage tanks, filling and testing the whole of the water installations in accordance with CP 310 and CP 342.

**11.8 *Protection***

All pipework shall be properly protected from damage during the course of the works and during the backfilling of any trenches or closing up of any ducts. The Contractor at his own expense shall replace any pipework damaged due to non-protection thereof.

**11.9 *Builder's work drawings and measurement details***

Notwithstanding anything contained in the Principles of Measurement of Works (International) for works of construction, June 1979, builder's work in connection with plumbing and sanitary installation has been given as an item.

**SECTION 11: PLUMBING AND SERVICES INSTALLATIONS (CONT'D)****11.10 Measurement and Rates (cont'd)**

Rates for pipes shall include for fixing as required, the provision of all plugs, screws and other fixings, for all pipe clips, holder bats, etc., short lengths, cutting and joints in the running length.

All fittings, valves, taps, meters, sanitary ware, tanks, etc., shall include for jointing to pipes and prices shall allow for all necessary adaptors, connectors, bolts, flanges, sealing rings, etc. The Contractor shall also include for all testing as described and for complying with all bye-laws and regulations.

**11.11 Setting out**

The position of all pipe runs, including joints and connection, shall be agreed with the Architect before work is commenced.

**11.12 Steel water pipes and fittings**

Steel pipes for water supply shall comply with BS 1387 of medium grade and fittings shall be of equal quality. All pipes and fittings shall be galvanised.

Wherever possible, bends shall be used in preference to elbows. Pipes shall be firmly and neatly secured to blockwalls and all concrete surfaces with galvanised malleable iron brackets or saddle clips or holderbats as appropriate.

All pipes shall be screwed, socketed and jointed with sealing tape or other approved jointing compound.

All bib taps and pillar valves shall comply with BS 1010 and shall be of brass or chromium plated where so described.

Stop valves shall comply with BS 1010 and shall be of brass with crutch handles. Those in exposed places shall have chromium plated polished bodies.

Sluice valves shall comply with BS 5163 and gate valves to BS 5154.

**11.13 Copper pipes**

Copper pipes for water and gas supplied in all cases, and also for sanitation purposes, shall comply with the requirements of BS standard.

Pipes shall be firmly and neatly fixed to walls, with brass or copper bands or brackets for pipes up to and including 65mm diameter and with approved holderbats for pipes over 65mm diameter, all built into walls in (1:3) cement mortar and to timber work with brass or copper pipe clips screwed on.

Unless otherwise specified, all copper pipes shall be jointed with approved brass or gunmetal compression fittings of the expanded tube and cone type with coupling nuts and rotary sleeve pieces.

**SECTION 11: PLUMBING AND SERVICES INSTALLATIONS (CONT'D)**

**11.13    *Copper pipes (cont'd)***

Copper pipes specified to be joined with capillary fittings, shall be jointed with approved capillary type fittings, each joint being formed by cutting end of pipe square, cleaning the bore of fitting and end of pipe in the bore with sand paper or steel wool, covering surface of pipe and inner surface of bore in fittings with flux supplied by the manufacturer of the fittings and inserting pipe into the fitting and heating same with a blow lamp until complete ring of solder appears around the mouth of the fitting. Fittings and pipes shall be wiped clean after jointing.

All necessary couplings, connectors, bends, elbows, tees and other fittings as may be required, shall be provided.

**11.14    *Soil and waste installations***

Soil and waste installation shall be in PVC pipes unless otherwise specified. All PVC pipes fittings and accessories shall comply with BS 4514 and BS 5255.

All jointing compounds, gaskets, washers and other jointing materials shall be of the types recommended by manufacturer and comply with BS 5572.

Vertical pipes and horizontal pipes continuously supported shall be fixed with moulded holding clips at 1 metre centres.

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**SECTION 12: GLAZING****12.1     *Glass generally***

All glass shall comply with BS 952 and shall be of the best quality of its respective kind, free from specks, bubbles, air holes, scratches, distortions and other surface imperfections and is to be of uniform thickness.

**12.2     *Sheet glass***

The clear float glass shall be polished plate glass of uniform thickness.

**12.3     *Putty***

Putty is to be the best quality glazing putty and obtained from an approved supplier. Putty for metal shall be an approved metal putty specially manufactured for that purpose. Putty for wood shall be an approved wood putty specially manufactured for that purpose.

**12.4     *Glazing***

Glass must be cut in panes to suit all glazed openings required, with sufficient clearance to prevent cracking by expansion contraction, vibration, etc. All puttied glass shall be pressed tightly and bedded into a sufficiency of putty, thoroughly back puttied and held firmly. The finished surface of putty is to be true in line and level and to be neatly cut in against the glass.

Putty must be neatly finished with smooth surfaces, sharp mitres, etc. All sashes, whether wood or metal, must be primed with an approved metal or wood primer prior to fitting and glazing. All glass to metal openings shall be fitted with approved glazing clips. Glass shall be springed in at wood sashes if puttied. Putty for glazing in hardwood shall be tinted or stained to match the wood.

**12.5     *Breakages and cleaning***

Should any glass be cracked or broken prior to handing over the building, the Contractor at his own expense shall replace the same.

At completion all glass is to be thoroughly cleaned both sides.

**12.6     *Workmanship generally***

All glass shall be carefully cut to the required sizes so that all panes of figured or textured glass are uniform in appearance.

Glazing shall be carried out in accordance with CP 152. Only putty and/or other glazing compounds recommended in CP 152, as being suitable for the particular material to be glazed shall be used. All glazing shall be weathertight on completion.

**12.7     *Mirrors***

Mirrors shall be fixed in accordance with CP 152.

**12.8     *Prices***

All rates for glazing shall include for all labours in raking, cutting, curved cutting and polished and bevelled edges.

## **SECTION 13: PAINTING AND DECORATING**

### **13.1 *Materials generally***

All materials for and used in connection with Painting and Decorating shall comply with the requirements in CP 231.

All paint, oil stains, varnish, linseed oil, knotting, driers, distempers, etc., shall be of the best quality and of an approved brand and manufacture.

All materials shall be used in strict accordance with the manufacturer's instructions and otherwise in accordance with the best standard practice.

Only primers and sealers recommended and supplied by the paint manufacturer for the particular surface shall be used. Only undercoats as recommended by the paint manufacturer for the particular finishing coat shall be used.

If necessary, paints, etc., shall be strained free from shins and similar impurities immediately before application.

Priming coats are to be applied over the whole surface and well brushed in to obtain the maximum penetration.

All materials shall be delivered to the job in their original sealed containers with the manufacturer's name and description of contents thereon.

Paint shall not be diluted unless in accordance with the manufacturer's instructions and no adulteration will be allowed.

### **13.2 *Colours of Paints***

Samples of the final colours required are to be submitted for approval before putting the work in hand and the work is then to be finished to the colour or colours approved. Each coat of paint is to be a distinctive colour working up to the finished colour as approved.

### **13.3 *Stripping, cleaning and filling materials generally***

All stripping, cleaning and filling materials including knotting, stopping and fungicide solutions shall be:-

1. suitable for the intended purpose
2. in accordance with the written recommendations of the manufacture of the subsequent covering
3. compatible with the subsequent covering

### **13.4 *Knotting***

Knotting shall comply with BS 1336.



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**SECTION 13: PAINTING AND DECORATING (CONT'D)****13.5     *Stopping and filling***

Stopping and filling for surfaces to receive a clear finish shall be tinted to match the colour of the surface.

Stopping and filling shall be finished off flush with and to match the texture and appearance of the surface being filled.

**13.6     *Workmanship generally***

Workmanship shall comply with the recommendations of CP 231.

External painting shall not be undertaken during rainy, damp or other adverse weather or where such weather is reasonably to be expected within the next 24 hours.

Before internal painter's work is commenced, all floors shall be swept clean and dirt and rubbish removed and the rooms left free from dust and dust free conditions being maintained during the progress of the work. No sweeping or dusting is to be done whilst the painting is in progress.

**13.7     *Preparation of surfaces generally***

The nature of all surfaces to be painted must be carefully inspected by the Contractor who must satisfy himself that the surfaces are in a perfect state to take the paintwork specified.

All loose material, mortar and render droppings, rust, oil, grease and any other deleterious and extraneous matter shall be removed so as to leave all surfaces perfectly clean, free from dust, dirt, grease, blotches before painting and decorating. Any irregularities, cracks, holes, open grain and the like shall be filled and surfaces to be decorated shall be cleaned and prepared in accordance with:-

1.        the recommendations in CP 231 and any other applicable BS and CP documents.
2.        the written recommendations of the manufacturer of the paint or other decoration to be applied.
3.        the best building practice.

and all surfaces shall be left clean, dry and level so as to ensure adhesion of the covering and its specified finished appearance.

Remove and ensure efflorescence has ceased before commencing decoration and treat mould infected surfaces with fungicide solution as directed.

Unless otherwise directed, the last coat of paint or finishing is to be done when all other work in the Contract is completed and the premises free from all rubbish and dirt. On completion all painter's work is to be touched up where necessary and any defects made good.

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**SECTION 13: PAINTING AND DECORATING (CONT'D)****13.8     *Application of paints generally***

Paint shall be applied by brush unless otherwise described or instructed.

Each coat of paint shall be of even thickness.

Prime/seal immediately after cleaning and preparing the surfaces. Allow each priming/sealing and undercoat to dry and lightly rub down with fine abrasive paper to a smooth even surface prior to applying successive coats.

The Contractor shall ensure that surfaces which have been primed prior to delivery to the site have been properly prepared and that the primer is of a suitable type firmly adhering and in good condition. Priming coats shall be touched up as necessary on joinery primed prior to delivery to the site and cleaned and prepared so as to be suitable to receive subsequent decoration. Any surfaces of such joinery which are cut after delivery to the site shall be prepared and primed as described.

Painting adjacent to glazing with putty shall be extended across putty and on to glass up to the sight line. All painting shall be cut in neatly and cleanly to line.

The finished paintwork shall be smooth and even coloured, free from brush marks, sags, runs, dust, hair or other extraneous material adhering thereto and any other defects and shall be all to the entire satisfaction of the Architect.

**13.9     *Rendered surfaces***

Rendering is to be perfectly set and thoroughly dry before painting, etc., and the onus is on the Contractor to satisfy himself that rendered surfaces are in a fit condition to receive decoration before commencing the works. Surfaces are to be brushed down, sanded smooth and cleaned down. All defects are to be patched and made good and given an extra coat of primer or sealer. Hair cracks and other blemishes on rendered surfaces to be painted shall be filled with an approved filler and any imperfections made good.

**13.10    *Wood preservative***

All timber built-in or in contact with walling and concrete shall be treated with two coats of an approved type of wood preservative.

**13.11    *Ironwork and steel surfaces***

Iron and steel surfaces are to be scraped and all rust, scale dirt, grease, etc., removed by scrapers or wire brushes before painting.

**13.12    *Galvanised surfaces***

Galvanised steel surfaces shall be treated with "Galvanised iron cleaner 13700" or other approved solution in strict accordance with the manufacturer's instructions and thereafter thoroughly washed down with clean water and the surface allowed to dry before painting.

**SECTION 13: PAINTING AND DECORATING (CONT'D)****13.13    *Woodwork***

All woodwork must be thoroughly prepared, sandpapered and rubbed down to a smooth, even finish before painting or staining or varnishing and thereafter each successive coat of paint stain or varnish is to be rubbed down to a smooth face before the next coat is applied. Knots are to be cleaned off and coated with an approved knotting. Stopping is to be tinted as required to match oiled or stained woodwork. Screw holes etc., are to be cleaned out pelleted or stopped with an approved filler or stopping as directed.

**13.14    *Copper pipes***

Copper pipes shall be rubbed down with coarse emery, cleaned with a solution of one part acetone to two parts of benzene and left to dry before painting.

**13.15    *Polyurethane varnish***

The polyurethane varnish is to be brushed on, using material as it comes from the can. Before application and between coats any nibs, raised fibres or sharp edges are to be rubbed down with fine dry abrasive paper and dusted off.

The polyurethane varnish is to be applied in four coats, the first two coats to be gloss finish rubbed down and the following two coats to be matt finish.

**13.16    *Cleaning and protection***

All painter's work shall be protected as necessary including the provision of caution signs as necessary and the whole of the work shall be left clean and perfect all to the entire satisfaction of the Architect.

**13.17    *Preparation of surfaces***

The preparation and pre-treatment of surfaces as described herein is to be taken in addition to the number of coats of paint hereafter specified and all rates are to include for such proper pre-treatment which is described in the Bills of Quantities as "Prepare". Rates shall also include for any required protection of Painter's work, providing the necessary caution signs and leaving all work clean and perfect.

**13.18    *Redecoration of previously painted surfaces*****13.18.1    Previously Painted Render**

Painted rendered surfaces being redecorated shall be washed down, filled where necessary with suitable stopping or patching, plaster, spot primed and rubbed down ready to receive new paint. Distempered plaster surfaces being redecorated shall be rubbed down ready to receive new distemper but where the distemper is in poor condition or where a finish other than distemper is to be applied. old distemper shall be completely removed by wetting and scraping, the surfaces filled as above where necessary and rubbed down ready to receive the new finishing.

**SECTION 13: PAINTING AND DECORATING (CONT'D)**

Surfaces previously painted with lime wash to be recoated with lime wash, must be well rubbed down with a brush to remove all loose materials. If it is required to recoat with any type of paint other than lime wash, the surface must be completely stripped down to the render and given a coat of approved bonding liquid.

**13.18.2 Previously painted metalwork**

If the paint film is in good condition and there are no signs of blistering or peeling, the surface shall be well cleaned down and lightly abraded prior to painting.

If the paint film has blistered or broken down or where rusting is evident, the surface shall be completely stripped of paint and well abraded with steel wire brushes (or by some other accepted method, such as sand blasting). After cleaning off rust, affected areas shall be primed with a suitable anti-corrosive primer.

Surfaces thus prepared may then be treated in the same way as new metal.

**13.18.3 Previously Painted Woodwork**

Paint film in good condition (i.e. free of peeling, flaking, crazing or other signs of failure) shall be dusted and wiped down. All traces of oil and grease shall be removed with a solvent rinse, particular attention being given to areas around door handles. All cracks, crevices and holes shall be scraped out and patch primed, and when dry, shall be made good with hard stopper, faced up and down to an even smooth surface. The whole of the woodwork shall then be lightly abraded with fine glass paper and finally wiped down in preparation for application of the primer.

Paint film in generally good condition but exhibiting occasional blisters, shall be prepared by removing the blisters, chamfering the edges smooth with glass paper, rubbing immediate area down to bare wood, spot priming and rubbing down.

Paint film in poor condition (exhibiting failure through checking, cracking, flaking, peeling, crazing, etc.) shall be completely removed by use of a blow lamp or paint remover. Care must be taken to avoid charring of wood when burning off. If slight charring should occur the area shall be primed with a good quality aluminium wood primer.

Paint removers shall be free of wax and caustic substances and shall preferably be of water rinsable grade. The whole area subject to treatment by paint remover shall be well washed with water to ensure complete removal of old paint and paint remover.

Painting shall then proceed as with new woodwork.

Oiled Hardwood being redecorated shall be thoroughly cleaned down, stopped with tinted stopping and rubbed down.

Painting or redecorating shall then proceed as with new woodwork.

**13.18.4 Prices**

Prices are to include for all preparation, sanding and rubbing down between coats and cleaning off at completion.

**SECTION 14: EXTERNAL WORKS****14.1 *Specification of other trades***

The specifications of other trades shall apply equally to this work section.

**14.2 *Pavings and surfacing***

The whole of the paving and surfacing work is to be as specified in the Engineer's specification.

No constructional traffic shall be permitted on the prepared formation or the finished surface.

The sub-base and filling for service roads shall be prepared as described in the Engineers specification for Roadworks. Crushed coral surfacing shall comprise washed coral from an approved source laid and compacted in layers as described.

All sub-bases of compacted earth shall be treated with weed killer, applied strictly in accordance with the manufacturer's instructions.

**14.3 *Precast concrete kerbs and channels***

Precast concrete kerbs and channels shall comply with BS 340 and shall be laid and bedded as described. Specially cast circular kerbs or quadrants shall be used on curves of small radius. All kerbs and quadrants shall be laid true to line and level.

**14.4 *Precast concrete paving slabs***

Precast concrete paving slabs shall comply with BS 368 a similar approved. Rates shall include for all raking and curved cutting, fair ends, rounded ends, angles, intersections and the like.

**14.5 *Landscaping***

The Contractor shall satisfy himself that the levels of the ground shown on the drawings are correct and bring to the notice of the Architect any discrepancies before landscape operations are commenced. The drawings shall be deemed to be correct if no such notice is given to the Architect. The whole of the landscaping works shall be as specified in the Special Specification issued by the Interior Designer and Landscape Architect.

The Contractor shall satisfy himself that the levels of the ground shown on the drawings are correct and bring to the notice of the Architect any discrepancies before landscape operations are commenced. The drawings shall be deemed to be correct if no such notice is given to the Architect.

Filled areas, surfaces of excavations, slopes of embankments and cuttings and reinstated surfaces of ground shall be trimmed to a correct profile and, where directed by the Architect, shall be covered with a layer of topsoil spread lightly and consolidated to a uniform thickness. The soil shall be free from all builder's debris, rubble, concrete, stones above 40mm ring and clear of weeds. The surface shall be scarified before spreading topsoil.

**SECTION 14: EXTERNAL WORKS (CONT'D)**

**14.5     *Landscaping (cont'd)***

Topsoil set aside shall be clean dry excavated material free from rubble, debris, rubbish, deleterious matter or other pollution and shall be spread and levelled to a compacted thickness of 150mm.

The Contractor shall allow in his prices for loading up and carting away to tip all surplus excavated material arising from excavations or preparation of surfaces for landscaping.

All grassed areas shall be maintained, by watering necessitated by weather conditions at all times, cutting as necessary, protecting from damage up to the end of the Defects Liability Period.

**14.6     *Fencing***

Galvanised steel chain link fencing shall comply with BS 1722

## ***STRUCTURAL ENGINEERS' SPECIFICATIONS***

# **CONSULTANCY SERVICES FOR SELECTED DEVELOPMENT PROJECTS IN RODRIGUES**

## **ENGINEER'S SPECIFICATION**



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## **SECTION 1.0 GENERAL**

### Article 1.1 - Location of Site

The site of works is located in the island of Rodrigues

### Article 1.2 - Works to be executed and Technical Documents

The technical documents for the execution of the work consist of the tender documents detailing the Technical Specifications and the Drawings. However, due to the particular nature of the works, these documents may be subject to modifications, additions and adaptations to the Site Conditions.

### Article 1.3 – Extent of the Contract

The work specified shall include all general work preparatory to execution, all matters, things, requisites and work of any kind necessary for the due and satisfactory construction, completion and maintenance of the Works to the true intent and meaning of the Drawings and this Specification and further drawings and orders that may be issued by the Engineer from time to time; compliance by the Contractor with all Conditions of Contract whether specifically mentioned or not in the clauses of this Specification; all materials; apparatus, plant, machinery, tools, fuel, water, temporary works and roads, strutting, timbering moulds and tackle of every description, transport, offices, stores, workshops, staff and labour; the provision of proper and sufficient protective works, temporary fencing, lighting and watching required for safety of the public and protection of the Works and adjoining lands and waterways; all measures necessary to ensure the safety of shipping, and sanitary accommodation for staff and workmen; taking and maintenance of all insurances, the payment of all wages, salaries, fees, royalties, duties or other charges arising out of the execution of the Works; the regular clearance of rubbish, reinstatement and clearing up and leaving perfect on completion.

Any error in description or in quantity or omission of items from the contract bills shall not vitiate this contract but shall be corrected accordingly.

### Article 1.4 - Works Executed by Employer Or Other Contractors

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

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

Article 1.5 - Liaison With Authorities

The Contractor shall keep in close contact with the Police and other authorities who have regulatory or statutory oversight and/or control of the Works and its immediate environment. The Contractor shall comply with the requirements of these authorities in the execution of the works under the purview of the respective institution or authority, control of workmen, movement of traffic, passage through inhabited zones or other matters, and shall provide all assistance or facilities, which may be required by such officials, in the execution of their duties.

The Contractor shall keep all necessary contacts and liaison to secure the approvals required from the respective authorities in connection with the contract. All required notifications, documentation and approvals required shall be properly maintained and recorded to that effect. The costs associated for the liaison with authorities and securing all necessary approvals shall be included in the Contractor's priced tender.

Article 1.6 - First Aid, Welfare and Safety Precautions

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

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

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

Article 1.7 - Alterations To And Preservation Of Services

1.7.1 Contractor's Responsibilities

The Contractor shall acquaint himself with the position of all existing works and services such as water pipelines, irrigation canals, power cables, surface water drains, water mains, electricity, telephone cables and telephone lines and poles, etc. before any excavation or other work likely to affect them is commenced.

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

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

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

#### 1.7.2 Survey Of Existing Services

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

Notwithstanding the foregoing requirements, and without lessening the Contractor's responsibility, the Contractor shall inform the Engineer immediately if any existing works are exposed.

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

***The price for investigation of all services, its protection, temporary diversion and maintenance of such services shall be deemed to be included in the tendered rates and price.***

#### 1.7.3 Removal And Diversion Of Services

The Contractor shall be responsible for arranging, for the moving of services where necessitated by the works, subject to the approval of the Engineer.

Immediately after the issue of the Engineer's instructions to commence work, the Contractor shall carry out a survey of all the existing services likely to be affected by the permanent works.

He shall then liaise with the relevant authority for the removal, modification or diversion of the services.

In the case of existing irrigation or water pipes the Contractor shall work, in conjunction with the relevant authorities, and the Engineer for finalisation of all instructions regarding the works on the public network. Permanent supply using existing services shall be maintained throughout the construction period, and any costs shall be included in the contractor's tendered rates for any temporary diversions required by the contractor.

#### 1.7.4 Damage To Services

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

### Article 1.8 - Traffic Deviations, Traffic Control and Signs



The Contractor shall be responsible for the safe and easy passage of road traffic on the existing carriageway as well as sections under construction.

Public traffic must be always reasonably and effectively accommodated on existing roads in the vicinity of the works and throughout the project area and all access roads to private lands must be kept open until adequate deviations have been constructed by the contractor to the satisfaction of the Engineer.

He shall bear all cost of and shall be responsible for the provision of flagmen guards, fences, barriers and lights as may be necessary for the safety and direction of the public as required by the Laws of Mauritius or local By-Laws or as ordered by the Engineer and all such arrangements shall receive the approval of the Engineer.

The Contractor shall erect and maintain on the Works and at prescribed points on the approaches to the Works all signs necessary for the direction and control of traffic, and advertisement of the Works. All these signs and their locations shall be approved by the Engineer before erection. Traffic signs shall be illuminated by night and the cost of providing, maintaining and lighting the signs shall be included in the sum tendered against the appropriate item in the Bill of Quantities.

Where by reason of the contractor's activities in the execution of the works or for any other reason due to the execution of the contract, public traffic cannot be safely accommodated on sections of the existing road, the contractor shall construct and maintain temporary deviations as instructed by and to the approval of the Engineer. The contractor shall submit to the Engineer for his approval all site plans and other drawings showing alternative routes that will have to be followed by deviated traffic indicating all warning, directional, informative and other signs required for the safe and easy passage of such traffic. All such drawings shall be submitted at least two months before the coming into operation of the said traffic diversions.

All temporary traffic signs and markings used for any traffic diversion should be in accordance with international norms regulating same. These standards shall also be applicable to the signalization of all site works.

The cost of all deviations or repairs to existing roads prior to the operation of the traffic diversions or reinstatement thereof after the completion of traffic diversions shall be borne by the Contractor.

#### Article 1.9 Programme To Be Furnished

Within the time frame stipulated in the Conditions of Contract or elsewhere, the Contractor shall submit to the Engineer for his approval: -

- A general programme (Programme of Works) showing the timing, order of procedure and general methods for carrying out the Works, with timing for mobilisation of equipment and plant and for purchase of important materials (Milestones).
- A proper construction methodology, especially with the handling and storage of the colluviums material.

- The organization (Organigram), staff (Staff List), labour (Labour List), equipment and plant (Plant List) proposed for the execution of the Contract. The planning shall be updated on the last week of each month.
- The layout and general arrangement of all temporary Works including site installation, he proposes to construct for the purposes of the Contract.

The Engineer after examining and if necessary discussing with the Contractor such document shall give his final approval before the commencement of the Works.

#### Article 1.10 - Setting Out

- The Contractor shall be responsible for the full and proper setting out of the Works. The principal setting out points and benchmarks shall be referenced out during construction and the Contractor shall maintain these throughout the Contract Period.
- The dimensions and levels shown on the Drawings are believed to be correct, but the Contractor shall verify the same on Site and is no way absolved from responsibility from any consequence arising from the inaccuracy of such dimensions or levels.
- The Contractor may be required to prepare and submit additional drawings to complete the tender drawings. He shall give the Engineer not less than 24 hours notice, of his intention to set out or give levels for any part of the work in order that arrangements can be made for checking. The Contractor shall provide all the necessary instruments, appliances, labour and any material or staging that the Engineer may require for checking the setting out or levels as specified in the Article hereof.
- Any marks made by the Engineer shall be carefully preserved Work shall be suspended for such time as it is necessary for checking the lines and levels on any part of the Works.

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

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

#### Article 1.11 - Progress Report

The Contractor shall submit to the Engineer at least 24 hours before each site meeting a Progress Report for the preceding period, showing up to date progress during the previous period on all important items in each section of the Work in

the manner prescribed by the Engineer including the plant and personnel schedule. The progress report shall be related to the programme such as defined in Article 1.9 of these Technical Specifications.

Article 1.12 - Temporary Works

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

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

- All land to be permanently used or occupied by the Works will be provided by the Employer, in whole at the start of works or in part as the works progress.
- The Contractor shall maintain all offices required by his Site Staff, workshops, storage sheds, etc., and clear away on completion of the Contract and leave the Site in clean and tidy condition.
- The Contractor shall provide latrines and ablutions for his employees, maintain them in a sanitary condition throughout the Contract and clear away on completion and leave the Site in a clean and tidy condition. The Contractor shall be solely responsible for any living accommodation required by his employees.
- When no longer required for the Contract, all such provisions shall be left or dismantled and disposed of as directed by the Engineer and their Sites shall immediately be cleaned and left as far as practicable in the same condition as that obtained immediately prior to occupation.

Article 1.13 - Water And Electricity Supplies

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

Article 1.14 - Nature Of Ground And Conditions Of Work

The Contractor must satisfy himself as to the general circumstances at the site of the Works and the construction thereon, the form of river beds, and banks, the flows in the river, the surface of the ground and nature of the materials to be excavated, the possibility of subsidence from soft ground and bad and broken

materials, and falls of rock in or arising out of the Works, and the possibility of floods and landslides, and the rates and prices in the Bills of Quantities will be held to cover all such contingencies.

Article 1.15 - Faulty Work

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

Article 1.16 - Particulars Of Existing Works

Such information as may be given on the Drawings, as to the present condition and character of the existing structures, roadways and other services, and as to the form and dimensions of various parts of the existing structures and positions and particulars of pipes, cables and other mains and information arising as a result of trial pits and boreholes is given without guarantee of accuracy and neither the Employer nor the Engineer will be liable for any discrepancy therein.

Article 1.17 - Protection Of Works

The Contractor shall take all steps necessary to protect the permanent Works and all stores and materials from the effects of weather, including floods and cyclones, theft and shall be entirely responsible for any delay, damage or loss arising therefrom. The Contractor shall take account in his rates for the mitigation of noise and dust pollution generated in the execution of the contract.

Article 1.18 - Protection From Water

The Contractor shall keep the whole of the Works free from water and allow in his prices for all dams, cofferdams, pumping, piling, shoring, temporary drains, sumps etc., necessary for the purpose and shall clear away and make good at his own cost and to the satisfaction of the Engineer all damage caused thereby. The drainage of the natural ground in the vicinity of the earthworks and drainage work generally shall be carried out in advance of the rest of the Works.

Article 1.19 - Unauthorised Persons

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

Article 1.20 - Filling In Holes And Trenches

The Contractor immediately upon completion and approval of any work shall fill up all holes and trenches which may have been made or dug, level mounds or heaps of earth that may have been raised or made, and clear away all rubbish which may have become superfluous or have been occasioned or made by the execution of such work; and the Contractor shall bear and pay all costs, charges, damages and expenses which may be incurred or sustained on account or in

consequence of any accident which may happen by reason of holes and trenches connected with the work being dug and left unfenced or material being left or placed in improper situations.

Article 1.21 - Joint Measurement Of Extras

In such case as the Contractor shall find it necessary to execute any works, or provide any materials which he feels entitled to claim as extras to the Bill of Quantities he shall obtain written permission from the Engineer before commencing such work and shall make arrangements for the Works, or materials to be measured jointly with the Engineer, and the quantities agreed. Neglect to obtain authority to commence any such work, shall entitle the Engineer to disallow any claim for extras arising there from. The fact that joint measurement took place in no way commits the Engineer to recognise the validity of such claim, if it is considered unjustified. The Engineer, shall at all times, have full access to the Contractor's time books and may daily check the item of any extra works with the Contractor's timekeeper or otherwise, but the fact of his agreeing upon any time, shall in no way bind the Engineer to value the work, other than by measurement if he thinks fit to do so.

Article 1.22 – Advertising

The Contractor shall not erect any advertisement in any form within the Site or on adjoining ground, but shall provide a project board at the main entrances to the Site bearing suitable inscriptions including the name of the Contractor in accordance with details provided by the Engineer.

Article 1.23 – Site office

The Contractor shall provide during the period of the Contract, which for the purpose of this Clause shall extend to two months beyond the date of the practical completion certificate a furnished Container Type Site offices of area of about 100m<sup>2</sup> for the Engineer and his staff.

The Contractor shall also provide the services of two experienced chainmen and all equipment and miscellaneous items for carrying out survey work such as electronic total station, prisms, ranging rods, dumpy levels, tripods, survey books, sheets, etc. as well as all office requisites such as pencil, stationery, etc. as instructed by the Engineer.

The Contractor shall, within one week of the letter of acceptance, submit to the Engineer in the form of drawings, schedules etc., his layout of proposals and list of furniture and equipment for the site office.

Article 1.24 - Provisional Acceptance

After completion of the Works and at least eight (8) working days before the date of provisional acceptance, the Contractor is to submit to the Engineer the as-built drawings.

The drawings shall be supplied at the Contractor's expenses in six (6) copies, two (2) of which shall be in the form of printouts and one (1) copy on CD Roms.

The failure to supply the as-built drawings in time shall automatically prevent the provisional acceptance.

Article 1.25 - Progress Photographs

The Contractor shall arrange with a photographer approved by the Engineer for the taking of progress photographs including electronic copies for the different stages of construction of the Works, upon the direction of the Engineer. The photographs will be taken at intervals of one month minimum and the Contractor shall arrange to supply four unmounted enlargements not less than 150mm by 100mm and electronic copies of each print chosen by the Engineer for enlargement.

The number of exposures and enlargements will be as directed/ordered by the Engineer.

Article 1.26 - Responsibility Of The Contractor

Where the approval of the Engineer is required under these Technical Specifications, such approval shall not relieve the Contractor of his duties or responsibilities under the Contract.

Article 1.27 - Units Of Measurement

The units of measurement to be used throughout this Contract are in general metric units of metres (m), kilogrammes (kg), Newton (N) degrees Celsius (C) and litres (l).

Article 1.28 - Standard Specification

In order to establish standards of quality, reference has been made in this Specification to certain British Standards (BS) and to certain other National or International Standards.

The British or other Standards referred to shall be the latest edition published at the date of issue of tender documents.

All the conditions and particulars as to standard of materials, workmanship and tests contained in such British or other Standards shall be compiled for the various items.

Other equivalent National or International Standard Specifications, which will ensure equal or higher qualities of materials or workmanship, may be substituted at the sole discretion of the Engineer if requested by the Contractor.

Article 1.29 - Site Diary

A diary shall be held on site by the Engineer or his representative.

The following entries shall be made every day: -

- Administrative procedures relative to the execution and running of the contract, such as notifications, visas etc.....
- Climatic conditions (rainfall, winds, temperature, water levels etc.)
- The results of control tests
- Incidents and details likely to have an effect on the future functioning of the works, calculation of cost prices and the actual duration of the Works.
- Any observation and instruction imposed on the Contractor

Everyday there shall be annexed to this journal, a detailed statement prepared by a representative of the Contractor and which shall indicate for each item of work the working hours, the number and qualification of the personnel, the equipment present on site and their running time, the duration and causes of any stoppages, the daily evaluation of the amount of work executed

Article 1.30 – Signboards

Signboards (1 No.) shall be erected by the contractor on site at a location to be given by the Engineer. The signboards shall be made up of 5 no. wooden planks, 2.5m long, 300mm wide and 25 mm thick, bolted on 50mm diameter galvanized pipes embedded in concrete and properly braced against wind loadings. The planks shall be painted white and the lettering blue. A height of 100mm should be adopted for the letterings in lower case. Alternative proposal shall be submitted to approval of Engineer.

The Contractor shall obtain instruction from the Engineer in respect of the information to be displayed on the signboards and dimension of lettering.

## SECTION 2.0 – EARTHWORKS

### Article 2.1 – Excavation

2.1.1 "Excavation" shall consist in the loosening, digging, loading, hauling and disposal of normal, soft, rippable, loose, unsuitable and boulders materials to the lines, levels, slopes and widths shown on the Drawings or as directed by the Engineer. It shall include compaction, finishing and shaping of all surfaces formed by such excavations in accordance with these Technical Specifications.

**The Contractor shall take special care for the saving of all suitable excavated materials for embankment or subgrade construction.**

2.1.2 Removal of existing structures, site clearance, removal of topsoil and removal of unsatisfactory material shall be carried out in proper sequence so that one operation does not interfere with another. Sufficient time shall be allowed between each operation for any measurement required by the Engineer to be carried out and the Contractor shall not proceed with any other operation until such time as any measurement has been agreed and approved.

2.1.3 where a firm foundation is not encountered at the bottom of the excavation due to presence of soft, spongy or other unstable material, the Contractor shall, at his own expense, remove such unstable material and replace with approved material thoroughly compacted to a density not less than 95% B. S. Heavy Maximum Dry Density.

2.1.4 All excavations shall be carried out in such a manner that the back slopes are neatly trimmed to the lines shown on the Drawings or as directed by the Engineer.

2.1.5 Where excavation reveals a combination of suitable and unsuitable materials, the Contractor shall, wherever the Engineer considers it practicable and so directs, carry out the excavation in such manner that the suitable materials are excavated separately for use in the works without contamination by the unsuitable material.

2.1.6 In wet weather clay cuttings shall not be excavated and shall not be taken down to less than 25 cm above final level of the subgrade.

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



### Article 2.2 - Road Excavations

Road excavations will be carried out in order to cart away unsuitable materials from existing pavement to widen carriageway or shoulder or adjust level of existing road.

They shall consist in excavation of any material from pavement or subgrade to such a depth as shown on the Drawings or as directed by the Engineer.

The works include:

- Dismantling and removal of existing cats eyes
- Scarifying, loosening and digging asphaltic material from the carriageway shoulder or verge
- Loading, carting away and disposal of all materials in spoil tips, temporary stockpiles or in subgrade of new pavement as directed by the Engineer
- Shaping and Compaction of the bottom of the excavation to 95% B.S. Heavy Compaction or as directed by the Engineer.

Excavation in any material shall be paid as normal excavation.

### Article 2.3 - Classification of Excavated Materials

#### 2.3.1 Topsoil

Topsoil shall consist of a material containing vegetable root system existing in a thin layer on the natural ground surface. Topsoil shall be used later for verges or to cover embankment slopes and borrow pits shall be stockpiled on well-drained ground to be approved by the Engineer.

#### 2.3.2 Approved Material

Approved material shall consist of all material complying with Articles 2.7 and 2.13 of these Technical Specifications or which, in the opinion of the Engineer, is suitable for incorporation in the construction.

#### 2.3.3 "Rock"

Rock is defined as all materials, which in the opinion of the Engineer, require blasting or the use of metal wedges and sledgehammers, or the use of compressed air drilling for their removal and which cannot be extracted by ripping with a tractor of at least 300 brake hp with a single, rear mounted, heavy duty ripper. Tractor shall be in good order, operating weight forty (40) tones, operated by qualified operator.

#### 2.3.4 Power Of The Engineer

Should any difference of opinion arise between the Contractor and the Engineer, as to the classification of the material, the Engineer's decision shall be final.

#### Article 2.4 - Removal of Top Soil

Where embankment/subgrade will be constructed on natural ground, removal of topsoil depth shall be directed by the Engineer, shall be stripped after clearing and grubbing. In the fill areas containing humus or other deleterious materials harmful to the stability of road, the Engineer may order for a depth greater than 300 mm within the area designated. The stripped area shall be compacted as per Article 2.19. The stripped materials shall be stockpiled for use on the surfaces before turfing and surplus material shall be disposed off as directed by the Engineer to a site identified by the Contractor and approved by the Engineer at any distance from the work site.

Where the removal of topsoil has not been specifically directed, any top soil excavated shall be deemed to be part of the general excavation.

#### Article 2.5 - Preparation of Natural Ground

The natural ground or the surface of an earth/gravel road after removal of top soil as per Article 2.4 on which the embankment / subgrade is to be constructed shall be prepared in accordance with the following requirements:

When an existing earth/gravel road, referred to as natural ground on which subgrade is to be constructed falls below within 0.3 m of the subgrade level, and if existing material is suitable for subgrade, the natural ground shall be prepared as subgrade preparation in earth cut as per Article 2.7.

When the natural ground or an existing earth / gravel road, referred to as natural ground on which the embankment is beyond 0.3 m of the subgrade level and existing material is suitable for construction of embankment, the natural ground shall be prepared as embankment by loosening and recompacting the existing natural ground to a depth of 300 mm or as directed by Engineer, before placing new embankment and subgrade layers.

#### Article 2.6 – Subgrade

The subgrade is defined as the surface on which the subbase is placed or on which the base is placed and where no subbase is required as shown on the Drawings or as directed by the Engineer.

The subgrade, once it has been finally shaped and compacted and approved by the Engineer, shall be protected from damage and kept well drained at all times. Storage or stockpiling of plant or materials on the finished subgrade shall not be permitted.

Where the subgrade is damaged by the Contractor's own vehicles or vehicle belonging to the general public or by rain or from any other cause, then the damaged or deformed material shall be dug out and shall be replaced with approved compacted material at the Contractor's expense.

Article 2.7 - Subgrade in Cut

In accordance with the definition of subgrade in Article 2.6 of the Technical Specifications, the plasticity index of materials in the top 30 cm of subgrade in cut shall not be more than 25%.

If they do not comply with this requirement, they shall be removed as directed by the Engineer and replaced by selected materials.

Article 2.8 - Subgrade Preparation in Earth Cuts

The objective of this operation is to ensure that the subgrade and its foundation comprise suitable material and specified density, that it is compacted to the specification limits and that it is levelled, shaped and made to a condition fit for receiving subsequent pavement layers.

For this purpose, the material in earth cut to be used as subgrade shall be tested for conformity to Article 2.22. If found suitable, the surface shall be loosened to a depth of 200 mm or as directed by the Engineer, the moisture content adjusted, shaped to the specified levels and crossfall, and compacted to the density specified in Article 2.19 considering top 500 mm as subgrade.

If the material is found unsuitable, the same shall be sub-excavated to a depth of 500 mm below subgrade level or as ordered by the Engineer, replaced by suitable material and compacted to the specified degree.

Where a strata of boulder mixed with soil is met with, the same shall be sub-excavated to a depth of 500 mm or as directed by the Engineer and replaced by suitable subgrade material.

Article 2.9 - Subgrade Preparation in Rock Cuts

The rock cut for subgrade shall be made true to the designated line and levels in the drawing. The gaps/holes and unevenness so created in the process of rock cutting shall be made up to the required depth through levelling, shaping and compaction of crushed stones conforming to sub-base quality as per Engineer's approval.

Article 2.10 – Tolerances

2.10.1 The finished subgrade shall be properly shaped and compacted to a smooth surface which shall not show any departure from the required cross section greater than within the range -2 cm to +2 cm at any point. When measured with a 3 meters straight edge, deflections shall not be greater than 2 cm.

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

2.10.3 The deflections measured under 8.2 tons axle load shall not exceed the maximum value determined during the proof rolling section as described in Article 4.4 hereof.

Article 2.11 - Construction Of Embankment

2.11.1 All fill material shall be supplied from the general excavation wherever possible, or from approval borrow pits or quarries.

2.11.2 No material shall be deposited until the ground shall have been prepared in accordance with Article 2.12 and approved by the Engineer. The material shall be neatly and evenly spread over the area of the embankment to such an extent that the embankment is composed of fully compacted material for the widths required in uniform horizontal layers in accordance with Articles 2.19. The layers shall be kept shaped and trimmed and levelled by approved equipment. The surface of the layers shall at all times be maintained to such camber or cross falls as will shed water and prevent ponding. No subsequent layers shall be placed until each layer has been properly shaped, compacted and approved by the Engineer. If before the approval of a layer, damages, if any, such as cracking, rutting, corrugations, potholes, softening, erosion etc, are caused to the lower layer for any reasons whatsoever, such damages shall be made good by the Contractor at his own cost to the satisfaction of the Engineer before placing of materials for overlying layer. The methods employed for making good of damages as above shall include scarification with recompaction or reconstruction using new materials, as directed by the Engineer. Embankments shall be formed according to the Drawings or as directed by the Engineer. Side slopes shown on the Drawings are indicative only of the expected slope required for the material used and may be altered to suit the requirements of the material where directed by the Engineer.

2.11.3 Compaction shall not proceed until the moisture content of the material has been adjusted in accordance with Article 2.19. Any adjustments involving the incorporation of additional moisture shall be carried out by approved plant and shall be so arranged that the required moisture content shall be uniform throughout the layer to be compacted and shall remain uniform during compaction. The removal of excess moisture content shall be carried out by spreading out the material for aeration by mechanical means and remixing it at regular intervals. Should circumstances arise when the removal of excess moisture cannot be achieved, work on the compaction of the material shall be suspended until the conditions of weather and drainage are such as permit the required moisture content to be attained. The contractor's attention is drawn to the fact that no claim for extension of time and / or additional costs will be entertained for any stoppage of work arising for the conditions of weather and drainage preventing the drying of the material and it will be assumed that the contractor's rates and prices shall provide for such stoppages.

The contractor may opt to use imported fill from borrow pits to replace any material with an excess moisture content in order to avoid stoppage of the work. However the cost of such replacement shall be borne entirely by the contractor, unless same has been specifically ordered by the Engineer.

Where soft area has resulted from negligence on the part of the Contractor, it shall be removed and replaced with suitable material at his own expense.

Watering and compaction plant shall be approved by the Engineer prior to the commencement of the Work but such approval shall not relieve the Contractor of his responsibility to provide suitable and adequate plant for the construction of the works.

Article 2.12 - Preparation Prior To Embankment Construction

2.12.1 The construction of embankment shall commence after the Engineer's approval. If after topsoil stripping the ground is considered unacceptable by the Engineer, the Contractor shall excavate to such depths as required and dispose of the material to spoil tips as directed.

2.12.2 The Contractor shall execute all works necessary to drain the natural ground prior to forming of the embankment. Should any subsequent embankment filling be adversely affected through lack of such drainage, the Contractor shall remove and replace it at his own expense.

2.12.3 Prior to placing fill material in embankments, the Contractor shall compact the top 30 cm of the natural ground in accordance with Article 2.5, 2.14 and Article 2.15.

Article 2.13 - Materials for Embankment

Two types of materials shall be considered:-

- Materials for construction of the main body of the embankments
- Selected materials:-
  - for construction of the top 30 cm of embankment.
  - for filling of holes and depressions and shaping of the surface where excavations have been carried out in soils where exists an important percentage of basaltic boulders.

2.13.1 Materials for Construction Of the Main Body Of The Embankments

The materials shall comply with the following requirements:-

- Plasticity Index: not more than 30%
- Liquid limit: not more than 55%
- Maximum Size: 300 mm
- Swelling: not more than 3%

2.13.2 Selected Materials

The materials shall comply with the following requirements: -

- Plasticity Index: not more than 25%

- Maximum Size: 100 mm
- C.B.R. value after 4 days soaking, at 95% of the B.S Heavy Maximum Dry Density: not less than 10% (C.B.R. specimen prepared at B.S Heavy Optimum Moisture Content + 2%)
- Swelling: not more than 1%

Rock and boulders embankment shall be built in layers not exceeding 50 cm in thickness of loose material. Top 150 mm of rock fill embankment shall be well-graded granular material (crusher run), having maximum size of particle of 100 mm. This will act as top of sub-grade. There should be a minimum of 175 mm thick sub-base cushion over the rock fill.

The Contractor shall take special care to minimise segregation of material during handling and placing.

Compaction shall be carried out as follows: -

First pass : Using a pressure-type roller

Following passes : Using a vibrating roller with a out-of-balance weight of 10 tons at least, or other approved plant.

Compaction control shall be carried out by survey method (levelling) or as directed by the Engineer.

The interstices between the lumps shall be filled with smaller lumps, aggregates and sand as directed by the Engineer. Compaction shall be as directed by the Engineer.

Each layer shall be approved by the Engineer.

#### Article 2.14 - Embankment against Sloping Ground

When embankment is to be placed and compacted on hill sides, or new embankment is to be compacted against existing embankment, where the slopes are steeper than 4:1 (H:V), continuous horizontal benches each at least 300 mm wide shall be cut into the old slope for ensuring adequate bond with the fresh embankment/subgrade material to be added. The material obtained from cutting of benches could be utilised in the widening of the embankment/subgrade. However, when the existing slope against which the fresh material is to be placed is flatter than 4:1 the slope surface may only be scarified instead of resorting to benching.

Where the width of the widened portions is insufficient to permit the use of usual wider rollers, compaction shall be carried out with the help of tandem rollers, small vibratory rollers, mechanical tampers or other approved

equipment. Benching of slopes shall be considered incidental to the work and shall not be measured separately.

Article 2.15 - Embankment and Subgrade Around Structures

To avoid interference with the construction of abutments, wing walls or return walls of culvert/bridge structures, the Contractor shall, at points to be determined by the Engineer suspend work on embankments forming approaches to such structures until such time as the construction of the latter is sufficiently advanced to permit the completion of approaches without the risk of interference or damage to the structures.

Unless directed otherwise, the filling around culverts, bridges and other structures up to distance of twice the height of the road from the back of the abutment shall be carried out independent of the work on the main embankment. The fill material shall not be placed against any abutment or wing wall unless permission has been given by the Engineer but in any case not until the concrete or masonry has been in position for 14 days. The embankment and subgrade shall be brought up simultaneously in equal layers on each side of the structure to avoid displacement and unequal pressure. The sequence of the work in this regard shall be approved by the Engineer.

Where it may be impracticable to use power rollers or other heavy equipment, the compaction shall be carried out by mechanical tampers or other methods approved by the Engineer. Care shall be taken to see that the compaction equipment does not hit or come too close to any structural member so as to cause any damage to them or excessive pressure against the structure. Payment shall not be measured separately and deemed to be included in other rates and prices.

Article 2.16 - Construction of High Embankments and Embankments on Soft Foundation

Where the embankment exceeds 6 metre in height or where directed by the Engineer, the embankment shall be constructed in stages as instructed by the Engineer. The subgrade layer, that is the top 500 mm of the embankment, shall be constructed only after the Engineer is satisfied that the embankment is stable and no more consolidation settlement is expected to take place.

On soft foundations, such as in marshy areas, the embankment work shall be given priority in construction operation so that sufficient time is available for the ground to consolidate prior to application of the pavement layers. For such cases, the Engineer may order surcharging of embankments by the addition of fill to such levels as determined by him for effecting quick consolidation of sub-strata. The surcharge shall be removed only when the Engineer is satisfied that no more settlement is possible. Removal of the surcharge shall be to a level 500 mm below the subgrade level. The stripped embankment surface shall be scarified to an average depth of 100 mm and compacted to the designated density. Only after this operation the subgrade layer shall be constructed. The surcharge fill shall be deemed as if additional embankment has been constructed and measured accordingly. Removal of the surcharge and recompacting the surface of the stripped embankment shall be considered incidental to the work and shall not be measured separately.

Article 2.17 - Side Slopes

The Contractor shall construct at his own expense temporary kerbs and downspouts to protect the embankment's side slopes from erosion due to surface water.

All side slopes shall be neatly trimmed and the finished slopes shall not vary by more than 5 cm from the required cross section. Steep slopes in cuttings shall be cleared of all loose and insecure fragments.

All excess material including accumulation, at the foot of side slopes of embankments, of boulders, lumps or other rubbish shall be taken to tip.

No sharp change in the inclination shall be left, edges being rounded off to provide gradual change and discourage erosion.

Any slips or falls of materials shall be removed and the faces retrimmed in accordance with this Article at the Contractor's expense.

The side slopes given on the Drawings whether for cut or for embankment are subject to variation by the Engineer according to the nature of the soil.

Article 2.18 - Material for Surfacing Side Slopes, Verges

Surfacing materials for side slopes and verges shall consist of approved, suitable top soil obtained from the general excavations or from other approved sources and shall be free from all sticks, roots and stones of 3 cm in greatest dimension. Top soil shall not be handled when it is so wet that it will become densely compacted during its placement.

Article 2.19 - Compaction Of Earthworks

2.19.1 The moisture content of fill material of natural ground during compaction shall never exceed B. S. Heavy Optimum Moisture Content (OMC) for the densities specified in Article 2.19.2 hereof of more than 2%.

2.19.2 The compaction requirements are as follows:-

(Heavy Maximum Dry Density: H.M.D.D.)

(a) Compaction of the top 30 cm of natural ground under the embankment: not less than 90% B.S.H.M.D.D.

(b) Compaction of the top 30 cm of cuts under the pavement structure: not less than 95% B.S.H.M.D.D.

(c) Compaction of embankment except for the top 30 cm: not less than 90% B.S.H.M.D.D.

(d) Compaction of the top 30 cm of the embankment other than rock or boulder embankment: not less than 95% B.S.H.M.D.D.



Article 2.20 - Side Slopes

The Contractor shall construct at his own expense temporary kerbs and downspouts to protect the embankment's side slopes from erosion due to surface water.

All side slopes shall be neatly trimmed and the finished slopes shall not vary by more than 5 cm from the required cross section. Steep slopes in cuttings shall be cleared of all loose and insecure fragments.

All excess material including accumulation, at the foot of side slopes of embankments, of boulders, lumps or other rubbish shall be taken to tip.

No sharp change in the inclination shall be left, edges being rounded off to provide gradual change and discourage erosion.

Any slips or falls of materials shall be removed and the faces retrimmed in accordance with this Article at the Contractor's expense.

The side slopes given on the Drawings whether for cut or for embankment are subject to variation by the Engineer according to the nature of the soil.

Article 2.21 - Earthworks for structures

2.21.1 Excavation

Foundation excavation shall include the removal of all material, of whatever nature, necessary for the construction of the foundations and sub-structures in accordance with the plans or as directed by the Engineer.

It shall include the construction of all cribs, cofferdams, dewatering, etc., which may be necessary for the excavation of the work. It shall also include the subsequent removal of cofferdams and cribs and the placement of necessary backfill as specified. It shall also include stock-piling of the suitable excavated material for return as backfill and compaction as specified, and the disposing of excavated material that is not required for backfill, in a manner or in locations so as not to affect the waterway of the channel and be unsightly.

All sub-structures, where practicable, shall be constructed in open excavation and, where necessary the excavation shall be shored, braced, or protected by cofferdams in accordance with approved methods.

Foundation excavation shall be classified according to Article 2.3 of the Specification. Separate measurement and payment shall be made of each class of material respectively.

Excavations shall be kept free from water. The bottom of the excavation shall be thoroughly cleaned of loose material, mud and water and carefully trimmed and shaped to the correct levels and dimensions and, after approval in writing by the Engineer, the Contractor shall lay a blinding layer of concrete Class 15 to receive the concrete floor or footing, tamped to a smooth finish, providing all forms and screeds and any sump holes for drainage and pumping. Any

pockets of soft soil in the bottoms shall be removed and replaced with Class 15 concrete. The Contractor shall make good with Class 15 concrete any additional excavation below the bottom of the foundations to remove material that the Contractor allows to become unsuitable, the cost of which shall be borne by the Contractor.

Pumping from the interior of any foundation enclosure shall be done in such a manner as to preclude the possibility of the movement of water through any fresh concrete. No pumping will be permitted during the placing of concrete, or for a period of at least 24 hours thereafter, unless it is to be done from a suitable sump separated from the concrete work by approved means. Pumping to dewater a sealed cofferdam shall not commence until the seal has set sufficiently to withstand the hydrostatic pressure.

#### Backfill to structures

Up to the rock line, materials for foundation fill shall consist of lean concrete of Class 15 and as required by the Engineer.

Above the rock line, all materials used for backfill shall be crusher run 0/31.5 stabilised with cement to produce compressive strength at seven days of 150 mm cubes of not less than 8 N/mm<sup>2</sup> and not greater than 10 N/mm<sup>2</sup>.

All spaces excavated and not occupied by abutments, or other permanent work shall be backfilled with approved material up to the surface of the surrounding ground, with a sufficient allowance for settlement. All backfill material shall be placed in horizontal, uniform layers not exceeding 200 mm in thickness, and not less than 75mm after compaction, and shall be brought up uniformly and simultaneously on all sides of the structure. Each layer of backfill shall be compacted to a density of not less than 95% B.S. Heavy Compaction.

For filling to structures above existing ground level, the Contractor shall so arrange his programme for the construction of structures and earthworks that the filling behind and around any structure is carried but concurrently with, and as part of, the earthwork operation

#### 2.21.2 Cement stabilised fill to earth retaining structures

All materials used for compaction against earth retaining structures shall be of a quality acceptable to the Engineer, free from large lumps, wood or other extraneous matter. Granular fill shall consist of well-graded crusher 0/31.5 stabilised with cement to produce a compressive strength of between 8 and 10 N/mm<sup>2</sup> at 7 days on cubes of 150 mm. The fill behind abutments, wingwalls and culverts shall be deposited in well-compacted horizontal layers not exceeding 200 mm in thickness and not less than 75 mm in thickness after compaction and shall be brought up uniformly and simultaneously on all sides of the structure. Each layer of the backfill shall be compacted to a density of not less than 90% of B.S. Heavy Compaction. The material to a depth of 1500 mm below the soffit of the approved slab or finished road level shall be compacted to 95% B.S. Heavy Compaction, and shall consist of a graded crushed stone of a similar quality as the road sub base.

No backfill shall be placed against any abutment, wingwall or culvert until permission has been given by the Engineer and not until the concrete has been in place 14 days or until the cubes results show the specified strength, whichever is the later.

The material shall not contain more than 0.2 % of sulphate ions as determined by B.S. 1377 unless special precautions to the approval of the Engineer are taken to protect the concrete.

#### 2.21.3 Mixing of Backfill Material

The cement stabilised crusher run material to be used for backfilling to structures and earth retaining structures may be mixed in place or in a plant.

##### Mixing in Place

The Constructional Plant and method shall include:

(a) A cement spreader or approved method which will spread cement uniformly on to the material and provides the required proportion of cement per cent by weight to provide the specified compressive strength with a tolerance of plus or minus 0.5 per cent.

(b) A rotary mixer fitted with tines and capable of mixing the cement uniformly into the material for the full depth of the layer in a single pass. The mixer shall be capable of adjustment to control the depth of processing and shall be equipped with a water spray bar. The spray bar shall be regulated to spray water onto the material at a predetermined rate fixed in relation to the speed of travel of the mixer and providing the required proportion of water per cent by weight, with a tolerance of plus or minus 1.0 per cent. Alternatively a bowser which is similarly equipped may be used.

The first pass of the mixer shall be made to mix in the cement without adding water, one or more further passes shall be made, mixing in the required amount of water.

Each pass of the mixer shall overlap the adjacent pass at longitudinal joints by at least 100 mm and at traverse joints by 1.0 metre.

#### 2.21.4 Measurement and payment for earthworks for structures

Earthworks shall be paid on net volume. No payment shall be made for over-excavation or bulk earthwork except where same is specified in the Bill of Quantities. Excavation shall be deemed to be in any material.

### Article 2.22 -Testing of Naturally Occurring Materials

#### 2.22.1 Preparation of Disturbed Samples for Testing

The preparation of disturbed samples for testing shall be carried out in accordance with the procedure given in B. S. 1377.

#### 2.22.2 Tests on Naturally Occurring Materials

The tests shown below shall be conducted in accordance with the relevant British Standard or

Moisture Content: B. S. 1377 Test 1A

Speedy Moisture Content: as directed by the Engineer

Liquid Limit: B. S. 1377 Test 2A or 2 B

Plastic Limit: B. S. 1377 Test 3

Plasticity Index: B. S. 1377 Test 4

Specific Gravity: B. S. 812

Bulk Density: B. S. 812

Particle Size Distribution: B. S. 1377, Test 7A

Particle size analysis by Hydrometer method: B.S 1377 Test 7D  
(If required at the discretion of Engineer)

Sand Equivalent: AASHTO T 176

All sieving shall be done by the wet method. Dry sieving may only be carried out with the specific permission of the Engineer.

#### 2.22.3 Compaction Tests

The tests shall be carried out in accordance with B. S. 1377 test 13.

#### 2.22.4 California Bearing Ratio Test

The test shall be carried out in accordance with B. S. 1377 test 1 dynamic compaction method 1.

All C.B.R. Specimen shall be prepared at B. S. Heavy Optimum Moisture Content and at B. S. Heavy Optimum Moisture Content + 2%.

All C.B.R. tests on unstabilised soils are to be carried out after 4 days soaking.

## SECTION 3.0 - CONCRETE

### 3.01 Code of practice for concrete work

All workmanship, materials, tests and performance in connection with the concrete work shall be in conformity with the British Standard Code of Practice BS 8110 for the Design, Materials and Workmanship for “The Structural Use of Concrete” and BS 8007 1987 “Code of Practice of Concrete Structures for Retaining Aqueous Liquids” where not inconsistent with these Preambles.

### 3.02 Cement

Cement unless otherwise specified shall be Portland Cement of strength class 42.5 N complying with the requirements of BS 12 1991 and a manufacturer’s certificate of Test in accordance with BS 12 1991 shall be supplied for each consignment delivered to the site.

Cement may be delivered to the site either in bags or in bulk.

If delivered in bags, each bag shall be properly sealed and marked with the manufacturer’s name and shall be stored in a weatherproof shed of adequate dimensions with a raised floor. Each consignment shall be kept separate and marked so that, it may be used in the sequence in which it is received. Any bag found to contain cement which has set or partly set shall be completely discarded and not used in the works. Such bag/bags shall be removed from site within 24 hours. Bags shall not be stacked more than 1.5 m in height.

If delivered in bulk, the cement shall be stored in waterproof silo either provided by the cement supplier or by the Contractor but in either case the silo shall be to the approval of the Engineer.

### 3.03 Aggregates

Aggregates shall conform with the requirements of BS 882: 1992 and the sources and types of all aggregates are to be approved in all respects by the Engineer before work commences.

The grading of aggregates shall be one within the limits set out in BS 882 and as later specified and the grading, once approved, shall be adhered to throughout the works and not varied without the approval of the Engineer. Fine aggregate shall be clean, crushed rock sand and coral sand, of hard quality and shall be free from lumps of stone, earth, loam, dust, salt, organic matter and any other deleterious substances. The maximum quantities of material passing the 75 um sieve shall not exceed the values given in Table 6 of BS 882 : 1992. Coral sand shall be washed in running water to the satisfaction of the Engineer. It shall be graded within the limits of Zone C or M of Table 4 of BS 882.

Coarse aggregate for concrete shall be crushed blue basalt stones to the approval of the Engineer. It shall be hard, clean and roughly cubical in shape, non porous, free from dust, decomposed stone, clay, earthy matter, foreign substances or

friable, thin, elongated or laminated pieces. It shall be graded within limits of Table 3 of BS 882 for graded aggregate. The flakiness index shall not exceed 40. if in the opinion of the Engineer, the aggregate meets with the above requirements but is dirty or adulterated in any manner it shall be screened and/or washed with clean water, if he so instructs, at the Contractor's expense.

Aggregates shall be delivered to the site in their prescribed sizes or gradings and shall be stock-piled separately on paved areas or boarded platforms in separate units to avoid intermixing, excessive segregation and contamination with other materials. On no account shall aggregates be stock-piled on the ground. Fine aggregate shall be allowed to drain until it has reached a uniform moisture content before it is used.

#### 3.04 Quality of Mixing Water

Water of chemical composition acceptable for drinking is suitable for concrete.

The water used for making and curing concrete and mortar shall be free from objectionable quantities of silt, organic matter, alkali, salt or other impurities. In particular, inorganic matter in solution shall not exceed 500 parts per million by weight and in suspension shall not exceed 30 parts per million by weight and the total alkali bicarbonate/carbonate content of the water shall be less than 1000 parts per million by weight.

The water shall be from an approved source and shall contain no deleterious matter which significantly affects the setting time or strength or durability of the concrete or which has any effect on the appearance of the hardened concrete by discoloration or efflorescence or prevents the achievement of the approved test cube strengths at 28 days for the appropriate grade of concrete.

The Contractor shall test the water which he proposed to use and shall submit the records of such tests to the Engineer before placing any concrete in the permanent works.

The Contractor shall make regular tests of the water during concrete construction works. The water shall be sampled at the point of discharge into the mix and the frequency of sampling shall be as approved by the Engineer.

#### 3.05 Admixtures

Concrete admixtures complying with BS 5075 shall be allowed with the prior approval of the Engineer. "Plasticiser" where used will be added to the mixing water in proportion recommended by the manufacturer and strictly in accordance with their written instructions, to achieve better workability. No additional cost will be paid for the use of the plasticizer.

#### 3.06 Reinforcement Materials

Steel reinforcement shall be plain mild steel bars or high yield deformed bars complying with MS 10, or cold worked deformed bars complying with Ms 10. Steel reinforcement shall be cut from straight bars free from kinks and bends or other damage and cold bent by experienced competent workmen. At the time

of incorporation in the works, the reinforcement shall be clean and free from loose mill scale and loose rust.

Bars of diameter 20 mm or greater shall be bent in a bending machine designed for the purpose and approved by the Engineer. Bending and cutting shall be in accordance with BS 4466 unless otherwise specified or ordered by the Engineer.

The Contractor shall supply the Engineer with the certificates of the manufacturer issued in compliance with MS 10 for all the required tests, including the rebend test, in respect of each consignment delivered to site.

Steel fabric reinforcement shall comply with MS 34 & MS 35.

Steel reinforcement shall be stored sheltered and supported by wooden blocks so as to prevent sagging. Bars shall be stored in separate lots according to diameter and quality. No claim on account of non-availability of bars up to 12 metre lengths will be allowed.

### 3.07 Fixing Reinforcement

Reinforcement shall be accurately bent to the shapes and dimensions shown on the drawing and in accordance with BS 4466. Reinforcement must be cut and bent cold and no welded joints will be permitted unless so detailed.

Reinforcement shall be accurately placed in position as shown on the drawings and shall be secured against displacement by using No 18 S.W.G. annealed binding wire or suitable clips at intersections and laps and shall be supported by approved concrete plastic or metal supports, steel chairs, spacers or metal hangers to ensure the correct position and cover before concreting and shall be kept in the same position during concreting. However, metal supports, chairs, etc shall have minimum 12 mm cover made of concrete blocks, or shall have approved plastic shoes.

### 3.08 Position and Correctness of reinforcement

No concreting shall be commenced until the Engineer has inspected the reinforcement in position and until he has approved the same. The Contractor shall give two clear days notice of his intention to concrete. The minimum period between two inspections shall be 24 hours.

Irrespective of whether any inspection and/or approval of the fixing of the reinforcement has been carried out as above, it shall be Contractor's sole responsibility to ensure that the reinforcement complies with the details on the drawings and is fixed exactly in positions shown therein and in the position to give the prescribed cover.

The Contractor will be held entirely responsible for any failing or defect in any portion of the reinforced concrete structure and including any consequent delay, claims, third party claims, etc... where it is shown that the reinforcement, has been incorrectly positioned or it is incorrect in size or quantity with respect to the detailed drawings.

Unless otherwise permitted by the Engineer, reinforcement shall not bent after being embedded in hardened concrete

Unless otherwise instructed concrete cover to reinforcement bares in any face shall be as per Table 3.1

**Table 3.1**

	A For all members of structures more than 300 m away from the sea and at altitude less than 350 m, and internal members in other areas (mm)	B For external members exposed to weather for structures located in proximity of sea within 300 m from sea ad for structures at altitude greater than 350 m (mm)
(a) Foundations against earth face	75	75
(b) Foundations against blinding	50	50
(c) Walls below ground or against water face	40	40
(d) Columns:		
>200 mm	35	35
200 mm or less	30	30
(e) Ground beams	30	35
(f) Beams and walls	30	35
(g) Slab on hardcore	30	35
(h) Suspended slabs	30	30

### 3.09 Concrete Mixes

#### (1) Grades of Concrete

The grades of structural concrete to be used in the permanent works shall be those shown designated in Table 3.2 in which the class designation includes two figures. The first figure is the nominal strength at 28 days expressed as N/mm<sup>2</sup> and the second figure is the maximum nominal size of aggregate in the mix.

#### (2) Design of Proposed Mixes

The Contractor shall design all the concrete mixes called for on the drawings, and bills of quantities making use of the ingredients which have been approved by the Engineer for use in the permanent works and in compliance with this Specification.



- (i) The aggregate portion shall be well graded from the nominal maximum size to small sizes downwards.
- (ii) The cement content shall be such as to achieve the strengths called for in Table 3.2 but in any case not less than the minimum necessary for impermeability and durability shown in Table 3.3
- (iii) The workability shall be consistent with ease of placing and proper compaction having regard to the presence of reinforcement and other obstructions.
- (iv) The water-cement ration shall be the minimum consistent with adequate workability but in any case not greater than that allowable for impermeability and durability shown in Table 3.3 taking due account of any water contained in the aggregates.
- (v) The drying shrinkage determined in accordance with BS 1881 shall not be greater than 0.05%
- (vi) The ration of fine aggregates to total aggregates based on mass shall be within the following limits:

Coarse Aggregate Size	Minimum Ratio	Maximum Ratio
10mm	0.45	0.55
14mm	0.40	0.50
20mm	0.35	0.45
40mm	0.30	0.40

Table 3.2

**CONCRETE GRADES AND STRENGTHS**

GRADE OF CONCRETE	CHARACTERISTIC COMPRESSIVE STRENGTH AT 28 DAYS (N/mm <sup>2</sup> )	COMPRESSION STRENGTH COMPLIANCE REQUIREMENTS			
		Any individual test result (N/mm <sup>2</sup> )	Mean of a group of test results		
			First 2 (N/mm <sup>2</sup> )	First 3 (N/mm <sup>2</sup> )	Any Consecutive 4 (N/mm <sup>2</sup> )
15/20	15	13	15	16	17
20/20	20	17	21	22	23
25/20	25	22	26	27	28
30/20	30	27	31	32	33
35/20	35	32	36	37	38
40/20	40	37	41	42	43
45/20	45	42	46	47	48

Note: The strength requirements given above shall apply irrespective of the maximum size of aggregates used.

Table 3.3

**MINIMUM CEMENT CONTENT AND MAXIMUM WATER/CEMENT RATIO**

GRADE OF CONCRETE	MINIMUM CEMENT CONTENT (kg/rn <sup>3</sup> )	MAXIMUM WATER/CEMENT RATIO	
		A	B
15/20	200	0.70	X
20/20	250	0.65	X
25/20	300	0.60	X
30/20	325	0.60	0.55
35/20	350	0.58	0.53
40/20	400	0.55	0.48
45/20	425	0.50	0.45

Notes:

- (a) The minimum cement contents given above are per cubic metre of compacted concrete made with 20 mm nominal size of aggregates.

For maximum aggregate size of 12 mm, the minimum cement content should be increased by 40 kg/m<sup>3</sup>. For maximum aggregate size of 40 mm, the minimum cement content may be reduced by 30 kg/m<sup>3</sup>.

- (b) Under the heading 'Maximum water/cement ratio'', column A applies to sheltered and average conditions and column B applies to severe conditions and water retaining structures. Refer Article 3.08 for A and B.
- (c) Use of 'An Approved Concrete Admixture' to BS 5075 to achieve the strength with the maximum water/cement ratio as tabulated above is allowed.
- (d) Use of more than 40 kg over and above the minimum cement content specified and tabulated above is not allowed.

### 3.10 Requirements for Designed Mixes

#### (1) Evidence of Suitability of Proposed Mix Proportions

Evidence should be submitted to the Engineer for each grade of concrete showing that at the intended workability, the proposed mix proportions and manufacturing method will produce concrete of the required quality.

The following information should be provided before any designed mix is supplied. Subsequently the Contractor should declare any change in sources of materials and any change in cement content which results in a difference greater than 20 kg/m<sup>3</sup> from the cement content last declared:

- (a) Nature and source of each material
- (b) The proposed proportions or quantity of each constituent per cubic metre of fully compacted concrete.
- (c) Either
  - (i) Data from previous production of concrete using the materials and plant which will be used to produce the concrete, confirming that the proposed mix proportions satisfy the criteria given in 3.10 (2), or.
  - (ii) Where no satisfactory data exist under item (a) data from mixes confirming that the proposed mix proportions satisfy the requirements of 3.10 (3).

Sampling and testing shall be carried out by the methods described in the relevant Parts of BS 1881.

#### (2) Proposals based on previous production data

When based on previous production data, the mean 28 days compressive strength calculated from n cube results, from separate batches of concrete shall exceed the specified characteristics strength by

$$k s [0.86 + (2/n)]$$

where

k is a statistical constant, not less than 1.64,

$$3.0 \text{ N/mm}^2$$

n is the number of consecutive test results, not less than 10 and not greater than 100. A test result may be a single result or the mean of two or four results from cubes of the same sample provided the difference between the strengths of two cubes divided by their mean is less than 30%.

When n exceeds 100, the mean strength shall exceed the specified characteristic strength by  $k_s$ , in which k shall not be less than 1.64 and s shall not be less than  $3.0 \text{ N/mm}^2$ .

Previous production data for use in calculating these criteria shall be 28 days compressive strength results from separate batches of concrete sampled at random over an immediately prior period exceeding one month and not exceeding one year, using the materials and plant which are proposed for the work.

(3) Proposal based on Trial Mixes

Where trial mixes are required three separate batches of concrete should be made using materials likely to be typical of the proposed supply and preferably under full scale production conditions. If circumstances make this inconvenient, with a written permission of the Engineer the batches may be mixed in a laboratory. The workability of each of the trial batches shall be the same as the proposed supply. Three cubes shall be made from each batch for test at 28 days. The average compressive strength of the three cubes testes at 28 days shall exceed the specified characteristic strength by at least  $10 \text{ N/mm}^2$ .

(4) Additional Trial Mixes

During production before any change is made to an approved design mix, Contractor shall seek an approval for the Engineer giving reasons for the change and substantiating the proposal. This approval may only be obtained if the proposal is submitted with test results of the proposed design mix.

3.11 Requirements of Nominal Volumetric Mix

If the Contractor fails to achieve the requirements of Article 3.10 and/or prefers nominal volumetric mix, he may use the following with a written approval from the Engineer:

Description	Mix 30/20 1:1.8:2.8	Mix 25/20 1:2.4:3.8	Mix 20/20 1:2.7:4.2	Mix 15/20 1:4:6
Cement	1 bag of 50 kg	1 bag of 50 kg	1 bag of 50 kg	1 bag of 50 kg
Crushed rock sand	$1\frac{1}{4}$ cu ft	$1\frac{3}{4}$ cu ft	$1\frac{7}{8}$ cu ft	$1\frac{7}{8}$ cu ft
Coral sand	1 cu ft	$1\frac{1}{4}$ cu ft	$1\frac{1}{2}$ cu ft	$1\frac{1}{2}$ cu ft
10 mm to 5 mm graded aggregate	1 cu ft	$1\frac{1}{4}$ cu ft	$1\frac{1}{4}$ cu ft	$1\frac{1}{4}$ cu ft
	$2\frac{1}{2}$ cu ft	$3\frac{1}{2}$ cu ft	4 cu ft	4 cu ft

20 mm to 10 mm graded aggregate	0.55	0.6	0.65	0.65
Maximum water/cement ratio	50 mm	50 mm	50 mm	50 mm
Maximum slump				

### 3.12 Ready Mixed Concrete

Ready mixed concrete may be used subject to the approval of the Engineer.

When it is used the Contractor shall ensure that all the requirements of these specifications are complied with.

Further to above requirements, the Contractor shall ensure that transport and delivery of ready mixed concrete comply with the recommendations of Clause 4.10.4 of BS 5328: Part 3:1990.

The concrete shall be transported to the site in truck mixers and shall be continuously agitated until it is delivered on site. The Contractor shall ensure that no water is added after it is delivered.

For plant mixed concrete the Contractor shall check that the delivery note for each truck shows the time when water is first added to the concrete materials, and the maximum allowable time interval between the completion of discharge and the mixing of water. This time interval should be 30 minutes less than the initial setting time of the cement. Any concrete which is not placed in its final position within this time interval should not be used.

Sample of workscube shall be taken by the Main Contractor at the place where concrete is finally placed in the structural members/

### 3.13 Waterproof Concrete

Where 'waterproof concrete' is specified, 'sealocrete', 'sika', or other approved waterproofing material and plasticizing agent complying to concrete admixtures to British Standard shall be added to the mixing water in the proportion recommended by the manufacturers and strictly in accordance with their written instructions. Waterproof concrete shall be grade 30/20 and shall meet all the strength requirements of the specified class, except that the fine aggregate shall consist solely of rock sand.

### 3.14 Quality Control of Concrete Production

#### (1) Sampling

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 and/or of deposition as instructed by the Engineer, and in the presence of a representative of the Engineer, all in accordance with the

sampling procedures described in BS 1881 and with further requirements set out below.

Six 150 mm cubes shall be made from each sample and shall be cured and tested all in accordance with BS 1881, two at seven days and two others at 28 days.

Each sample shall be taken from one batch selected at random and at intervals such that the rate of sampling is not less than the minimum rates of sampling given in Table 3.4. At least one sample should be taken of each grade of concrete on each day that concrete is placed. The actual rate of sampling shall be increased for critical elements if instructed by the Engineer.

Table 3.4

Minimum Rate of Sampling	
Average Rate of Sampling on Sample Per	Example where Applicable
10 m <sup>2</sup> or 10 batches	Columns, cantilever
20 m <sup>3</sup> or 20 batches	Beams, slabs
50 m <sup>3</sup> or 50 batches	Solid rafts, breakwaters

(2) Testing

- (a) The consistency of all concrete shall be determined by means of the slump test in accordance with British Standards Specification No 1881 'Methods of Testing Concrete'. The Contractor shall provide the necessary number of slump

Slump tests shall be made at frequent intervals when concreting is in progress and as ordered by the Engineer. It shall, nonetheless be determined for each batch from which samples are taken for other tests. The first consistency tests shall be made immediately concreting is commenced on any section. For the purposes of any test two slump tests shall be taken at a time and the average adopted for compliance to this specifications.

The slump required shall be determined by the Engineer and shall be varied to suit the purpose for which the concrete is required. The slump of the concrete in any batch shall however, not differ from the value established by trial mixed by more than 25 mm or one third of the value, whichever is the greater. No concrete shall be used with a slump exceeding 75 mm without the approval of the Engineer.

The cost of providing slump apparatus and labour and materials required for taking slump tests shall be included in the rates for concrete in the Bill of Quantities.

- (b) The water cement ration as estimated from the results of (a) above, or when required by the Engineer, determined by samples from any batch shall not vary by more than 5% from the specified maximum value or the value established during the trial mixes, whichever is the lower.
- (c) The compressive strength of the concrete at 28 days shall be such that any individual test result as well as the means of the first 2, first 3 or any consecutive 4 test results comply with the strength requirements given under the appropriate headings in Table 3.2. in this context, a result is defined as the average strength of the two cubes taken from one batch and tested at 28 days.
- (d) When the difference between the strengths of the two cubes divided by their mean exceeds 30%, the test result shall be deemed invalid and Article 3.15 (2) shall apply.

### 3.15 Failure to comply with requirements

#### (1) Quantity of concrete represented by strength test results

The quantity of concrete represented by a group of four consecutive test results shall include the batches from which the first and last samples were taken together with all intervening batches. Similarly, the first two or three results shall be taken as representing all the intervening batches. For the individual test result requirements given in Table 3.2 only the particular batch from which the sample was taken shall be at risk.

- (2) The Contractor shall take any action instructed by the Engineer to remedy concrete which does not comply with the specification. The results of such actions do not nullify the previous establishment of non-compliance with the specification based on requirements for cube test results. The Contractor shall be responsible for all costs and delays for such actions. Such action may include but is not necessarily confined to the following:
  - i. Increasing the frequency of sampling until control is again established.
  - ii. Cutting test cores from the concrete and testing in accordance with Bs 1881
  - iii. Carrying out strengthening or other remedial work to the concrete where possible or appropriate
  - iv. Carrying out non-destructive testing such as load tests on beams
  - v. Removing the failed concrete

### 3.16 Mixing Concrete

Before any plant for batching, mixing, transporting, placing, compacting and finishing concrete is ordered or delivered to site, the Contractor shall submit

to the Engineer for approval full details of all the plant which he proposes to use and the arrangements he proposed to make.

Concrete for the permanent works shall be batched and mixed in one or more central plants unless the Engineer agrees to some other arrangement.

Mixers shall be of a capacity sufficient to take one whole bag of cement per batch. Smaller size mixers shall not be used. Weigh batching machines with water measuring device shall be of an approved type and shall be properly maintained and checked weekly for its accuracy. All materials shall be thoroughly mixed dry before the water is added and the mixing of each batch shall continue for a period of not less than two minutes after the water has been added and until there is a uniform distribution of the materials and the mass is uniform in color.

The entire contents of the mixer drum shall be discharged before recharging. The volume of mixed materials shall not exceed the rated capacity of the mixer. Whenever the mixer is started, 10% extra cement shall be added to the first batch and no extra payment will be made on this account.

### 3.17 Conveying

- (1) The concrete shall be mixed as near to the place where it is required as is practicable to avoid re-handling and only as much as is required for a specified section of the work shall be mixed at one time, such section being commenced and finished in one operation without delay. All concrete must be efficiently handled and used in the works within twenty (20) minutes of mixing. It shall be discharged from the mixer direct either into receptacles or barrows and shall be distributed by approved means which do not cause segregation or loss of ingredients or otherwise impair the quality of the concrete. Approved mechanical means of handling will be encouraged, but the use of chutes for placing concrete is permitted provided they are not longer than 6 m and their slope do not exceed one vertical to two horizontal and is not less than one vertical to three horizontal. Conveying of concreting by hand-buckets or similar shall not be allowed. Similarly conveying of concrete by belt conveyor shall not be allowed.
- (2) Pumped Concrete – Coarse aggregate size shall be limited to 20 mm for pumped concrete mixes. The slump of concrete discharged into the pump may exceed the specified slump by the amount of slump loss in the pumping system up to a maximum of 25 mm. the slump loss shall be the difference between slump tests made at both ends of the pumping system. If tests indicate a loss greater than 25 mm, the Contractor shall modify the pumping system as required to reduce the slump loss to 25 mm or less.
- (3) A superplasticiser should preferably be used in pumped concrete. The slump of the concrete mix shall not exceed 75 mm before addition of superplasticiser.



3.18 Depositing

Placing of concrete in supported elements, e.g. slab, beam shall not be started until the concrete previously placed in top parts of columns is not longer plastic and has been in place at least for two hours.

Concrete shall be placed from height not exceeding 1.5 m directly into its permanent position and shall not be worked along the shutters to that position unless otherwise approved, concrete shall be placed in a single operation to the full thickness of slabs with beams and similar members. The Engineer shall allow concrete to be placed for walls exceeding 150 mm thickness from a height up to 3 m and in layers not exceeding 750 mm if FORM-SCAFF or other approved system of formwork is used.

In addition, Contractor will ensure that the concrete shall be deposited continuously such that no concrete shall be deposited on concrete which has hardened sufficiently to cause the formation of seams or places of weakness within the section. Placing shall be carried out at such a rate that the concrete which is being integrated with fresh concrete is still plastic.

Concrete in columns may be placed to a height of 3 m with careful placing and vibration to achieve satisfactory results. Where the height of the column exceeds 3 m suitable openings must be left in the shutters so that this maximum lift is not exceeded.

Concrete shall be placed continuously until completion of the part of the work between construction joints as specified hereinafter or of a part of approved extent. At the completion of a specified or approved part construction joint of the form and in the positions hereinafter specified shall be made. A record of all such joints must be made by the Contractor and a copy supplied to the Engineer.

3.19 Placing Concrete under water

When required concrete shall be deposited under water by an approved method in such a way that the fresh concrete enters the mass of previously placed concrete from within causing water to be displaced with minimum disturbance at the surface of the concrete.

3.20 Precautions of mixing and placing

Any accumulation of set concrete on the reinforcement shall be removed by wire brushing before further concrete is placed. The Contractor shall provide runaways for concreting to the satisfaction of the Engineer. Under no circumstances will runaways be allowed to rest on the reinforcement.

Care shall be taken that the concrete is not disturbed or subjected to vibrations and shocks during the setting period.

Mixing machines, platforms and barrows shall be cleaned before commencing mixing and be cleaned on every cessations of work.

Where concrete is laid on hardcore, concrete blocks or other absorbent materials of the base shall be suitably and sufficiently wetted before the concrete is deposited.

3.21 Compaction of Concrete

(1) Compaction

At all times during which concrete is being placed, the Contractor shall provide adequate trained and experienced labour to ensure that the concrete is compacted in the forms to the satisfaction of the Engineer.

Concrete shall be placed neither at a rate greater than will permit satisfactory compaction nor to a depth greater than 750 mm before it is compacted.

3.22 Vibration of Concrete

(1) General

During and immediately after placing, the concrete shall be thoroughly compacted by means of continuous tamping, spading, slicing, rodding, forking and vibration. Vibration is required for all concrete of grades with 28 days strength greater than 15 N/mm<sup>2</sup>.

Care shall be taken to fill every part of the formwork, to work the concrete under and around the reinforcement without displacing it and to avoid disturbing recently placed concrete which has begun to set. Any water accumulating on the surface of newly placed concrete shall be removed and no further concrete shall be placed thereon until such water is removed.

(2) Internal Vibrators

Internal vibrators shall have a frequency of not less than 7000 cycles per minute. Such vibrators shall visibly affect the concrete within a radius of 225 mm from the vibrator.

Vibrator shall not be used to move concrete from place to place in the formwork.

At least one internal vibrator shall be operated for every two cubic metres of concrete placed per hour and at least one spare vibrator shall be maintained on site in case of break-down during concreting operations.

(3) External Vibrators

External formwork vibrators shall be of the high frequency low amplitude type applied with the principal direction of vibration in the horizontal plane. They shall be attached directly to the forms at no more than 1.2 m centers.

In addition to internal and external vibration, the upper surface of suspended floor slabs shall be leveled with a tamping or vibrating screed prior to finishing. Vibrating elements shall be of the low frequency high amplitude type operating at a speed of not less than 3,000 r.p.m.

### 3.23 Curing and Protection

Care must be taken that no concrete becomes prematurely dry and fresh concrete must be carefully protected within two hours of placing from rain, sun and wind by means of Hessian sacking, polythene sheeting or other approved means. This protective layer and the concrete itself must be kept continuously wet for at least three days after the concrete has been placed. The Contractor must allow for the complete covering of all fresh concrete for a period of three days.

Hessian or polythene sheeting shall be in the maximum widths obtainable and shall be secured against wind. The Contractor will not be permitted to use old cement bags, Hessian or other material in small pieces. When temperature exceeds 30°C the new concrete shall be covered with a layer of drip dry Hessian.

Curing compound to Engineer's approval may be used.

Traffic or loading shall not be allowed on the concrete except with the written permission of the Engineer.

Contractor should allow in his price the adequate supply and storage of water, if not available from the water main, for curing of the concrete as specified above.

If the Contractor intends to use curing compound or membrane, he should submit full details of the same with manufacturer's literature and test certificate from independent laboratory and seek the Engineer's approval before use. The curing compound should have an efficiency index of not less than 90% when tested in accordance with BS 7542.

The curing compound shall be applied strictly in accordance with the manufacturer's recommendations. The method of monitoring the application rate and the area to which curing compound has been applied shall be submitted by the Contractor for Engineer's approval and the approved method shall be strictly followed by the Contractor. The Engineer may, at his discretion, require the Contractor to adopt an effective alternative means of curing any area of the structure where membrane curing is unsatisfactory in the opinion of the Engineer.

### 3.24 Faulty Concrete

Any concrete which fails to comply with these preambles, or which shows signs of setting before it is placed shall be taken out and removed from the site. Where concrete is found to be defective by the Engineer after it has set, the concrete shall be cut out and replaced in accordance with the Engineer's instructions. On no account shall any faulty, honeycombed, or otherwise

defective concrete be repaired or patched until the Engineer has made an inspection and issued instructions for repair. The whole of the cost whatsoever, which may be occasioned by the need to remove faulty concrete, shall be borne by the Contractor.

The top and bottom surface of slabs shall be within 6mm for area less than 40 m and within 10 mm for area 40 m and above of the normal levels shown on the drawings. The top of upstand beam and soffit of downstand beams shall be truly level and line and non-cumulative tolerance of 5 mm for length up to 10.0 m and not more than 10 mm for full length of the beam exceeding 10.0 m length Walls and columns shall be truly plumb and non cumulative tolerance of 10 mm in each storey and not more than 20 mm out in their full height will be permitted.

Where drawings call for tolerance other than those given in this paragraph the drawings shall prevail.

The Contractor shall be responsible for the cost of all corrective measures required by the Engineer to rectify work which is not constructed within the tolerance set out above.

### 3.25 Construction Joints

#### (1) Position of Construction Joints

Construction joints shall be permitted only at the locations shown on the drawings or as instructed on the site by the Engineer. In general they shall be perpendicular to the lines of principal stress and shall be located at points of minimum shear, viz vertically at or near, mid spans of slabs ribs and beams.

#### (2) Maximum Distance between Construction Joints

Suspended slabs are generally to be cast using alternative bays not exceeding 12 m in length. At least 48 hours shall elapse between the casting of adjacent bays. Joints between bays shall be in positions to be agreed with Engineer. Beams shall be cast with the slab.

Mass concrete shall be cast in alternate bays in lengths not exceeding 7.5 m and in depths not exceeding 1.5 m. adjacent sections shall not be cast within 48 hours of each other Ground floor slab on hardcore shall be cast in alternate bays not exceeding 4.0 m in length, unless otherwise shown on the drawings. At least 48 hours shall elapse between the casting of adjacent bays.

Under no circumstances shall concrete be allowed to tail off, but shall be deposited against stopping-boards.

(3) Preparation of Construction Joints

Before placing new concrete already set, the face of the old concrete shall be thoroughly hacked and roughened to expose the coarse aggregates. The surface shall be cleaned, laitance and loose material removed therefrom. Immediately before placing the new concrete the surface shall be saturated with water. All construction joints of roof and external walls and external beams shall be treated with epoxy resin in accordance with the manufacturer's instruction by an experienced skilled worker. Main Contractor shall ensure that full water tightness of external construction joints is achieved.

Before the final set of the concrete, the construction joints at the top shall be made good with surface trowelling.

(4) Reinforcement across Construction Joints

At construction joints in slabs, minimum reinforcement of 0.15% of the cross section of the slab should be provided on each face of the slab as per Engineer's detail.

Prices for concrete shall include for construction joints as required by Articles 3.25 (1) to 3.25 (4) above.

3.26 Expansion / Contraction Joint

Joint fillers shall be flexcell or high density styropor and sealants shall be Elastomeric of an approved type unless otherwise shown on the drawings. Reinforcement or other embedded items bonded to the concrete shall not extend continuously through any expansion / contraction joint.

External peripheral strip of the joint fillers shall be sawn and fixed so that it can be removed easily to form the depth and width of the sealants. Unless otherwise shown on the drawing, the depth of the sealants shall not be less than the width of the expansion joint.

The gap for sealants shall be cleared of any mortar and foreign material. The edges of concrete on the sides of the expansion joint shall be protected from

breaking. Broken edges shall be repaired with ‘Epoxy Mortar’ of approved quality such that the width and the line of the expansion joint is perfectly maintained.

The elastomeric seleants shall be applied after the application of approved separating membrane and the primer all as per manufacturer’s specifications.

### 3.27 Waterbars

#### (1) Type

Waterbars shall be PVC waterbars to British Standards and of an approved type and shape shall be provided in the positions indicated on the drawings. At places galvanized m.s strip can be used as waterbar, where shown as such.

#### (2) Joints

Water bars shall be heat welded in accordance with the manufacturer’s instructions and where the waterbar is to be fixed vertically, metal clips as manufactured by the supplier of the water bar or of other approved design shall be provided to suspend the waterbar from the reinforcement.

#### (3) Additional Waterbar

Where waterproof concrete is used the Contractor shall adhere strictly to the position and type of construction joints as specified or detailed on the drawings. Any deviation from this procedure or the provision of additional construction joints will require the prior approval of the Engineer and any additional waterbars which may be required will be at the Contractor’s expense.

#### (4) Form work to Waterbar

Formwork shall be designed with sufficient timber formers and blocking pieces to support the waterbar and to ensure that it is not displaced during concreting. In the case of horizontal joints in vertical walling and similar members, the formwork shall be so constructed as to permit the starter or upstand of concrete surrounding the lower half of the waterbar to be poured in the same operation as the slab or other member from which it springs. Formwork to walls or similar members where a waterbar is positioned at the base of the lift, shall have sufficient openings not

less than 300 mm square at approximately 225 mm above the level of the waterbar to permit checking that the waterbar is correctly positioned and not displaced during concreting.

No concreting will be permitted to portions where upstand starter form an integral part until the formwork to the starter has been fixed and approved.

### 3.28 Embedded Items in Concrete

#### (1) General

All sleeves, inserts, anchors and embedded items required for adjoining work or for its support shall be approved by the Engineer and shall be placed prior to concreting and shall be used after an interval of time approved by the Engineer.

All Contractors whose work is related to the concrete or must be supported by it shall be given ample notice and opportunity to furnish embedded items before concrete is placed.

Expansion joint material, waterstops, and other embedded items shall be positioned accurately and rigidly, voids in sleeves, etc... shall be filled temporarily with readily removable materials to prevent concrete entering into them.

#### (2) Electrical Conduits

Conduits shall be of size not exceeding 20 mm overall diameter. They shall be placed at least 75 mm apart in the central thickness of the slab and beam. The group (consisting of maximum 3 @ 75 mm each apart) of conduits to be spaced at not less than 2000 mm apart. At crossing the conduits should not be more than 2 nos vertically. Where diameter of conduits exceeds 20 mm approval of such drawing showing their exact position and numbers should be obtained from the Engineer. The same applies to insert for electrical sockets, similar fittings into the concrete members.

### 3.29 Formwork

#### (1) Materials and Design

Formwork shall be constructed of timber or steel or precast concrete or other approved material with sufficient strength to withstand pressure resulting from placing and vibration of the concrete and with rigidity to achieve the specified tolerances.

The design and engineering of the formwork as well as its construction shall be the responsibility of the Contractor. The formwork shall be designed for the loads, lateral pressure, pressure due to cyclonic winds and other loads likely to be encountered on site.

Shop drawings for formwork including the location of shoring and reshoring shall be submitted for approval by the Engineer before erection.

#### (2) Construction

All formwork shall have joints close enough to prevent leakage of liquid from the concrete and formwork shall be jacked or wedged and clamped or bolted to permit adjustments before concreting and to permit easing and removal of formwork without jarring the concrete. Formwork shall be securely braced and strutted against lateral deflections and vertical movements. Where formwork is supported on previously constructed portions of the reinforced concrete structural frame, the Contractor shall by consultation with the Engineer ensure that the supporting concrete structure is capable of carrying the load and / or is sufficiently propped from lower floors or portions of the frame to permit the load to be temporarily carried during construction.

Formwork shall be cambered by the Contractor to the amount approved by the Engineer to compensate for anticipated deflections prior to hardening of the concrete.

(3) Preparation for Concreting

The Contractor's attention is drawn to the various surfaces textures and applied finishes required and the faces of the formwork next to the concrete must be of such material and construction and be sufficiently true to provide a concrete surface which will in each particular case permit the specified surface treatment or applied finish.

At construction joints, contact surface of the form sheating for surfaces shall overlap 300 mm and shall hold tight against the hardened concrete to prevent offsets or loss of mortar.

Methods of fixing and positioning of the formwork which results in holes through the concrete and / or left in metal ties or similar in the concrete shall require the Engineer's approval.

All surfaces which will be contact with concrete shall be oiled or greased to prevent adhesion of mortar. Oil or grease shall be of a non-staining mineral type as approved by the Architect / Engineer applied as a thin film before the reinforcement is placed.

Surplus moisture shall be removed from the forms prior to placing of the concrete. For surfaces to receive waterproofing membrane, an approved water based mould oil compatible with the specified waterproofing materials shall be used. For fair-face concrete to receive paint an approved mould oil compatible with paint shall be used.

Temporary openings shall be provided at the base of columns, wall and beam forms and at any other points where necessary to facilitate cleaning and inspection immediately before the pouring of concrete. Before the concrete is placed the shuttering shall be trued-up, and the interior of the form shall be completely cleared of all extraneous materials including accumulated water.

The reinforcement shall then be inspected for accuracy of fixing. Immediately before placing the concrete, the formwork shall be well wetted and inspection openings shall be closed.



(4) Defective Formwork

Defective formwork shall be removed or strengthened and improved by the Contractor according to the instructions by the Engineer.

(5) Formwork to Construction Joints, etc...

Formwork forming the construction joints and expansion joint shall be rigid, tight to avoid loss of mortar and true in square.

Formwork shall be inspected and passed by the Engineer before placing reinforcement and / or concreting.

3.30 Stripping Formwork

Formwork shall be removed without undue vibration or shock and without damage to the concrete.

Contractor should submit concrete cube test results at 3 days / 7 days and seek the Engineer's approval before removal of formwork. No formwork shall be removed without the prior consent of the Engineer and the minimum periods that shall elapse between the placing of the concrete and the striking of the formwork will be as follows:

(a) Beam sides, walls and columns (unloaded) hours	24
(b) Slab soffits except of flat slab, shell roof, folded plate construction (with props designed to left under) hours	84
(c) Soffits of ribbed slab and hollow block composite floor slab except solid strips (with props designed to left under)	5 days
(d) Flat slab, shell roof and folded plate construction slab soffits and sides (with props designed to left under)	10 days
(e) Beam soffits including those of solid strips of hollow block composite floor slabs, waffle slab (with props designed to left under)	10 days

If the formwork is not designed for removal of soffits with props left in place, the soffits and props should be left in position until the appropriate period for removal of props given below. (subject to works cubes achieving at seven days the 2/3 of specified 28 days strengths and the loads due to constructions on them being lighter than the designed loads, the props can be removed for):

(f) Slab soffits except of flat slab, shell roof, folded plate construction	10 days
(g) Flat slab, shell roof folded plate construction slab soffits and sides	14 days
(h) Beam soffits including those of solid strips of hollow block composite floor slabs, waffle slab	14 days

If the Contractor wishes to take advantage of the shorter stripping times as permitted above for beam and slab soffits when props are left in place, he must so design his formwork that sufficient props as agreed with the Engineer can

remain in their original position without being moved in any way until expiry of the minimum time for removal of props. Stripping and re-propping will not be permitted.

For other systems of construction such as prestressing or post-tensioning, stripping of formwork should be carried out after the concrete attains the requisite strength and after tensioning of tendons, but in no case shall it be less than 72 hours.

Contractor shall be responsible for consequent damage arising from early stripping of formwork.

3.31 Making Good

After removal of formwork, all projections, fins, etc...on the concrete surface shall be chipped off, and made good to the requirements of the Engineer. Any voids or honeycombing shall be treated as described in 'Faulty Concrete'.

3.32 Surface Finishes from Formwork or Moulds

(1) Type A finish

This finish is obtained by the use of properly designed formwork or moulds of closely jointed sawn boards. The surfaces will be imprinted with the grain of the sawn boards and their joints. Alternatively, steel or other suitable material may be used for the forms. Small blemishes caused by entrapped air or water may be expected, but the surface should be free from voids, honeycombing, or other large blemishes. Unless and otherwise shown, this is the finish required for all rendered surfaces after hacking as specified for rendering.

(2) Type B finish

The finish is obtained by the use of properly designed forms of closely jointed wrought boards. The surfaces will be imprinted with the slight grain of the wrought boards and their joints. Alternatively, steel or other suitable material may be used for the forms. Small blemishes caused by entrapped air or water may be expected, but the surface should be free from voids, honeycombing or other large blemishes.

(3) Type C finish

This finish can only be achieved by the use of good quality concrete and by using properly designed forms having a hard, smooth surface. The concrete surfaces should be smooth with true, clean rises. Only very minor surface blemishes should occur and there should be no staining or discoloration from the release agent.

Unless and otherwise shown, this is the finish required for 'Fairface' concrete or precast concrete.

(4) Type D finish

This finish is obtained by first producing a Type B finish on thoroughly compacted high quality concrete, cast in properly designed forms. The surface is then improved by carefully removing all fins and other projections, thoroughly washing down and then filling the most noticeable surface blemishes with a cement and fine aggregate paste.

Every effort should be made to match the colour of concrete. Care should be taken, in the choice of any release agent used, to ensure that the finished concrete surface is not permanently stained or discoloured.

Unless and otherwise shown, this is the finish required for 'off shutter' concrete where shown without rendering.

(5) Type E finish

This finish is obtained by first producing a Type C finish and then, while the concrete is still green, filling all surface blemishes with a fresh, specially prepared cement and fine aggregate paste. Every effort should be made to match the colour of the concrete. After the unit has been properly cured, the faces should be rubbed down where the necessary, to produce a smooth and even surface.

Tolerances specified in Article 3.24 (1) will be reduced to half for Types C & E finishes.

3.33 Precast Concrete

(1) General Requirements

Unless otherwise approved by the Engineer, all precast concrete construction shall be carried out on the site and shall conform to requirements given elsewhere in these preambles.

The maximum size of coarse aggregate in precast concrete shall not exceed 20 mm except for thickness less than 75 mm where it shall not exceed 12 mm. Minimum cement in concrete will be increased as per guidance given in Table 3.3

The compacting of precast concrete shall conform with requirements given elsewhere in these preambles except for thin slabs where use of immersion type vibrators is not practicable, the concrete in these slabs may be consolidated on a vibrating table or by any other methods approved by the Engineer.

(2) Curing

The precast work shall be made under cover and shall remain under the same for three days. During this period and for a further seven days the concrete shall be shielded by sacking or other approved material kept constantly wet. It shall then be stacked in the open for at least a further seven days to season before being set in position where steam curing is used these times may be reduced subject to the approval of the Engineer.

Steam curing of precast concrete will be permitted. The procedure for steam curing shall be subject to the approval of the Engineer.

(3) Method of Handling

Precast concrete units shall be constructed in individual forms. The method of handling the precast concrete units after casting, during curing and during transport and erection shall be subject to the approval of the Engineer, providing that such approval shall not relieve

the Contractor of responsibility for damage to precast concrete units resulting from careless handling.

(4) Repairs

Repair of damage to the precast units, except for minor abrasions of the edges which will not impair the installation and/or appearance of the units will not be permitted and the damaged units shall be replaced by the Contractor at his own expense.

3.34 Moulds

Except where precast work is described as 'fair-face' or as having an 'exposed aggregate' or terrazzo finish the moulds shall be made of suitable strong sawn timber true in form to the shape required. Unless otherwise described, faces are to be left rough from the sawn moulds.

Where precast work is described as 'fair-face' the moulds are to be other approved moulds which will produce a smooth dense fair face to the finished concrete suitable to receive a painted finish direct and free from all shutter marks, holes, pitting, etc... in his prices for such precast work, the Contractor shall include for all rubbing down to produce the finish required, to the satisfaction and approval of the Engineer / Architect.

Where precast work is to have an 'exposed aggregate' or terrazzo finish the moulds shall be constructed to the requirements given for moulds for 'fair-face' work. The method of achieving the exposed aggregate finish shall be the 'aggregate transfer' or other approved methods. A sample showing the required finish and shape shall be approved by the Architect / Engineer.

The precast units shall be installed to the lines, grades and dimensions shown on the drawings or as directed by the Engineer.

## SECTION 4.0 –ROADWORKS

### Article 4.1 – General

#### 4.1.1 Terminology

- Subgrade Surface or Formation Level on embankments and in cuttings shall be the surface level of the earthworks after completion of the earthworks.
- The subgrade shall be the material immediately underneath the subgrade surface.
- The pavement shall be formed by the materials laid above formation level. It shall comprise the subbase where required, the stone road base or the bituminous base course and the wearing course. The finished level shall be the surface of final layer of the pavement.
- On drawings or in Technical Specifications hereof

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

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

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

- Bituminous Surface Treatment applies for a film of bituminous binder covered by a layer of nominal single sized stone chippings.
- A sealing coat composed of a film of bituminous binder covered with a layer of fine aggregate shall complete double bituminous surface treatment on carriageways.

#### 4.1.2 Works to be executed

The roadworks shall consist of the following operations:-

- (a) Preparation of subgrade surface
- (b) Preparation with excavated colluviums material, polyethylene sheet and plywood
- (c) Construction of crushed stone
- (d) Construction of bituminous concrete wearing course
- (e) Construction of shoulder and footpath
- (f) Application of a surface treatment
- (g) Construction of verges and slopes of embankment and top soiling
- (h) strengthening of existing pavements

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

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

#### 4.1.3 Programme to Be Furnished

The Contractor shall submit to the Engineer for his approval the programme and drawings specified in Article 1.9 of T.S.

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

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

#### 4.1.4 Typical Cross Section

- The typical cross sections shown on Drawings shall be applied on cross sections levelled as specified in Article 1.10 and to be issued by the Engineer.
- Some adaptations are to be foreseen, particularly the theoretical camber fixed at 2.5% in alignment which may vary between 2.5 and 3%. Nevertheless in alignment and for the same cross section, the camber on each half of the carriageway shall not differ by more than 0.5%.
- The nominal thickness specified on typical cross sections and on plan and longitudinal profiles are deemed to be the minimal thickness of material to be laid down.

### Article 4.2 Preparation Of Subgrade Surface For Existing Road

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

### Article 4.3 Precautions During Rains

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

Article 4.4 Proof Rolling Sections

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

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

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

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

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

Article 4.5 Drainage Layer

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

Article 4.6 Crushed Stone Sub Base and Base Construction

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

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

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

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

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

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

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

Equipment for compacting shall be composed of vibrating rollers with W/L ratio greater than 20 kg/cm and heavy tyred roller of more than 2.5 T by wheel.

The thickness of the processed layer shall be checked continuously at all stages of the construction to ensure that the thickness of the final compacted layers is at all points within the tolerances specified in Article 4.8.

Article 4.7 Compaction Requirements For Sub Base And Base Courses

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

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

Compaction shall continue until: -



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

AND

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

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

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

#### Article 4.8 Tolerances For Crushed Stone Sub Base And Base Course

##### 4.8.1 Surfaces

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

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

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

##### 4.8.2 Deflection Measurement Under A 8.2 Ton Axle Load

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

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

Article 4.9 Shoulder Construction

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

Article 4.10 Preparation Of Crushed Stone Base For Prime Coat

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

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

Article 4.11 Application Of Prime Coat

4.14.1 On completion of the preparation of the base and approval of the surface by the Engineer, the prime coat of MC 30 or other approved binder as required in Article 2.31, shall be applied immediately by means of a pressure distributor at the rate of spread of 1.2 Kg/m<sup>2</sup>.

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

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

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

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

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

Any areas insufficiently covered shall be resprayed by spray lance to the satisfaction of the Engineer.

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

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

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

Where required by the Engineer, or in order to protect the base surface under traffic, the prime coat shall be covered with sand or single sized aggregate 4/6 at the rate of 6 litre/m<sup>2</sup>.

#### Article 4.12 Tack Coat

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

The surface to be tacked shall be swept clean of all loose particles and dust immediately prior to the application of the tack coat, at the rate of 0.600 Kg/m<sup>2</sup> of RC 250 or 0.300 Kg/m<sup>2</sup> of residual bitumen from bitumen emulsion.

#### Article 4.13 Surface Treatment

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

##### 4.13.1 Average Rates

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

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

#### 4.13.2 Spraying Binder

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

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

All road furniture shall be protected.

#### 4.13.3 Spreading Chippings

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

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

#### 4.13.4 Completion

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

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

Article 4.14 Bituminous Concrete Base Course And Wearing Course4.14.1 Mix Design

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

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

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

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

4.14.2 Mix Requirements

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

		<b>Base Course</b>	<b>Wearing Course</b>
Bitumen Content	(%)	5.0 – 5.5	6.0 – 6.5
Marshall Stability	(kN)	Min. 7.0	Min. 9.0
Flow	(mm)	1 - 4	1 - 4
Air Voids	(%)	3 – 5	3.5 – 4.5
Voids in Mineral Aggregate	(%)	16 - 20	16 - 20
Voids filled with Bitumen	(%)	70 – 85	75 - 82

The gradation and quality of aggregates and filler shall satisfy the requirements tabulated below:

Material for Sub-Base Course

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

<b>NOMINAL SIZE OF SIEVE (MM)</b>	<b>PERCENTAGE WEIGHT PASSING</b>
50	100
20	65-90
10	35-62
5	27-46
2	14-34

0.5	5-20
0.2	3-14
0.08	2-10

The Los Angeles Value shall not exceed 32 and the sand equivalent value shall be more than 50.

Material For base Course

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

NOMINAL SIZE OF THE SIEVE (MM)	PERCENTAGE WEIGHT PASSING
30	100
20	75 - 100
10	47 - 75
6.3	35 - 60
2	18 - 38
0.5	7 - 22
0.2	4 - 15
0.08	2 - 10

The Los Angeles value shall not exceed 30.

The Flakiness Index shall not exceed 40%.

The Sand Equivalent Value shall be more than 60.

#### 4.14.3 Working Mix

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

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

The bituminous concrete shall be checked every day, 2 bitumen extraction shall be carried out. For Marshall test, at least 6 samples shall be taken.

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

#### 4.14.4 Asphalt Plant

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

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

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

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

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

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

#### 4.14.5 Control Of Mixing And Asphalt Plant

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

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

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

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

#### 4.14.6 Transport

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

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

#### 4.14.7 Laying

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

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

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



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

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

Mixes which have a lower temperature shall be discarded.

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

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

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

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

#### 4.14.8 Compaction

The attention of the Contractor is drawn to Article 4.7. The roller operators shall be fully-trained and experienced men. An indicative composition of compaction equipment is :

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

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

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

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

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

#### 4.14.9 Control of Compaction

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

- The density shall be more than 97% of the density determined by the Marshall test, and more than 100% of the LCPC density.
- Densities measured by "Troxler" type apparatus shall be gauged with densities measured on drilled core-samples. If for two consecutive working days, more than 10% (ten per cent) of the measurements do not comply with these requirements, the work shall be stopped in order to examine and improve the methods and equipment used and if necessary substitute any defective equipment.
- Deflection measurements shall be carried out and requirements of Article 4.8.2 apply for bituminous concrete courses.

#### 4.14.10 Tolerances

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

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

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

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

#### Article 4.15 Grassing, Topsoiling and Landscaping

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

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

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

Planting shall preferably be carried out at the beginning of a rainy season, but where this is not possible, the grass shall be kept watered. Grassing and landscaping shall be paid under the corresponding Items of the Bill of Quantities

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

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

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

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

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

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

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

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

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

## **SECTION 5.0 – DRAINAGE**

### Article 5.1 General

The present section includes the construction of:

- Drains
- Pipe and box culverts including head works, wing walls and cover slabs
- Gullies and Catchpit
- Retaining walls,
- Masonry works (including retaining walls, stone facing, rainwater downspout etc)
- Riprap

### Article 5.2 Drainage programme

The Contractor shall submit to the Engineer for his approval immediately after the signature of the Contract a carefully prepared programme for the drainage works which shall allow for completion of all drainage systems necessary for drainage during construction, before works are started.

### Article 5.3 Drainage Excavation

The Contractor shall excavate all drainage systems to the lines, levels, gradients and dimensions shown on the Drawings or as directed by the Engineer.

Excavation for drainage systems shall be carried out in accordance with the requirements of the section <earthworks> of these Technical Specifications.

Should excavations be executed to greater depth or dimensions than necessary through the incidence of boulders or through other causes, the Contractor shall backfill and make good, with approved materials thoroughly compacted, to the correct level and dimensions and to the approval of the Engineer.

The material excavated for drainage systems shall be, if suitable, set aside for use as backfill and if unsuitable or in excess, run to spoil tips.

### Article 5.4 Timbering and Shoring of Excavations

The sides of excavations such as trenches, holes shall, where required, be timbered and shored to the satisfaction of the Engineer. The Contractor shall remain liable for any damage or injury consequent upon removal of timbering or shoring.

Where directed by the Engineer the timbering and shoring shall be left in excavations and measured and paid for except if, in the Engineer's opinion, the necessity for leaving the timber in has arisen from carelessness or neglect on the part of the Contractor.

Article 5.5 Trenches and Holes Excavation and Backfilling

- 5.5.1 The trenches and holes excavations shall be of sizes sufficient to enable the bottom to be compacted as required, the bed to be laid, the pipes and concrete to be placed accurately and proper backfilling and ramming to be carried out.
- 5.5.2 Where required the bottom of such excavations shall be compacted to 95% B.S.H.M.D.D.
- 5.5.3 Where rock is met at level of the intended bottom of the trench or hole, it shall be cut to a depth of 20 cm below this level and replaced with sand, granular material or other material to the approval of the Engineer.
- 5.5.4 Trenches and holes shall be kept free from water until any works such as concrete or joints therein are sufficiently set; the Contractor shall construct any temporary drains that the Engineer may deem necessary.
- 5.5.5 Where seepage of water occurs in trenches or holes, bedding and backfilling shall be carried out using sand, granular material or crushed stones or other material as directed by the Engineer.
- 5.5.6 Material for backfilling shall be to the approval of the Engineer and shall be deposited in layers not exceeding 15 cm of loose material, compacted with power rammers, the moisture content of the material being adjusted to facilitate thorough compaction. The density of each compacted layer shall not be less than 95% of B.S.H.M.D.D.

Article 5.6 Lined trapezoidal ditch

Lined trapezoidal ditches shall be built in masonry to the cross-section as shown in the drawing or as directed by the Engineer, and the invert level shall be finished to a steady longitudinal gradient not less than 0.5% and the fall shall be in all cases towards a culvert.

Article 5.7 Unlined trapezoidal ditch

Unlined trapezoidal ditches shall be constructed to the cross section as shown on the drawing or as directed by the Engineer.

The invert level shall be finished to a steady longitudinal gradient of not less than 1% and the full shall be in all cases towards a culvert.

#### Article 5.8 Pipe Culverts

Pipe culverts shall be placed after cleaning their inside. Any damaged pipe shall be rejected.

Pipes shall be embedded in class 15 concrete to the line and level as shown on the drawings or as directed by the Engineer.

The method, tools for placing the pipes, joints to be used shall be to the approval of the Engineer.

A properly fitted plug shall be well secured at the end of each pipe already laid and shall be removed only when the next pipe line is being laid or on completion of the pipe line or culvert.

Where required by the Engineer, bedding shall curve upward along the culvert to correct for expected settlement and to ensure tightness in the lower half of the joints.

The flow line of the pipes shall be within a range of 0.5 cm of the specified level shown on the drawings or as directed by the Engineer.

Backfilling shall be brought up evenly on both sides of the pipe. Special care shall be taken to compact thoroughly the material under the haunches of the pipe and to ensure that backfilling material is in intimate contact with the pipe.

Jointed pipes shall be tested as directed by the Engineer.

Masonry works shall comply with the requirements of Section 8 of these Technical Specification and the end of all pipes shall be neatly built into the walls and finished with cement mortar.

No separate payment shall be made for excavation of pipe culverts and the cost thereof shall be deemed to be included in the rate for provision and laying of the pipe.

#### Article 5.9 Gullies and Manholes

Gullies and Manholes shall be built to the lines, levels, dimensions, and details given in the drawings or as directed by the Engineer. The bottom of the excavation shall be blinded with class 15 concrete. The base slab and the walls shall be built with class 30 concrete. The internal surfaces shall be of off-shutter finish with the construction joints rubbed down to make a uniform level surface. The top edge of the wall shall be carefully finished smooth and level so that no rocking of the precast cover slabs occurs.

#### Article 5.10 Masonry Works

The stones for masonry works and the mortar for laying stone shall be in accordance with the requirements of Article 8.1

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

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

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

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

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

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

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

#### Article 5.11 Riprap

The stones for riprap shall be as specified in Article 8.3. They shall be laid with closed joints from the bottom of the slope of the embankment or existing ground, upward, the larger stones being laid at the bottom.

#### Article 5.12 Rainwater Downspouts

The stones for rainwater downspouts shall be as specified in Article 8.3. They shall be laid and bedded in class 15 concrete to the lines, levels and dimensions given in drawings or as directed by the Engineer.



## **SECTION 6.0 - STRUCTURAL STEELWORK**

### Article 6.1 General

The present section deals with the specifications for both structural steelwork and associated steelwork.

### Article 6.2 Standards

Except otherwise specified, all materials shall conform with the requirements of the relevant and latest British Standards and all workmanship for structural steelwork shall be in accordance with British Standard BS 5950: 1985 and to all British Standards that it may refer to.

The British Code of Practice for wind loading CP 3: Chapter V is also relevant.

Other equivalent national or European (e.g. French or German) standard specifications may be used at the sole discretion of the Engineer and with his approval. In such cases, copies of relevant materials of these standard should be submitted. Any marked difference between the proposed standards and British Standards should be highlighted.

### Article 6.3 Calculation Assumptions

All steel elements shall be designed to resist, apart the normal imposed loads, cyclonic wind loads of 77 metres per second in an exposed site. All framing members shall be shop fabricated for boiled field assembly.

Roof canopies and roof extensions shall be designed for the required up lift load. Furthermore, permissible deflections for all steel elements shall be restricted to 1 in 300 under normal loading and to 1 in 175 under cyclonic wind load conditions.

### Article 6.4 Quality of materials and workmanship

The quality of all materials and workmanship used in the execution of this contract shall comply with the requirements of most recent issues of the following British Standards and Codes of Practice, including all amendments to date of calling for tenders:

BS 4360	Weldable Structural Steels
BS 5950	Structural use of steelwork in building
BS 4848 and BS 4 (part 1)	Hot rolled structural steel sections as 4848 (part 2) Hollow sections
BS 4848 (part 4)	Equal and unequal angles
BS 5135	Are welding of carbon and carbon manganese steel
BS 639	Covered carbon and carbon manganese steel electrodes for the manual metal are welding
BS EN 288 (part 3)	Welding procedure tests for the are welding of steel
BS 2600 (part 1)	Radiographic examination of fusion welded butt joints in steel

BS 4190	ISO metric black hexagon bolts, screws and nuts
BS 3692	ISO metric precision hexagon bolts, screws and nuts
BS 4320	Metal washers for general engineering metric series
BS 5493	Code of practice for protective coating of iron and steel structures against corrosion
BS 729	Hot dip galvanized coatings on iron and steel articles
BS 2569 (part 1)	Sprayed metal coating. Protection of iron and steel by aluminium and zinc against atmospheric corrosion
BS 5531	Code of practice for safety in erecting structural frames

The contractor is required to submit a certificate of compliance from his supplier stating that the material to be supplied to him for the project shall meet the requirements of the relevant specifications mentioned above, similarly, certificate for the manufacture/fabrication/galvanizing, etc... should be submitted; all before ordering.

Contractor is required to obtain test certificates for chemical analysis and mechanical tests, including Charpy V notch impact test from steel maker for each batch of the steel supplied to his fabricator and to submit the same to the Engineer for his written approval.

The Engineer may at any time require any materials to be tested in accordance with the requirements of the Standards listed above. The cost of all tests shall be borne by the Contractor. The Contractor shall, when required, promptly supply to the laboratory for testing at his own expense test pieces as required by the Engineer. The costs of tests on materials shall be borne by the Contractor. If in the opinion of Engineer, faulty materials and / or workmanship has been used in the Works, the Contractor may be directed to dismantle and cut out the parts concerned and remove them for examination and testing. The cost of dismantling, cutting out and making good to the approval of the Engineer shall be borne by the Contractor, in addition to the costs due to delays, etc... all in accordance with the Conditions of Contract.

The test certificates of chemical analysis will give all necessary information including percentage of alloying elements to assist the fabricator of the Contractor to decide on precautions to be taken during welding.

Materials, fabrication and erection in hot rolled sections of structural steel work shall comply with BS 5950: Part 2: 1985.

#### Article 6.5 Fixing to Concrete

Contractor is to check and ensure that provision for tolerances shown on the drawings for connection to concrete are adequate for erection. Contractor may propose to use at his cost appropriate diameter tubes in expanded metal covered with nylon mesh or removable appropriate diameter tubes for casting of the holding down bolts before grouting with cement sand mortar as per Clause 2.6 of Section 2 of British Standard BS 5950: Part 2. The tolerance gap up to 25 mm between the base plate and the concrete top will be in approved epoxy mortar instead of Portland cement grout so that the space is completely filled, all according to British Standards or an equivalent international standard. Gap greater than 25 mm thick will be filled with approved epoxy motor as per the British Standard. Holding down bolts should not be grouted until steelwork has

been corrected for all defective work, lined, plumbed and leveled. All holding down bolts will have an additional lock nut.

#### Article 6.6 Fabrication

##### (1) Cutting and Bending

All members, plates, brackets, etc... shall be neatly and accurately sheared, sawn or profiled to the required shape as shown on the drawings. It will be free from burrs and distortion. Cutting of sheet material upto 15 mm thickness shall be by guillotine shear and/or by heavy-duty shears.

Thicker plates shall be cut by cold saw or abrasive wheel. Manual oxyacetylene flame cutting will not be permitted. Laser cutting for the hollow sections will be preferred. Ends of sections (CHS) are required to be prepared by saddling machine, Muller of similar before welding.

If members or plates are bent or set, the bends or sets shall be correctly made to the radii or angles specified without leaving marks. The material may be heated to permit this. Material that has been heated shall be annealed to approval.

##### (2) Punching and Drilling

Holes for black and high precision bolts shall be drilled or punched 2 mm larger in diameter than the bolt issued. Holes for high tensile friction grip bolts shall be drilled or sub-punched and reamed to 3mm larger in diameter than the specified bolts sizes.

All drilled holes shall be parallel sided and shall be drilled with the axis of the holes perpendicular to the surface. Badly drilled holes shall either be reamed out if approved and/or larger bolts fitted or otherwise as directed by the Engineer. All rough arises shall be ground off. Holes for bolts in material thicker than 8 mm must be drilled. When holes are drilled in one operation through two or more thickness of material, the parts shall be separated after drilling and all burrs removed before assembly. Holes for bolts shall not be formed by a gas cutting process.

Holes of not less than 12 mm dia. must be drilled at places to be agreed with the firm galvanizing the finished product to allow for access to molten zinc, venting of hot gasses and subsequent draining of zinc.

#### Article 6.7 General

##### (1) Girders trusses and portal frames

Girders, trusses and portal frames shall be carefully set out to the dimensions shown on the drawings. Where it is required that the girders, trusses and portal frames be cambered, such camber shall be provided by bending the bottom chord to the arc of a circle.

Notwithstanding any dimensioned spacing of purlin cleats, the Contractor shall ensure that purlin cleat spacing is satisfactory for the available stock lengths of roof sheeting. However, the Engineer's

approval must first be obtained before any alteration is made in purlin spacing or sheeting sizes.

Article 6.8 Boxed Members

Abutting edges of boxed members shall be connected and sealed with a continuous weld to exclude the entrance of moisture. Where specified such welds shall be ground flush if it is directed by the Engineer and finished to the approval of the Engineer.

(1) Shop Assembly

Such assembly of unit in the shop as is specified or necessary before transporting to the site will be inspected by the Engineer before and after galvanizing. The work will be laid out in the shop or yard so that all parts are accessible for inspection and testing of the work.

The Contractor shall furnish all facilities for inspection and testing of the work and he must notify with reasonable notice the Engineer on each occasion when material is ready for inspection.

(2) Storage and Handling

Fabricated steelwork must be stored clear of the ground and be kept clean, handled and stored to avoid damage to steelwork and its protective coating.

Article 6.9 Welding

All welding shall be carried out in strict accordance with the specified British Standard with electrodes also to specified British Standard. Unless where shown otherwise all welds shall be of size not less than 8 mm. welding on site is not permitted unless where shown specified as site welding on the drawings.

Fusion faces shall be free from irregularities such as tears, fins, etc... which would interfere with the deposition of weld metal. Fusion faces shall be smooth and uniform and shall be free from loose scale, slag, rust, grease, paint and/or other deleterious material.

All welds shall be acceptable types, shall be of the finished sizes specified and shall be carried out in such sequence that minimum distortion of the parts welded results. No welds less than four times the nominal fillet size shall be deemed capable of carrying load. Preparation of edges for welding shall be carried out by planning or machine flame cutting.

Parts to be welded shall be maintained in their correct relative positions during welding by jigs. Multiple run welds shall be carried out with each run closely following the previous run but allowing sufficient time for the proper removal of slag.

The Contractor shall ensure that each run is inspected and any unsatisfactory weld cut out and remade to approval. Welds in material 25 mm or greater in thickness shall be made by the Argon arc or similar approved process, and special precautions shall be taken to prevent weld cracking.

Unless otherwise shown, the minimum size of filler/butt weld shall be 8mm. on completion; welds shall present a smooth and regular finish. Weld metal shall be solid throughout with complete fusion between weld metal and parent metal and between successive runs throughout the joint.

Defects shall be cut out and made good to approval in sound weld metal. For butt welds to ensure full throat thickness at ends run on and run off plates are used. Butt welds in CHS or RHS shall be with backing plates of the thickness shown or of the thickness of the thicker member. Materials of the plates should be same as that of materials welded.

No additional welds or tack welds other than shown on the drawings will be permitted without the written approval of the Engineer. Contractor is required to submit and to arrange for testing at the workshop all at his cost, the evidence of competence of welders in accordance with the specified British Standard for the type of works of the project.

Contractor will be deemed to have allowed in his rate for fabrication costs for welding for radiographic tests in accordance with the specified British Standard. Weld defect criteria C generally in accordance with Tables 18 and 19 of BS 5135 will be applicable.

#### Article 6.10 Bolting

All bolts used shall be of such length that at least two full thread is exposed beyond the nut after the nut has been tightened on washer/washers between bold head/nut and the structural member. Where a nut or bolthead would bear on an inclined surface a beveled washer of the correct shape shall be fixed between the two surfaces. Beveled washers shall not be allowed to get out of position during fabrication and erection and for this purpose may be spot-welded to the steel surface. Such spot weld will be treated as welding on site. Washers for oversize/shaped holes shall be of thickness shown or that of the connecting plates. No bolts used shall be less than 12 mm diameter.

Bolts, nuts and washers used shall be spun galvanized to have minimum coating of 85 microns and they shall be tapped lightly oiled after galvanizing. Seal bolt holes by an approved method (this will be deemed to have been included in the rate for fixing) to prevent access of moisture in hollow sections. Contractor will submit the method for Engineer's approval.

#### Article 6.11 Marking

All members of the structure to be site assembled shall be match marked in accordance with the shop details and marking plans submitted for approval.

#### Article 6.12 Protective Treatment

After manufacturing the lengths of the columns, girders, trusses, bracings etc... between the bolted connection shown on the drawings are required to be hot dipped galvanized to BS 729 with minimum coating thickness of 85 microns.

The steel is cleaned of foreign material, scale and roughen surface. It may be necessary to use an approved blast cleaning to Engineer's approval before acid

pickling by immersing in a bath of suitably inhibited acids which dissolve or remove mill scale and rust to achieve galvanizing to BS 729.

Double bath dipping can be used when the length or width as shown on the drawing exceeds the size of the bath.

Inside of hollow sections shall be dry and clear of all debris before sealing holes left for ventilation, etc... as per section 4.6 of the British Standard. Contractor is deemed to have included the cost of such works in the tendered price.

Where the protective surface is damaged by handling tack welding for temporary members, cutting, drilling, welding, etc, it shall be cleaned with an approved blasting before treating the surface with zinc metal spray coating to BS 2569, Part 1. Such coating will be of 170 microns thickness.

All architectural /structural steel section, wire rope not shown as structural members on structural drawings, etc, shall have protected hot dipped galvanized coating and finished as structural members. Steel windows forming part adjacent to the roof light or wall structure shall be hot dipped galvanized as structural members including its fixings.

Painting to structural members shown on drawings is not required unless specified after galvanizing. But cleaning of them without damaging protective treatment should be carried out at no costs.

#### Article 6.13 Erection

(1) Delivery, Storing and Handling

Steel shall be stored and handled and erected in such a manner that no member is subject to excessive stresses which could have an adverse effect on the properties of the steel. If in the opinion of the Engineer, the steelwork has been subject to such treatment, the Contractor shall remove this steel from the site and replace it at his own expense.

(2) Erection of structural steel works, equipment etc...

Contractor shall give a fortnight's notice to the Engineer before start of works. All erection shall be carried out by competent and experienced men and the Contractor shall take every care to safeguard the public, workmen and adjoining property. Contractor shall comply with the requirements of Occupational Safety, Health and Welfare Act of Mauritius 1989. Recommendations of BS 5531 Code of Practice for Safety in Erecting Structural Frames shall apply.

All gear used shall be of adequate strength and shall comply with all Regulations current at the time. Approval of the Factory Inspectorate will be obtained in writing where it is required to comply with Government Regulations. Remove from site any defective equipment and label it out of order in bold visible letter for such time until it is removed from site.

During erection the work shall at times be adequately bolted, guyed and /or braced to make the structure secure.

The Contractor shall be held responsible for all damage caused to the structure, workmen or buildings during erection.

Article 6.14 General

(1) Alignment, Site Dimension, etc...

No erection shall commence before accurate Site Dimensions have been taken by the Contractor, and no claim will be considered should final dimensions differ from those on the drawings. Any modifications to the structural steel required in order to comply with Site dimensions shall be made in an approved workshop to the Engineer's approval before erection is commenced.

(2) Erection Details

No member or part of a member which has been bent or distorted shall be erected in that condition. All straightening shall be done in the workshop.

Columns shall be wedged to line and level on steel wedges and checked by the Engineer. After acceptance, column bases shall be grouted to approval before wedges are removed. Unless shown on the drawing, all columns shall be left truly vertical and correct to line and level. Beams, girders, trusses, etc... shall be erected level unless otherwise shown and correctly positioned.

Trusses and open web joints shall be carefully handled at all times and when being erected shall be lifted at such points and in such a manner as will preclude any possibility of damage from erection stresses.

Immediately after erection, each girder/truss shall be made secure by purlins, bracing or guys to approval.

Bracing shall be placed in position as soon as dependant work will permit.

(3) Field Connections

In making connections, drifting of unfair holes will not be permitted and holes not matching properly shall either be reamed or drilled out and a larger bolt inserted or otherwise as directed by the Engineer.

Members having holes formed or enlarge by oxy cutting will be condemned.

Article 6.15 Supports and Foundation

(1) Positioning and Setting out of foundation bolts

Subcontractor for fabrication/erection will check the discrepancies with Main Contractor who will immediately inform the Engineer with his proposal for rectification for Engineer's approval.

Where foundation bolts are not shown they will be not less than 16 mm diameter and all bolts will be of grade 8.8 as of specified British Standard.

(2) Packings

Packing shall not be larger than 25 mm under the base plate.

(3) Bedding and grouting up of structure

Space upto 25 mm and under below base plate shall be grouted by epoxy mortar instead of neat cement.

Contractor is deemed to have included in his rate encasing by concrete as specified in Clause 6.3.3 of BS 5950: Part 2 of steel work in foundations upto ground floor into his rate for fixing bolts of structure.

Article 6.16 Tolerances

For tolerances allowed for in Clause 3.24 (1) in specification for concrete bases, reinforced concrete columns and reinforced concrete beams supporting the steel structure.

Deviation for camber at mid span to be not more than  $L/1000$  or 6 mm whichever is greater.

Flatness for contact bearing shall be such that when measured with 1 m straight edge the gap does not exceed 0.75 mm.

Fitting and components whose location is critical, i.e. main columns, girders and trusses for supporting the forces due to loads, deviation from the intended position shall not exceed 3 mm and isolated bolt holes or group of holes the deviation shall not exceed 2 mm. Punched hole deviation due to distortion shall not be more than 1 mm.

The Engineer at his own discretion can increase the tolerances by 25% to 50% to line up with other approved international standards upon request to by reputed and experienced firm of steel fabrication/erection Contractor.

Article 6.17 Roofing, Cladding, Flashings and Gutters

(1) General

The Contractor shall supply all materials viz, purlins, roof and side claddings, gutters, flashings etc... and install them the lines and levels as shown in the drawings and described in the specification. The roof and wall cladding are designed to resist cyclonic winds and to remain watertight during cyclones. *However, responsibility of the water tightness of the roof and wall cladding will remain that of the Contractor. The test of roof and wall cladding will be carried out with*



*water pressure at an appropriate pressure with 32 mm diameter hose pipes and minimum 3 no. pumps for minimum three hours for each 15.0 m bay.*

(2) Design Life Durability

The roof and wall cladding its fixing is to perform satisfactorily for the following periods:

- ❖ Twenty years without any maintenance for structural members and ten years for roof sheeting
- ❖ Fifty years with appropriate regular maintenance

The Contractor has to provide the guarantee for the above requirements.

Article 6.18 Purlins

The purlins shall be rolled sections formed from high tensile (450 Mpa min yield strength) zinc coated steel strip. The steel strip should conform to Australian Standard 1397.

Article 6.19 Roof and wall sheets

The sheeting shall be of steel of high yield strength 300 N/mm minimum yield strength). It shall be Trimdek IBR profile as shown on drawing. It shall comply with Australian Standard AS 1562, design and installation of metal roofing. The base thickness should be 0.48 mm steel (minimum) for high tensile grade 550 steel, and 0.6 mm thick for steel grade 300.

They shall be treated with zinc / aluminium for 150 gm/mm<sup>2</sup> to AS 1397. The exterior surface shall be of selected colour and colorbond ultra steel with substrate to AS 1397 oven baked polyester finish to AS 2728. The total thickness to be min 0.54 mm coating to have a guaranteed life without maintenance for ten years after completion of the project. Fixing of sheeting to be as shown and stated on the drawing. Similar approved material may be used.

Suppliers such as Spandek Hiten from Lysaght or Multidek Hiten from KH Industries (SEA) Pte. Ltd or profilage Ocean Indien Ltée or similar should allow for all the fittings, fixings weather strips, plastic supports, etc... all as shown on the drawings and also normally required for roof sheeting in cyclonic region with maintenance free guarantee.

They shall be in one length except at change of angle where it will be bent to shape/angle before over baked polyester finish to AS 2728 is applied and will be lapped 300 mm on either side of the change of angle such that it is bolted to both the purlins provided at the change of angle.

Painting to structural steel shall be as specified for galvanized steel where so required by the Architect.

Contractor shall submit shop drawings with full details of roof sheeting purlins fixing, etc... for written approval by this office before ordering and/or commencing.

Article 6.20 Fasteners

All fasteners for fixing of wall and roof cladding shall be in screws complying with Australian standards AS 3566 class 4. Self tapping screws may be used for fixing the sheeting to purlins and rails. J. bolt, where they are used shall be bent round 180°. Side laps of the sheeting to purlins @ 300 c/c are fixed with self drilled steel fasteners. All fasteners should be suitable for cyclonic areas and should have a design life of 50 years with no maintenance. The sheeting fasteners will have a cyclonic assembly, complete with non conductive EPDM washers and plastic support at ridge fixation and be maintenance free all to Engineers approval.

Article 6.21 Sealers

All joints shall have waterproof strip/sealant. The sealants shall be approved by the Engineer and should be appropriate for the type and manufacture of sheeting.

Article 6.22 Translucent Sheets

Translucent sheets shall be made of polyester resin reinforced with glass fibre incorporating UV light stabilizers and shall meet the architectural specifications and shall be strong to resist cyclonic wind speed and water tightness. Contractor will submit strength and design calculations for Architect and Engineer's approval. The translucent sheet shall match with the approved roof sheeting profile. Fixing shall be carried out strictly as recommended by the Manufacturers. The translucent sheets shall be laid according to Architect and Engineer's instructions.

Article 6.23 Flashing

They shall be as specified for sheeting and/or of shape as shown on Architect's drawing. Flashings shall be manufactured from the same base material as specified herein above for roofing and cladding and shall cover the claddings by a minimum of 300 mm. attachments and joints shall be made with fasteners and sealants as indicated herein above.

Article 6.24 Laying of Claddings

The method of laying shall be as per the recommendation of the Manufacturer and as approved by the Engineer.

Article 6.25 Care of Works

All roofing and claddings and other material shall be properly packed and secured at the Manufacturer's premises before shipment.

Packs of sheet shall be kept dry in transit and on site to prevent water and/or condensation being trapped between adjacent surfaces. Packs of sheets standing on site shall be stored clear of ground. Sheets shall be handled using clear dry gloves. The roof and gutters shall be swept clean of all debris at the end of each day's work and particularly on completion of fixing. The job shall be left in a clean and watertight condition.

Article 6.26 Painting

(1)Paints

All paints are to be supplied to meet the requirements of the appropriate British or other specified Standard by a supplier approved in writing by the Engineer. Paints are to be delivered to the site or the Structural Contractor's works in the original containers as supplied by the manufacturer with seals unbroken and are to be used in strict accordance with the manufacturer's instructions. Manufacturer's representatives are to be free to visit the site and inspect materials and workmanship, and if necessary take samples of materials for laboratory analysis.

Paints are not to be thinned unless instructed by the Engineer. No external painting is to be carried out during rain or when rain is likely to occur before the paint has had time to dry. All surfaces are to be dry and free from moisture at the time of painting.

(2) Preparation for painting

All structural steel shall be thoroughly scrapped and wire brushed to remove mill scale and rust. Dirt and grease or oil shall be washed off with white spirit and the steel allowed to dry.

(3) Painting to ungalvanised surfaces

A first coat of Red Lead type C Primer shall be applied in the works immediately after the steel preparation has been completed, in accordance with the requirements specified in MS 13. A minimum of 24 hours shall elapse before the steel is moved from its position whilst painting.

After delivery to site, steel shall be carefully examined and all areas where the priming coat has been damaged and/or where rust has developed shall be washed with white spirit and wire brushed as necessary and a further priming coat as for the first coat applied to completely cover the damaged areas.

A minimum of 48 hours after any patching work has been completed. The whole of the steel shall be cleaned off with white spirit and 2<sup>nd</sup> coat of Red Lead type C Primer of a different approved colour or shade from the first coat shall be applied and the painted steelwork left undisturbed for a further 48 hours.

During erection, surface of steel which are to be in contact shall be painted with one further coat of primer as previously described and the surfaces brought together whilst the paint is still wet.

After erection a third and finishing high class alkyd enamel (white) or other approved shade of colour to BS 4800 "Schedule of Paint Colours for Building Purposes" meeting the requirements of SABS 630 'Decorative high gloss enamel paint for interior and exterior use' or a coat of Micaceous Iron Oxide is applied if noted on the drawing.

Bolts, nuts and washers etc... shall after erection is completed to approval, be carefully degreased with white spirit and painted as for steelwork.

Steel purlins and sheeting rails shall generally be painted as for steelwork except for purlins and rails supporting.

Aluminium sheeting, when the following specification shall be used:

- |                      |   |                                |
|----------------------|---|--------------------------------|
| 1 <sup>st</sup> Coat | - | Red Oxide Zinc Chromate Primer |
| 2 <sup>nd</sup> Coat | - | Red Oxide Zinc Chromate Primer |
| 3 <sup>rd</sup> Coat | - | Approved Aluminium Paint       |

The interior of mild steel gutters shall be prepared as previously described and painted with two coats of Epilac coal tar epoxy paint.

(4)Painting to galvanized Surface Treatment

- a) Surfaces shall be thoroughly cleaned wire brush to remove scales dirt and grease or oil shall be washed with white spirit.
- b) Apply one coat of etching primer (with min 15% phosphoric acid) to enable sufficient adhesion of the subsequent paint.
- c) Apply one coat of calcium plumbate primer in accordance with 'SABS 912'.
- d) Apply two coats of white high gloss enamel in accordance with SABS 630 'Decorative High Gloss Enamel Paint for Interior and exterior Use' of an approved shade of colour to Bs 4800 – allow 24 hours intervals between each coat.

## **SECTION 7.0 – STRUCTURAL TIMBER**

### Article 7.1 General

All structural timber shall comply with the recommendations given in British Standard 5268-2:2002 Structural use of timber – Part 2: Code of practice for permissible stress design, materials and workmanship. Structural assemblies, workmanship, treatments, testing, inspection and maintenance shall be in conformity to BS 5268-2:2002

### Article 7.2 Timber Grade

Timber that shall be used for the structural elements shall be Hardwoods with strength class varying from D40 to D70.

In addition, structural timber should conform to the following list of standards, where applicable:

- BS EN 1912:2004: Structural timber Strength classes- Assignment of visual grades and species
- BS 4978:1996 Specification of Softwood Grades for Structural Use
- BS 5756:2007 Visual grading of hardwood. Specification
- BS 449, BS 1202, BS 1203, BS 1204, BS 1210, BS 1579, BS 4978, BS 5669, BS 5756, BS EN 301, BS EN 336, BS EN 338, BS EN 518, BS EN 519

### Article 7.3 Mark

All structural timber members shall be graded clearly and permanently bearing the following the following information:

1. Grade/Strength class
2. Specification of species
3. Number of relevant British Standard
4. Company and grader/machine used
5. Company logo
6. Timber connection

### Article 7.4 Service Class

The service class of the timber shall depend on the moisture content and relative humidity of the site and shall be defined as one of the followings:

- a) Service class 1 is characterized by a moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air only exceeding 65 % for a few weeks per year. In such moisture conditions most timber will attain an average moisture content not exceeding 12 %.
- b) Service class 2 is characterized by a moisture content in the materials corresponding to a temperature of 20 °C and the relative humidity of the surrounding air only exceeding 85 % for a few weeks per year. In such moisture conditions most timber will attain an average moisture content not exceeding 20 %.

- c) Service class 3, due to climatic conditions, is characterized by higher moisture contents than service class 2.

#### Article 7.5 Durability

The Durability of the structural timber shall comply with the recommendations give in BS 5268-5.

#### Article 7.6 - Treatments

Preservative treatment should be in accordance with BS 5268-5. Fasteners used in wet timber or in timber which will be exposed to the wet exposure condition should be non-corrodible or be treated by an anti-corrosive process.

#### Article 7.7 – Testing

The Engineer shall request for testing as per section 8 of 5268-2:2002 when required.

#### Article 7.8 – Storage

Precautions should be taken during storage, prior to delivery, and on site to minimize changes in moisture content due to the weather. Rain, damp and direct sunlight are all potentially harmful to timber and wood-based components.

Materials and components should be stored on dry bases, and stacks should be evenly supported on bearers with spacer sticks at regular intervals.

#### Article 7.9 – Connection

All connections shall comply with the section 6.6 of 5268-2:2002. Welding works and all steel plates shall comply section 6: Steelwork of these specifications.

#### Article 7.10 – Shop drawings and workshop preparation

Shop drawings for timber works shall be submitted by the contractor for the approval by the Engineer. Preparation of shop drawings shall be deemed to be included in the execution of the works.

The Contractor shall allow the Engineer to visit the workshop where assembly pieces are being prepared.

## **SECTION 8.0 – MASONRY WORKS**

### **Article 8.1 Stones for Masonry Works**

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

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

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

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

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

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

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

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

### **Article 8.2 Blockwall**

#### **8.2.1 Concrete Blocks**

Concrete cellular blocks shall be obtained from an approved manufacturer and shall have been manufactured in accordance with BS 6073: Part 1: 1981. The sizes of the blocks are to be 457 \* 203 \* 150 or 200. An average compressive strength from a sample of 10 blocks on gross area shall be as specified on the drawing. No individual block shall have a compressive strength less than 80% of the specified on gross area. The testing of the blocks shall be in accordance with Appendix B of BS 6073: Part 2 may be allowed at the discretion of the Engineer.

#### **8.2.2 Mortar**

Cement mortar for laying blocks shall consist of a mixture of ordinary Portland cement and cleaned washed sand material as specified for the use of concrete.

in proportion of 1 part cement: 1 part coral sand: 3 parts rock sand by weight with an approved plasticiser in liquid form which shall be mixed and proportioned as specified by the manufacturer. In no case, the proportion of plasticiser will be less than 100 cc per 50 kg of cement.

Alternatively mortar for laying of blocks shall consist of 1 part ordinary Portland cement: 3 to 4 parts washed rock sand by weight, materials as specified for the use of concrete and an approved plasticiser in liquid form shall be mixed and proportioned as specified by the manufacturer.

The ingredient of mortar shall be measured by proper gauge boxes, or by weigh batcher. When measured by the gauge boxes the dry density of sand shall be taken as 1360 kg/m<sup>3</sup> and of cement as 1440 kg/m<sup>3</sup>. The mixing by hand shall not be permitted. Mixing shall be by an approved mechanical batch mixer of capacity not less than 0.1 m<sup>3</sup> (finished product).

#### 8.2.3 Setting and Jointing

Mortar shall be used within one hour of mixing. The blocks shall be laid in a stretcher bond with 10 mm thick joints. The joint shall not vary  $\pm 0.3$  mm and shall achieve the specified height in specific number of courses shown on the drawings. The work shall be carried out with horizontal and level and no part shall be 4 courses above adjacent work during construction. The vertical joint shall be 10 mm thick with  $\pm 3$  mm tolerance.

No extra claim of labour and/or material or whatsoever will be entertained by Clients due to non availability of specified sizes of concrete blocks. The Contractor shall build to the specified height floor to floor by cutting the concrete block and/or placing extra concrete height of the ring beams. The adjustment of thickness of mortar joint shall not be permitted.

No vertical joint in any course shall be within 110 mm of a similar joint in the course immediately above or below except where shown otherwise.

A written approval of the design engineering consultants is required by the Contractor for the following:

1. Changes in position of load bearing walls
2. Sizes of structural opening for doors, windows or others
3. Cutting of a horizontal chase in the wall of length more than 900 mm and depth 20 mm
4. Cutting of a vertical chase more than 25 mm wide x 20 mm deep
5. Built in services in walls requiring cutting of the walls
6. Number of length of cutting in walls for conduits, services, etc... in excess of 2 of nature mentioned in (3) or (4) above.

No pipes carrying hot water shall be embedded in masonry wall. All cutting in the walls for fixings of doors, windows, etc... shall be kept to minimum, meaning that fixings may be built with the courses of masonry. The damaged or displaced block shall have to be removed and made good before concreting ring beam above and/or rendering whichever is earlier.



#### 8.2.4 Reinforcement and Blockwork

All external block walls exposed to rain and wind will be reinforced with brick reinforcement as shown for every third course and will be well anchored at ends and bends to r.c. wall ties or columns.

The reinforcement shown at the tee and right angle junctions of masonry with or without r.c. wall tie columns shall be built with the courses of masonry. The r.c. wall tie columns shall be concreted in heights not more than six courses of masonry along with the masonry. The construction of r.c wall toe column will not be permitted ahead of construction of walls. The concrete to the r.c wall tie column shall be class 25/20 nominal mix with slump not more than 50 mm unless otherwise specified on the drawing. The reinforcement to the r.c. wall tie column shall be as shown on the drawings.

Whenever removable panel for future door or window is anticipated, the same will be built with brick reinforcement at alternate courses and good bonding is ensured to make the joints leak proof.

At the end of each working day of the masonry work, horizontal and vertical joints on both faces shall be raked out 4 mm deep with a scraper. Faces of the r.c. wall tie columns and ring beams shall be roughened and hacked with chisel hammer between 16 hours and 32 hours after they have been concreted. This is essential for proper bond between rendering and walls.

#### 8.2.5 Curing

The completed masonry work shall be cured continuously for 72 hours with water. Curing of masonry works shall start four hours after they have been laid.

#### 8.2.6 Load bearing walls

Load bearing walls shall comply with British Standard BS 5628: Part 1: 1992 and BS 5628: Parts 2 and 3: 1985 where not inconsistent with these Preambles.

### Article 8.3 Stone Work

#### (a) Generally

Stone for use in masonry work shall consist of sound undecomposed basalt obtained from approved boulders and be of even texture and colour.

#### (b) Stone for Pitching and Stone Facing

Stone for pitching to drains, inlets and outlets, embankments and around structures shall consist of sound, undecomposed basalt with thickness not less than 15 cm and facing dimensions not less than 22 cm.

#### (c) Stone For Rip Rap

Stone for use as riprap shall consist of reasonably well-shaped, hard, dense, and durable rock. Separate lumps of stone shall weigh generally between 10 and 80 kg of which 80% shall be 20 kg or larger and not more than 10% less than 10 kg.

(d) Hardcore

Hardcore filling where required shall be clean hard quarry chips, clean basalt, hard broken stone or other approved material broken to 75mm gauge. All fillings shall be laid in layers not exceeding 150mm thick well packed, rammed and blinded on top with fine stone or other approved fine material and watered to receive concrete.

## ***M&E ENGINEERS' SPECIFICATIONS***

# Electrical Specifications

## For

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### Rehabilitation Works at Grand La Fourche Corail Primary School, Rodrigues

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1. INTRODUCTION
2. STANDARDS
3. DRAWINGS
4. EXTENT OF PRESENT SPECIFICATIONS
5. DETAILED ELECTRICAL SPECIFICATIONS
  - 5.1 DISTRIBUTION BOARDS AND SUB DISTRIBUTION BOARDS
  - 5.2 SWITCHGEARS
  - 5.3 POWER CABLES
  - 5.4 WIRING CABLES
  - 5.5 CONDUITS
  - 5.6 WIRING ACCESSORIES
  - 5.7 PVC TRUNKING
  - 5.8 LUMINAIRES
  - 5.9 EARTHING & BONDING
6. WALL MOUNTED FANS
7. HANDING-OVER PROCEDURE
8. SCHEDULE OF LUMINAIRES

## 1. INTRODUCTION

This section shall relate to the description of the installations and the specifications of materials and equipment to be used on the project.

## 2. STANDARDS

The IET wiring regulations BS 7671:2018 (Requirements for Electrical Installations), 18<sup>th</sup> Edition published by the Institution of Engineering and Technology and BSI.

British standards issued by the British Standards Institution.

This document shall serve as a reference throughout to determine acceptability of materials, techniques and workmanship.

Where the installation of a particular material or equipment is described by the manufacturer, the Contractor shall submit this information to the M&E Engineer before the start of the works. The Contractor shall also ascertain that the procedures laid down are properly followed.

Where an item or subject within the contract has not been covered either under the BS 7671:2008, or in the specifications contained within the section, the relevant British Standards Codes of Practice shall be referred to.

## 3. DRAWINGS

Drawings, as listed in the relevant section, are supplied for tender purposes only.

The M&E Engineer shall submit new drawings, incorporating the latest requirements of the Client, if any, to the successful Tenderer. The latter will be required to prepare necessary working drawings for approval by the M&E Engineer before implementation.

## 4. EXTENT OF PRESENT SPECIFICATIONS

The following items shall be covered within the present specifications.

- 4.1 Distribution Board and sub distribution Boards
- 4.2 Switchgears
- 4.3 Power Cables
- 4.4 Wiring Cables
- 4.5 Conduits
- 4.6 Wiring Accessories
- 4.7 Cable Tray and PVC Trunking
- 4.8 Luminaires
- 4.9 Earthing & Bonding

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## 5. DETAILED ELECTRICAL SPECIFICATIONS

### 5.1 *DISTRIBUTION BOARDS AND SUB DISTRIBUTION BOARDS*

All DBs and SDBs shall be designed and constructed electrically as per the respective one line diagram. The DBs and SDBs enclosures shall be surface mounted, made of reinforced polyester (self-extinguishing and insulating), and fitted with a hinged door under lock and key. Degree of protection shall be IP44 minimum.

All DBs and SDBs shall be supplied with incoming MCCB / MCB/Isolator/ID, outgoing MCBs, distribution blocks, terminal blocks, mounting rails, perforated/plain plates, face plates, phase indicators, fuses, cable glands, engraved labels and other accessories.

The DBs and SDBs shall be labelled properly using engraved labels to be approved by the M&E Engineer before order.

Detailed drawings of the DBs and SDBs shall be approved by the M&E Engineer before importation and assembly. The DBs and SDBs shall be supplied with a minimum of 30% spare capacity.

### 5.2 *SWITCHGEARS*

All switchgears shall also be from reputable manufacturers and be strictly to either BS norms. They shall be designed for fixed installation. Switchgear used must be such that neutral lines are always interrupted at the same time as phase lines. i.e switchgear will always be 4 pole or 2 pole. All switchgears shall be of the same make as far as possible

The Contractor must ensure that the breaking capacity of each switchgear is appropriate for the purpose it will be used. This shall be calculated and indicated on all working drawings.

### 5.3 *POWER CABLES*

All power cables (unless otherwise specified) shall be PVC insulated, PVC sheathed with copper conductors. They shall be steel wire armoured, rated at 600/1000V and manufactured to BS 5467 or BS 7889

Conductors shall be stranded copper of high conductivity.  
Core identification shall be:  
Brown, Black, Grey and Blue for 4-core cables.

Where single core power cables are specified, the colour shall be according to the phase to which it shall be connected, ie. brown, black or grey for the phases, blue for neutral and green or yellow/green for earth.

The earth continuity conductor shall always be green or yellow/green.

Cables not meeting the above core identifications will not be accepted under any circumstances.

All power cables shall be terminated suitably using proper glands, lugs and terminals.

The Contractor shall allow for all draw boxes as required.

Underground power cables including those for external lighting shall be laid in yellow/orange PVC pipes of appropriate diameter at a minimum of 800mm below ground level.

On top of this layer, yellow/orange plastic warning tape 200mm wide at least 0.5mm thick marked "DANGER ELECTRICITY" at no more than 300mm interval shall be laid along all run.

The Contractor shall allow for supply and laying of all PVC pipes, plastic warning tape complete with proprietary accessories, etc.

#### **5.4 WIRING CABLES**

All wiring within polyethylene conduits shall generally be PVC insulated single core copper conductor cables. Minimum size of cable shall be 1.5 mm<sup>2</sup> for lighting circuits and 2.5 mm<sup>2</sup> for socket circuits.

Cables sizes for other circuits shall be as specified on the one-line diagram of the relevant distribution or sub-distribution boards.

Colour coding shall be strictly implemented all over the building as follows:

Brown for phase  
Blue for neutral  
Green or yellow/green for earth

All wiring cables to be used must be manufactured to the relevant MS or BS standards.

#### **5.5 CONDUITS**

Conduits to be embedded into concrete or chased into block walls shall be plastic, flexible and be specially manufactured for this purpose. Suitable accessories shall be used for the implementation of the conduit network.

Where conduits are surface mounted or laid within dry wall partitions, etc. only non-fire propagating ones shall be used. Locally manufactured conduits not meeting EN norms shall not be accepted on this project.

During implementation of the project the Contractor shall ensure that all necessary precautions are taken for the protection of the conduits from breakage or blockage. The appropriate accessories shall consequently be used.

Unless otherwise stated, conduit sizes shall be as follows:-

- For lighting circuits - 20mm or equivalent
- For socket circuits - 25mm or equivalent
- For Telephone/data circuits - 20mm or equivalent

For all other circuits, conduits shall be laid as specified on the respective layout drawings.

#### **5.6 WIRING ACCESSORIES**

They shall be surface or flush mounted using appropriate mounting accessories.

Final point user accessories shall be equivalent to Model Synergy from Legrand or model System 8000 from Hager. They shall conform to BS3676 and/or BS1363.

The Contractor shall provide for appropriate proprietary back boxes or clip-on support frames and associated accessories for mounting of these either flush to walls or in partitions or in PVC trunking.

Minimum ampere rating for light switches shall be 10A. For BS sockets minimum rating shall be 13A.

Samples of all fittings and accessories shall be submitted to the M&E Engineer for approval prior to order.

Unless otherwise stated on the drawings, all switches are to be 1400 mm above finished floor level and all switch sockets shall be fixed at a height of 300 mm above finished floor level.

### **5.7 PVC TRUNKING**

PVC trunking in the perimeter of each room shall be of single compartment trunking, the dimension shall be of dimension 80x50mm or as required for end point installation.

All PVC trunking shall be supplied and installed c/w proprietary covers, cover joints, clip-on partitions, inner and outer bends, flat angles, tees, end caps, adaptors, etc. Appropriate clip-on stables for retaining cables shall be provided.

A sample of the trunking and each accessory shall be submitted to the M&E Engineer for approval before order.

### **5.8 LUMINAIRES**

Luminaires shall be as listed in the Bill of Quantities and described in the schedule given at the end of this section. They shall be of LED type with energy efficient performance.

Bidders may propose luminaries equivalent to the specified ones for consideration by the M&E Engineer/Architect.

Catalogues and full technical specifications of all luminaires must be submitted with the bid.

Samples of each luminaire shall be submitted for final approval by the M&E Engineer and Architect before order.

### **5.9 EARTHING & BONDING**

New earthing stations must be provided and executed as specified in the bill of quantities. Earth electrodes shall be at least 600mm long and buried not less than one metre below the ground level. Bare copper conductor of appropriate size as indicated in the bill of quantities shall link the earth electrodes to the earth terminals of the distribution boards.

The earthing resistances to be achieved shall be 5.0 ohm.

The Contractor shall allow in his price for all additional works or materials including non-soluble earth enhancing compounds required to achieve the desired earth resistances. Earth tests must be carried out to the satisfaction of the M&E Engineer prior to backfilling and / or concreting.

All electrical distribution boards shall be connected to the earth bar using suitable insulated earth conductors of appropriate cross-section.

The Contractor shall provide necessary identification plates on all earth terminals.



## 6. WALL MOUNTED FANS

Wall mounted fans should be compliant to international standard IEC 60335-2-80/2002 and adapted for tropical climate. It shall be rated 230V, 50Hz, complete with all manufacturer's fixation fittings and accessories. Fans should be mounted in accordance to manufacturer's installation instructions. Fans to be complete with thermal cut outs protective device.

## 7. HANDING-OVER PROCEDURE

When the installations are practically complete with all accessories, components, spares and tools provided, that all testing, commissioning, and instructions have been satisfactorily completed and that all "Record or AS-Made" drawings together with all schematic diagrams, wiring diagrams, maintenance manuals and instruction charts have been provided, a recommendation will be made by the Consulting M&E Engineer to hand over the installations.

Upon practical completion of the works, three copies of the Operation & Maintenance Manual (O&M Manual) shall be provided. This manual shall contain A4 size printed papers with proper plastic bindings, with stiff plasticised covers, plasticised sub-divisions for each section, a ready means of reference and a detailed index. Additionally one copy shall be provided in digital format on CD.

The O&M manual shall contain full operating and maintenance instructions for each item of equipment included in the works presented in a form to deal systematically with each system and shall include the following where applicable :-

- Warranty Certificates (to be valid as from the date of acceptance of the installations)
- Automatic control items and systems and control settings.
- Legend for colour coding of all services.
- Internal wiring diagrams of equipment and panels.
- Procedures for fault finding.
- Procedures to adopt in an emergency should any item fail in its operation.
- Itemised lists of essential and secondary spares for all equipment.
- Index of record drawing numbers and titles.
- Records of performance tests.
- Specifications and reference numbers of Switchgear and other electrical items.
- Other systems not mentioned here but relevant to the present job.

The O&M manual may contain manufacturer's standard operating and maintenance instructions and leaflets where these are applicable. Where the equipment is non-standard, the information for the manual shall be obtained from the manufacturer.

During the progress of works, the Contractor is required to produce installation shop drawings based on the Consulting M&E Engineer's intent design drawings.

Installation shop-drawings shall be approved by the Consulting Engineer. They shall be made available for inspection and checking upon request.

Installation shop-drawings shall indicate the followings:-

- The sizes, types and routes of all cables, cable trays and conduits.
- The positions of all equipment.
- The exact routes, levels, sizes, types, makes and dates of laying of all cables.
- The reference numbers of all electrical circuits. Each circuit reference number shall be carefully checked against the installation and updated distribution diagrams produced compatible with the shop-drawings.

As-made or Records drawings shall also be provided for all equipment which together with the printed instructions provided, shall be sufficient to enable the equipment to be operated, maintained, dismantled, re-assembled and adjusted.

All record drawings shall be submitted for approval. On receipt of approval, the following set of record drawing shall be provided:

- One complete set in digital format on CD.
- Three complete sets of prints on paper.
- One set of prints on approved plastic material of those drawings showing, switchgear layouts, and diagrams of main electrical connections. Each of these prints shall be plasticized and handed over to the client.

The relevant record drawings of plant and equipment and instructions shall be completed by the date of Practical Completion or Sectional Completion.

If the shop-drawings or record drawings as required during the progress of the works are not produced and approved, the cost of preparing such drawings will be deducted from outstanding payments, for which there will be a 2.5% deduction made from the value of work certified. The amount withheld may be released in stages as evidence of production of the necessary drawings if submitted and approved.

## 8. SCHEDULE OF LUMINAIRES

TYPE	DESCRIPTION	EQUIVALENT OR SIMILAR TO:
1	Surface Mounted Light, 5400Lm, at least 135Lm/W efficiency, Light Temperature of 4000K.	PXF LIGHTING LATTE NEW LED 36W (4000K) WITH DIFFUSER, WHITE
2	Surface Mounted Light, IP65, 1300Lm, at least 115Lm/W efficiency, Light Temperature of 4000K.	FUMAGALLI, UMBERTA LED 11W 1300LM, 4000K

3	Surface Mounted Light, IP65	PXF LIGHTING FIBRA LED, 1500MM 30W, 4800LM (4000K) WITH DIFFUSER, WHITE
4	Surface Mounted Light	FUMAGALLI, BERTA LED 11W 1300LM, 3000K, IP65
5	Surface Mounted Light	BERTINA LED 7W/800LM ,3000K, IP65
EM1	Surface Mounted Emergency Exit Light, LED, 3W, Non Maintained c/w appropriate Legend (Pictogram) Kit, 3hrs autonomy on battery with auto test	PXF SAFE LED III

# **PLUMBING AND FIRE FIGHTING INSTALLATIONS SPECIFICATIONS**

For

REHABILITATION WORKS AT GRAND LA FOURCHE  
CORAIL PRIMARY SCHOOL

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1. Plumbing & Sewer Installations

1.1 INTRODUCTION

1.2 PIPINGS

1.2.1 COLD WATER PIPINGS

1.2.2 WASTE PIPES

1.2.3 SUPPORTS, HANGERS, ETC

2. Fire-Fighting Installations

2.1 INTRODUCTION

2.2 FIRE EXTINGUISHERS

## 1. PLUMBING & SEWER INSTALLATIONS

### 1.1 INTRODUCTION

Scope of works for plumbing and sewer installations shall consist of the following:-

- (i) Underground water pipe from water unit to PE Domestic Tank (Capacity 2x4000L).
- (ii) External Underground HDPE piping c/w accessories to the building.
- (iii) PVC piping connection to each user point for cold water.
- (iv) External sewer piping via manholes and then to septic tank.
- (v) Rain water harvesting system.

### 1.2 PIPINGS

#### 1.2.1 **COLD WATER PIPINGS**

##### 1.2.1.1 *Internal*

Water supply pipings shall be in:

- (i) uPVC pressure type, rated to withstand a pressure of 16 bars minimum. uPVC pipes shall conform to relevant International Standards (ISO R 161), BS 4514. These shall be generally used at ceiling soffits and in risers.

Joints on uPVC pressure pipes shall be solvent welded by use of appropriate PVC solvent glue. Parts to be joined shall be cleaned first to remove all traces of grease and dirt before being glued together.

Solvent welded screwed fittings shall be used wherever required, at stop valve, flexible pipes etc.

At all user ends, chrome plated ringed flexible pipes of appropriate lengths shall be used.

At each branch out from the mains underground pipe, a Quarter turn valve with stainless steel handle shall be provided in a valve chamber. All valves shall be of high quality to BS1010.

Mini ball valve shall be fixed at each supply to WHB's and sinks. The valves shall be full bore valves with finger handles and shall be brass and nickel plated.

Chrome plated angle valves to the highest quality shall be provided at WC cistern supplies and jet washers.

Water piping shall be pressure tested to 8 bars at completion of installation works. A certificate to that effect is to be submitted.

### 1.2.1.2 External

The external underground cold water piping shall be in High Density Polyethylene pipe (HDPE), rated to PN16.

The cold water pipes shall be properly and neatly laid underground. Trenching shall be by others. Compacting and laying of pipes shall be the Plumbing Contractor's responsibility.

#### HIGH DENSITY POLYETHYLENE PIPES (HDPE)

High density polyethylene pipes (HDPE) shall have a normal pressure rating of 16 bars at +20°C.

The pipes shall have **electrofusion** joints.

#### POLYETHYLENE FITTINGS

Polyethylene fittings to be supplied shall be of the electrofusion types and shall be as described below.

#### TRANSITION FITTINGS - POLYETHYLENE / OTHER PIPE CONNECTIONS

The polyethylene side shall have integral heating coil or provided with long end with electrofusion couplers. Electrofusion safety voltage specifications shall apply the metal-side shall be manufactured as per specifications of relevant pipe connector.

The transition fittings shall be a monolithic product guaranteed to axial bursting and internal pressure tightness.

#### HDPE TAPPINGS TEES SADDLES

The saddles shall be supplied in two anti-corrosion bolts and nuts for right clamping on the HDPE pipes.

The saddles shall be fitted with integral heating coil to enable electrofusion jointing. Electrofusion safety voltage specifications shall apply.

The saddles shall be supplied complete with tapping device, appropriate key including all fittings / couplers for connection with 20mm HDPE service pipes or otherwise as directed by the Engineer. These fittings / couplers for connection shall also be fitted with heating coil to enable electrofusion jointing.

The tapping shall be internally threaded to the nominal diameter given for the ferrule as specified.

Spigot surfaces can be scrapped off again to permit the insertion and more freely as far as the marker line of the insertion depth.

### **1.2.2 WASTE PIPES**

All internal waste pipes, waste water and sewer, shall be in uPVC, PN6 type of the appropriate dimensions.

Underground sewer pipes shall be in uPVC, SN8, rubber ring push fit type (Brown or Pink colour) to MS6 Standards.

Joints shall be solvent welded on the uPVC internal pipes by use of appropriate solvent glue. Parts to be joined shall be cleaned thoroughly to remove all traces of grease and dirt prior to joining.

All joints are to be tested for leaks. A certificate to that effect is to be submitted.

PVC bottle traps, with vertical inlets and horizontal outlets, are to be connected at discharges from wash hand basins, sinks. These shall be of renowned make and quality.

Floor traps shall be provided at toilets (wherever possible) for draining of overflow or cleaning water. They shall have low height and have horizontal discharge,

The floor traps shall be of renowned make and quality.

Individual waste pipe and sewer pipe shall run in the duct risers. The waste pipes shall be connected to the sewer pipes at soffit of ground floor through a "U" or "P" Trap so as to prevent foul odour rising in the pipes.

### **1.2.3 SUPPORTS, HANGERS, ETC**

All pipes are to be properly and solidly supported at reasonable distances along their whole lengths, and along walls.

A rail type supporting system shall be used. The rail frame shall be fixed to the wall of the risers and ceilings and individual tackles and studs with saddles at their ends shall be used to support the pipes. The fixation items shall be of renowned make. (SIKLA / MUPRO)  
The supports, hangers etc shall permit frequent expansion and contraction of the pipes.

## **1.3 PAINTING**

All exposed pipes (uPVC) and fittings shall be painted with white UV paint.

## 2. FIRE-FIGHTING INSTALLATIONS

### 2.1 INTRODUCTION

Scope of works for the Fire Fighting installations shall consist of the following: - (Supply, Install, Test & Commission)

- (i) Fire extinguishers, bottle type, CO<sub>2</sub> and ABC types.
- (ii) Any other works as may be assigned by M&E Engineer.

### 2.2 FIRE EXTINGUISHER

Fire Extinguishers shall be supplied and placed at selected locations in the building. They shall be of ABC and CO<sub>2</sub> type.

The ABC (ammonium phosphate) and CO<sub>2</sub> type fire extinguisher shall be bottle type, constructed from high pressure seamless steel cylinder to International Standards. They shall be lever operated (in brass head) with built-in pressure release safety disc to rupture at 24,000Kpa.

The fire extinguishers shall be fitted with a discharge horn and delivered complete with wall brackets. The capacity shall be 2.5kg.



# RAINWATER HARVESTING INSTALLATIONS SPECIFICATIONS FOR REHABILITATION WORKS AT GRAND LA FOURCHE CORAIL PRIMARY SCHOOL

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## 1. INTRODUCTION

The scope of works for rainwater harvesting installations shall consist of the following:-

- (i) Pipe works connection from existing rainwater downpipes to 2 Nos. 6000 Lt new rain water P.E tanks.
- (ii) A filtration and sanitisation system for the rainwater collected in P.E Tanks.
- (iii) A transfer system to Changing Room water tanks at high level (using head from the filtration pumps where transfer pumps are not available).

## 2. FILTRATION PUMPS

The pumps shall be centrifugal self-priming type, coupled directly to the electric motor and having a pre-strainer at inlet. It shall be similar to those for swimming pool applications.

The pump body and base support shall be in Cast iron. The shaft and mechanical seals shall be in AISI 316 stainless steel. Strainer baskets shall be in 304 Stainless steel. Motor protection shall be rated to IP 54. Capacity of pump shall be as indicated in the BOQ. Motor power shall be as appropriate. The pumps shall operate on 230V, 1ph, 50 Hz.

## 3. SAND FILTERS

The filter body shall be in laminated polyester and fiberglass complete with top lid, PP base, pressure gauge, water drain plug, air vent and sand discharge port.

Filtration velocity shall be  $50\text{m}^3/\text{h}/\text{m}^2$  or less. The capacity of the filter at each pool shall be as indicated in the BOQ. Filtering medium shall be sand. Diameters shall be 500mm minimum.

## 4. PIPINGS

- *Internal*

Water supply pipings shall be in uPVC pressure type, rated to withstand a pressure of 16 bars minimum. Dimensions shall be as appropriate, as indicated in drawings and Bill of Quantities, e.g 20/15 uPVC pipe shall mean external diameter = 20mm, internal diameter= 15mm OR 20/15 uPVC pipe means ½" pipe. uPVC pipes shall conform to relevant International Standards (ISO R 161), BS 4514.

Joints shall be solvent welded by use of appropriate PVC solvent glue. Parts to be joined shall be cleaned first to remove all traces of grease and dirt before being glued together.

Plumbing works shall be done by experienced tradesman.

Solvent welded screwed fittings shall be used wherever required, at stop valve, flexible pipes etc.

At all user ends, chrome plated ringed flexible pipes of appropriate lengths shall be used.

At top end of risers, automatic air release valve and anti-hammer valves shall be fitted.

All valves shall be of high quality to BS1010.

Water pipings shall be pressure tested to 8 bars at completion of installation works.

A certificate to that effect is to be submitted.

Connections between PE pipes and uPVC pressure pipe shall be brass fittings with rubber gaskets.

Mini ball valve shall be fixed at each branch in riser and as per plumbing schematic.

- *External Underground Cold Water Piping*

The external underground cold water piping shall be in High Density Polyethylene pipe (HDPE), rated to PN16.

## 5. HIGH DENSITY POLYETHYLENE PIPES (HDPE)

High density polyethylene pipes (HDPE) shall be manufactured in accordance with ISO 161A, ISO 3607 and ISO 1167, DIN 8075, AFNOR NFT 54-072 or equivalent to the approval of the Engineer and shall have a normal pressure rating of 16 bars at +20<sup>0</sup>C. The pipes shall be constructed with polyethylene having a minimum density of 0.941 g/cm<sup>3</sup> including 2.0 to 2.5% of carbon black required for UV stabilisation and a maximum melt flow index of 10g/10 min. Recycled materials shall not be used in their manufacture.

The pipes shall be of black colour with 4 co-extrudes equally spaced blue broad stripes.

The pipes shall be suitable for joining by means of electrofusion joints.

## 6. POLYETHYLENE FITTINGS

The connections and fittings shall have a nominal pressure rating identical to the polyethylene pipe on which they are installed and shall fit same exactly.

Polyethylene fittings to be supplied (Tees, Elbows etc.) shall be of the electrofusion types and shall be as described below.

## 7. TRANSITION FITTINGS - POLYETHYLENE / OTHER PIPE CONNECTIONS

The polyethylene side shall have integral heating coil with contact terminals or provided with long end with electrofusion couplers. The transition fittings shall be a monolithic product guaranteed to axial bursting and internal pressure tightness and withstand 16 bars test pressure i.e. a nominal 10 bars pressure.

They shall also have high tensile and compressive strengths with a density of approximately  $0.936$  to  $0.95 \text{ g/cm}^3$  at  $23^\circ\text{C}$ . Their melt index shall be within the range of  $0.4$  to  $1.3 \text{ gm/10 min}$ .

The fittings shall have deep insertion lengths with a wide fusion zone and a cold zone in the centre. They shall also have fusion indicators.

Electrofusion safety voltage specifications shall apply the metal-side, shall be manufactured as per specifications of relevant pipe connector. The fittings shall have a bar code label which can be read by the want, of the electrofusion equipment. They shall be compatible for electrofusion with HDPE pipes with melt index groups 003 to 050 and shall be electrofused at any safety electrofusion voltage within the range of 16 volt to suit the electrofusion welding equipment owned by this Authority.

## 8. SUPPORTS, HANGERS, ETC

All pipes are to be properly and solidly supported at reasonable distances along their whole lengths, in vertical riser ducts and along walls.

PVC clamps, galvanised saddles, galvanised hangers with tubular clamps shall be used. Screws to be used shall be brass.

The supports, hangers etc shall permit frequent expansion and contraction of the pipes.

# **DRAWINGS**

## **C. DRAWINGS**

List of Architect's Drawings

List of Structural 's Drawings

List of Mechanical & Electrical Engineer's Drawings

CONSULTANCY SERVICES FOR SELECTED DEVELOPMENT PROJECTS IN RODRIGUES

## REHABILITATION WORKS AT GRAND LA FOUCHE CORAIL PRIMARY SCHOOL

1602/ED/713A

NOVEMBER 2021

**LUXCONSULT** (Mtius) LTD  
CONSULTING ENGINEERS  
23, Shevchenko Avenue  
Cuatro Torres  
MAURITIUS  
Telephone : 427 02 99  
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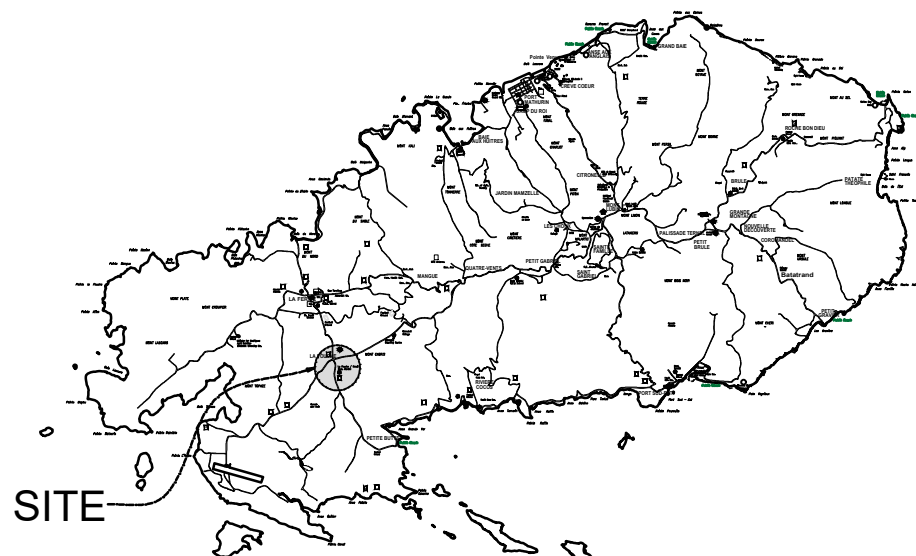
In Association with



6, Ave. des Capucines, Quatre Bornes.  
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Royal Road, St-Paul / Mesnil, Phoenix.  
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Ebene.  
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## SITE

## LOCATION PLAN

INDEX	DATE	MODIFICATIONS	INI.
REVISIONS			
DATE		ISSUED TO	INI.
DWG. ISSUE			

Notes

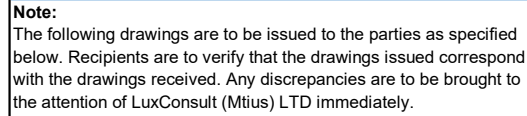
1. DO NOT SCALE. USE FIGURED DIMENSIONS
2. ALL DIMENSIONS TO BE CHECKED BEFORE ANY WORK IS PUT IN HAND.
3. ANY DISCREPANCY SHOULD BE REPORTED BACK TO THE ARCHITECT.

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TENDER 000

**Issue No:** 0  
**Ref. No :** 2016-717  
**Project :** REHABILITATION WORKS AT GRAND  
LA FOUCHE CORAIL PRIMARY SCHOOL,  
RODRIGUES

[illegible][illegible]

[A - Approval] [T - Tender] [C - Construction]

T

Distribution Recipients			Distribution method						
<b>Contractor</b>	:	-							
<b>Employer</b>	:	Rodrigues Regional Assembly	E						
<b>Project Manager</b>	:	Luxconsult (Mtius) Ltd	E						
<b>Architect</b>	:	Design Forum Ltd	E						
<b>Structural Engineer</b>	:	Luxconsult (Mtius) Ltd	E						
<b>Quantity Surveyor</b>	:	OCAL Ltd	E						
<b>MEP Engineer</b>	:	Profive Ltd	E						
<b>Issued by:</b> Akhilesh Putty		<b>Date:</b> 16/11/21	[E - E-mail]	[H- Hardcopy]	[C- CD-ROM]				

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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)**<sup>1\*</sup> dated December 2021, for the Procurement of Works (available on website [ppo.govmu.org](http://ppo.govmu.org)) except where modified by the Particular Conditions of Contract below.

Procurement Reference Number: **RRA/EDU/OAB/W/41/2021/2022**

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<sup>1\*</sup> Public Body to insert complete reference of the document applicable as at this date by consulting PPO's website.

## Particular Conditions of Contract

<b>A. General</b>	
<b>GCC 1.1 (r)</b>	<p>The Employer is: -</p> <p><b>Rodrigues Regional Assembly</b>  <b>Commission for Education (Administration) and Others</b>          Antoinette Prudence Human Resource Development Centre          Malabar, Rodrigues          Tel: (230) 831-5630          Fax: (230) 832-4906\          E-mail: - dbceducation@rragov.mu</p>
<b>GCC 1.1 (v)</b>	The Intended Completion Date for the whole of the Works shall be <b>180 days from date of start of works (fourteen days after handing over site)</b>
<b>GCC 1.1 (y)</b>	The Project Manager is <b>Luxconsult (Mtius) Ltd, 23 Stevenson Street, Quatre Bornes</b>
<b>GCC 1.1 (aa)</b>	The Site is located at <b>Grand La Fouche Corail, Rodrigues</b> and is defined in drawing No. <b>01</b>
<b>GCC 1.1 (dd)</b>	The Start Date shall be <b>14 days after handing over of site</b>
<b>GCC 1.1 (hh)</b>	<p>The Works consist of: -</p> <ul style="list-style-type: none"> <li>• Upgrading Works to Block C</li> <li>• Conversion of Existing Toilet Block into Cloakroom</li> <li>• External Drainage and Site Works</li> <li>• Mechanical, electrical and plumbing installations</li> </ul>
<b>GCC 2.2</b>	Sectional Completions are: <b><i>Not Applicable</i></b>
<b>GCC 2.3(i)</b>	<p>The following documents also form part of the Contract:</p> <ul style="list-style-type: none"> <li>• <b>Insurance Policy</b></li> <li>• <b>Scope of Works</b></li> <li>• <b>Addenda</b></li> </ul> <p><b>The insurance policies shall be submitted within 21 days as from the date of receipt of Letter of Acceptance, for verification by the Quantity Surveyor before the handing over of site.</b></p>
<b>GCC 3.1</b>	The language of the contract is English

	The law that applies to the Contract is the law of Mauritius.
<b>GCC 5.1</b>	The Project manager <b>may</b> delegate any of his duties and responsibilities.
<b>GCC 8.1</b>	Schedule of other contractors: <b>Not Applicable</b>
<b>GCC 13.1</b>	<p>Except for the cover mentioned in (d) (i) hereunder, the other insurance covers shall be in the joint names of the Contractor and the Employer and the minimum insurance amounts shall be:</p> <p>(a) for the Works, Plant and Materials: Minimum Amount of Insurance shall be the total value of the Contract Price <b>+10%</b> Professional Fees and + <b>MUR 100,000</b> for removal of debris.</p> <p>(b) for loss or damage to Equipment: <i>for the replacement value of the equipment that the contractor intends to use on site until the taking over by the Employer.</i></p> <p>(c) for loss or damage to property (except the Works, Plant, Materials, and Equipment) in connection with Contract: <b>Rs 30,000,000</b> representing the value of properties that are exposed to the action of the contractor in the execution of the works. It will extend to the property of the procuring entity as well. This cover shall be in the joint names of the two parties.</p> <p>(d) for personal injury or death:</p> <p>(i) of the Contractor's employees: Minimum Amount of Insurance shall be <b>MUR 5,000,000</b> (Mauritian Rupees Five Million) per occurrence with the number of occurrences unlimited.</p> <p>(ii) Third Party Liability: Minimum Amount of Insurance shall be <b>MUR 10 Million</b> (Mauritian Rupees Ten Million) per occurrence with the number of occurrences unlimited. The cover shall extend to the Employer's Representatives.</p> <p>(e) for loss or damage to materials on-site and for which payment have been included in the Interim Payment Certificate, where applicable.</p> <p>The Contractor shall choose to take the insurance covers indicated above as separate covers or a combination of the Contractor's All Risks coupled with the Employer's liability and First Loss Burglary, after approval of the Employer. All insurance covers shall be of nil or the minimum possible deductibles at sole expense of the contractor.</p> <p><b>The insurance policies shall be extended to cover for any extension of the intended completion date or due to delay by the contractor up to the end of the defects liability period of the works.</b></p>

<b>GCC 14.1</b>	<p>Site Data are: There are no Site Investigation Reports for this project. Bidders are however advised to visit the site prior to submission of bid. They should acquaint themselves with the nature of the site, extent of the work, means of access, general nature of the soil and all other matters which may influence their bid.</p> <p>No claim due to ignorance of these factors as mentioned in the preceding paragraph shall be entertained from the contractor.</p>
<b>GCC 20.1</b>	<p>The Site Possession Date(s) shall be: <b><i>Grand La Fouche Corail Primary School, Rodrigues</i></b> within Fourteen (14) days from submission and approval of Insurance covers. The area of the site which may be occupied by the Contractor for his use as site office or for erection of workshop etc. shall be approved by the Project Manager or his representative.</p>
<b>GCC 23.1 &amp; GCC 23.2</b>	<p>Appointing Authority for the Adjudicator: <b>No Adjudicator shall be appointed for this Contract.</b></p>
<b>GCC 24.</b>	<p>In case a dispute of any kind arises between the Employer and the Contractor in connection with, or arising out of, the contract or the execution of works or after completion of works and whether before or after repudiation or other termination of Contract, including any dispute as to any opinion, instruction, determination, certificate or valuation of the Employer's Representative, the matter in dispute shall, in the first place, be referred in writing to the employer's representative, with a copy to the other party.</p> <p>The Employer and the Contractor shall make every effort to resolve the dispute amicably by direct informal negotiation. If, after twenty-eight (28) days, the parties have failed to resolve their dispute or difference by such mutual consultation,</p> <p>then either the Public Body or the Contractor may give notice to the other party of its intention to refer the matter to</p> <p style="padding-left: 40px;">“the competent courts of Mauritius”</p>
<b>B. Time Control</b>	
<b>GCC 25.1</b>	<p>The Contractor shall submit for approval a Program for the Works within 28 days from the date of the Letter of Acceptance.</p>
<b>GCC 25.3</b>	<p>The period between Program updates is <b>30 days</b>.</p> <p>The amount to be withheld for late submission of an updated Program is <b>Rs 25,000 in the next payment certificate</b>.</p>

<b>C. Quality Control</b>	
<b>GCC 33.1</b>	The Defects Liability Period is: <b>365 calendar days</b>
<b>GCC 34.1</b>	<p>Delete sub-clause 34.1 and replace by the following:</p> <p>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.</p>
<b>GCC 39.7</b>	Interim Payment for Materials on site is applicable for <b>cement, aggregate, rocksand, blocks and reinforcement</b>
<b>D. Cost Control</b>	
<b>GCC 40.1</b>	Amend clause 40.1 by replacing 21 days by 7 and 42 days by 28 days.
<b>GCC 41.1 (l)</b>	<p>The term "exceptionally adverse weather conditions" is hereby defined as any one of the following events:</p> <ul style="list-style-type: none"> <li>(1) 100 mm rainfall or above recorded in one day at the nearest rain station;</li> <li>(2) An official declaration of "Torrential Rain" by the Meteorological Department of Mauritius; and</li> <li>(3) Cyclone warning Class III or IV.</li> </ul>
<b>GCC 43.1</b>	The currency of the Employer's country is: <b>Mauritian Rupees.</b>
<b>GCC 44.1</b>	The Contract is <b>not</b> subject to price adjustment.
<b>GCC 45.1</b>	<p>The proportion of payments retained is: <b>10 % of the value of work certified up to completion of works and 5 % up to issue of making good defects certificate.</b></p> <p>Amend Clause 45 by replacing Sub-Clause 45.2 with the following:          "Upon the issue of a Certificate of Completion of the Works by the Project Manager, in accordance with GCC 53.1, half the total amount retained shall be repaid to the Contractor and the other half after 6 months. If after the release of the full retention money and up to the end of the Defects Liability Period, the Contractor fails to correct a Defect within the time specified in the Project Manager's notice, this shall constitute a breach of the Contractor's obligations under the contract and the Project Manager shall assess the cost of having the defect corrected and recover the money from the Performance Security.          The Contractor may substitute retention money with an "on demand" Bank/Insurance guarantee."</p>
<b>GCC 46.1</b>	The liquidated damages for the whole of the Works are <b>Rs 20,000 per Day.</b>



	The maximum amount of liquidated damages for the whole of the Works is 7.5% of the Contract price.
<b>GCC 47.1</b>	The Bonus for the whole of the Works <b>is not</b> applicable.
<b>GCC 48.1</b>	The Advance Payments shall be: <b>10 % maximum of the contract price less provisional and contingency sum</b> and shall be paid to the Contractor within 7 days after signature of the Contract and submission of the Advance Payment security by the contractor not later than <b>14 days after issue of letter of Acceptance</b> .
<b>GCC 49.1</b>	The Performance Security amount is <b>10 % maximum of the contract price</b> .
<b>E. Finishing the Contract</b>	
<b>GCC 56.1</b>	The date by which operating and maintenance manuals are required is <b>Fifteen days after practical completion certificate has been issued</b> . The date by which “as built” drawings are required is <b>Fifteen days after practical completion certificate has been issued</b> .
<b>GCC 57.2 (g)</b>	The maximum number of days is: 60 days
<b>GCC 59.1</b>	The percentage to apply to the value of the work not completed, representing the Employer’s additional cost for completing the Works, is <b>20%</b>

## Section V- Contract forms

### Performance Security

.....*Bank/Insurance Company's Name and Address of Issuing Branch or Office*.....

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

**Date**.....

**PERFORMANCE GUARANTEE No.:** .....

We have been informed that .....*[name of the Contractor]* .....(hereinafter called "the Contractor") has entered into Contract No.....*[reference number of the Contract]* ..... dated..... with you, for the execution of .....*[name of Contract and brief description of Works]*.....(hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a performance security is required.

At the request of the Contractor, we ..... *[name of Bank/Insurance Company]* .....hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ..... *[amount in figures (amount in words)]* .....such sum being payable in the types and proportions of currencies in which the Contract Price is payable, upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire and returned to us not later than twenty- one days from the date of issuance of the Defects Liability Certificate, calculated based on a copy of such Certificate which shall be provided to us, or on the.....day of ....., ..... whichever occurs first. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

.....*Seal of bank/Insurance Guarantee and*

**Signature(s)**.....

## Advance Payment Security

*[Bank's/ Insurance Company's Name, and Address of Issuing Branch or Office]*

**Beneficiary:** ..... *[Name and Address of Employer]* .....

**Date:** .....

**Advance Payment Guarantee No.:** .....

We have been informed that . . . . *[name of the Contractor]*. . . . (hereinafter called “the Contractor”) has entered into Contract No. . . . . *[reference number of the Contract]*. . . . dated . . . . . with you, for the execution of . . . . . *[name of contract and brief description of Works]*. . . . (hereinafter called “the Contract”).

Furthermore, we understand that, according to the Conditions of the Contract, an advance payment in the sum . . . . . *[name of the currency and amount in figures]*<sup>1</sup>. . . . . (*[amount in words]*. . . . .) is to be made against an advance payment guarantee.

At the request of the Contractor, we . . . . *[name of the Bank/Insurance Company]*. . . . hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of . . . . *[name of the currency and amount in figures]* \*. . . . . (*[amount in words]*. . . . .) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor used the advance payment for purposes other than the costs of mobilization in respect of the Works.

It is a condition for any claim and payment under this guarantee to be made that the advance payment referred to above must have been received by the Contractor on its account number . . . . *[Contractor's account number]*. . . . . at . . . . *[name and address of the Bank/Insurance Company]*. . . . .

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor as indicated in copies of interim statements or payment certificates which shall be presented to us. This guarantee shall expire, at the latest, upon our receipt of a copy of the interim payment certificate indicating that eighty (80) percent of the Contract Price has been certified for payment, or on the . . . day of . . . . . , . . . . .<sup>2</sup>, whichever is earlier. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

. . . . . *[Seal of Bank/Insurance Company and Signature(s)]* . . . . .

### **Note –**

*All italicized text is for guidance on how to prepare this demand guarantee and shall be deleted from the final document.*

*1 The Guarantor shall insert an amount representing the amount of the advance payment denominated either in the currency(ies) of the advance payment as specified in the Contract, or in a freely convertible currency acceptable to the Employer.*

*2 Insert the expected expiration date of the Time for Completion. The Employer should note that in the event of an extension of the time for completion of the Contract, the Employer would need to request an extension of this guarantee from the Guarantor. Such request must be in writing and must be made prior to the expiration date established in the guarantee. In preparing this guarantee, the Employer might consider adding the following text to the form, at the end of the penultimate paragraph: “The Guarantor agrees to a one-time extension of this guarantee for a period not to exceed [six months][one year], in response to the Employer’s written request for such extension, such request to be presented to the Guarantor before the expiry of the guarantee.”*

## 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: \_\_\_\_\_  
 for and on behalf of the Employer

Signed by: \_\_\_\_\_  
 for and on behalf the Contractor

in the  
 presence of: \_\_\_\_\_  
 Witness, Name, Signature, Address, Date

in the  
 presence of: \_\_\_\_\_  
 Witness, Name, Signature, Address, Date

# DRAWINGS

## Client

**RODRIGUES REGIONAL ASSEMBLY**

CONSULTANCY SERVICES FOR SELECTED DEVELOPMENT PROJECTS IN RODRIGUES

Project

## REHABILITATION WORKS AT GRAND LA FOUCHE CORAIL PRIMARY SCHOOL

File

1602/ED/713A

Date \_\_\_\_\_

NOVEMBER 2021

Consumers



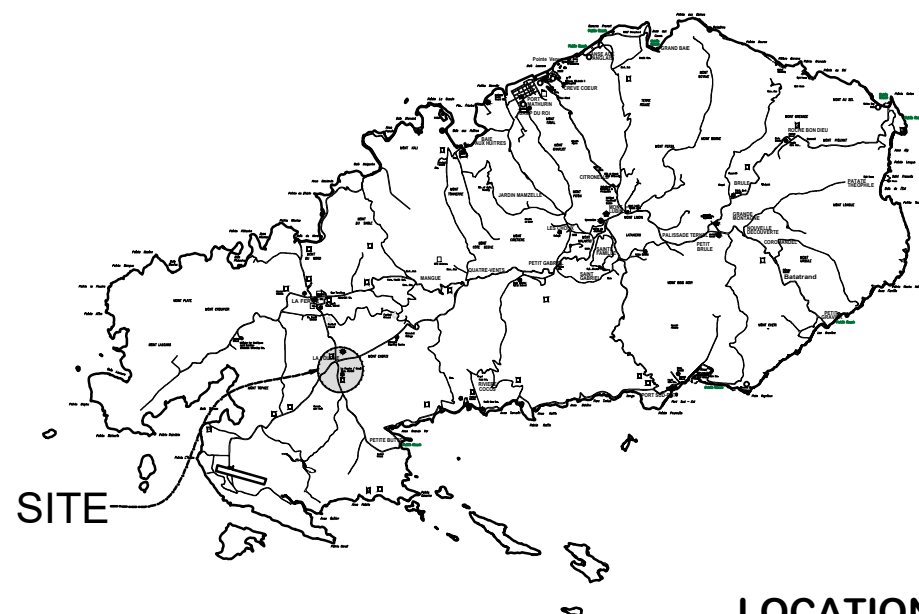
In Association with



6, Ave. des Capucines, Quatre Bornes.  
Tel: 465 9556 / E : aarc@intnet.mu

**Royal Road, St-Paul / Mesnil, Phoenix.**  
**Tel: 696 3956 / E: [info@ocalmauritius.com](mailto:info@ocalmauritius.com)**

Ground Floor, The AXIS - 26, Cybercity,  
Ebene.  
Tel: 467 7015 / E: [profive@intnet.mu](mailto:profive@intnet.mu)



## LOCATION PLAN

INDEX	DATE	MODIFICATIONS	INI.
REVISIONS			
DATE		ISSUED TO	INI.
DWG. ISSUE			

Notes

1. DO NOT SCALE. USE FIGURED DIMENSIONS
2. ALL DIMENSIONS TO BE CHECKED BEFORE ANY WORK IS PUT IN HAND.
3. ANY DISCREPANCY SHOULD BE REPORTED BACK TO THE ARCHITECT.

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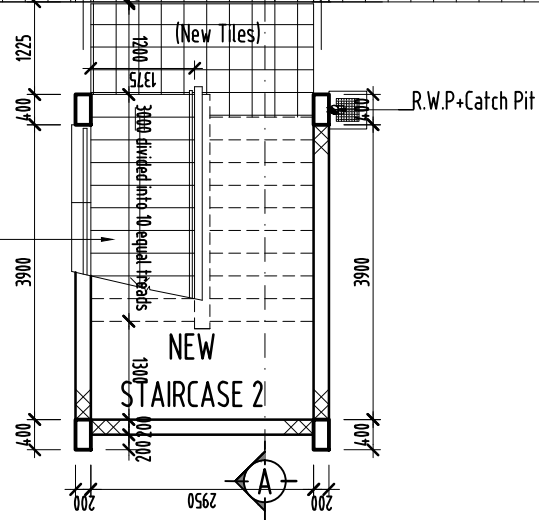
# ARCHITECTURAL DRAWINGS

[illegible]

TENDER 000







Drawing:- **BLOCK C**  
**EXISTING GROUND FLOOR PLAN**  
**AND SCHEDULE OF OPENINGS**

File no.:-	1602/ED/713A	Sheet no.:-	BC01		
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6, Ave. des Capucines, Quatres Bornes, Mauritius.  
Tel : 465 9556, Fax:465 1159 e-mail: aarc@intnet.mu

Vat. Registration No. 20200391

Drawn by:-	CR								
Checked by:-	GRR								
Scale:-	1:100								
Date:-	NOVEMBER 2021	INDEX	DATE	MODIFICATIONS	INL	DATE	ISSUED TO		INL
				REVISIONS			DWG. ISSUE		



Client:-	
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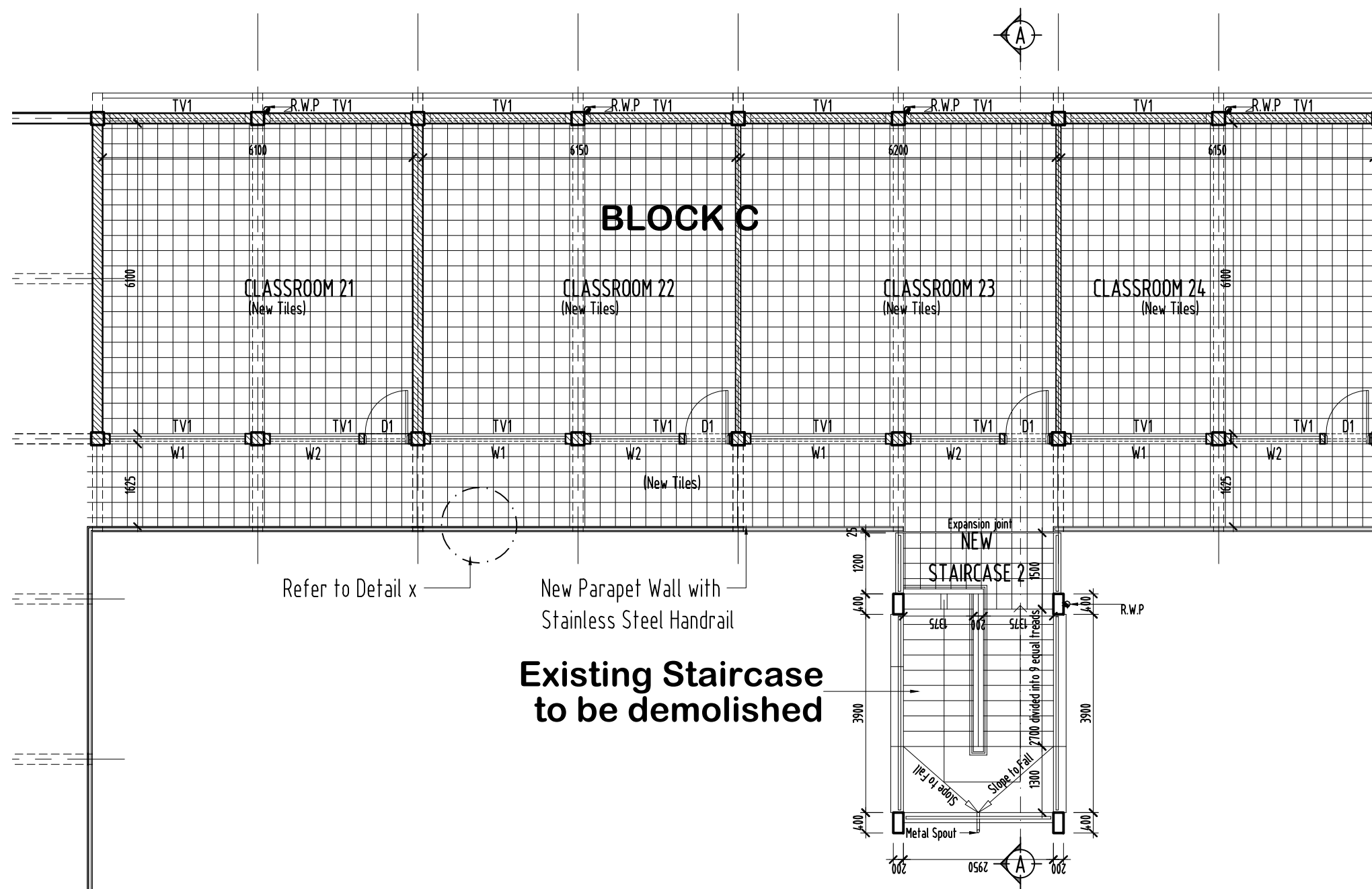
RODRIGUES  
REGIONAL ASSEMBLY



	Project:-
--	-----------

# REHABILITATION WORKS AT GRAND LA FOUCHE CORAIL PRIMARY SCHOOL

**DESIGN FORUM Ltd.** ARCHITECTS



Floor level				
Item	D1	W1	W2	TV1
Type	ALUMINIUM LOUVERED DOOR	ALUMINIUM LOUVERED WINDOW	ALUMINIUM LOUVERED WINDOW	ALUMINIUM LOUVERED TOP VENT
Quantity	4	4	4	16
Location	CLASSROOM	CLASSROOM	CLASSROOM	CLASSROOM
Glazing	6MM CLEAR LAMINATED GLASS	6MM CLEAR LAMINATED OR TEMPERED GLASS	6MM CLEAR LAMINATED OR TEMPERED GLASS	
Ironmongeries	PROVIDE COMPLETE WITH HINGES,HANDLE, CYLINDER LOCKS,DOOR STOP & HOLDER	N/A	N/A	N/A

## SCHEDULE OF OPENINGS

NOTE :-  
ALL EXISTING OPENINGS TO BE  
REPLACED BY NEW ALUMINIUM  
OPENINGS

TENDER

Drawn by:-	CR								
Checked by:-	GRR								
Scale:-	1:100								
Date:-	NOVEMBER 2021								
INDEX	DATE	MODIFICATIONS	INL	DATE	ISSUED TO	INL			
REVISIONS							DWG. ISSUE		



Client:-

RODRIGUES  
REGIONAL ASSEMBLY



Project:-

REHABILITATION WORKS AT  
GRAND LA FOUCHE CORAIL  
PRIMARY SCHOOL

DESIGN FORUM Ltd. ARCHITECTS

Drawing:-

BLOCK C  
EXISTING FIRST FLOOR PLAN  
AND SCHEDULE OF OPENINGS

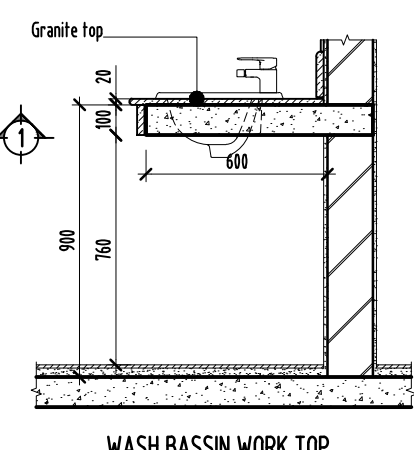
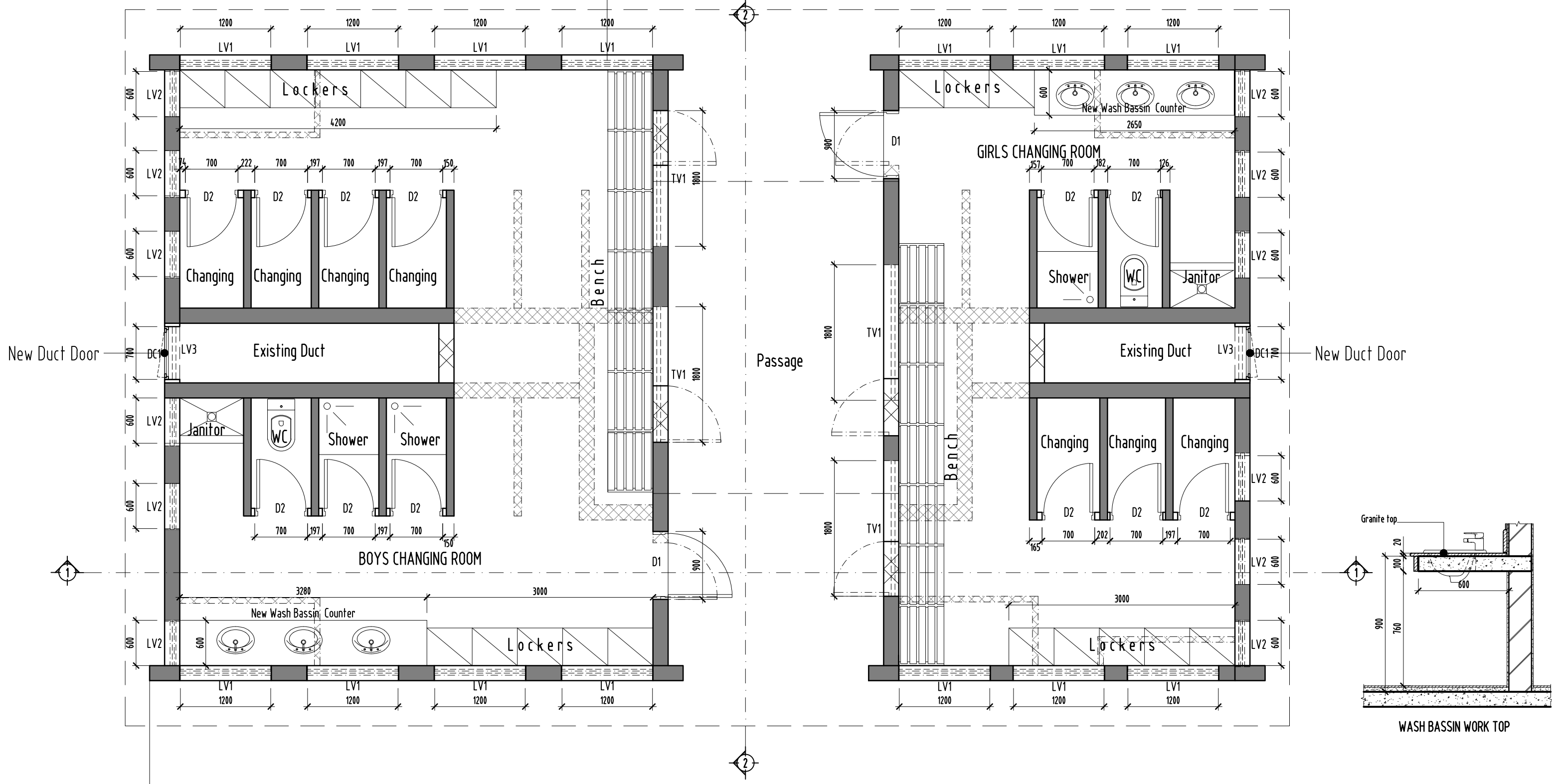
File no:- 1602/ED/713A Sheet no:- BC02

6, Ave. des Capucines, Quatres Bornes, Mauritius.  
Tel : 465 9556, Fax:465 1159 e-mail: aarc@intnet.mu

Val . Registration No. 20200391







**Legend**

New Block Wall:

Existing block wall:

Existing Wall to be cut/removed:

**NOTE**

:- ALL FLOOR AND WALL TILES TO BE REPLACED AS PER ARCH' SPECS

:- ALL OPENINGS TO BE REPLACED BY ALUMINIUM

**TENDER**

Drawn by:-	CR												<b>RODRIGUES REGIONAL ASSEMBLY</b>		<b>Project:- REHABILITATION WORKS AT GRAND LA FOCHE CORAIL PRIMARY SCHOOL</b>	<b>Drawing:- TOILET BLOCK EXISTING GROUND FLOOR PLAN</b>
Checked by:-	GRR															
Scale:-	1:50															
Date:-	NOVEMBER 2021															
		INDEX	DATE	MODIFICATIONS	INL	DATE	ISSUED TO	INL								
		REVISIONS				DWG. ISSUE										

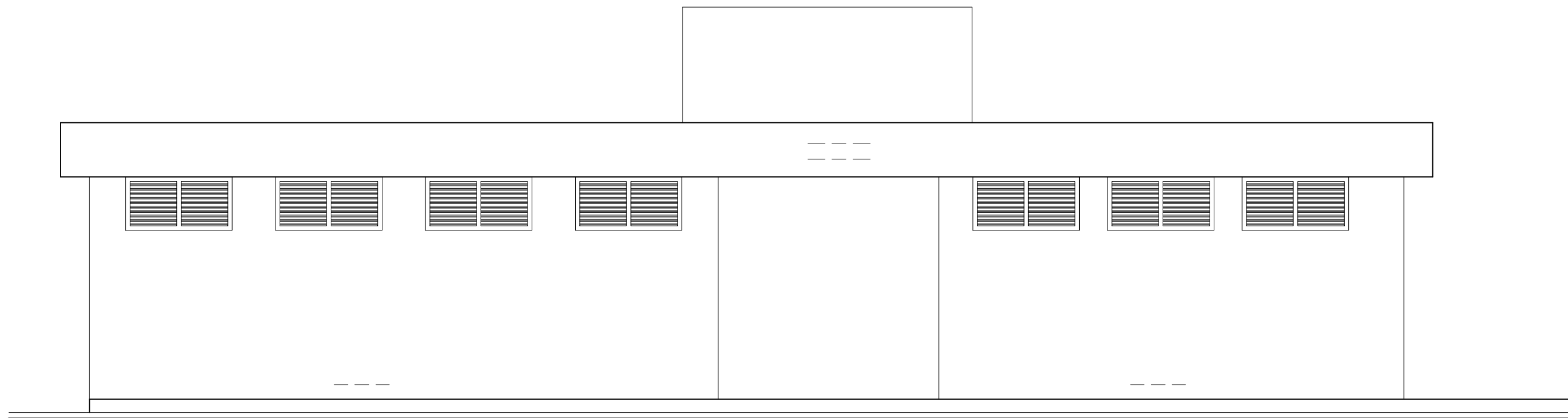
6, Ave. des Capucines, Quatres Bornes, Mauritius.  
Tel : 465 9556, Fax: 465 1159 e-mail: aarc@intnet.mu

Design Forum Ltd. ARCHITECTS

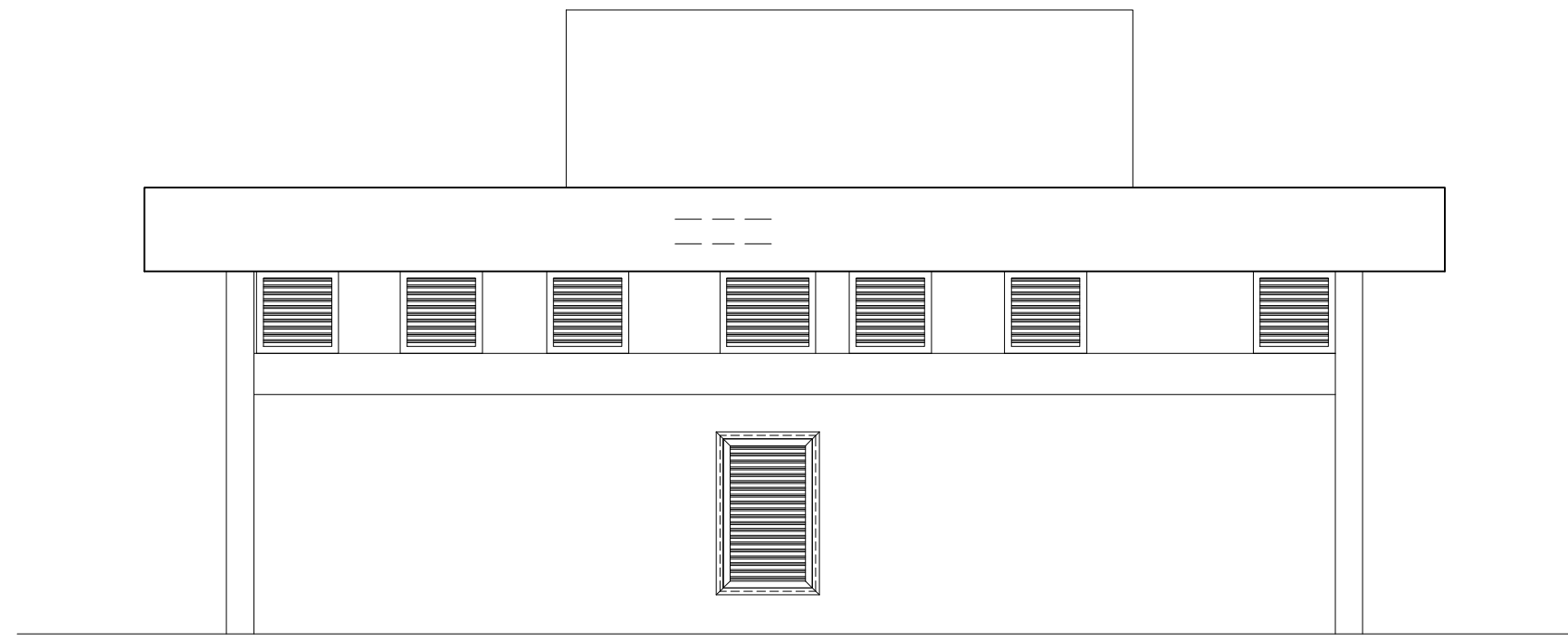
Vat . Registration No. 20200391







FRONT ELEVATION



### L.H.S ELEVATION

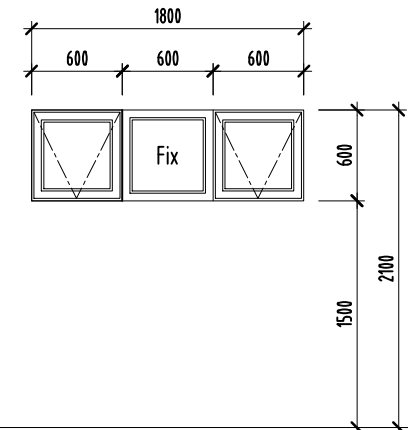
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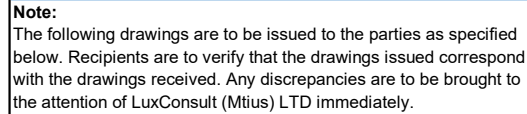
# TENDER

[illegible]





**Issue No:** 0  
**Ref. No :** 2016-717  
**Project :** REHABILITATION WORKS AT GRAND  
LA FOUCHE CORAIL PRIMARY SCHOOL,  
RODRIGUES

[illegible][illegible]

[A - Approval] [T - Tender] [C - Construction]

T

Distribution Recipients	Distribution method
-------------------------	---------------------

[illegible]

[E - E-mail] [H- Hardcopy] [C- CD-ROM]

NOTES:

1. This drawing to be read in conjunction with all relevant Architect's and M&E Engineer's drawings. Any discrepancies shall be reported to the Engineer before execution.

2. Dimensions must not be scaled or assumed. After notification, discrepancies or missing dimensions will be corrected in writing by the Engineer.

3. Concrete strength at 28 days to be as follows:

a) Foundations25 MPa

b) Columns25 MPa

c) Surface Beds25 MPa

d) Walls25 MPa

e) Beams25 MPa

f) Slabs25 MPa

g) Staircase25 MPa

h) Water Retaining structures40 MPa

4. All excavations for foundations to be inspected and approved by the Engineer before casting of blinding concrete.

5. Grade 15MPa blinding concrete to be cast under all foundation, strip footing and ground-bearing slabs, minimum thickness 50 mm.

6. Reinforcement

T - High Yield deformed bars with a min yield stress of 460 MPa

R - Hot Rolled mild steel bars with a min yield stress of 250 MPa

7. Cover to Main Steel

a) Columns25mm

b) Stairs25mm

c) Beams30mm

d) Slabs25mm

e) Foundations50mm against blinding

f) Foundations75mm against earth

g) Water Retaining structures50mm

8. All laps to have a minimum length of 50 x Dia. of BAR

9. Timber used for structural elements shall be hardwood based on BS 5268 Part2 : strength class D40 to D70. Shop Drawings for the timber works shall be submitted for approval.

10. All connecting plates supporting the timber structure shall be in steel and be hot dipped galvanised. No site welding is allowed. The steel plates have to be fabricated in workshop. Shop drawings have to be submitted for approval

11. All weld to be 5mm continuous fillet weld.
- LEGEND
- COLUMN BELOW AND ABOVE


COLUMN BELOW

COLUMN STARTS ABOVE

BLOCKWORK FROM FOUNDATION

BLOCKWORK FROM GROUND FLOOR
- 
- 
- 
- 150 & 200 BLOCK WALL AT MAXIMUM 3.5m C/C  
FOR POSITION OF B/WALL REFER TO ARCH. DRAWINGS  
TYPICAL WALL TIE DETAILS
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- Notes:-

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  3. Any discrepancy should be reported back.
- Client:



RODRIGUES REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR SELECTED DEVELOPMENT PROJECTS IN RODRIGUES
- Project:


REHABILITATION WORKS AT GRAND LA FOUCHE CORAIL PRIMARY SCHOOL, RODRIGUES

Drawing title:


GENERAL NOTES
- | Rev. | Date | Made by | Amendments | Issued | Date |
|------|------|---------|------------|--------|------|
|      |      |         |            |        |      |
|      |      |         |            |        |      |
|      |      |         |            |        |      |
|      |      |         |            |        |      |
|      |      |         |            |        |      |
- |                        |  |
|------------------------|--|
| Date                   | 04.10.21                                   |
| Scale                  | 1:25                                       |
| Drawn by               | S.A  |
| Designed by            |  |
| Checked by             |  |
| File name and location | R:\2016-717\ETUDE_TD\0A0\GENERAL NOTES.dwg |
- Drawing number:

16717-TD-3ST00


Stage:

TENDER
- 


LUXCONSULT CONSULTING ENGINEERS



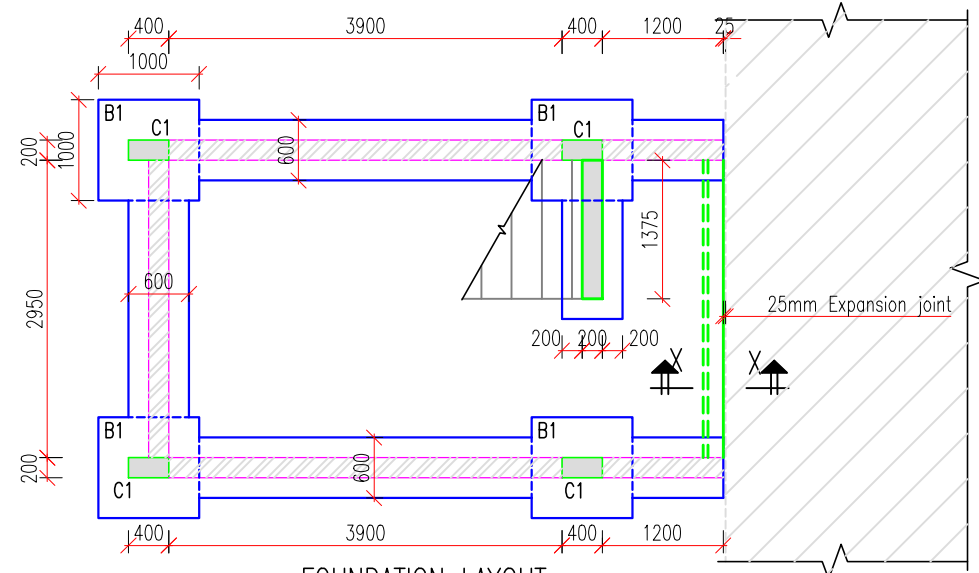
Ocal Ltd



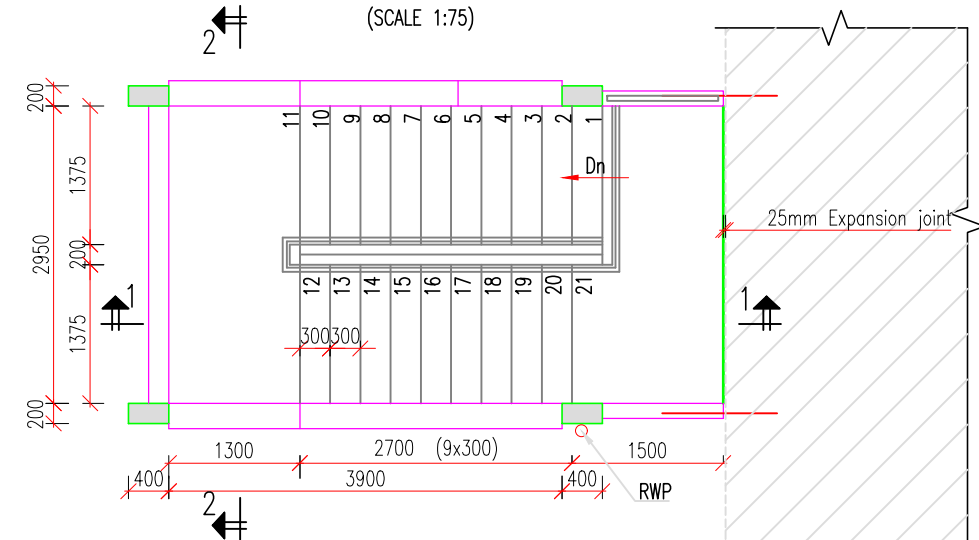
design forum



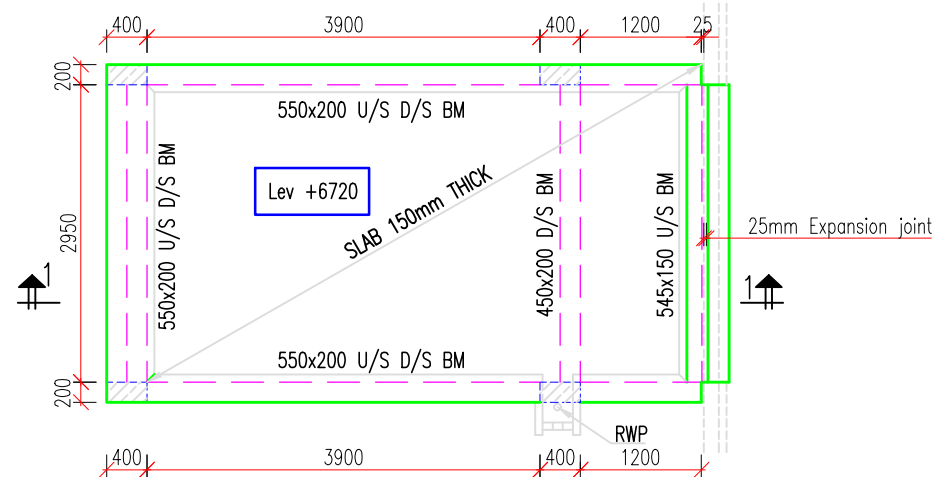
PRO\_FIVE LTD



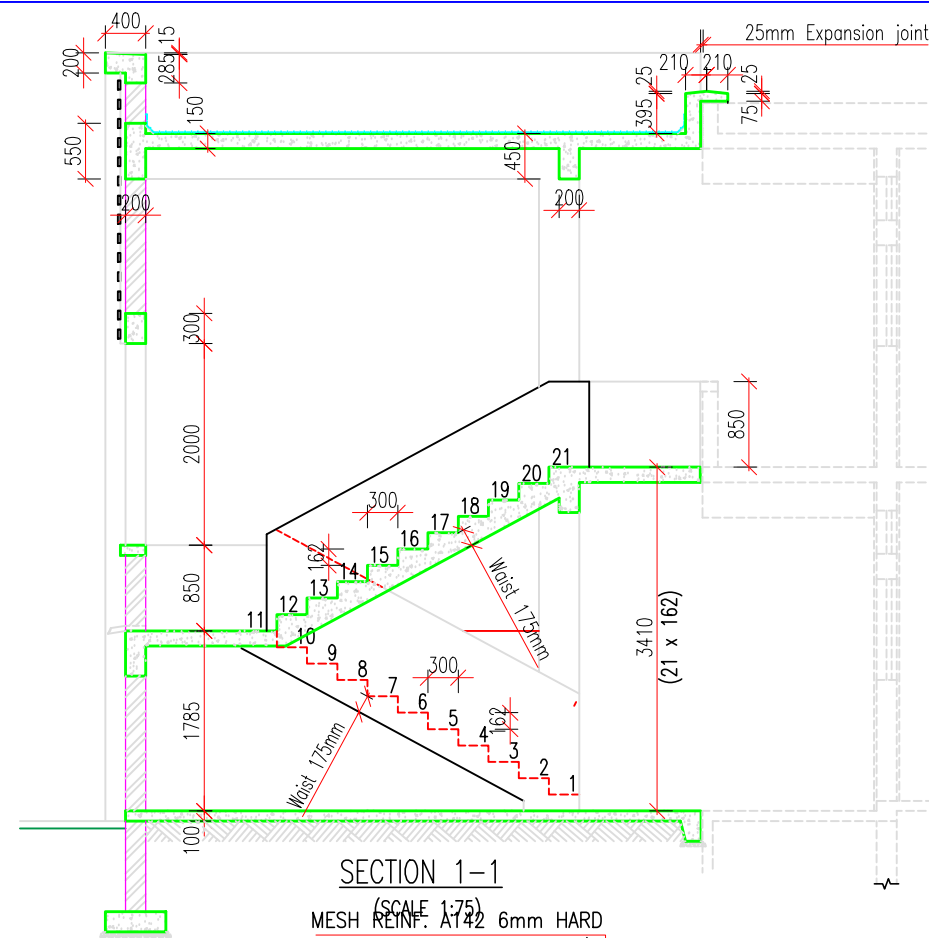
FOUNDATION LAYOUT  
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LAYOUT AT 1ST FLOOR  
(SCALE 1:75)

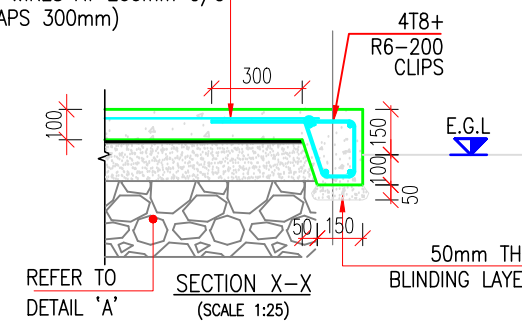


ROOF LAYOUT  
(SCALE 1:75)



SECTION 1-1  
(SCALE 1:75)

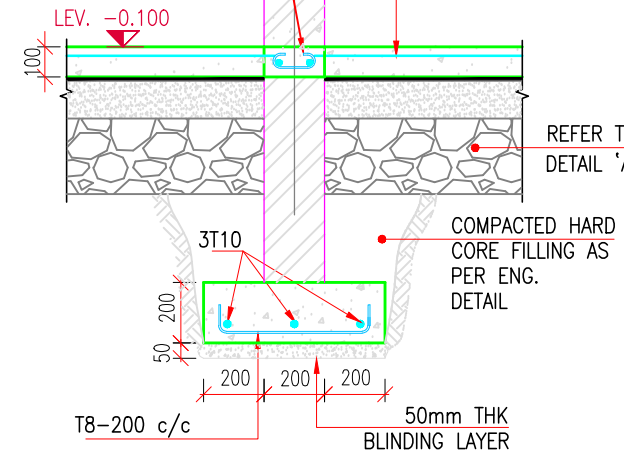
MESH REINF. A142 6mm HARD  
DRAWN WIRES AT 200mm C/C  
(MIN LAPS 300mm)



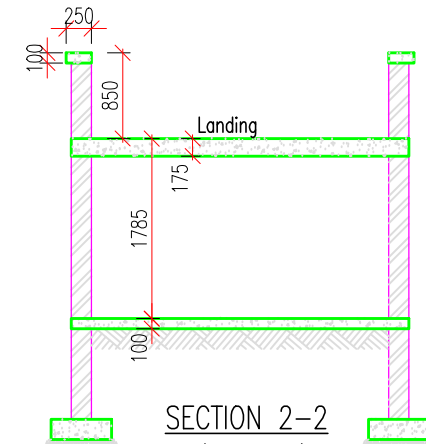
SECTION X-X  
(SCALE 1:25)

2T8+  
R6-200  
CLIPS

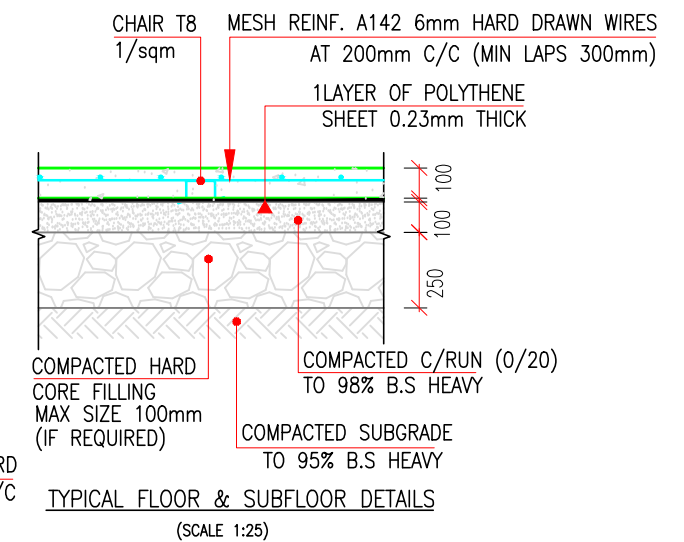
MESH REINF. A142 6mm HARD  
DRAWN WIRES AT 200mm C/C  
(MIN LAPS 300mm)



TYPICAL STRIP FOOTING DETAIL  
(SCALE 1:25)



SECTION 2-2  
(SCALE 1:75)



TYPICAL FLOOR & SUBFLOOR DETAILS  
(SCALE 1:25)

SCHEDULE OF BASES		
BASE TYPE	SIZE mm	REINFORCEMENT
B1	1000 x 1000 x 250 deep	T10-200 B1&B2

COLUMNS SCHEDULE		
COLUMN	SIZE mm	REINFORCEMENT
C1	200x150	4T12 + T8-200 LINKS

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Client:   
**RODRIGUES REGIONAL ASSEMBLY**  
CONSULTANCY SERVICES FOR SELECTED  
DEVELOPMENT PROJECTS IN RODRIGUES

Project: **REHABILITATION WORKS AT GRAND LA  
FOUCHE CORAIL PRIMARY SCHOOL,  
RODRIGUES**  
Drawing title:  
**FOUNDATION, FIRST FLOOR & ROOF LAYOUT  
AND SECTIONS**

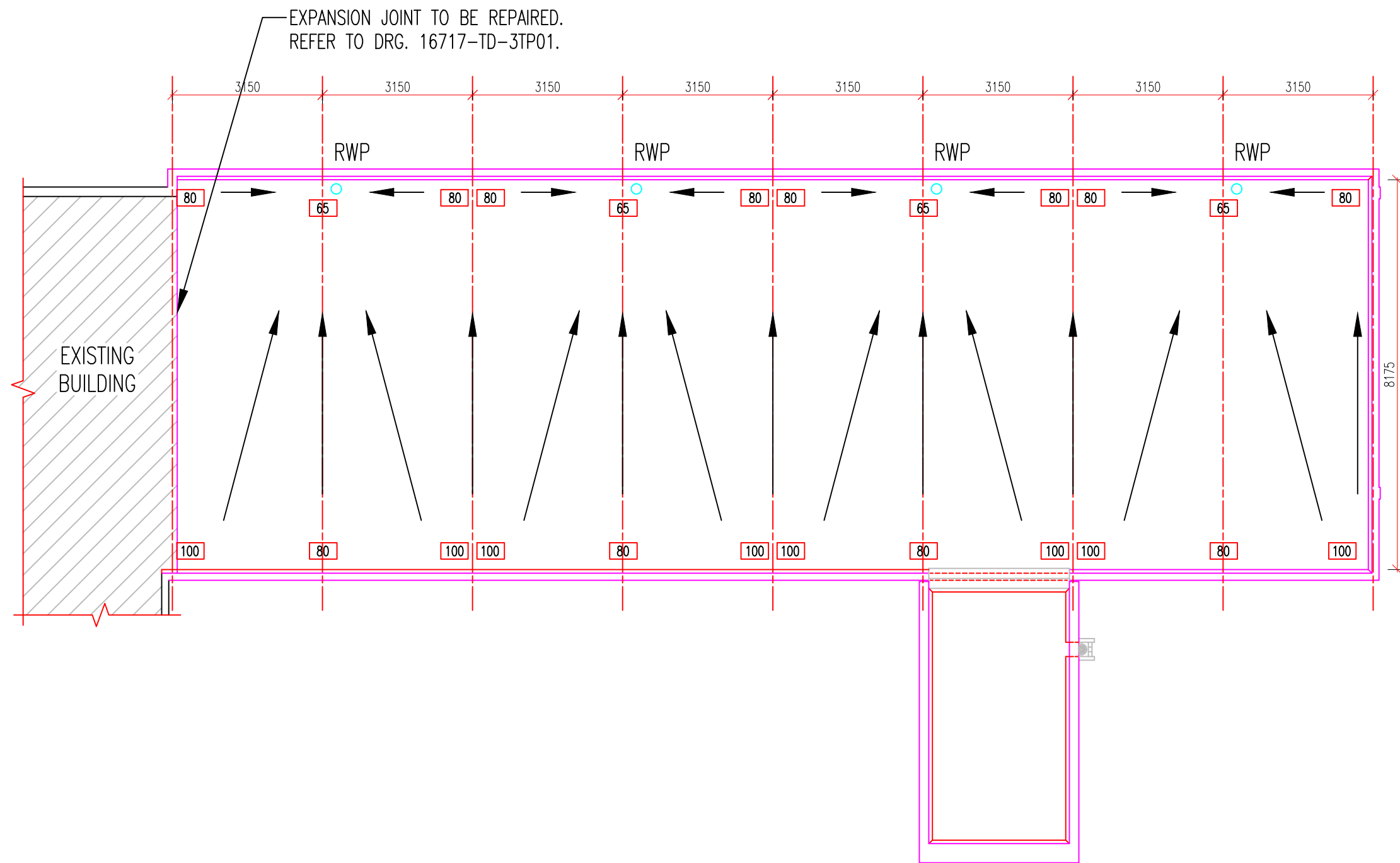
Rev.	Date	Made by	Amendments	Issued	Date

Date	04.10.21
Scale	1:75, 1:25
Drawn by	S.A
Designed by	
Checked by	
File name and location	R:\2016-717\ETUDE_TD\0A0\STAIRCASE.dwg

Drawing number:  
**16717-TD-3ST01**  
Stage:  
TENDER

**LUXCONSULT** (M) LTD  
CONSULTING ENGINEERS  
23, Seremban Avenue  
Seremban, Negeri Sembilan  
70300 Seremban  
E-MAIL: lux@luxconsult.com  
Web: www.luxconsult.com

In Association with  
  

# LEGEND:

- 80 Maximum spot thickness of new concrete topping in mm.
- RWP New PVC Rain water pipe  $\phi 110\text{mm}$   
For new concrete topping details refer to Dwg. No. 16717-TD-3TP02.  
Exact location of RWP to be confirmed on site.

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2. All dimensions to be checked before any work is put in hand.  
3. Any discrepancy should be reported back.

Client:   
**RODRIGUES REGIONAL ASSEMBLY**  
CONSULTANCY SERVICES FOR SELECTED  
DEVELOPMENT PROJECTS IN RODRIGUES

Project: **REHABILITATION WORKS AT GRAND LA  
FOUCHE CORAIL PRIMARY SCHOOL,  
RODRIGUES**

Drawing title:  
**ROOF LAYOUT**

Rev.	Date	Made by	Amendments	Issued	Date

Date: 09.11.21  
Scale: 1:100  
Drawn by: S.A.  
Designed by:   
Checked by:   
File name and location: R:\2016-717\ETUDE\_TD\0A0\ROOF\_LAYOUT.dwg

Drawing number:  
**16717-TD-3ST02**  
Stage:  
TENDER

**LUXCONSULT** (Mtius) LTD  
CONSULTING ENGINEERS  
23, Serapiou Avenue  
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Telephone: +262 03 39  
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E-MAIL: [lux@luxconsult.mu](mailto:lux@luxconsult.mu)  
Web: [www.luxconsult.mu](http://www.luxconsult.mu)

In Association with

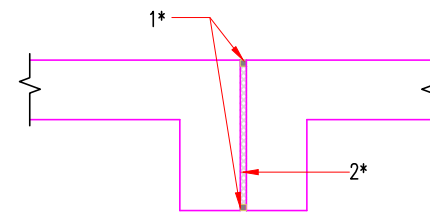
  

PRO\_FIVE LTD

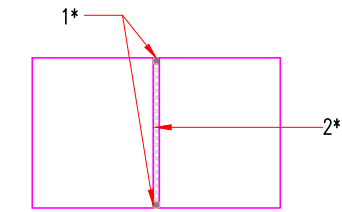
## 2. SPALLING OF SLAB REPAIR

3. DELAMINATED CONCRETE TO BE REMOVED TO REACH SOUND CONCRETE. SURFACE TO BE CLEANED AND FREE OF DEBRIS PRIOR TO REPAIR.
2. CONCRETE REMOVED 15mm BEHIND EXPOSED REINFORCEMENT (IF ANY)
1. TEMPORARY SUPPORTS AT 1000mm c/c PROPERLY FIXED AND SECURED PRIOR TO CARRYING OUT REPAIR WORKS (TO ENGINEER'S ACCEPTANCE)
- REPAIR TO BE IN STAGES IF DAMAGED LENGTH EXCEEDS 1m.
- SUPPORTS TO BE REMOVED 7 DAYS AFTER REPAIR WORKS.
4. EXPOSED RUSTED REINFORCEMENT TO BE WIRE BRUSHED TO EXPOSE SHINY SURFACE.
- REINFORCEMENT TO BE CLEANED, FREE FROM DEBRIS AND CORROSION INHIBITOR SUCH AS SIKA ARMATEC-110-EPOCEM OR EQUIVALENT IS APPLIED AS PER MANUFACTURER'S INSTRUCTIONS AND TO ENGINEER'S ACCEPTANCE.
5. AFTER TREATING REINFORCEMENT, EPOXY CONCRETE SUCH AS DURAREP FR MORTAR OR EQUIVALENT TO BE APPLIED AS PER MANUFACTURER'S INSTRUCTIONS & ENGINEER'S ACCEPTANCE. SURFACE TO BE PREPARED FOR PAINTING. REPAIRED CONCRETE TO BE CURED AS PER MANUFACTURER'S INSTRUCTIONS.

## 3. EXPANSION JOINT REPAIR DETAILS

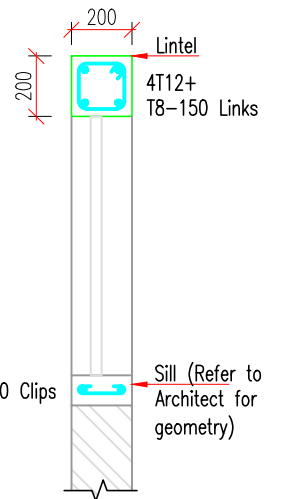


BEAM EXPANSION JOINT



COLUMN EXPANSION JOINT

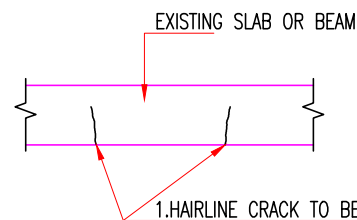
- 1\*. DAMAGED / DETERIORATED SEALANT TO BE REMOVED AND JOINT (INCLUDING SURROUNDINGS) CLEANED, DRY AND FREE OF DEBRIS. SEALANT SUCH AS SIKA POLYSUPHIDE PG (OR THIOFLEX 600) OR EQUIVALENT TO BE APPLIED AS PER MANUFACTURER'S INSTRUCTIONS AND TO ENGINEER'S ACCEPTANCE.
- 2\*. DAMAGED COMPRESSIBLE MATERIAL/POLYSTYRENE STRIP TO BE REMOVED AND REPLACED WITH NEW COMPRESSIBLE STRIP AS DIRECTED BY ENGINEER AND TO ENGINEER'S ACCEPTANCE PRIOR TO APPLYING SEALANT.



TYPICAL CILL & LINTEL DETAILS

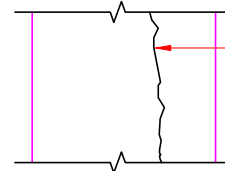
(SCALE 1:25)

## 1. REPAIR- CRACK IN SLAB/BEAM



1. HAIRLINE CRACK TO BE CLEANED THOROUGHLY USING SCRAPING TOOL.
2. DUST AND LOOSE DEBRIS TO BE REMOVED.
3. CRACK TO BE FILLED WITH LOW SHRINK REPAIR MATERIAL SUCH AS SIKAFLEX PRO-11FC (OR INJECT NITROFILL LV) OR EQUIVALENT AS PER MANUFACTURER'S INSTRUCTIONS AND TO ENGINEER'S ACCEPTANCE.
4. REPAIRED CRACK SURFACE TO BE PREPARED TO RECEIVE PAINT.

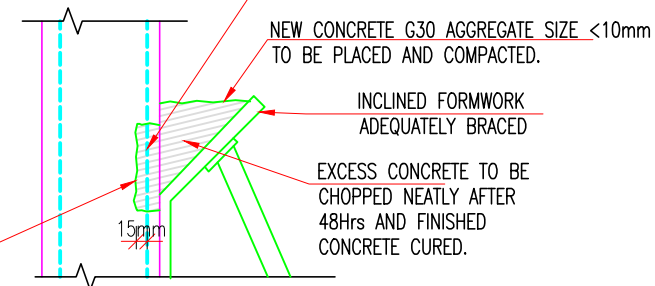
## 5. Surface crack repairs for walls & columns



1. CRACK TO BE CLEANED AND PREPARED AS PER MANUFACTURER'S INSTRUCTIONS.
2. INJECT CRACK WITH NITROFILL LV OR EQUIVALENT TO FILL CRACK COMPLETELY AS PER MANUFACTURER'S INSTRUCTION AND TO ENGINEER'S ACCEPTANCE.
3. SURFACE TO BE PREPARED FOR PAINTING.

## 4. CRACK REPAIR FOR DAMAGED COLUMNS

(SCALE 1:10)



- LOOSE CONCRETE TO BE REMOVED AND SURFACE TO BE CLEANED AND TREATED WITH EPIDERMIX 344 OR EQUIVALENT AS PER MANUFACTURER'S INSTRUCTIONS & TO ENGINEER'S ACCEPTANCE PRIOR TO CONCRETING

- EXPOSED RUSTED REINFORCEMENT TO BE WIRE BRUSHED UNTIL SHINY SURFACE. REINFORCEMENT IS CLEANED (FREE FROM LOOSE DEBRIS) AND CORROSION INHIBITOR SUCH AS SIKA ARMATEC-110-EPOCEM OR EQUIVALENT IS APPLIED AS PER MANUFACTURER'S INSTRUCTIONS AND TO ENGINEER'S ACCEPTANCE.

NOTE: SURROUNDING BEAMS AND SLAB TO BE PROPPED PRIOR TO STARTING REPAIR WORKS TO ENGINEER'S ACCEPTANCE. PROPS TO BE REMOVED AFTER 7 DAYS.

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Client:



RODRIGUES REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR SELECTED DEVELOPMENT PROJECTS IN RODRIGUES

Project:

REHABILITATION WORKS AT GRAND LA FOUCHE CORAIL PRIMARY SCHOOL, RODRIGUES

Drawing title:

CRACK REPAIR DETAILS

Rev.	Date	Made by	Amendments	Issued	Date

Date	25.10.21
Scale	1:25, 1:10
Drawn by	S.A
Designed by	
Checked by	
File name and location	R:\2016-717\ETUDE_TD\040\16717-TD-3TP01.dwg

Drawing number:

16717-TD-3TP01

Stage:

TENDER

**LUXCONSULT** (Mtius) LTD  
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23, Seranang Avenue  
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In Association with

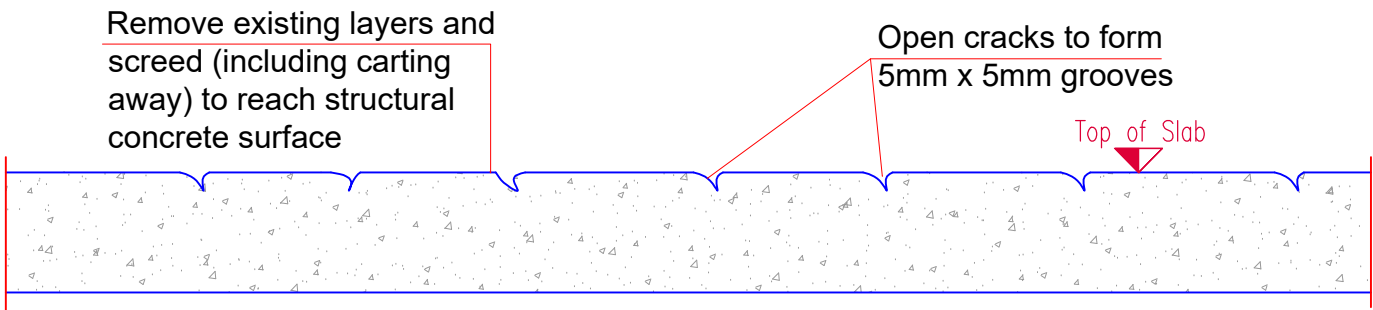
  



REPAIR AT ROOF  
TENTATIVE METHODOLOGY

STEP 1 - Prop soffit of slab

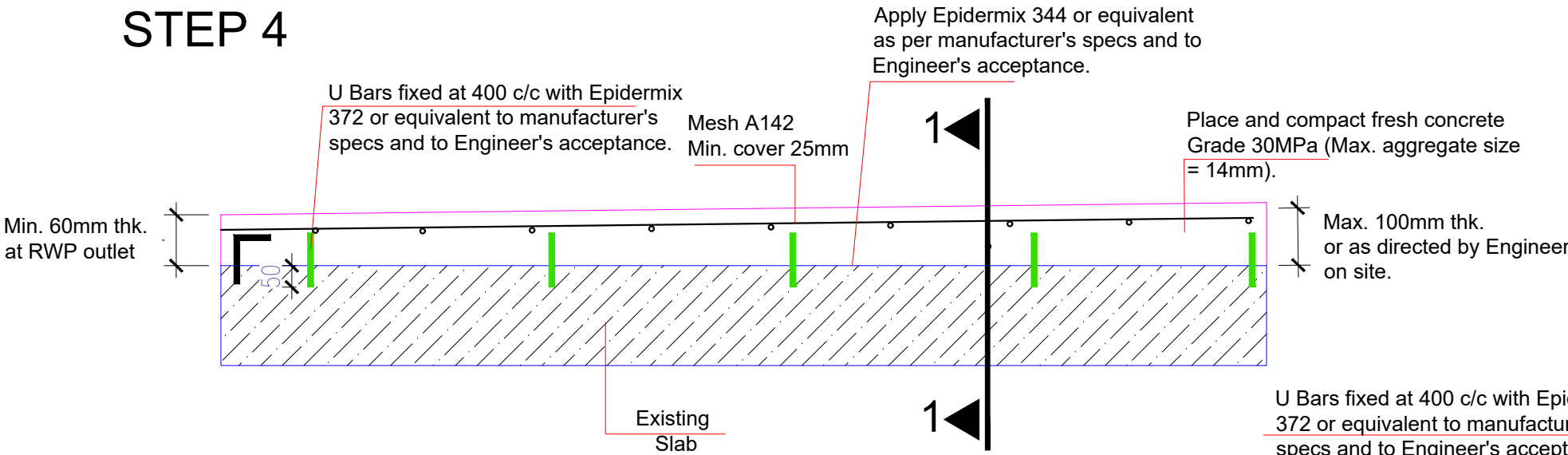
STEP 2



STEP 3 -

Clean and wash roof. Allow to surface dry. Dowel T8 U-bars, fixed using Epidermix 372 or equivalent at 400 mm c/c.

STEP 4



NOTE:

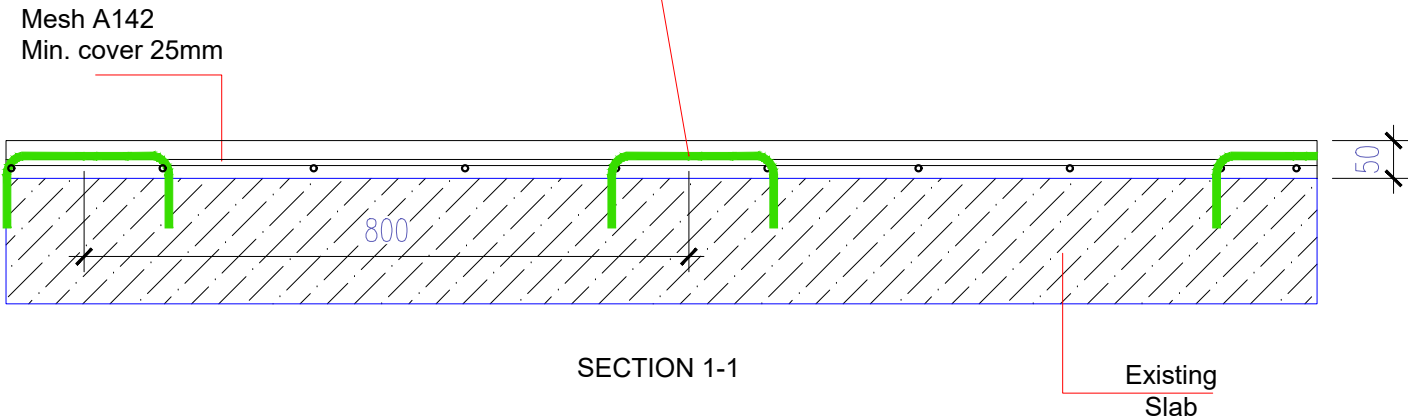
1. New concrete to be cured as per Engineer's Specifications after casting.
2. Props to be removed 14 days after curing of concrete or to Engineer's acceptance.

STEP 5

Lay 25mm thk. screed with bonding agent such as Jaycocrete Standard or Equivalent to Engineer's acceptance.

STEP 6

Apply new waterproofing as per Architect's requirements and to manufacturer's specifications.



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DEVELOPMENT PROJECTS IN RODRIGUES

Project:  
**REHABILITATION WORKS AT GRAND LA  
FOUCHE CORAIL PRIMARY SCHOOL,  
RODRIGUES**

Drawing title:  
**CONCRETE TOPPING DETAILS**

Rev.	Date	Made by	Amendments	Issued	Date

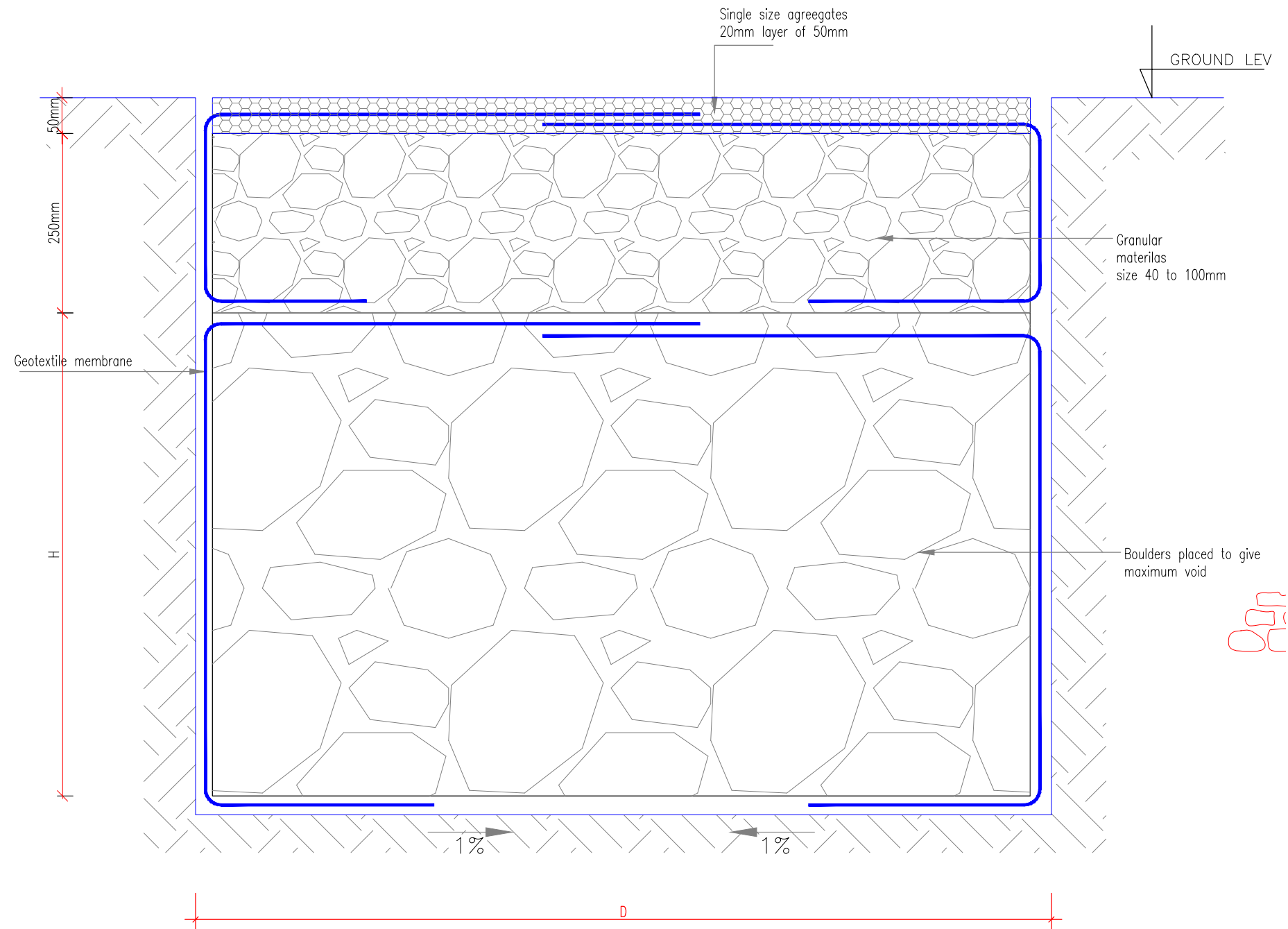
Date	25.10.21
Scale	1:25, 1:10
Drawn by	S.A
Designed by	
Checked by	
File name and location	R:\2016-717\ETUDE_TD\0A0\16717-TD-3TP02.dwg

Drawing number:	16717-TD-3TP02
Stage:	TENDER

Drawing number:	16717-TD-3TP02
Stage:	TENDER

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### ABSORPTION PIT DETAILS

NOTE:

All overlaps minimum 300mm unless shown.  
Dimensions as per M&E requirements.

Geotextile membrane

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CONSULTANCY SERVICES FOR SELECTED  
DEVELOPMENT PROJECTS IN RODRIGUES

Project:

**REHABILITATION WORKS AT GRAND LA  
FOUCHE CORAIL PRIMARY SCHOOL,  
RODRIGUES**

Drawing title:

**ABSORPTION PIT DETAILS**

Rev.	Date	Made by	Amendments	Issued	Date

Date	04.10.21
Scale	1:1,1:25
Drawn by	S.A
Designed by	
Checked by	
File name and location	R:\2016-717\ETUDE_TD\0A0\CATCH-PIT AND ABSORPTION-PIT DETAILS.dwg

Drawing number:

**16717-TD-3TP03**

Stage:

**TENDER**

**LUXCONSULT**  
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RODRIGUES  
REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:

REHABILITATION WORKS AT  
GRAND LA FOUCHE CORAL  
PRIMARY SCHOOL, RODRIGUES

DRAWING TITLE:

GROUND FLOOR PLAN  
LIGHTING LAYOUT-BLOCK C

NO.	DATE	BY	CONTENTS
-----	------	----	----------


BASE:

DESIGN FURNISHED  
GROUND FLOOR PLAN  
Dwg no.: BC01  
28.08.2021



In Association with



DATE:	9.09.21
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SCALE:	1:150 (A3)
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DRAWN BY:	RM
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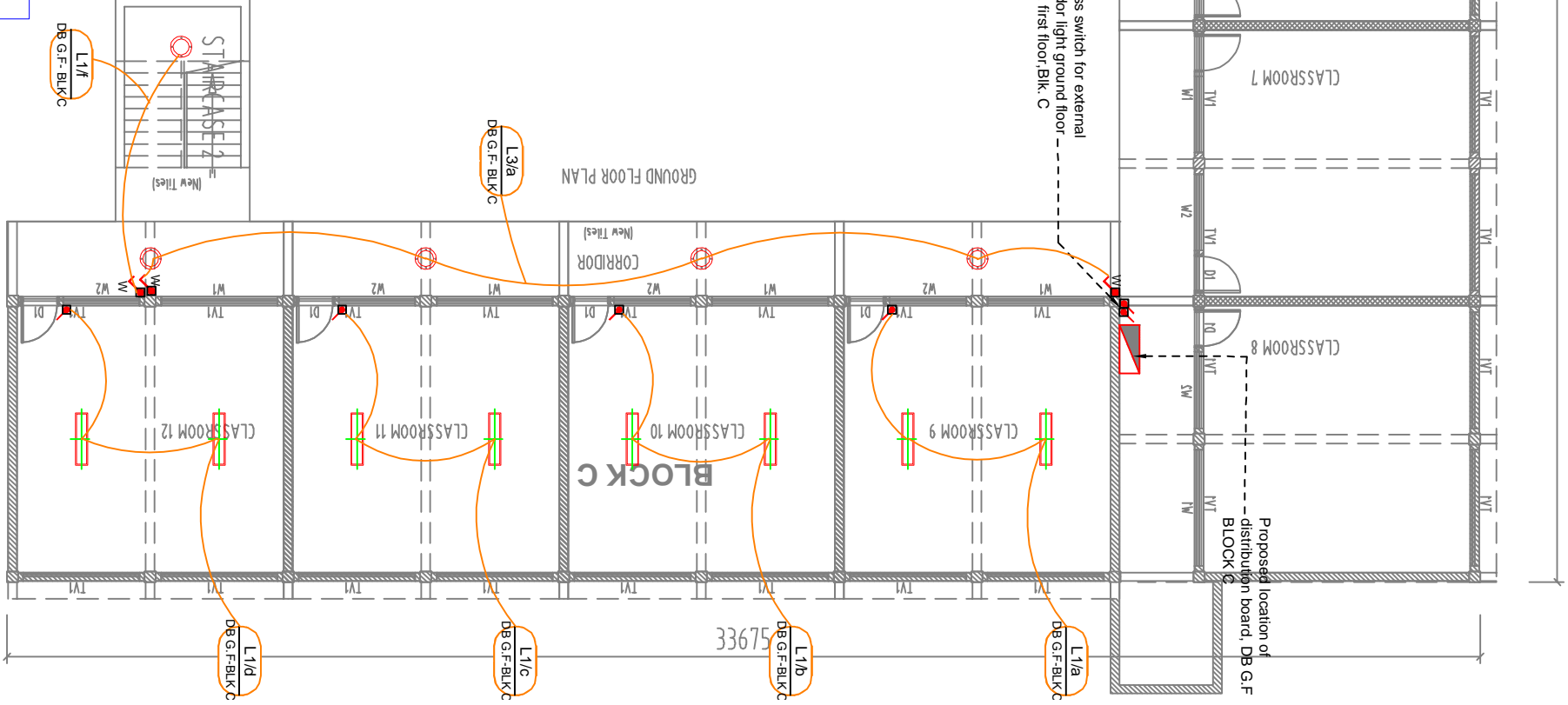
DESIGNED BY:	SS
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CHECKED BY:	SS
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DRAWING No.: PF/58/21/E101 REV.: T0

STATUS:

TENDER DRAWING

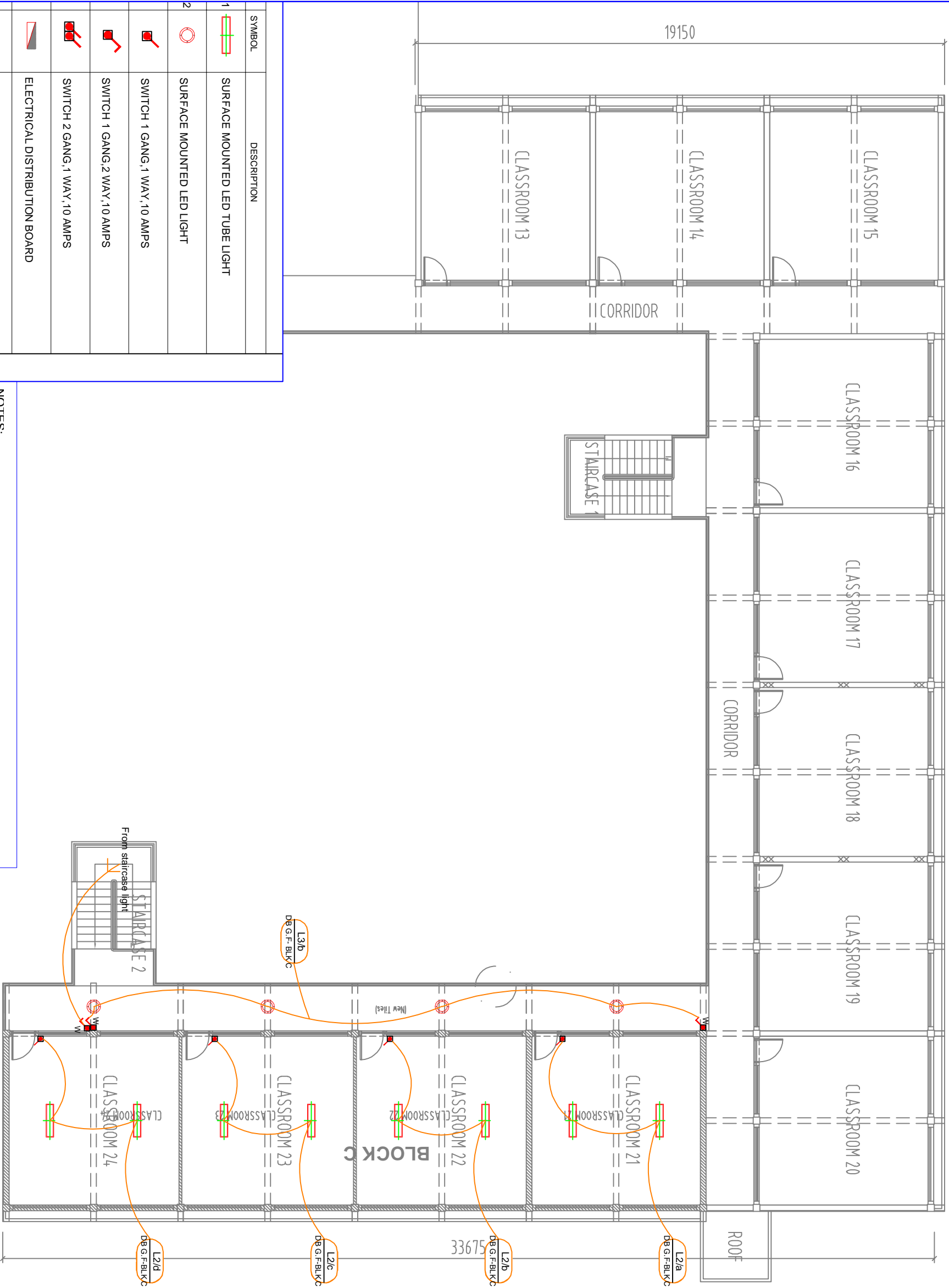


LEGEND

ITEM	SYMBOL	DESCRIPTION
Type 1		SURFACE MOUNTED LED TUBE LIGH
Type 2		SURFACE MOUNTED LED LIGHT
		SWITCH 1 GANG,1 WAY,10 AMPS
		SWITCH 1 GANG,2 WAY,10 AMPS
		SWITCH 2 GANG,1 WAY,10 AMPS
		ELECTRICAL DISTRIBUTION BOARD

- NOTES:
- All switches to be at height 1200mm AFFL centered, unless otherwise specified.
  - All manual call points to be at height 1400mm AFFL centered.
  - Electrical distribution board to be at height 1500mm AFFL, underside.
  - Fire Alarm panel to be installed outside Main Office.

39975



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RODRIGUES  
REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:  
REHABILITATION WORKS AT GRAND LA  
FOUCHE CORAIL PRIMARY  
SCHOOL, RODRIGUES

DRAWING TITLE:

FIRST FLOOR PLAN  
LIGHTING LAYOUT-BLOCK C

NO. DATE BY CONTENTS


BASE:

DESIGN LUXCONSULT LTD  
FIRST FLOOR PLAN  
Dwg no: BC01  
28.08.2021



In Association with



DATE: 9.09.21

SCALE: 1:150 (A3)

DRAWN BY: RM

DESIGNED BY: SS

CHECKED BY: SS

DRAWING No.: PF/58/21/E102 REV: T0

STATUS:

TENDER DRAWING

SYMBOL	DESCRIPTION
1	SURFACE MOUNTED LED TUBE LIGHT
2	SURFACE MOUNTED LED LIGHT
	SWITCH 1 GANG, 1 WAY, 10 AMPS
	SWITCH 1 GANG, 2 WAY, 10 AMPS
	SWITCH 2 GANG, 1 WAY, 10 AMPS
	ELECTRICAL DISTRIBUTION BOARD

NOTES:

1. All switches to be at height 1200mm AFFL centered, unless otherwise specified.
2. All manual call points to be at height 1400mm AFFL centered.
3. Electrical distribution board to be at height 1500mm AFFL, underside.
4. Fire Alarm panel to be installed outside Main Office.

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REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:

REHABILITATION WORKS AT GRAND  
LA FOURCHE CORAL PRIMARY  
SCHOOL, RODRIGUES

DRAWING TITLE:

GROUND FLOOR PLAN  
CHANGING ROOM BLOCK

NO.	DATE	BY	CONTENTS

BASE:

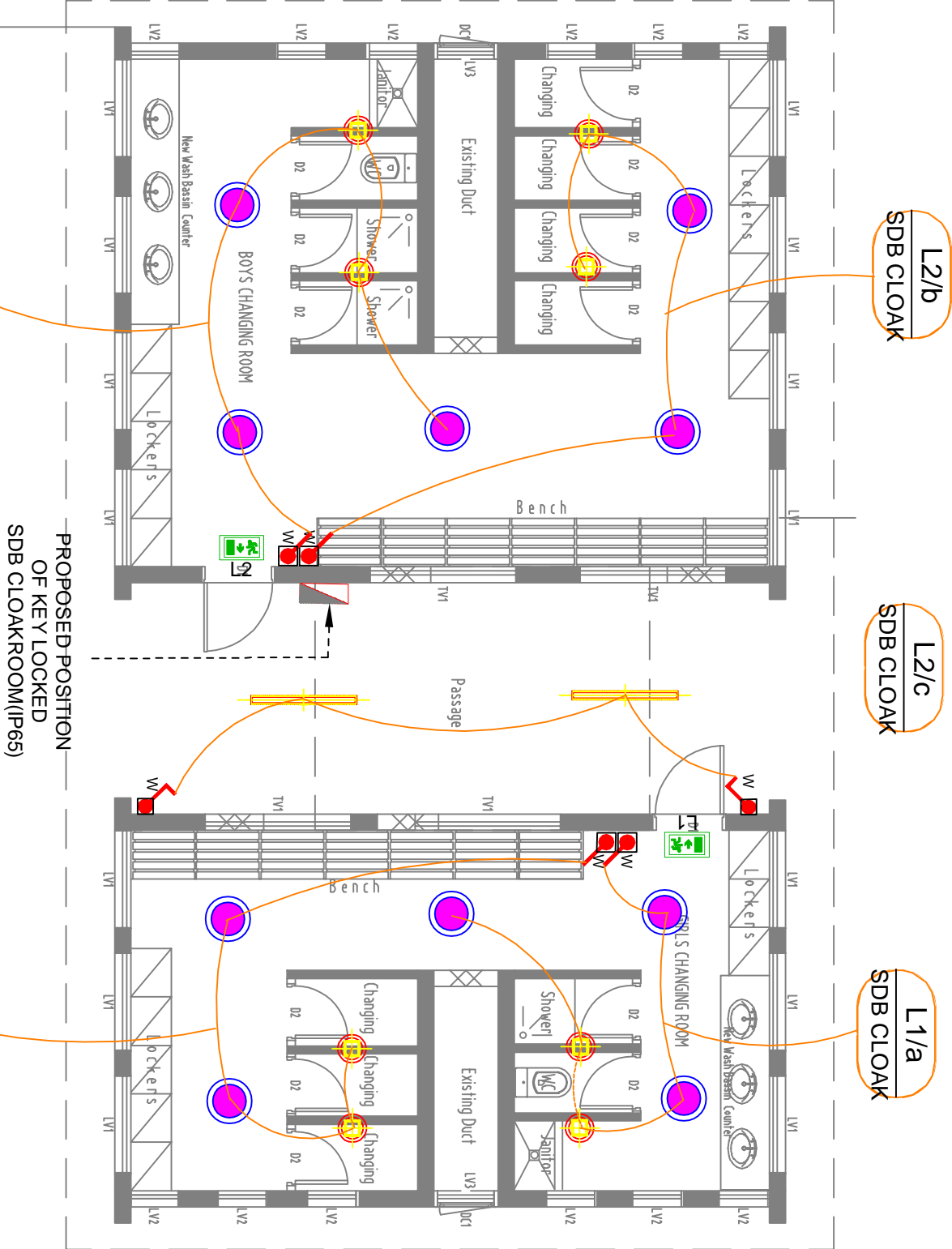


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DESIGNED BY:	SS
CHECKED BY:	SS
DRAWING No.:	PF/58/21/E103 REV: TO
STATUS:	<div>TENDER DRAWING</div>



LEGEND

SYMBOL	DESCRIPTION
	TYPE 3
	TYPE 4
	TYPE 5
	TYPE EM
	SWITCH 1 GANG, 1 WAY, 10 AMPS(IP65)
	SWITCH 1 GANG, 2 WAY, 10 AMPS(IP65)
	ELECTRICAL DISTRIBUTION BOARD

NOTES

1. All switches to be at height 1200mm AFFL centered, unless otherwise specified.
2. All switches to be offset 200mm from door frame, where applicable.
3. Electrical distribution board to be at height 1800mm AFFL, underside.



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CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:  
RENOVATION WORKS AT  
GRAND LA FOUCHE CORAIL  
PRIMARY SCHOOL

DRAWING TITLE:  
GROUND FLOOR PLAN  
POWER LAYOUT-BLOCK C

NO.	DATE	BY	CONTENTS

BASE:  
JLCAJIN TUNJUNI LTD  
GROUND FLOOR PLAN  
DWG NO. BC01  
28.08.2021



E-Mail: [info@luxconsult.mu](mailto:info@luxconsult.mu)  
Web: [www.luxconsult.mu](http://www.luxconsult.mu)

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DATE: 09.09.21

SCALE: 1:150 (A3)

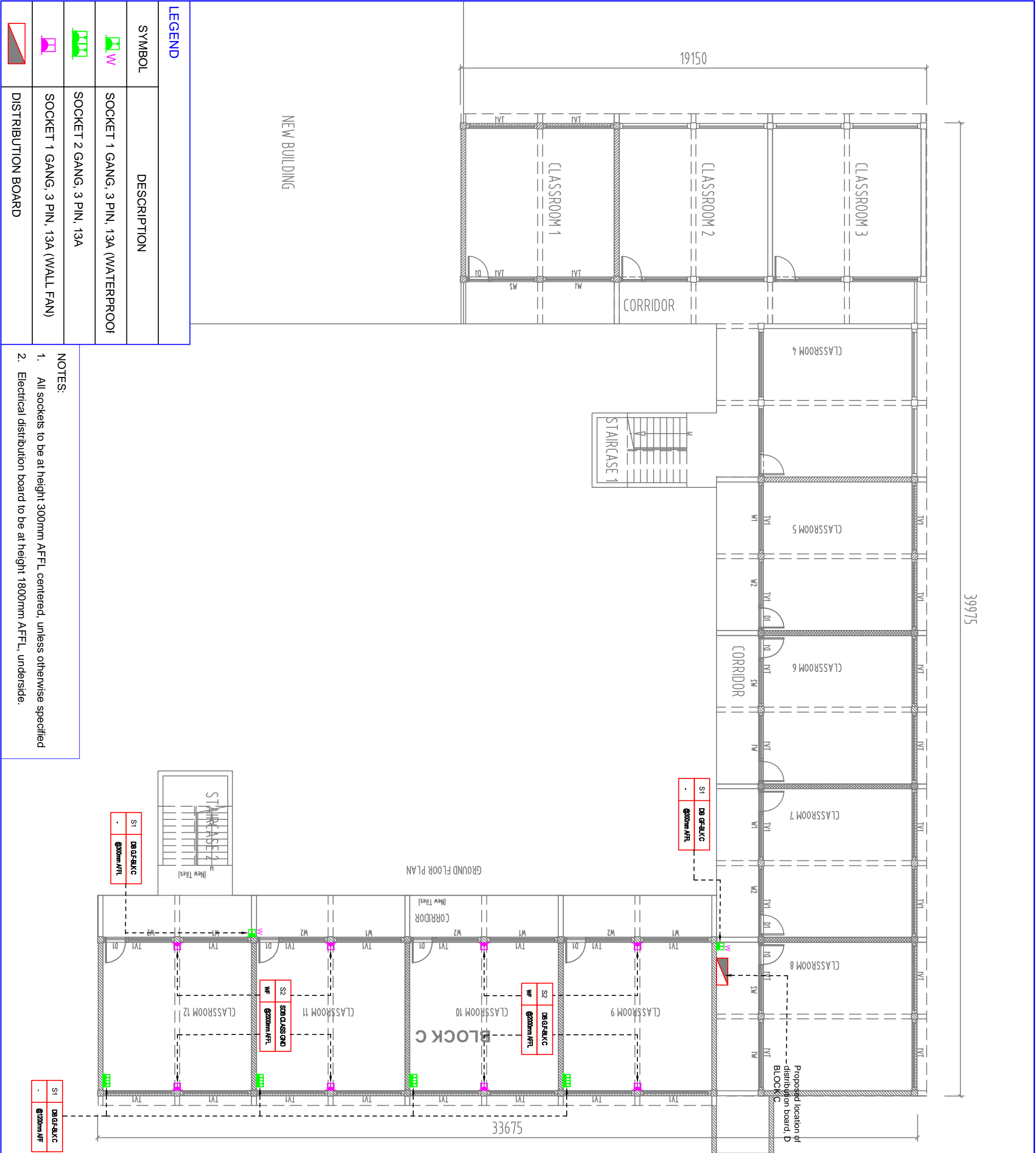
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CHECKED BY: SS

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REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:  
RENOVATION WORKS AT  
GRAND LA FOUCHE CORAIL  
PRIMARY SCHOOL

DRAWING TITLE:  
FIRST FLOOR PLAN  
POWER LAYOUT-BLOCK C

NO.	DATE	BY	CONTENTS

BASE:  
LUXCONSULT (Mitius) LTD  
FIRST FLOOR PLAN  
DWG NO. BC01  
28.08.2021

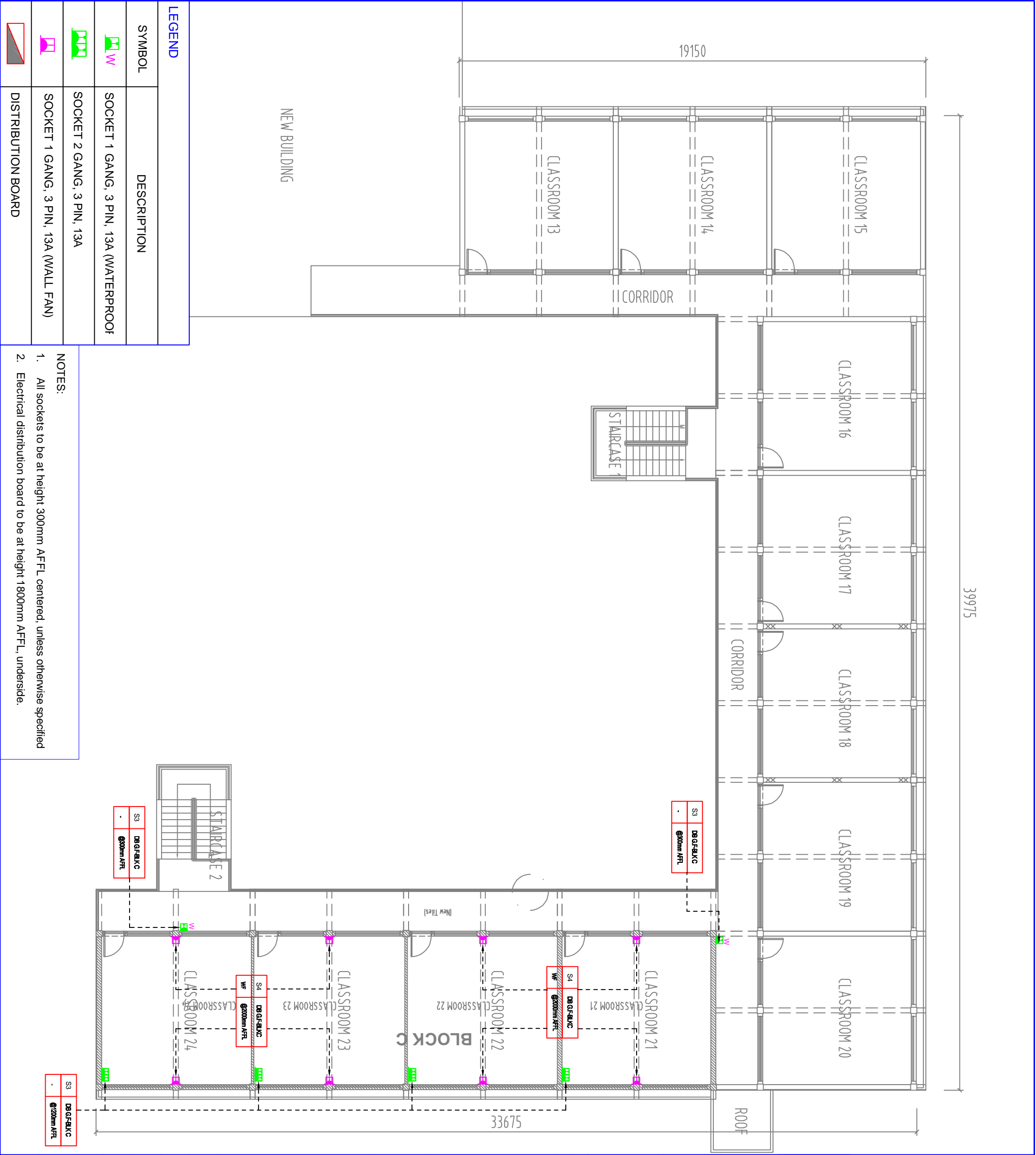






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E:- MALICM@infnet.mu  
Web: www.luxconsult.mu

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DATE:	09.09.21
SCALE:	1:150 (A3)
DRAWN BY:	NR
DESIGNED BY:	SS
CHECKED BY:	SS
DRAWING No.: PF/58/21/E105	REV: T0
STATUS:	TENDER DRAWING

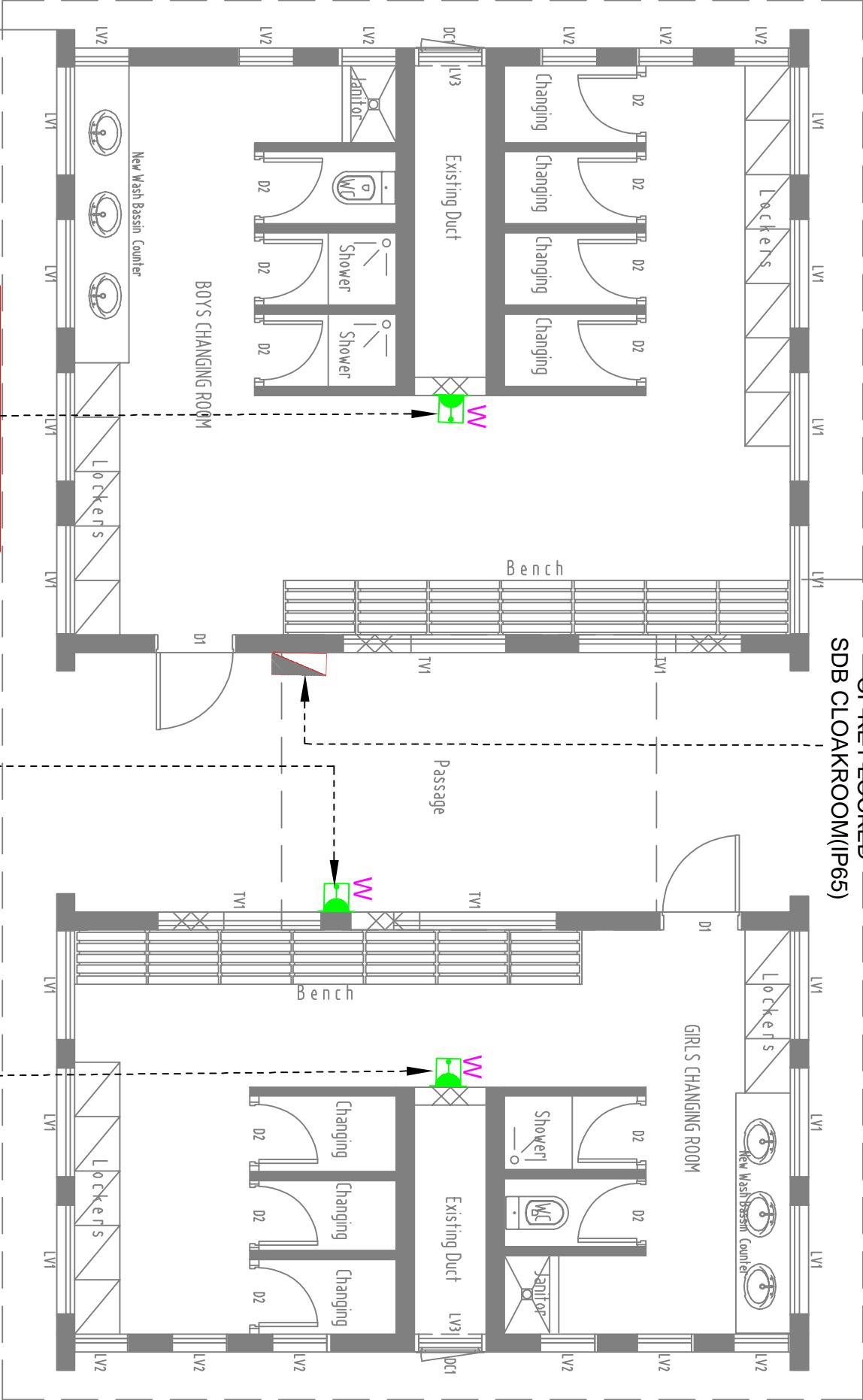


LEGEND	
SYMBOL	DESCRIPTION
	SOCKET 1 GANG, 3 PIN, 13A (WATERPROOF)
	SOCKET 2 GANG, 3 PIN, 13A
	SOCKET 1 GANG, 3 PIN, 13A (WALL FAN)
	DISTRIBUTION BOARD

- NOTES:
- All sockets to be at height 300mm AFFL centered, unless otherwise specified
  - Electrical distribution board to be at height 1800mm AFFL, underside.



PROPOSED POSITION  
OF KEY LOCKED

SDB CLOAKROOM(IP65)



S1	SDB CLOAKROOM	S1	SDB CLOAKROOM	S1	SDB CLOAKROOM
-	@300mm AFFL	-	@300mm AFFL	-	@300mm AFFL

LEGEND

SYMBOL	DESCRIPTION
	SOCKET 1 GANG, 3 PIN, 13A (WATERPROOF)
	DISTRIBUTION BOARD

NOTES:

- All sockets to be at height 300mm AFFL centered, unless otherwise specified.
- Electrical distribution board to be at height 1800mm AFFL, underside.

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REGIONAL ASSEMBLY

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SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:

RENOVATION WORKS AT  
GRAND LA FOURCHE CORAL  
PRIMARY SCHOOL

DRAWING TITLE:

GROUND FLOOR PLAN  
POWER LAYOUT-CHANGING ROOM

NO.	DATE	BY	CONTENTS

BASE:



In Association with



DATE:

06.09.21

SCALE:

1:75A3)

DRAWN BY:

NR

DESIGNED BY:

SS

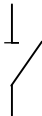




CHECKED BY:

SS

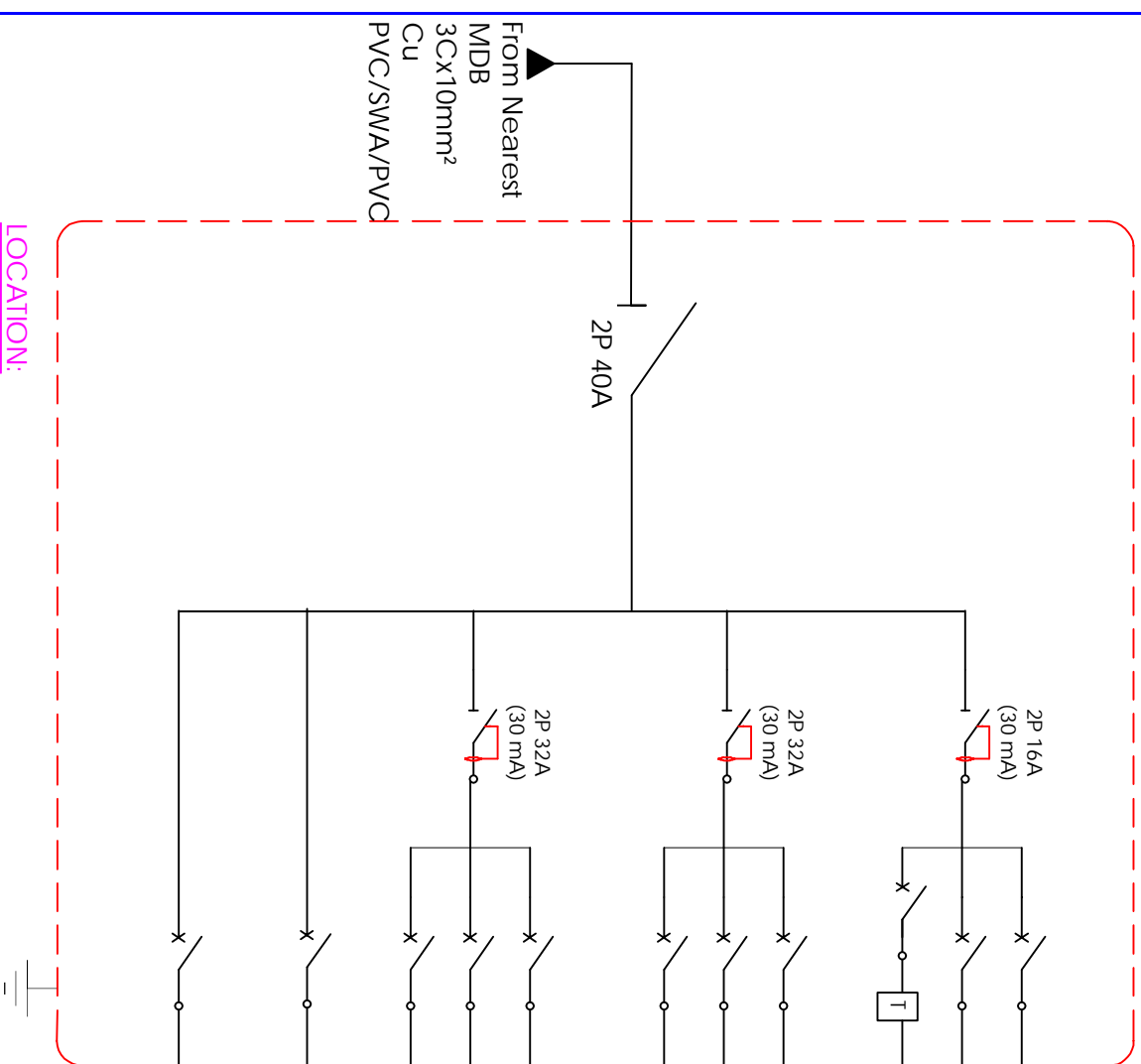
DRAWING No.: PF/58/21/E106 REV: TO

STATUS:

TENDER DRAWING

LEGEND		
1.		Isolator
2.		Weekly Timer
3.		RCD
4.		Circuit breaker
5.		RCBO

- NOTES:
1. Electrical distribution board to be at height 1500mm AFFL, underside.
  2. Timer to be weekly type c/w manufacturer's recommended protection and bypass switch.



MCB RATING	CCT No.	DESCRIPTION & LOCATION	CABLE TYPE/SIZE
1P+N 10A	L1	LIGHTING - CLASSROOM 09 - 12	3C X 1.5 mm² PVC Insulated
1P+N 10A	L2	LIGHTING - CLASSROOM 21 - 24	3C X 1.5 mm² PVC Insulated
1P+N 10A	L3	LIGHTING - CORRIDOR	3C X 1.5 mm² PVC Insulated
1P+N 16A	S1	SOCKETS - CLASSROOM 09- 12	3C X 2.5 mm² PVC Insulated
1P+N 16A	S2	SOCKETS - WALL FAN CLASSROOM 09 - 12	3C X 2.5 mm² PVC Insulated
1P+N 16A	SP	SPARE	
1P+N 16A	S3	SOCKETS - CLASSROOM 21- 24	3C X 2.5 mm² PVC Insulated
1P+N 16A	S4	SOCKETS - WALL FAN CLASSROOM 21 - 24	3C X 2.5 mm² PVC Insulated
1P+N 16A	SP	SPARE	
2P 25A	P1	FEEDER TO SDB CLOAKROOM	3C X 4 mm² PVC/SWA/PVC
2P 25A	P2	FEEDER TO SDB PUMPROOM	3C X 4 mm² PVC/SWA/PVC

Note: To add 1No. 2P 40A MCB in existing MDB from where DB G.F-BLK C is being fed

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CLIENT:

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REGIONAL ASSEMBLY

## CONSULTANCY SERVICES FOR SELECTED DEVELOPMENT PROJECTS IN RODRIGUES

**PROJECT:**  
REHABILITATION WORKS AT GRAND LA  
FOUCHE CORAIL PRIMARY SCHOOL,  
RODRIGUES

**DRAWING TITLE:**

SCHEMATIC FOR DB G.F-BLOCK C

NO.	DATE	BY	CONTENTS

BASE:



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INTERNATIONAL LTD

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Oceal Ltd  
Construction & Property Services & Project Management



Pro-Five Ltd  
ESTD 1995

LOCATION:  
CORRIDOR GROUND FLOOR

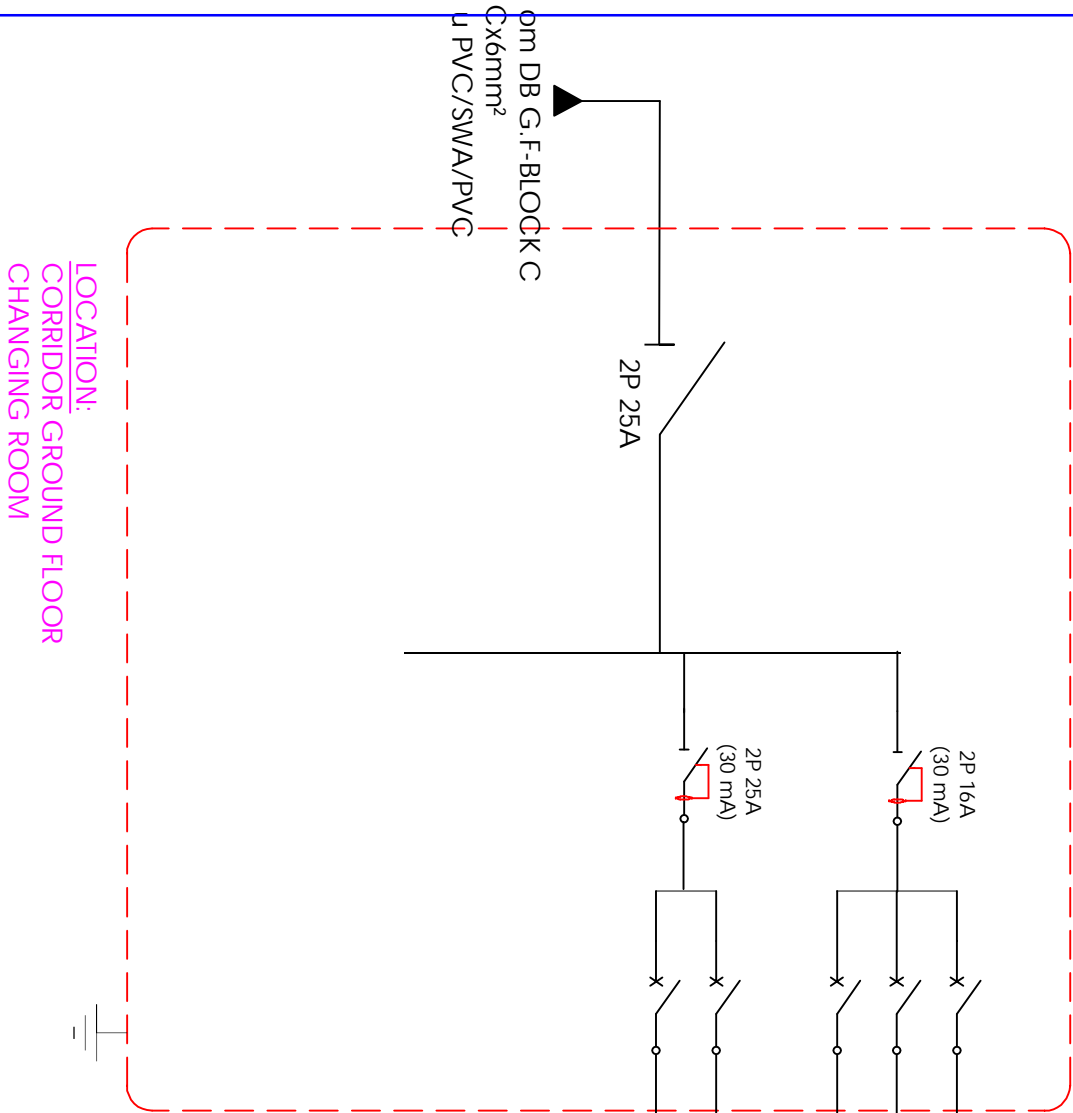
DRAWING No.: PF/58/21/E200 REV:T0

STATUS:

TENDER DRAWING

LEGEND	
1.	Isolator
2.	Weekly Timer
3.	RCD
4.	Circuit breaker
5.	RCBO

- NOTES:
- Electrical distribution board to be at height 1500mm AFFL, underside.
  - Timer to be weekly type c/w manufacturer's recommended protection and bypass switch.



MCB RATING	CCT No.	DESCRIPTION & LOCATION	CABLE TYPE/SIZE
1P+N 10A	L1	LIGHTING	3C X 1.5 mm² PVC Insulated
1P+N 10A	L2	LIGHTING	3C X 1.5 mm² PVC Insulated
1P+N 10A	SP	SPARE	
1P+N 16A	S1	SOCKETS	3C X 2.5 mm² PVC Insulated
1P+N 16A	SP	SPARE	

SDB CHANGING ROOM

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CLIENT:

RODRIGUES  
REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:  
REHABILITATION WORKS AT GRAND LA  
FOUCHE CORAL PRIMARY SCHOOL,  
RODRIGUES

DRAWING TITLE:

SCHEMATIC FOR SDB CHANGING ROOM

NO.	DATE	BY	CONTENTS

BASE:



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Web: [www.luxconsult.mu](http://www.luxconsult.mu)

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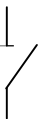






DATE:	06.09.21
SCALE:	NTS (A3)
DRAWN BY:	NR
DESIGNED BY:	SS
CHECKED BY:	SS

DRAWING No.: PF/58/21/E201 REV: T0

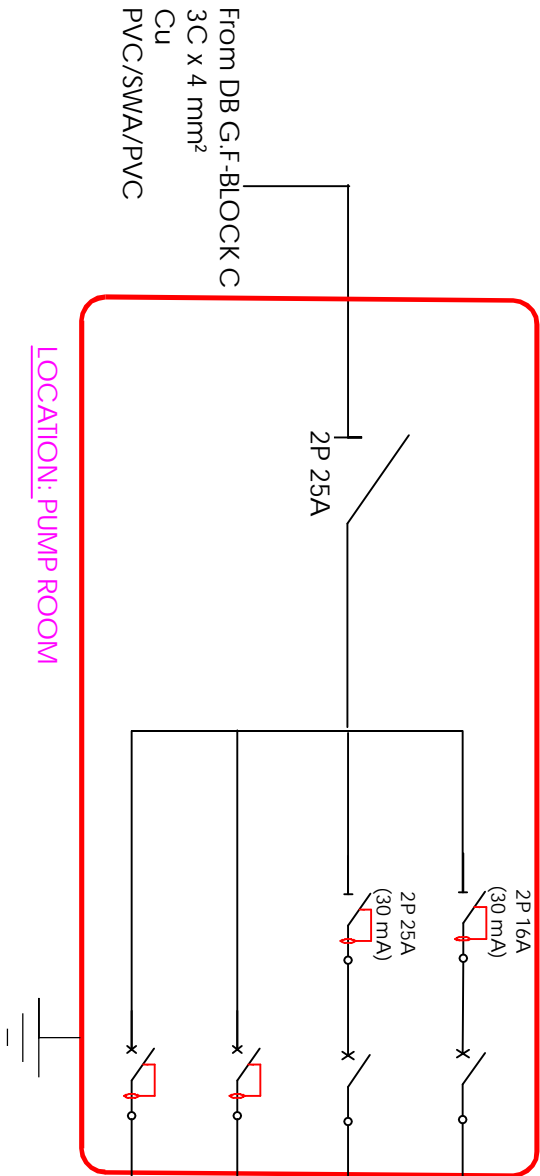
STATUS: **TENDER DRAWING**

LEUNG

1.		Isolator
2.		Weekly Timer
3.		RCD
4.		Circuit breaker
5.		RCBO

## SCHEMATIC OF DB PUMP ROOM

MCB RATING		CCT No.	DESCRIPTION & LOCATION	CABLE TYPE/SIZE
2P 10A (30mA)	L1		LIGHTING	3C X 1.5 mm <sup>2</sup> PVC Insulated
2P 16A (30mA)	S1		SOCKET	3C X 2.5 mm <sup>2</sup> PVC Insulated
2P 16A (30mA)	P1		FILTRATION PUMP CONTROL PANEL	3C X 2.5 mm <sup>2</sup> PVC Insulated
2P 16A (30mA)	P2		DOMESTIC TRANSFER PUMP CONTROL PANEL	3C X 2.5 mm <sup>2</sup> PVC Insulated



LOCATION: PUMP ROOM

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CLIENT:

RODRIGUES  
REGIONAL ASSEMBLY

## CONSULTANCY SERVICES FOR SELECTED DEVELOPMENT PROJECTS IN RODRIGUES

PROJECT:

REHABILITATION WORKS AT GRAND LA  
FOUCHE CORAIL PRIMARY SCHOOL,  
RODRIGUES

DRAWING TITLE:

## SCHEMATIC FOR SDB PUMP ROOM

NO.	DATE	BY	CONTENTS

BASE:

DATE:	06.09.21
SCALE:	NTS (A3)
DRAWN BY:	NR
DESIGNED BY:	SS
CHECKED BY:	SS

DRAWING No.: PF/58/21/E202 REV: T0

STATUS:

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REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:  
REHABILITATION WORKS AT  
GRAND LA FOURCHE CORAL  
PRIMARY SCHOOL, RODRIGUES

DRAWING TITLE:  
GROUND FLOOR PLAN  
AC&VENTILATION LAYOUT

NO.	DATE	BY	CONTENTS

BASE:  
LEGISLATIVE ORDER  
GROUND FLOOR PLAN  
Dwg.no. BC01  
28.08.2021



E-MAIL: [info@luxconsult.mu](mailto:info@luxconsult.mu)  
Web: [www.luxconsult.mu](http://www.luxconsult.mu)

In Association with



DATE: 06.09.21

SCALE: 1:150 (A3)

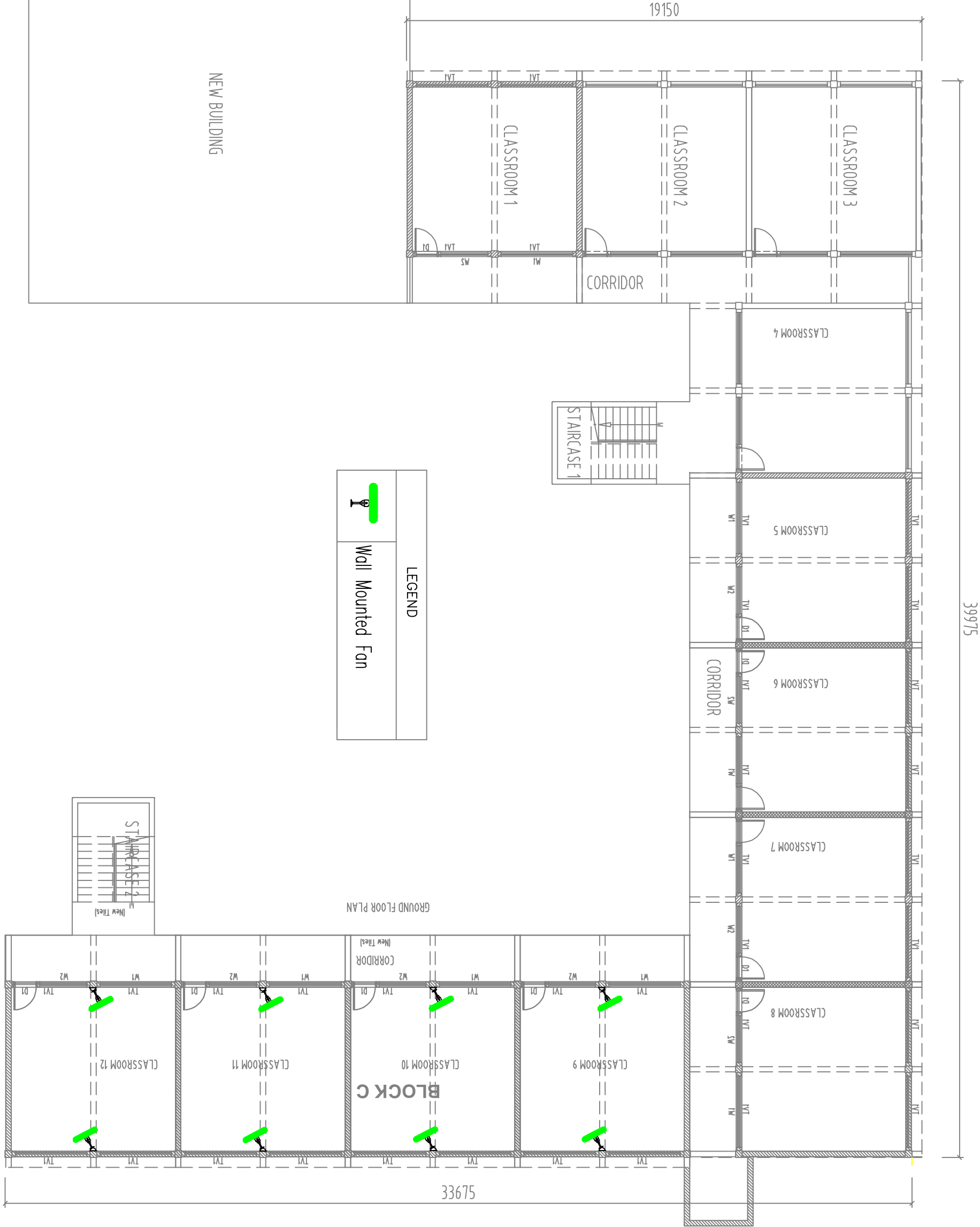
DRAWN BY: NR

DESIGNED BY: SS

CHECKED BY: SS

DRAWING No.: PF/58/21/M100 REV: T0

STATUS: TENDER DRAWING





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REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:  
REHABILITATION WORKS AT  
GRAND LA FOURCHE CORAL  
PRIMARY SCHOOL, RODRIGUES

DRAWING TITLE:  
FIRST FLOOR PLAN  
AC&VENTILATION LAYOUT

NO.	DATE	BY	CONTENTS

BASE:  
LUXCONSULT (MITIUS) LTD  
FIRST FLOOR PLAN  
DWG no. BC01  
28.08.2021



E-Mail: [info@net.mu](mailto:info@net.mu)  
Web: [www.luxconsult.mu](http://www.luxconsult.mu)

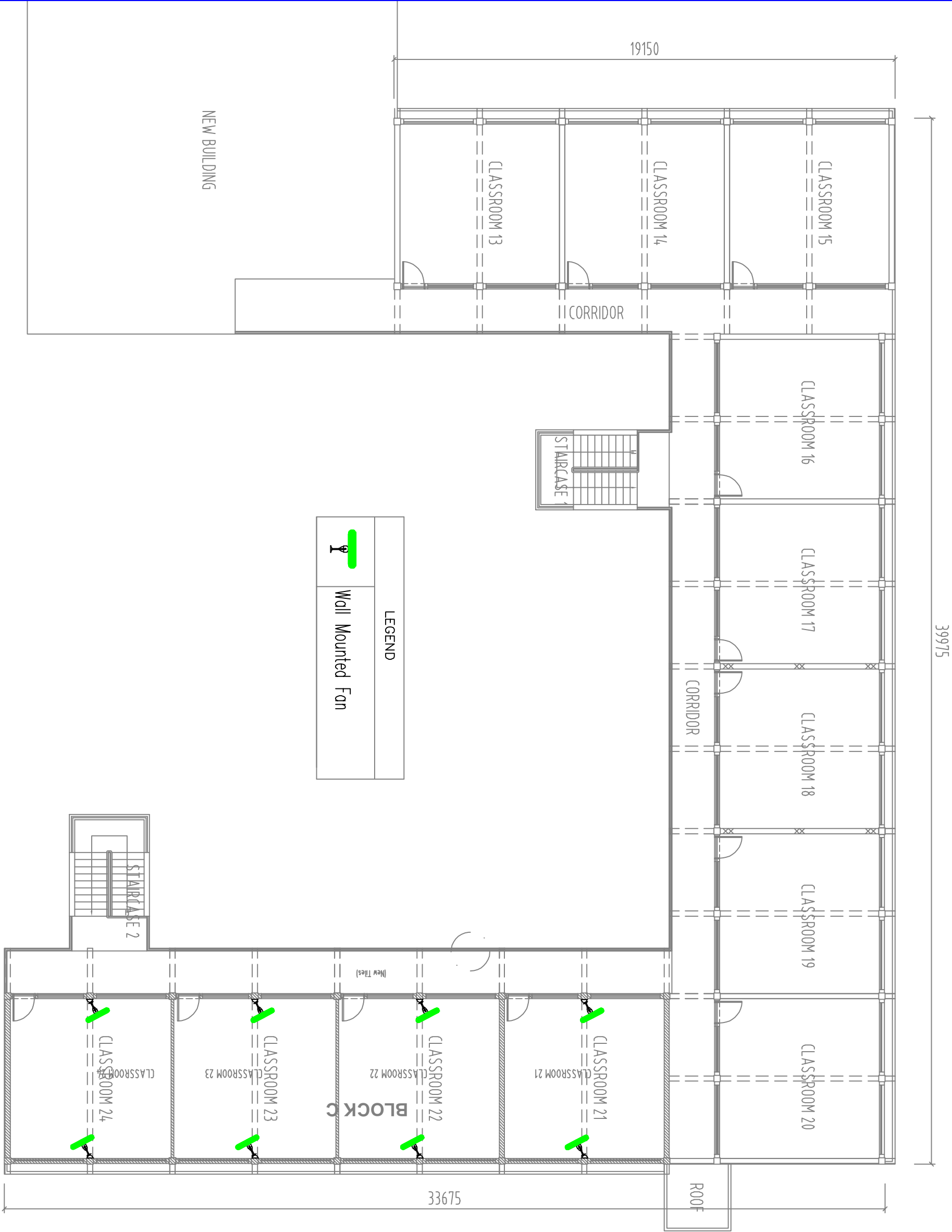
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DATE:	06.09.21
SCALE:	1:150 (A3)
DRAWN BY:	NR
DESIGNED BY:	SS
CHECKED BY:	SS

DRAWING No.: PF/58/21/M101 REV: T0

STATUS: TENDER DRAWING



LEGEND	
	Wall Mounted Fan

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RODRIGUES  
REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:  
REHABILITATION WORKS AT  
GRAND LA FOURCHE CORAL  
PRIMARY SCHOOL

DRAWING TITLE:  
GROUND FLOOR PLAN  
BLOCK C-FIRE FIGHTING LAYOUT

NO.	DATE	BY	CONTENTS

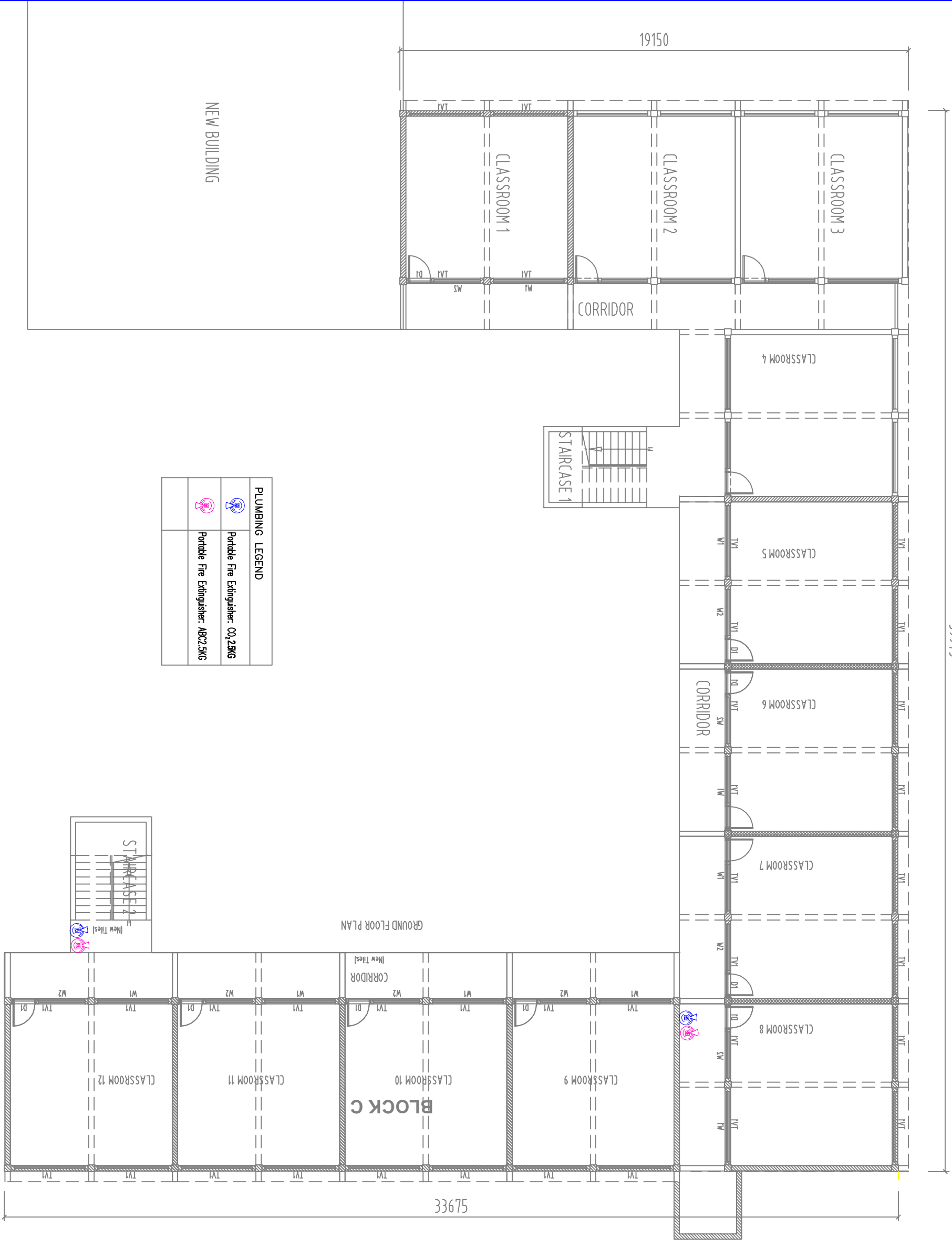
BASE:  
LUX CONSULT (MITUS) LTD  
GROUND FLOOR PLAN  
DWG NO. BC01  
28.08.2021



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DATE: 09.09.21

SCALE: 1:150 (A3)

DRAWN BY: RM

DESIGNED BY: SS

CHECKED BY: SS

DRAWING No.: PF/58/21/M102 REV.:T0

STATUS: **TENDER DRAWING**



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39975



PLUMBING LEGEND	
	Portable Fire Extinguisher: CO <sub>2</sub> 25KG
	Portable Fire Extinguisher: ABC 2.5KG

- Notes:-
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  3. Any discrepancy should be reported back.

CLIENT:

RODRIGUES  
REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:  
REHABILITATION WORKS AT  
GRAND LA FOURCHE CORAL  
PRIMARY SCHOOL

DRAWING TITLE:  
FIRST FLOOR PLAN-BLOCK C  
FIRE FIGHTING LAYOUT

NO.	DATE	BY	CONTENTS

BASE:  
LUXCON CONSULTING LTD  
FIRST FLOOR PLAN  
Dwg no.: BC01  
28.08.2021



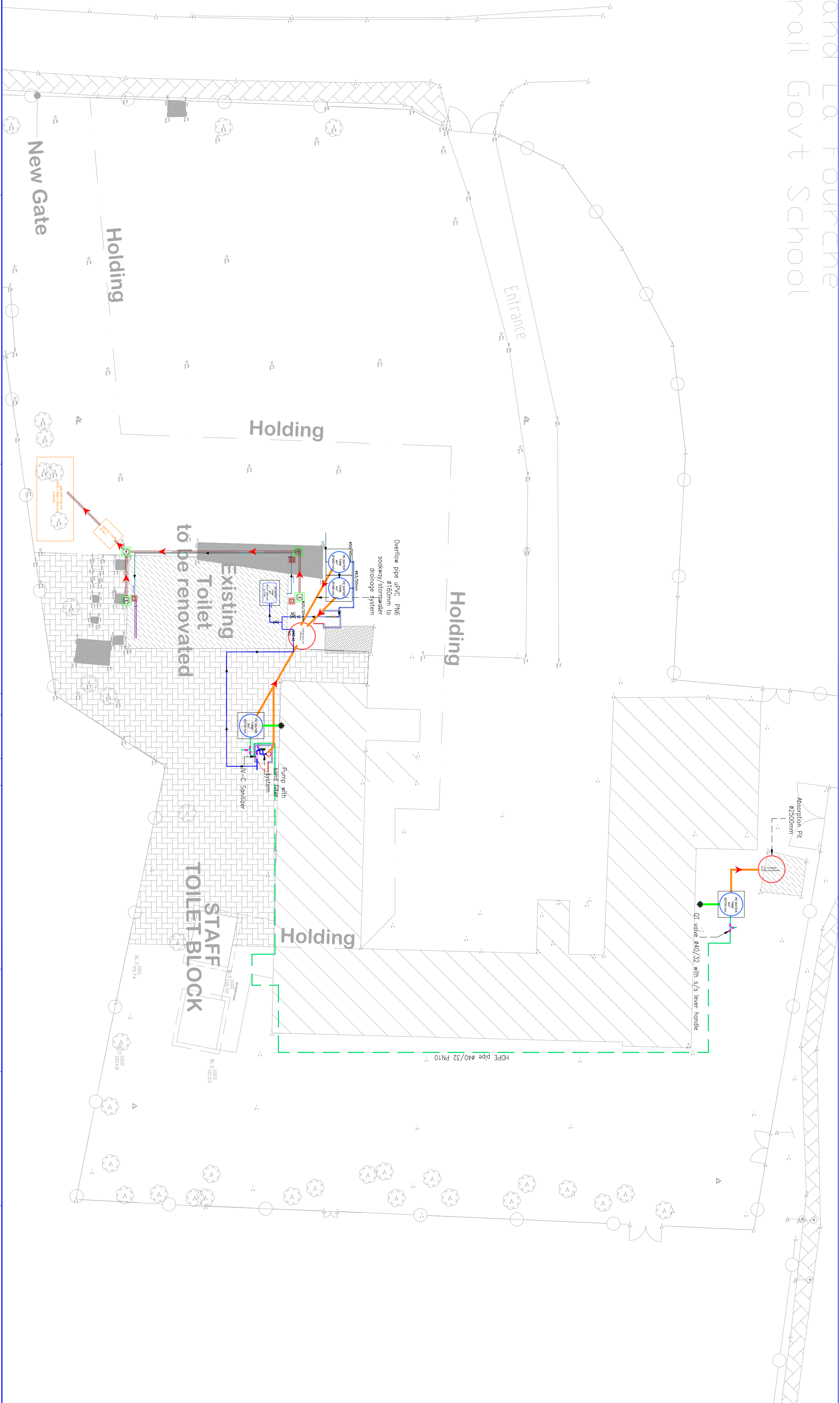
E-MAIL: [em@luxconsult.mu](mailto:em@luxconsult.mu)  
Web: [www.luxconsult.mu](http://www.luxconsult.mu)  
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DATE:	09.09.21
SCALE:	1:150 (A3)
DRAWN BY:	RM
DESIGNED BY:	SS
CHECKED BY:	SS
DRAWING No.:	PF/58/21/M103 REV:10

STATUS: TENDER DRAWING

GRAND LA FOURCHE  
Corail Govt School



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RODRIGUES  
REGIONAL ASSEMBLY

PROJECT:

RENOVATION WORKS AT  
GRAND LA FOURCNE CORAIL  
PRIMARY SCHOOL

DRAWING TITLE:

CONSULTANCY SERVICES FOR SELECTED  
DEVELOPMENT PROJECTS IN RODRIGUES

PLUMBING SITE PLAN

No. DATE: BY:

CONTENTS

DATE: 24.09.21

SCALE: 1:250 (A2)

DRAWN BY: RM

DESIGNED BY: BD

CHECKED BY: SS

DRAWING No.: PF/31/18/P100 REV: TO

STATUS:

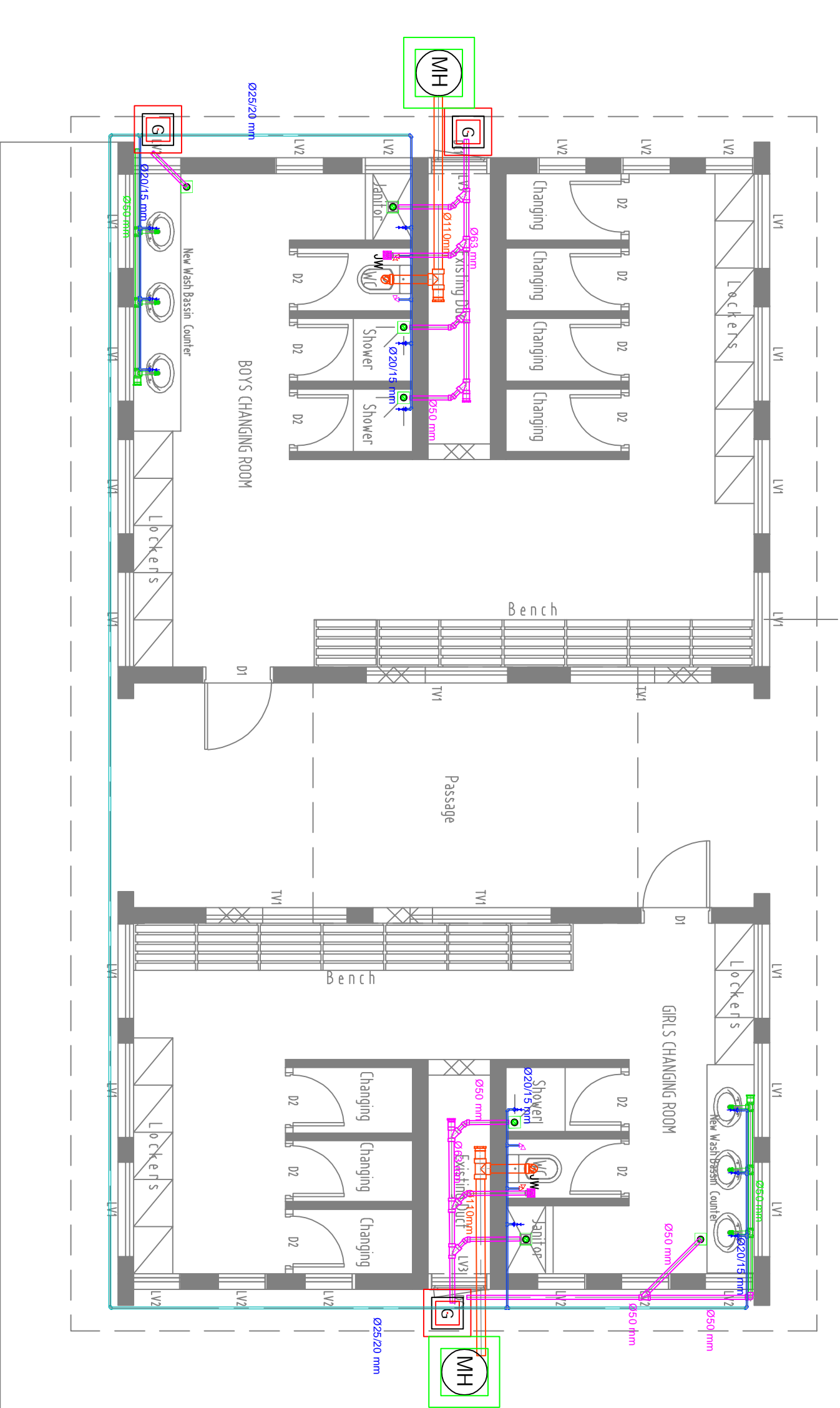
TENDER DRAWING



**Luxconsult**  
In Association with  
Coral Ltd  
25th Anniversary  
25th Anniversary



PLUMBING LEGEND	
	uPVC PN8 Sewer Pipe
	uPVC PN16 Waste pipe
	uPVC PN10 Waste pipe
	uPVC CW Distribution Pipe
	HDPE Water Pipe
	HDPE Cold Water Pipe
	Miniball Valve (3")
	Flexible Pipe
	Angle Valve
	Angle Valve for Jetwasher (3")
	Floor Drain
	Rodding Eye
	Gully Trap
	Sewer Manhole



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REGIONAL ASSEMBLY

CONSULTANCY SERVICES FOR  
SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:

REHABILITATION WORKS AT  
GRAND LA FOURCHE CORAIL  
PRIMARY SCHOOL

DRAWING TITLE:

CHANGING ROOM  
PLUMBING LAYOUT

NO. DATE BY CONTENTS


BASE:



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Web: [www.luxconsult.mu](http://www.luxconsult.mu)

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DATE: 06.09.21

SCALE: 1:60 (A3)

DRAWN BY: NR

DESIGNED BY: BD

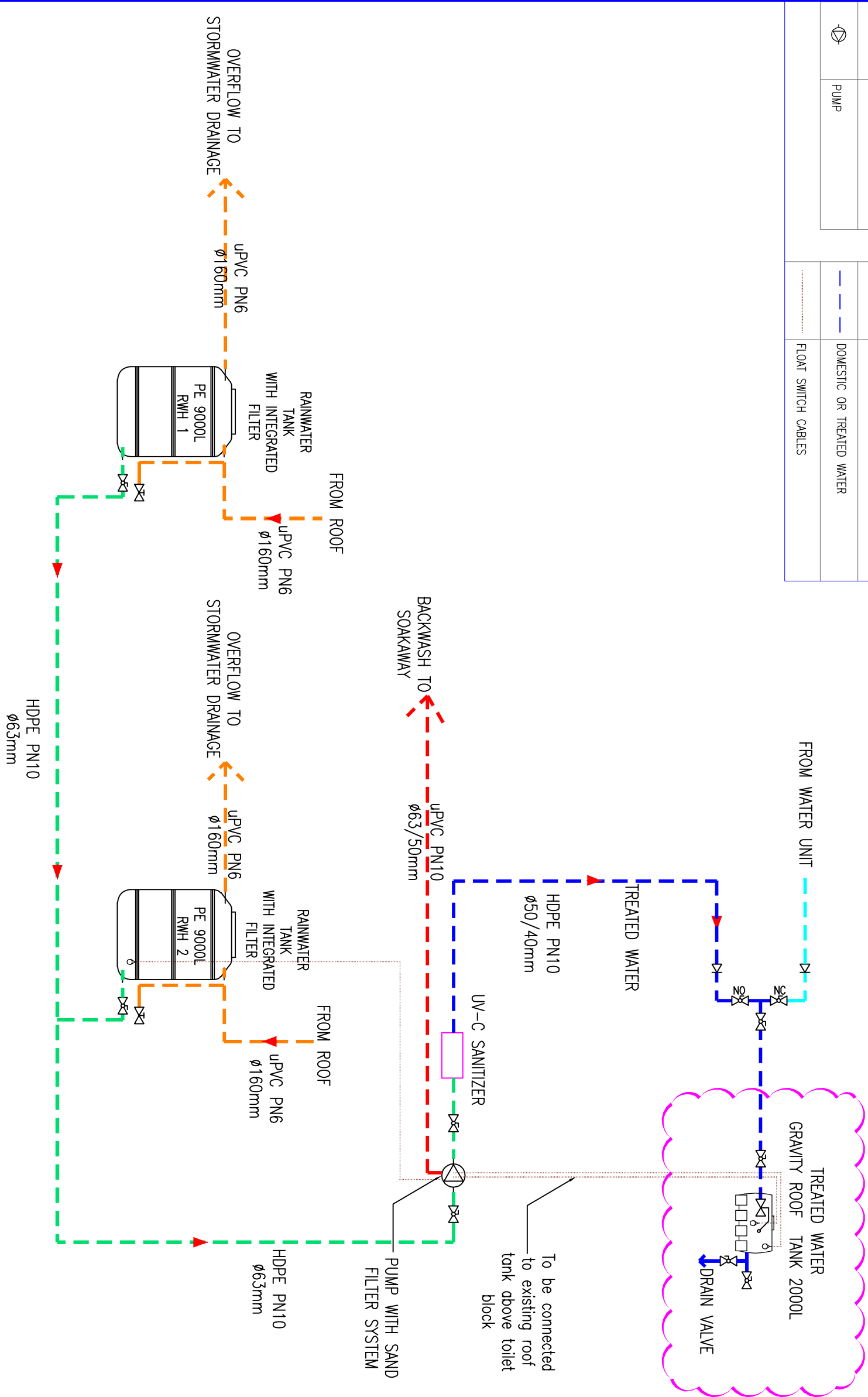
CHECKED BY: SS

DRAWING No.: PF/58/21/P-101

STATUS:

TENDER DRAWING


VALVES LEGEND		LINE LEGEND	
	QT BALL VALVE		COLD WATER
	NON RETURN VALVE		BACKWASH TO SOAKAWAY
	GATE VALVE FOR CLEANING		OVERFLOW FROM ROOF OR FEEDER TO TANKS
	BALL COCK VALVE		WATER FROM HARVESTED TANKS
	ANTI VIBRATION BELLOWES		WATER FROM WATER UNIT
	PUMP		DOMESTIC OR TREATED WATER
			FLOAT SWITCH CABLES



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SELECTED DEVELOPMENT PROJECTS  
IN RODRIGUES

PROJECT:


REHABILITATION WORKS AT  
GRAND LA FOUCHE CORAL  
PRIMARY SCHOOL

DRAWING TITLE:

SCHEMATIC FOR  
RAINWATER HARVESTING

NO.	DATE	BY	CONTENTS

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