TENDER DOCUMENT FOR REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

PUBLIC HEALTH & ALLIED WORKS

Closing date & Time: Friday 21 July 2023 at Noon

Pre-bid Visit: Tuesday 4 July 2023 at 10:00 am

Request For Proposal (RFP)

Project	REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD
Client	MauBank Ltd
Title	RFP Document for Public Health & Allied Works
Doc. No.	RFP/FCM/2023/ 32 (to be communicated on all correspondence relating to this RFP

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INSTRUCTION TO TENDERERS

1. INTRODUCTION

This tender is for the refurbishment of an existing office building located at Pope Hennessy street Port Louis for MauBank Ltd.

2. SCOPE OF WORKS

The scope of works for Public Health is in Annexure 1

3. General Instruction to Bidders

3.1. Bidder shall not have Conflict of Interest

Bidders should mandatorily declare conflict of interest situations. Bidders found to be in a conflict of interest situation, and which has not been disclosed, shall be disqualified. A Bidder may be considered to be in a conflict of interest with one or more parties in a bidding process if, including but not limited to; a Bidder or any of its affiliates participated as a consultant in the preparation of the design or technical specifications of the goods and services that are the subject of the bid.

3.2. Fraud and Corruption

MauBank Ltd will reject a proposal if it determines that the Bidder has, directly or through an agent, engaged in corrupt, fraudulent, collusive, or obstructive practices in competing for the procurement in question.

- ‘‘Corrupt practice” is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value to influence improperly the actions of another party;
- ‘‘Fraudulent practice” is any act or omission, including a misinterpretation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation;
- ‘‘Collusive practice” is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the action of a party;
- ‘‘Obstructive practice” acts intended to materially impede the exercise of the Bank inspection and audit rights.

3.3. Eligible Bidders

A Bidder that is under a declaration of ineligibility by the Government of Mauritius in accordance with applicable laws at the date of the deadline for bid submission or thereafter, shall be disqualified.

A Bidder who in the past failed to fulfil his contract with the Bank up to the level of our satisfaction shall be disqualified.

3.4. Sections of Bidding Documents

The Bidder is expected to examine all instructions, forms, terms and specifications in this Bid document and amendments, if any, thereto. Bid. Bid documents shall be deemed to have been submitted after careful study and examination with full understanding of its implications. The proposal should be precise, complete and in the prescribed format as per the requirement of this Bid document. Failure to furnish all information required by this Bid or submission of a proposal not responsive to this Bid in every respect will be at the vendor's risk and may result in rejection of the proposal.

3.5. Amendment of Bidding Documents

At any time prior to the deadline for submission of bids, MauBank Ltd may amend the Bid Documents by issuing addendum. Any addendum issued shall be part of the Bid Documents and shall be communicated in writing to all those who have obtained the Bid Documents. In situations where, open advertising bidding method has been adopted, the Bank shall publish addendums in newspaper and Bank's Website to ensure all bidders have the same information and understanding. To give prospective Bidders reasonable time in which to take an addendum into account in preparing their bids, the Bank may at its discretion extend the deadline for the submission of bids.

3.6. Language of Bid Response

The Bid response prepared by applicants, as well as any communication or document involving the Bid, between the applicants and MauBank Ltd shall be in English only.

3.7. Cost of Bidding

The Bidder shall bear all costs (direct and indirect, associated with the preparation of the proposed solution including any demonstration, detailed discussions and proof of concept of the proposed solution). The Vendor will supply all necessary materials and equipment associated with the preparation and submission of its bid, and MauBank Ltd shall not be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

3.8. Withdrawal, Substitution, and Modification of Bids

No bid may be withdrawn, substituted, or modified in the interval between the deadline for submission of bids and the expiration of the period of bid validity period.

The withdrawal, substitution or modification of a bid after the deadline for submission of bids has expired will result in forfeiture of the bid security amount (If Any).

Bidder may withdraw its bid prior to the deadline for the submission of bids without forfeiting its bid security (If Any).

3.9. Confidentiality

This Bid is meant strictly for the invited Vendor and for the sole purpose of submitting a proposal in response to the Bid and may not be used or shared with any other party or for any other purpose without the express written consent of the Bank.

The information contained in this Bid is proprietary to the Bank and must be treated by the Vendor as CONFIDENTIAL. The information is to be used by each Vendor solely for the purpose of preparing a response to this Bid and may not be used or shared with any other party or for any other purpose without the express written consent of the Bank.

Information relating to the examination, evaluation, comparison, and post-qualification of bids, and recommendation of contract award, shall not be disclosed to bidders or any other persons not officially concerned with such process.

3.10. Clarification of Bids

To assist in the examination, evaluation, comparison and post-qualification of the bids, The Bank may at its discretion, ask any Bidder for a clarification of its Bid. Any clarification submitted by a Bidder in respect to its Bid and that is not in response to a request by MauBank Ltd shall not be considered. The Bank's request for clarification and the response shall be in writing. No change in the prices or substance of the Bid shall be sought, offered, or permitted, except to confirm the correction of arithmetic errors (if any) discovered in the Evaluation of the bids.

3.11. Correction of Arithmetic Errors

Provided that the Bid is responsive, MauBank Ltd shall correct arithmetical errors on the following basis:

- If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected; and
- If there is a discrepancy between words and figures, the amount in words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail.

3.12. Late Bids

MauBank Ltd shall not consider any bid that is received after the deadline and shall be declared late and rejected.

3.13. Right to accept or reject any /All Bids

MauBank Ltd reserves the right to accept or reject any bid, and to annul the bidding process and reject all bids at any time prior to contract award, without thereby incurring any liability to Bidders.

3.14. Mauritian Law

It is hereby agreed that all matters arising during the tendering exercise, shall be governed by the Laws of Mauritius, and it is agreed that both Bidder and Bank shall submit to the exclusive jurisdiction of the Courts of Mauritius.

4. DOCUMENTS

The tender must be based on all the tender documents. A complete set of the tender documents comprises of:

a Instructions to Tenderers
b Form of Tender
c Bill of Quantities
d Performance Specifications
e Drawings.

5. SITE INSPECTION

The Tenderer is deemed to have inspected the site and made himself acquainted with the nature, extent, and requirement of the works. No claim for extra expenses or extension of time under the Contract will be entertained on the ground that insufficient information was given in the Tender Documents or that the Tenderer was not conversant with the conditions prevailing at the site or that during the course of the work, he encountered unexpected difficulty which could have been avoided by inspection of the site.

6. TENDER BOND

Tender bond representing 10% of quoted value should be submitted together with your response.

7. EXPENSES INCURRED IN SUBMISSION OF TENDERS

The Employer will not be responsible for, nor pay for, expenses or losses which may be incurred by any Tenderer in the preparation of the Tender or in visiting the site in connection therewith.

8. TENDER PRICE

The tender shall be on a **fixed price basis but exclusive of Value Added Tax** and shall be based on the Conditions of Contract, Performance Specifications, Drawings and Bills of Quantities and any requirement specified in the Tender document. The currency shall be in Mauritian Rupees abbreviated as "MUR" or "Rs".

9. SUFFICIENCY OF TENDER

The Tenderer must allow in his tender for all labour, materials, constructional plant, temporary works, and everything necessary for the execution and completion of the works in accordance with the tender documents and the tender will be deemed to comply entirely with the terms of the tender documents. The Tenderer's attention is particularly drawn to laws and regulations concerning safety and health, labour regulations, social insurance, labour taxes, and tax deductions, import restrictions and duties, Contractor's tax and Companies Registration requirements.

Unless otherwise stated, the Tenderer shall inform himself especially regarding labour availability. Under no circumstances shall any lack of manpower at any level, be acceptable as a valid cause of delay in the completion of the Subcontract.

Tenderers are invited to visit the proposed site before submission of the tenders. The successful Tenderer shall be deemed to have satisfied himself as to the nature and extent of the works. No claim for extra expense or for extension of time under the contract will be allowed on the grounds that insufficient information was given in the Tender documents, that the Tenderer was not conversant with the conditions prevailing at the site or that during the course of the work, he encountered unexpected difficulty which could have been avoided by inspection of the site.

10. Specific Instruction to bidders

10.1. NDA (Annexure 2)

Vendors interested in participating in this Bid should sign, stamp and date the document.

10.2. Standard Contract Template (Annexure 3)

Standard Contract template to be signed off upon award.

10.3. Communication

The vendor shall follow strict instruction of this bid - From the issue date of this Bid until the selection is announced, responding vendors may not communicate, either orally or in writing regarding this Bid with any staff except as noted above. To ensure equal treatment for each responding vendor, all questions regarding this Bid must be submitted by email ONLY to the Contact Persons provided by the bank. All such questions will be answered by email. Replies to the questions / clarifications will be sent

to all Suppliers who have intentions of submitting a response to the Bid. Vendors failing to comply with this requirement will be subject to disqualification

10.4. Acknowledgement of Vendor

By submitting the Proposal, it shall be deemed true that the applicant has:

- made a complete and careful examination of the Bid.
- received all relevant information requested from MauBank Ltd;
- acknowledged and accepted the risk of inadequacy, error or mistake in the information provided in the Bid or furnished by or on behalf of the Authority or relating to any of the matters referred to above.
- satisfied itself about all matters, aspects and information, necessary and required for submitting an informed Application proposal and performance of all of its obligations thereunder;
- acknowledged that it is not in a situation of Conflict of Interest; and agreed to be bound by the undertaking provided by itself under the terms and conditions hereof.

MauBank Ltd shall not be liable for any omission, mistake, or error on the part of the Applicant in respect of any of the above or on account of any matter or aspect arising out of or concerning or relating to the Bid or the Selection Process, including any error or mistake therein or in any information or data given by itself.

10.5. Documents comprising the Bid Response

The Bid response prepared by the applicant shall consist of the different parts as required by the bidding document. The Bid not in compliance with the requirements shall be immediately rejected.

10.6. Bid Submission Procedures

The following shall form part of the tender submission:

a The offer, including the Forms of Tender dully filled and signed.
b The priced Bill of Quantities (BoQ).
c Name and address of the proposed surety for the Performance Security referred to in the Conditions of Contract.
d Proposed materials, equipment, and plant.

A hardcopy of the tender shall be deposited in a designated Tender Box situated on ground floor of MauBank Head as per below mentioned address on **Friday 21 July 2023, at Noon**.

The Chairperson
Bid Opening Committee
MauBank Ltd
25, Bank Street, Cybercity
Ebene 72201
Republic of Mauritius

All tender submission shall be in a single sealed envelope wherein two separate envelopes – one for financial and one for technical bearing the reference number of the tender on the top right-hand corner of each envelope.

All tender submission shall be in a single sealed envelope. No need for separate financial and technical envelopes- all in a single envelope.

10.7. Clarification of tender documents

A prospective bidder requiring any clarification on the bidding documents should contact through an official e-mail to procurement Department on **procurement@maubank.mu** at latest **10 days** before the bid submission deadline. If the Bank determines that it is necessary to amend the bidding document due of a clarification, it shall do so in accordance with internal procedure.

10.8. Bid Validity Period

The bid shall remain valid for a period of **120 days** after the bid submission deadline. The Bank shall reject a bid valid for a shorter period as non-responsive.

10.9. Bidders information Sheet

Information as required in **Annexure 4- Bidder's information sheet** should be provided along with the proposal.

11. INSTRUCTIONS FORMING PART OF CONTRACT

These Instructions to Tenderers shall form part of the Contract. I/We the undersigned have read the above Instructions to Tenderers and acknowledge them.

Signed by the said Contractor.

Signature: ……

Name: ……....

In the capacity of: ……

Date: ……

FORM OF TENDER

Date:

The Chairperson,
Bid Opening Committee
MauBank Ltd
25, Bank Street, Cybercity
Ebene 72201
Republic of Mauritius

Refurbishment of Pope Hennessy Building at Port Louis for MauBank Ltd – Public Health & Allied Works

1 Having examined the Drawings, Conditions of Contract, Specification, Bill of Quantities and Appendices thereto and Addenda No ..... to..... for the above named works, We, the undersigned, offer to construct, complete and maintain the whole of the Works in Conformity with the said Drawings, Conditions of Contract, Specification, Bill of Quantities and Appendices thereto and Addenda No.....to…….....for the sum of Mauritian Rupees…….....
.....……..……..…..…….....
.....……..……
.(MUR…….…..…..) or such other sum as may be ascertained in accordance with the said Conditions of Contract.

2 If our Tender is accepted and the Contract awarded to us, we undertake to commence the Works within such period after possession of site as stated in the Preambles and to complete the whole works comprised in the Contract within the time for completion stipulated in the same Preambles.

3 If our Tender is accepted, We will obtain within ***fourteen days (14)*** of receipt of notification of acceptance a Performance Bond from a local bank (to be approved by the Architect) to be jointly and severally bound with us in a sum equivalent to ten per cent of the Contract Sum for the due performance of the Contract under the terms of a Performance Bond to be approved by you in the Form enclosed herein.

4. We agree to abide by this Tender for the period *of* ***ninety days (90)*** from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

5 Unless and until a formal Agreement is prepared and executed this Tender or an adjusted tender together with your written acceptance thereof shall constitute a binding contract between us.

6. The Employer reserves the right to accept or reject any tender and to annul the tendering process and reject all tenders at anytime prior to the award of contract without thereby incurring any liability to any bidder or any obligation to inform the bidder of the grounds for the Employer's action.

Date this……day of……..2023

Signature……

FORM OF PERFORMANCE BOND

BY THIS BOND

we_____

(hereinafter called "the Contractor") whose registered office is situated at

_____

_____

AND

_____

_____

(hereinafter called "the Surety") whose registered office is situated at

_____are held and firmly bound to _____

_____ (hereinafter called "the Employer") in the sum of Mauritian Rupees _____-

(Rs. _____)

for the payment of which sum we bind ourselves and, each of us, our successors, heirs, executors, administrators and assigns, jointly and severally by these presents.

WHEREAS by a Contract made between the Employer of the one part and the Contractor of the other part, the Contractor has contracted and agreed that he the Contractor will in such manner, within such periods and to such satisfaction, construct, execute, complete and maintain such works as in the Contract are mentioned namely **Refurbishment of Pope Hennessy Building at Port Louis for MauBank Ltd** – **Public Health works** (hereinafter called the "Said Contract") and will perform and fulfil the other obligations imposed on the Contractor by the said contract.

NOW THE CONDITION of the above written Bond is such that if the Contractor shall well and truly perform and observe all the terms, provisions, conditions and stipulations which, under or by virtue of the said contract or any award made under the provisions therein contained, are on the Contractor's part to be performed and observed according to the true purpose, intent and meaning thereof or if on default of the Contractor the Surety shall satisfy and discharge the damages sustained by the Employer thereby up to the above written bond, then this obligation shall be null and void but otherwise shall be and remain in full force and effect for the duration of Contract. The surety shall only be excused when the principal for which it stands as surety is by law excused and in no other case.

PROVIDED ALWAYS, and it is hereby declared, that no alteration in terms of the said Contract made by agreement between the Employer and the Contractor or in the extent or nature of the works to be constructed, completed and maintained there under and no allowance of time by the Employer under the said contract or any forbearance or forgiveness or in respect of any matter or thing concerning the said contract on the part of the Employer or the Architect shall in any way release the surety from any liability under the above-written Bond.

_____

("good for the sum of Mauritius

Rupees_____")

Signed, sealed and delivered by the said

_____

for and on behalf

of_____

in the presence of (name address and description)

_____

_____

("good for the sum of Mauritian Rupees

_____") Signed,

Sealed and delivered by the said_____

for and on behalf of _____

in the presence of (name, address and description) _____

_____

FORM OF AGREEMENT

The Employer is _____ of

The Contractor is_____of

The Employer desires the execution of certain Works known as

Refurbishment of Pope Hennessy Building at Port Louis for MauBank Ltd – Public Health & Allied Works

OFFER

The Contractor has examined the documents listed in the Appendix which forms part of this Agreement and offers to execute the Works in conformity with the Contract for the sum of

_____ (in words)

(in figures) ( )

or such other sum as may be ascertained under the Contract.

This offer, of which the Contractor has submitted two signed originals, may be accepted by the Employer by signing and returning one original of this document to the Contractor before

(date)

The Contractor understands that the Employer is not bound to accept the lowest or any offer received for the Works.

Signature: _____ Date: _____

Name: _____

Authorised to sign on behalf of (organisation name): _____

Capacity: _____

ACCEPTANCE

The Employer has by signing below, accepted the Contractor's offer and agrees that in consideration for the execution of the Works by the Contractor, the Employer shall pay the Contractor in accordance with the Contract. This Agreement comes into effect on the date when the Contractor receives one original of this document signed by the Employer.

Signature: _____ Date: _____

Name: _____

Authorised to sign on behalf of (organisation name): _____

Capacity: _____ _____

Appendix To Schedules of Conditions of Contract

This Appendix forms part of the Agreement.

[Note: with the exception of the items for which the Employer's requirements have been inserted, the Contractor shall complete the following information before submitting his offer.]

Item	Sub-Clause	Data
Documents forming the Contract listed in the order of priority	1.1.1	
Document		**Document Identification**
a) The Agreement b) Particular Conditions c) General Conditions d) The Specification e) The Drawings f) The Contractor's tendered design g) The bill of quantities		
Time for Completion	1.1.9	168 days (24 Weeks)
Law of the Contract	1.4	Laws of the Republic of Mauritius
Language	1.5	English Language
Provision of Site	2.1	On the Commencement Date
Authorised person	3.1	Mr Vikram Bhujun from Prodesign
Name and address of Employer's representative	3.2	Senior Manager Facilities Management MauBank Ltd 25, Bank Street Cybercity, Ebene 72201 Republic of Mauritius Helpdesk_management@maubank.mu
Performance security		
Amount	4.4	10% of the contract amount from a commercial bank.
Form	4.4	Performance security from Insurance company shall not be accepted.

** Employer to amend as appropriate*

Item	Sub-Clause	Data
Requirements for Contractor's design	5.1	Full design of the project
Programme:		
Time for submission	7.2	Within days (7) of the Commencement Date.
Form of programme	7.2	Gantt Chart
Amount payable due to failure to complete	7.4	Rs 5,000 per day up
		to a maximum of 10% of sum stated in the Agreement
Period for notifying defects Variation procedure	9.1 & 11.5	365 days* calculated from the date stated in the notice under Sub-Clause 8.2
Daywork rates	10.2	Not applicable.
Valuation of the Works*		Monthly valuations on progress of works on site. No payment for materials off site.
Lump sum Price	11.1	This contract shall be fixed sum contract, re-measurable on completion of works.
Percentage of value of Materials and Plant	11.2	Materials 70%
		Plant 80%

Item	Sub-Clause	Data
Percentage of retention	11.3	5%
Currency of payment	11.7	Mauritian rupee
Rate of interest	11.8	Bank lending rate
INSURANCES	14.1	
Type of cover*	**Amount of cover***	**Exclusions***
The Works, Materials, Plant	The sum stated in the contract	
and fees	Agreement plus 15%	
Contractor's Equipment	Full replacement cost	
Third Party injury to persons	Rs 2 million	
and damage to property	Rs 5 million	
Workers Other cover*		
Arbitration		
Rules	15.3	UNCITRAL Arbitration Rules
Appointing authority	15.3	The Employer in consultation with contractor
Place of Arbitration	15.3	Mauritius

ANNEXURE TO CONDITION OF CONTRACT

The Conditions of Contract shall be the FIDIC Short Form of Contract, 1st Edition 1999, published by Fédération International des Ingénieurs-Conseils (FIDIC).

ANNEXURE 1 – Scope of Works for Public Health& Fire Fighting Works

1. SCOPE OF WORKS PUBLIC HEALTH & FIRE FIGHTING

The scope of works for the public health and fire-fighting package shall be as described below:

1.1. Demolition Works

1) Decommissioning, dismantling, and carting away of existing sump pump in basement complete with any electrical control panel.

2) Decommissioning, dismantling, and carting away of existing water pipe works and pipeline accessories (valves, float switches, ball cock valves, etc.) to existing water tanks (fire tank and domestic tank) in basement which shall not be reused as per new design.

3) Decommissioning, dismantling, and carting away of existing potable cold-water transfer pump complete with any associated electrical and control panels.

4) Decommissioning, dismantling, and carting away of existing electrical and control panel serving existing firefighting pump (sprinkler pump).

5) Decommissioning, dismantling, and carting away of existing water pipe works and pipeline accessories (valves, float switches, ball cock valves, etc.) to existing water tank at roof level which shall not be reused as per new design.

1.2. New Works

1) Supply and installation of new sump pumps in basement complete with proprietary electrical and control panel.

2) Supply and installation of new packaged combined boosted cold-water service and fire hose reel (FHR) pump in technical room at ground level complete with proprietary electrical and control panel and all required accessories.

3) Supply and installation of new electrical and pump control panel for the existing firefighting pump (sprinkler pump).

4) Supply and installation of new fire hose reel (FHR) at all floors.

5) Supply and installation of new GMS, red colour painted FHR rising main and piping from basement to roof level and connection at all floors to FHR.

6) Supply and installation of new portable fire extinguishers at all floors besides the FHR as per new design.

7) Supply and installation of new uPVC boosted cold water service (BCWS) rising main and piping from basement to roof level and terminated at all floors in existing toilet/kitchenette blocks with an isolating valve.

8) Liaison with building operator and reconnection of existing water services to new isolating valves at each existing toilet/kitchenette blocks.

9) Supply and installation of new piping and piping accessories (valves, strainers, heavy duty ball cock valves, level switches, level sensors, etc.) at water tanks in basement and roof level as per new design intent.

10) Liaison with building operator for reconnection of existing firefighting (sprinkler) pump and new combined boosted cold-water service and fire hose reel (FHR) pump in technical room at ground level to existing and new pipework, as may be the situation, on suction and discharge sides of the respective pumps.

11) Liaison with mechanical and/or electrical Contractors for electrical feeder cables and power supply from new electrical distribution board and for other trades coordination.

12) Liaison with building Operator for coordination of works with Tenants at all times.

13) Testing and commissioning of the whole installation.

14) Record drawings and maintenance manuals.

15) Demonstration, instruction, and training of Employer's staff.

16) Any other items necessary to comply with the Performance Specifications and for the successful completion of the project to meet the design intent of the Consulting Engineer.

MUTUAL CONFIDENTIALITY AGREEMENT ('Agreement')

DATE: ….th ……. 202..

PARTIES

I. MauBank Ltd, ("**MauBank** ") whose registered office is at 25, Bank Street, Cybercity, Ebene 72201, Republic of Mauritius

II. ……., whose registered office is at…….

…….

together, the "**Parties**" and each a "**Party**".

RECITALS

A. In the course of discussions and correspondence between the Parties relating to the Proposed Transaction, each of the Parties will receive Confidential Information concerning the other, its Group, the Client and/or the Proposed Transaction.

B. Each Party recognises and acknowledges the competitive value and confidential nature of such Confidential Information and that damage could result to the other Party if it is disclosed to any third party.

C. This Agreement sets out the conditions on which each Party discloses to and receives from the other Party, Confidential Information.

1. DEFINITIONS

1.1 The following definitions apply in this Agreement:

"**Client**" means any underlying obligor or the company constituting the subject matter of the Proposed Transaction;

"**Confidential Information**" means all information relating to the Client, the Client Group and/or the Proposed Transaction, provided by the Disclosing Party (or disclosed on its behalf) to the Receiving Party and includes:

(a) all information relating to the Proposed Transaction or associated with the activities of the Client and its Group (including, its business affairs, financial dealings, operations, commercial strategies, technical information, product information, clients and supplier information, goodwill and reputation, know-how, proprietary rights, designs, trade secrets and market opportunities); and

(b) all documents that contain, reflect or use any information described in (a) above which can be either disclosed, offered, delivered, copied, acquired by observation or participation and communicated either directly or indirectly orally, in writing, electronically, in machine readable form, text, drawings, financial models, projections, plans, specifications, analyses, compilations, comparisons, evaluations, studies, designs, applications, notes, reports, records, extracts or any other means of representing or

recording and recalling information, marked as confidential,

but excludes information which:

(i) the Receiving Party already controlled, possessed or developed independently, prior to receipt from the Disclosing Party; or

(ii) was public knowledge at the time it was disclosed under this Agreement or becomes available to the public without breach of this Agreement; or

(iii) the Receiving Party lawfully receives without any such restrictions or obligations of confidentiality from a third party who in turn (to the best of the Receiving Party's knowledge and belief) received such information legally and not in breach of any obligation of confidentiality.

"**Disclosing Party**" means, in relation to any Confidential Information, the Party or its Group member which discloses such information;

"**Group**" means, in relation to a Party or the Client, that Party or the Client, each of that Party's or the Client's holding companies and subsidiaries and each subsidiary of each of its holding companies and (where applicable) representative and branch offices in any jurisdiction;

"**Permitted Person(s)**" means the directors, employees, agents and professional advisors of the Receiving Party's Group that have a need to receive Confidential Information in connection with the Permitted Purpose and that are under a duty of confidentiality to the Receiving Party;

"**Permitted Purpose**" means evaluating and negotiating the Proposed Transaction;

"**Proposed Transaction**" means *sourcing exercise reference / Name: …… Services;* and

"Receiving Party" means, in relation to any Confidential Information, the Party or its Group member which receives such information.

2. CONFIDENTIALITY UNDERTAKING FROM THE RECEVING PARTY

2.1 In consideration for the Disclosing Party agreeing to make available to the Receiving Party certain Confidential Information, the Receiving Party agrees to:

(a) keep the Confidential Information confidential and not (without the Disclosing Party's prior written consent) disclose it to anyone other than Permitted Persons or as provided for by Clause 3 below;

(b) keep confidential and not disclose to anyone the fact that the Confidential Information has been made available to the Receiving Party;

(c) use the Confidential Information only for the Permitted Purpose (unless disclosed under Clause 3);

(d) use reasonable endeavours to ensure that any person to whom the Receiving Party discloses any Confidential Information to (unless disclosed under Clause 3) is under a duty of confidentiality to the Receiving Party, similar to the Receiving Party's obligations under this Agreement;

(e) not make enquiries of any Client Group member or any of their directors, employees, agents or advisers relating directly or indirectly to the Proposed Transaction; and

(f) provide secure storage for all such Confidential Information in the Receiving Party's possession or control and apply at least the same security measures or degree of care as that which it would apply to its own confidential or proprietary information.

2.2 The undertakings are given by the Receiving Party for the benefit of the Disclosing Party without implying any fiduciary obligations on the part of the Receiving Party.

3. PERMITTED DISCLOSURE

3.1 The Disclosing Party agrees that the Receiving Party may disclose Confidential Information:

(a) to any insurers, auditors or service providers of the Receiving Party's Group;

(b) to any other person with the Disclosing Party's prior written consent provided that they are or will be under a duty of confidentiality to the Receiving Party;

(c) where requested or required by any court of competent jurisdiction or any applicable judicial, governmental, supervisory, regulatory or self-regulatory body;

(d) where required by the rules of any stock exchange on which the shares or other securities of any member of the Receiving Party's Group are listed; or

(e) where required by the laws or regulations of any country with jurisdiction over the affairs of any member of the Receiving Party's Group.

[3.2 If disclosure is required in the circumstances contemplated in Clause 3.1 (c), Clause 3.1 (d) or Clause 3.1 *(e),* the Receiving Party will (except where the disclosure is to a supervisory or requlatory body during the ordinary course of its supervisory or regulatory function over a member of the Receiving Party's Group), to the extent permitted:

(a) notify the Disclosing Party of the disclosure (prior to such disclosure if reasonably practicable); and

(b) if deemed appropriate by the Receiving Party, discuss with the Disclosing Party the content and extent of such disclosure.]'

4. NOTIFICATION OF UNAUTHORISED DISCLOSURE

4.1 The Receiving Party will promptly advise the Disclosing Party the circumstances (to the extent reasonably practicable and permitted) of any unauthorized disclosure, misappropriation or misuse by any Permitted Person or other third party of any Confidential Information upon the Receiving Party being put on notice of the same.

5. RETURN OR DESTRUCTION OF CONFIDENTIAL INFORMATION

5.1 All Confidential Information disclosed by the Disclosing Party (or on its behalf) will be deemed to be the property of the Disclosing Party and the Receiving Party and the Permitted Persons will

have no rights in title except as expressly agreed to by the Disclosing Party. If the Disclosing Party requests in writing, the Receiving Party will:

(a) either return or destroy all Confidential Information in the possession of the Receiving Party;

and

(b) use reasonable endeavours to procure that the Permitted Persons return or destroy such Confidential Information.

5.2 This Clause will not apply to the extent that any applicable law, rule or regulation or any applicable judicial, governmental, supervisory or regulatory body or the Receiving Party's internal policy requires it or any Permitted Person to retain any such Confidential Information. The obligations of confidentiality under this Agreement will continue to apply in such circumstances.

6. CONTINUING OBLIGATIONS AND EXPIRY

6.1 The obligations in this Agreement are continuing and will cease on the earliest of:

(a) if either Party becomes a party to or otherwise acquires (by assignment or sub participation) an interest, direct or indirect in the Proposed Transaction;

(b) the date of execution of a definitive agreement between the Parties with respect to the Proposed Transaction; and

(c) twelve months from the date of this Agreement.

7. NO REPRESENTATION

7.1 The Receiving Party acknowledges and agrees that the Disclosing Party:

(a) makes no express or implied representation or warranty as to, or assumes any responsibility for, the accuracy, reliability or completeness of any of the Confidential Information or any other information supplied by the Disclosing Party or any Client Group member or the assumptions on which it is based; or

(b) is under no obligation to update or correct any inaccuracy in the Confidential Information or any other information supplied by the Disclosing Party or any Client Group member or be otherwise liable to the Receiving Party or any other person in respect to the Confidential Information or any such information.

8. REMEDIES

8.1 The Receiving Party acknowledges and agrees that the Disclosing Party or the Client Group members may be irreparably harmed by any breach of this Agreement and damages may not be an adequate remedy. It is agreed that the Disclosing Party is entitled to seek an injunction or specific performance or similar remedy against any conduct or threatened conduct which is or would be a breach of this Agreement.

9. MISCELLANEOUS

9.1 This Agreement sets out the full extent of the Parties' obligations. Failure or delay by the Disclosing Party to enforce any of its rights under this Agreement shall not be taken as or deemed to be a waiver of such right. No waiver or amendment of any provision of this Agreement shall be valid or binding unless the waiver or amendment is made in writing and signed by the duly appointed representatives of both Parties.

9.2 If any provision of this Agreement is found by any court of competent jurisdiction to be invalid or unenforceable, such provision shall not affect the other provisions of this Agreement, which shall remain in full force and effect. The Parties shall use reasonable endeavours to find a new provision, resembling the invalid one, taking the original intent and purpose into consideration.

9.3 All notices under this Agreement shall be in writing and shall be sent by fax or first class registered or recorded delivery post to the Party being served at its address specified above and marked for the attention of that Party's signatory of this Agreement. The date of service shall be deemed to be the day following the day on which the notice was transmitted or posted as the case may be.

9.4 Nothing contained in this Agreement shall be construed to create an exclusive contractual arrangement, association, trust partnership or joint venture or impose a trust or partnership or fiduciary duty, obligation or liability between the Parties other than provided in this Agreement or to create any duty, standard of care or liability to any third party.

9.5 This Agreement is personal to the Parties and shall not be assigned or otherwise transferred in whole or in part by either Party without the prior written consent of the other Party.

9.6 This Agreement may be executed in any number of counterparts and this has the same effect as if the signatures on the counterparts were on a single copy of this Agreement.

9.7 This Agreement constitutes the entire Agreement and understanding between the Parties and supersedes any previous agreement, understanding, warranties and arrangements between the Parties relating to the Confidential Information and the Proposed Transaction.

10. INSIDE INFORMATION

10.1 The Parties acknowledge that some or all of the Confidential Information may be price-sensitive information and that the use of such information may be regulated or prohibited by applicable legislation including securities laws relating to insider dealing, market abuse or market misconduct. The Parties undertake not to use any Confidential Information for any unlawful purpose.

11. THIRD PARTY RIGHTS

11.1 Unless stated otherwise in this Agreement:

(a) a person not a Party to this Agreement has no right to enjoy or enforce any benefit under it; and

(b) the consent of any person not a Party to this Agreement is not required to amend this Agreement.

11.2 Notwithstanding any provisions of this Agreement, the Parties do not require the consent of any Client Group member or any member of either Party's Group to rescind or vary this Agreement at any time.

12. LIMITATION OF LIABILITY

12.1 Each Party excludes all liability for indirect, consequential, special or punitive loss or damage, including loss of business, profit or goodwill (whether the loss arises in contract, tort, under any statute or otherwise in connection with this Agreement) even if:

(a) the loss was reasonably foreseeable; or

(b) the other Party knew of the likelihood of the loss.

12.2 Each Party remains liable for any direct loss the other Party suffers arising from the first-mentioned Party's fraud, gross negligence or willful misconduct.

13. GOVERNING LAW AND JURISDICTION

13.1 This Agreement and any non-contractual obligations arising out of or in connection with it is governed by the laws in force in Mauritius and the Parties submit to the non-exclusive jurisdiction of the courts of that place.

13.2 The Parties shall attempt to solve any dispute arising out of or in connection with this Agreement by means of alternative dispute resolution such as but without limitation mediation. Any dispute, controversy or claim which may arise under this Agreement or the breach, termination or invalidity thereof which could not be resolved amicably, shall be resolved by arbitration by three (3) arbitrators appointed as follows: each Party shall appoint one arbitrator and the third arbitrator shall be appointed by mutual agreement of the two arbitrators failing which, the latter shall be appointed by a Judge of the Supreme Court of Mauritius sitting in Chambers. The place of arbitration shall be Mauritius, the costs of arbitration shall be borne by the losing party, the language of arbitration shall be English and the decision of the arbitrator shall be final binding and enforceable on both Parties and not subject to any appeal.

EXECUTED AS AN AGREEMENT IN TWO ORIGNALS ON: …./ ….. /2023

SIGNED for and on behalf of
MauBank Ltd
by its duly authorized representative:

Name: (Head of respective BU)……
Title: ……..

SIGNED for and on behalf of

……

by its duly authorised representative in:

Signature of Representative

Name: ……

Title: ……

THIS AGREEMENT is made on the …… day of ……..

BETWEEN: -

I. MauBank Ltd hereinafter referred as the "Customer", having its registered office at 25, Bank Street, Cybercity, Ebene 72201, Republic of Mauritius bearing registration number …… duly represented by its Chief Finance Officer, Mr. Deepak Mohadeb and Senior Manager - Facilities Management, Mr. Beekram Kumar Heeramun.

II. ……. hereinafter referred as the "Service Provider" or "SP", whose registered office is at …… bearing registration number ……. duly represented by its ……., ……. (Name of person)

together, the "**Parties**" and each a "**Party**".

WHEREAS-

A. The Customer is licensed to carry on Banking Business in Mauritius.
B. SP is willing to provide some of its services to the Customer.
C. The Customer is willing to make use of those services on the terms and subject to the conditions hereinafter contained.

1. Scope of services

i. **<u>To be filled by Business Unit.</u>**

ii. Standard of Care: In providing the Services, SP will exercise the same degree of care as it has historically exercised in providing such Services to its Affiliates prior to the date hereof, including at least the same level of quality, responsiveness and timeliness as has been exercised by SP with respect to such Services.

iii. Records: SP shall keep full and detailed records dealing with all aspects of the Services performed by it and:

(a) shall provide access to the related records to the Customer at all reasonable times; and

(b) shall maintain the records in accordance with good record management practices and with at least the same degree of completeness and care as it maintains for its other similar business interests.

2. Services outside the scope of this agreement

i. For the avoidance of doubt, any service not contained within this agreement shall be subject to a separate agreement or amendment of this agreement.

ii. Any variation to the scope of services that will be agreed upon, and any resulting additional work will be subject to an amendment of this agreement, prior to such work being performed.

3. Working principles

i. SP will strongly support the Customer to ensure the timely allocation and availability of resources.

ii. The Customer will be able to have access to a designated officer of the SP in case clarification or investigations are required to validate or confirm specific facts or information relating to or impacting the work that is being conducted.

4. The Customer Responsibilities

SP confirms that the definition and scope of the services detailed herein is agreed by the Customer to be sufficient to address the Customer's foreseeable needs. It is agreed that responsibility for providing support and assistance in the course of this agreement rests with the SP.

5. Fees

i. Payment of invoices will be made be made as per particulars below:

Account Number:

Account Name:

Bank Name:

ii. The Customer shall pay to the Supplier the Charges within thirty (30) days after the date on which the Customer receives a correct and error-free invoice.

iii. All Charges and other sums payable under this Agreement are exclusive of Value Added Tax and equivalent taxes in other countries which will be payable at the applicable rate.

iv. The Supplier shall, where requested by the Customer, comply with the Customer's invoicing requirements (electronic or otherwise)

6. Force Majeure

i. SP shall be under no liability to the Customer to perform any obligation or delay in performance arising as a result of force majeure, namely, circumstances beyond the control of SP which shall include (but shall not be limited to acts of God, act of war, perils of the sea or air, fire, flood, drought, disease outbreaks including epidemics, pandemics explosion, sabotage, accident, embargo, riot, terrorist attacks, civil commotion, including acts of the government, inability to supply the Software, materials, breakdown of equipment or labour disputes of whatever nature, strikes and lockouts.

7. Limitation of liability

I. Neither party limits or excludes its liability (i) in respect of any deceit, theft, fraud or fraudulent misrepresentation by it or its employees, and in the case of Supplier, by Supplier Personnel; (ii) for death or personal injury caused its negligence; (iii) under clauses 10 (Intellectual Property Rights); (iv) breach of clause 11 (Confidentiality); (v) reach of clause 12 (Data Protection); or (vi) to the extent such limitation or exclusion is not permitted by law. Subject to clause 7(i) the maximum aggregate liability of the Supplier to the Customer (other the liability covered by clause 7(i)) shall in respect of each default be limited to 150% of the Charges paid or payable under this Agreement.

II. Subject to clause 7(i), the maximum aggregate liability of the Customer and its Affiliates (other than liability covered by clause 7(i)) shall, in each Contract Year, be limited to the total Charges paid for Goods and Services under this Agreement during such Contract Year.

III. Subject to clauses 7(i), neither party will be liable to the other party for any indirect or consequential loss or damage including any indirect loss of business or profits, in each case whether arising from negligence, breach of contract or otherwise.

8. Third party rights

i. The services will be provided only to and for the Customer in accordance with the terms of this agreement and for no other purpose.

ii. Unless stated otherwise in this Agreement:

(a) a person not a Party to this Agreement has no right to enjoy or enforce any benefit under it; and

(b) the consent of any person not a Party to this Agreement is not required to amend this Agreement.

Notwithstanding any provisions of this Agreement, the Parties do not require the consent of any Client Group member or any member of either Party's Group to rescind or vary this Agreement at any time.

9. Termination

i. This Agreement may be terminated for convenience by the Customer at any time by giving to the SP not less than 14 days prior written notice.

ii. The following events shall allow the Customer to terminate this Agreement, in whole or in part, with immediate effect on giving written notice to the Supplier.

   a) material breach by SP of this Agreement (being a single event or a series of events which are together a material breach) which is either not capable of being remedied, or, if the breach is capable of being remedied, the Supplier fails to remedy such breach within 30 days of receiving written notice requiring it to do so;
   b) SP is affected by an Insolvency Event

iii. Within 30 days of expiry or termination of this Agreement, SP will return or destroy all Personal Data and any copies thereof, unless legislation or regulation prevents it doing so, in which case the SP undertakes that it will no longer process such Personal Data and will comply with the provisions of clause 13 (Confidentiality) in relation to such Personal Data such that the Personal Data remains confidential.

10. Intellectual Property Rights

i. All Intellectual Property Rights belonging to a party prior to the execution of this Agreement shall remain vested in that party.

ii. None of the Intellectual Property Rights in the Customer's trademarks and brands shall be used by the Supplier for any purpose without the Customer's prior written consent;

iii. SP hereby grants to the Customer, their agents and contractors, a worldwide, royalty-free, non-exclusive, perpetual, non-transferable licence (including the right to grant sub-licences) to use (i) any and all Intellectual Property Rights in the Goods, and (ii) any other Intellectual Property Rights to the extent necessary to:

(a) receive or use the Services;
(b) to enable the full benefit of ownership of the Goods, and (c) perform its obligations or exercise rights under this Agreement.

iv. SP shall at all times whether during or after termination or expiry of this Agreement indemnify and keep indemnified the Indemnified Parties against all losses suffered by, incurred by or awarded against any Indemnified Party or which are agreed by the Customer (or the relevant Indemnified Party) to be paid by way of settlement or compromise, arising out of or in relation to:

(a) any infringement or alleged infringement of any Intellectual Property Rights of any third party which is suffered by, incurred by or awarded against any Indemnified Party as a result of the Customer's (or the relevant Indemnified Party's) receipt of the Services or its use or possession of any Goods or Intellectual Property Rights provided or otherwise made available to any Indemnified Party; or

(b) any negligent or willful (or negligent and willful) act or omission of SP, its employees, agents or contractors in supplying, delivering or installing (or any one or more of them) the Goods whether or not such losses were foreseeable at the Effective Date

11.Governing law and jurisdiction

i. The contract shall be governed by and interpreted in accordance with the laws of Mauritius. Should any dispute arise between the parties, the parties shall attempt to resolve the dispute amicably, in good faith by senior level negotiations. Mauritian Courts shall have exclusive jurisdiction over any complaint or disagreement relating to this Agreement that cannot be resolved by such negotiations.

12. Data Protection

i. Notwithstanding the remaining provisions hereof, the Customer and SP hereby warrants and represents to the other that in the event that they Process any Personal Data, they shall comply with all Data Protection Legislation (to the extent directly applicable to the party in question) and such compliance shall include, but not be limited to, maintaining a valid and up to date registration or notification (where applicable) under the relevant Data Protection Legislation.

ii. The Customer and SP hereby warrants and represents to the other that they have collected all necessary consents and done all such things as may be required under the Data Protection Legislation and any other applicable law relating to the protection of

privacy, for the transfer of the Personal Data to the other party for the purposes of the other party Processing it as contemplated by this Agreement.

iii. SP shall not Process, transfer or permit access to any Personal Data outside the jurisdiction within or from which SP's obligations are being performed or the Personal Data is being Processed save to the extent notified to the Customer in writing in advance and in compliance with all Data Protection Legislation and any other applicable law relating to the protection of privacy or the access to information.

iv. SP shall notify the Customer promptly and in any event within twenty-four hours of becoming aware of any actual, suspected or alleged loss, leak or unauthorised Processing of any Personal Data.

v. SP shall notify the Customer promptly upon receiving a request for information made in terms of the Data Protection Legislation, claim, complaint or allegation relating to the Customer's compliance with the Data Protection Legislation in relation to the Personal Data (the Enquiry), and Supplier shall provide the Customer with all such assistance in dealing with and responding to such Enquiry as the Customer shall reasonably request, provided always that SP shall not take any other action in relation to any such Enquiry without the prior written authorisation of the Customer.

vi. SP shall implement appropriate technical and organizational measures to protect Personal Data against unlawful Processing and against accidental loss, destruction, damage, alteration or disclosure of the Personal Data. Such measures shall be appropriate to the harm that might result from unauthorised or unlawful Processing or accidental loss, destruction or damage to Personal Data and to the nature of Personal Data to be protected and shall include taking reasonable steps to ensure the reliability of employees having access to the Personal Data.

vii. In the event that a third party Processes any Personal Data on behalf of SP, SP shall procure compliance by such third party with the Data Protection Legislation

viii. SP shall be responsible for the acts or omissions of such third party in relation to such Processing as though they were SP's acts or omissions.

13.Confidentiality

i. Neither party will disclose to any third party without the written consent of the other party, any confidential information received as a result of or in connection with the receipt of, or the provision of, Services. Both parties agree that any confidential information shall only be used for the purposes of providing or receiving Services or any other contract between the parties. For the purposes of this Contract,

'Confidential Information' means any information relating to the Company's business which for the time being is being treated as confidential.

ii. Notwithstanding the above, either party will be entitled to disclose information (including know-how):
- to their respective regulatory bodies or legal advisers; or
- to a third party to the extent that this is required by any court of competent jurisdiction, or by a governmental or regulatory authority or where there is a legal duty or requirement to disclose

iii. SP will promptly advise the Customer of the full circumstances (to the extent legally permitted) of any unauthorised disclosure, misappropriation or misuse by any person or other third party of any Confidential Information upon the SP being put on notice of the same.

14. Miscellaneous

i. This Agreement is the complete and exclusive statement of the agreement between the Parties and supersedes all prior proposals, understandings and all other agreements, oral and written, between the Parties relating to the subject matter of this Agreement. This Agreement may not be modified or altered except by written instrument duly executed by both Parties.

ii. Force Majeure: Any delay or failure by either Party in the performance of this Agreement will be excused to the extent that the delay or failure is due solely to causes or contingencies beyond the reasonable control of such Party.

iii. If any provision, clause or part of this Agreement, or the application thereof under certain circumstances is held invalid or unenforceable for any reason, the remainder of this Agreement, or the application of such provision, clause or part under other circumstances shall not be affected thereby.

15. Acknowledgement and Acceptance

The Customer acknowledges its acceptance to the terms and conditions of this agreement by signing the confirmation below.

Written and signed in two copies, one for each party.

For and on behalf of MauBank Ltd (Customer)

Name: Deepak Mohadeb

Title: Chief Finance Officer

Signature .....

Date.....

Name: Beekram Kumar Heeramun

Title: Senior Manager - Facilities Management

Signature .....

Date.....

For and on behalf of ……. (Service Provider)

Name:

Title:

Signature .....

Date.....

ANNEXURE 4- Bidder’s information sheet

Information Sheet

[Please fill in this Form in accordance with the instructions indicated below where applicable. No alteration to its format shall be permitted and no substitution shall be accepted.]

1	**Company Details**	
	Legal Name:	
	In case of Joint Venture (**JV**), Legal Name of each party	
	Country of Registration	
	Year of Registration	
	Legal Address in Country of Registration	
	Name of the founder(s)/owner(s)	
	List of Board of Director(s), if there is a Board	
2	**Company Authorized Representative**	
	Name	
	Address	
	Telephone/Fax Numbers	
	Email Address	

3	**Related Party Transaction Declaration- As per Section 50 of BoM Act 2004 and Section 100 of Banking Act 2004 (section 28(4))**		
	Does your Organisation hold any shareholding in MauBank Ltd	(Yes) ☐	(No) ☐
	If Yes, Provide details.		
	Does any of your organisation owner/s, directors, shareholders, senior executives, has any related party as described by the above regulations, at MauBank Ltd.	(Yes) ☐	(No) ☐
	If Yes, Provide details.		
	Any changes in the above should be communicated to MauBank Ltd		
4	**Politically Exposed Person, Family Members & Close Associates (PEP) status**		
	Does any of your company Owners, Directors, shareholders, has/have a PEP (Politically Exposed Person, Family members & close associate) status, as described by regulations in force?	(Yes) ☐	(No) ☐
	If Yes, Provide details- (Name of person & position)		
	This is to enable MauBank Ltd to comply with its obligations pursuant to Regulation 15 of the Financial Intelligence and Anti- Money Laundering Regulations 2018 and its underlying laws, relating to measures to combat money laundering and the financing of terrorism.		
5	**Financial Accounting Ratios**	**Year 20__**	**Year 20__**
	Liquidity Ratio: - Working Capital Ratio	:	:
	: - Acid Test Ratio	:	:
	: - Cash Ratio	:	:
	Solvency Ratio: - Total Debt Ratio	:	:
	: - Debt to equity Ratio	:	:
	Bidders must compute the five ratios listed above.		

6	**Bank Account with MauBank Ltd**		
	Would you be willing to have a bank account with MAUBANK, for ease of quick payment etc.?	(Yes)	(No)
	if you are providing services to the bank? –	☐	☐
	Share Account Details if you are already a client		
7	**List of Documents to be attached with the Information Sheet**		
	Please tick boxes of documents that has been attached		
	Company Profile		☐
	In case of Joint Venture (**JV**), Letter of intent of JV or JV agreement		☐
	Financial statement for the last three years		☐
	Business Continuity Management Plan		☐
	Environmental, Health & Safety Policy in place		☐
	Certificate of Incorporation		☐
	Vat Certificate (For Local Companies)		☐
	Business Registration Certificate (For Local Companies)		☐

BILL OF QUANTITIES

BILL NO. 1: PRELIMINARIES AND GENERAL REQUIREMENTS

DESCRIPTION	AMOUNT (Rs.)
PRELIMINARY PARTICULARS **1) PARTIES AND CONSULTANTS** **i. EMPLOYER** The term "**EMPLOYER**" shall mean **MauBank Ltd** **25, Bank Street, Cybercity** **Ebene 72201** **Republic of Mauritius** **ii. CONSULTING ENGINEER** The term "CONSULTING ENGINEER" shall mean **Pro-Design Engineering Consultants Ltd** **1st Floor, Building No. 2** **Valentina Industrial Estate** **Phoenix 73553** **Republic of Mauritius** **320.000 PRICING AND COSTS** 320.010 GENERAL: This section details particular requirements for the pricing of the tender documentation and cost procedures during the contract. The Contractor shall be deemed to have allowed against each item or in his rates for the cost of complying with all the requirements of these preliminaries. All the items contained in the preliminaries shall apply to the whole of the works. The heading of the clauses in these Bills of Quantities shall not affect the interpretation thereof. 320.020 BASIS OF CONTRACT: The contract shall be • on a measured bill of quantities basis and accordingly shall be subject to re-measurement. • All additions or omissions shall be treated as variations. 320.080 OVERTIME AND ALLOWANCES: • Include for all necessary overtime and other expenses in the contract price that may be necessary in order to complete the Works in compliance with the contract programme. 320.090 SUBMISSION OF FINAL ACCOUNT: Submit a draft final account to the M&E Engineer using the contract procedures for checking purposes together with all the necessary supporting documents immediately after the practical completion of the contract Works. Prepare the valuation of variations, omissions and provisional work forming part of the Works and where appropriate in accordance with principles defined in this sub-clause. The basis for the determination of such valuation shall be the Bill Of Quantities shall be as per the provision of conditions of subcontract.	

DESCRIPTION	AMOUNT (Rs.)
All valuations as aforesaid prepared shall be submitted using the contract procedures to the M&E Engineer for approval. 320.100 INSTRUCTIONS AND VARIATIONS: All instructions shall be issued in writing and confirmed as per the provision of the subcontract. Submit the cost of each variation showing the quantities and rates applicable for all items of works, etc employed in accordance with the agreed contract schedule of rates. Submit to the M&E Engineer • Within 10 working days of the receipt of written instructions. No work will be certified for payment until all the necessary information is provided. 400.000 CONTRACT CONDITIONS 400.010 CONDITIONS OF CONTRACT: The conditions of the Contract are the FIDIC Short Form of Contract, 1st Edition 1999. 400.030 ORDER OF PRECEDENCE OF CONTRACT DOCUMENTS: The following order of precedence shall apply to the interpretation of the various documents that together constitute the conditions of Contract The order of precedence shall be: 1. The Contract Drawings 2. The Specifications 3. The Bill of Quantities I 410.000 PARTICULAR CONDITIONS 410.010 GENERAL: This section details particular conditions and requirements for the project. 410.020 INFORMATION PROVIDED BY OTHERS: Instructions, drawings, or other information required to be provided by the M&E Engineer and Client will be provided in due time upon written request provided always that such information is not requested unreasonably distant from nor unreasonably close to the date upon which it is necessary. Provide written request to the M&E Engineer in good time for any information required. 410.030 PROVIDE EVERYTHING NECESSARY: Provide everything necessary for the proper execution and completion of the contract works to the true intent and meaning of the contract documents. • Details of construction or materials which have not been referred to in the contract documents but the necessity for which my reasonably be implied or inferred from the said documents or which are usually or essential to the completion of the Works, shall be installed with no additional cost. 410.041 CO-ORDINATION OF TRADES: Allow for co-ordinating the contract works with the works of other trades and installations which may be on site during the period of the contract.	

410.042 CO-OPERATION WITH OTHERS:

Ensure that the contract works integrates with that of others and that full co-operation is maintained during the execution of the Works with that of others.

Co-operate with the Contractor, other subcontractors, suppliers, local authorities and statutory undertakings in the execution of the Works.

In the event of any extra costs being caused by failure to programme and arrange the execution of the Works so that it fully integrates with that of others, the installer of the Works may be liable for any additional costs thereby incurred.

410.060 NOISE AND NUISANCE:

Ensure that the contract works are undertaken with as little noise as possible.

- Ensure no nuisance by noisy working is caused to
  - the Employer
  - occupants of premises

Take all necessary precautions to prevent nuisance from smoke, rubbish and other causes.

Fit all compressors, percussion tools and vehicles with effective silencers of a type recommended by the manufacturer of the equipment.

410.080 PROGRAMME:

Provide a detailed programme(s) clearly illustrating how the overall programme

- Will be achieved within the contract period.

Provide the detailed programme

- Within 14 days from the award of the contract or such other dates as may be required by the Engineer

Due allowance is to be made in the programme(s) for, but not limited to, the following:

- The latest dates for release of final information required from the M&E Engineer and from the Client
- Required method statements.
- Ordering dates and manufacturing periods. The proposed delivery to site for each item of major plant to be clearly defined.
- The period required for the production, approval and issue of:
  - builder's work information
  - co-ordination drawings
  - installation drawings
  - shop drawings.

  Allow adequate time for the examination and approval by the M&E Engineer. Actual activities of production, adjustment, resubmission and review must be identified
- Installation periods for each system
- Work resulting from instructions issued in respect to the expenditure of provisional sums.
- Concurrent work by other trades.
- Any temporary works necessary for the completion of the engineering services installations.
- Period required for operating the systems, load simulation tests and final adjustment.
- Environmental load testing.
- Period for instructing the Employer training.
- Pre-commissioning, commissioning and performance testing of the engineering

DESCRIPTION	AMOUNT (Rs.)

services installations.
• The period required and latest dates for the production, approval and issue of record drawings and operating and maintenance instruction manuals.
• Provide programme information as
  • critical path network.
  • Gantt Charts
• Provide a separate and detailed commissioning programme for agreement with the M&E Engineer. Make due allowance for the following.
  • Commissioning, demonstration and instruction procedures.
  • Provision of written notice before each (or series of) test, inspection, commissioning or demonstration procedures are to be carried out, not less than fourteen days before the completion of the works
  • Demonstration to the M&E Engineer that test instruments and equipment are accurate.
 	
410.110 CONTINUITY OF THE WORKS:
No undertaking is given that the works will necessarily be able to proceed continuously.
• No claim will be allowed for discontinuity of work due to the necessity to conform to the contract programme.
 	
410.130 WORKING HOURS:
Working hours shall be agreed with the management.
 	
410.150 METHOD AND SEQUENCE OF WORK:
The method and sequence of work has to be agreed with the management.
 	
410.160 USE OF THE SITE:
The site shall be exclusively use for the purpose of this project. It shall not be used for storing materials other than for this project
 	
410.170 WORKING AREA:
The space available to the contractor and the working areas shall be in accordance with the provisions of the contract.
 	
410.200 STORAGE:
All materials and equipment shall be stored in waterproof, safe and secured areas as per Client's requirements and to Services Engineer's approval.
All materials and equipment and materials shall be offloaded, stored and transported in accordance with manufacturer's recommendations.
All electrical equipment and components shall be kept dry and free from dust.
Plug, cap or seal open ends on all tubes, conduit, trunking and associated equipment whilst in storage and during transportation to site.
Provide racks to prevent distortion of pipes, conduit and similar materials.
 	
410.280 DEFECTS LIABILITY:
Liability for making good defects in the Works shall be for a period of 12 months from the date of issue of the certificate of practical completion for the installations.
 	
If it is necessary to replace or renew any portion of the contract works as part of liability for defects, the defects liability period in respect of that portion of the contract Works shall be deemed to commence from the date of such replacement or renewal.
 	
The M&E Engineer may require that new tests be carried out to demonstrate that the plant is continuing to work satisfactorily if the replacement or renewal may affect the	

DESCRIPTION	AMOUNT (Rs.)
efficiency of the Works or any portions thereof. • Prior to practical completion submit a method statement for the approval of the M&E Engineer in agreement with the Client outlining how the defects which arise during the defects liability period will be rectified to ensure that disruption to the use of the building is kept to a practical minimum. • No additional costs will be accepted for undertaking works executed out of normal hours. 410.290 RIGHT OF ACCESS DURING DEFECTS LIABILITY PERIOD: Right of access will not be unreasonably withheld, at all reasonable working hours and at own risk and expense, to any part of the contract works for the purpose of inspecting the working of the installations or to the records of the working and the performance thereof. Subject to Client's approval and in agreement with M&E Consultant, that shall not be unreasonably withheld, undertake any tests considered necessary at own risk and expense. During the defects liability period and all necessary remedial works and/or rectification of defective materials and equipment liaise closely with the Client in agreement with the M&E Consultant and the Employer's staff. All such work shall be carried out in such a manner as to avoid or minimise shut-down time and inconvenience to the Employer. 410.330 DAMAGE TO STRUCTURE: • Exercise due care and attention in carrying out the contract works and be fully responsible for any damage caused to the structure or building finishes. • Obtain permission from the Main Contractor subject to M&E approval before any holes are cut in floors, walls or steelwork, etc. 410.340 INSPECTION BEFORE CONCEALMENT: Whenever work requiring inspection or testing is subsequently to be concealed give the following the notice to the Client and to M&E Engineer so that inspections may be made or tests witnessed before concealment • 5 days' notice 410.350 EQUIPMENT GUARANTEES: Plant and equipment guarantees shall commence at the date of practical completion and run for a minimum of 12 months after this date; or such more periods as provided by the manufacturers. Any costs associated with this requirement shall be included in the contract price. 410.370 DIMENSIONS: • Where installations are dependent upon site dimensions ensure that these are available before proceeding with the Works. • Dimensions should not be scaled from drawings. • Where dimensions are indicated on drawings check these on site, as appropriate, to ensure building construction tolerances and manufacturing tolerances can be accommodated. • Equipment should not be ordered or manufactured using quantities dimensions indicated on the Tender drawings.	

430.000 QUALITY

430.020 WORKMANSHIP AND MATERIALS:
All materials, articles and workmanship shall be of the best quality and execution as detailed in the specification and drawings.

All equipment and materials to be installed shall be new unless otherwise indicated.

All equipment shall be installed in accordance with the manufacturer's written instructions and recommendations.

All materials considered by the M&E Engineer to be unsound or not in accordance with the specification shall immediately be removed and properly replaced to the satisfaction of the M&E Engineer and the Main Contractor at no additional cost. All work carried out imperfectly or with faulty materials must be immediately removed and properly replaced to the satisfaction of the M&E Engineer at no additional cost.

The manufactured articles specified shall serve as a quality standard.

Where manufactured items are not specified by name submit with the tender all necessary details of proposed articles. The M&E Engineer shall approve these articles before their use is permitted.

430.030 DEFECTS:
Agree with the Client and the M&E Engineer a system of recording defects that should include

- A reference to identify the defect
- Description of the defect
- Remedial works proposed
- Agreement to remedial works proposed
- Confirmation of defect clearance

500.000 ORGANISATION AND DESIGN MANAGEMENT

500.010 SITE STAFF:

- Staff of sufficient number and competence in the opinion of the M&E Engineer and main contractor, shall be provided as necessary for design, drawing and technical information production, programming and administration to ensure efficient and satisfactory execution of the contract works.
- Provide all necessary superintendence during the execution of the contract works. The said staff shall be in attendance on site during the whole time that work is in progress.
- Employ on the site suitable qualified engineering staff to be in charge of the contract works from commencement to completion. The said staff shall be in attendance on site during the whole time that work is in progress.
- Responsibility for all drawings and technical information production shall be undertaken by a competent and qualified engineering staff as approved by the M&E consultant.
- Any change made to the appointment of staff during the contract works shall be agreed with the M&E Engineer with maximum notice being provided.
- If the M&E Engineer is of the opinion that any member of the site staff has been guilty of a serious breach of his duties, he may by notice require that person to be replaced within 2 weeks of the notification.

510.000 SUBMITTALS AND APPROVALS

510.010 GENERAL:
This section outlines the requirements and procedures for submittals to the M&E Engineer and to Client.

510.020 SUBMITTALS:
Prior to any orders being placed the M&E Engineer shall review all drawings and manufacturer's details. Submittals shall be in a clear, definable and easily read format with the specified technical details, notes, performance data and calculations where applicable all in the English language.

Where drawings are to be examined the manufacturer's details shown on the drawings must have been previously approved.

Include all costs for attending meetings associated with the submittal review procedure. Meetings will be held at 7 days intervals, which will be attended by M&E Engineer as required.

510.060 REVIEW OF SUBMITTALS:
Submittals will be examined for

- compliance in principle with the design intent
- Compliance with the specifications

Such examination shall not relieve any responsibilities and obligations under the contract.

510.080 SAMPLES:
Provide free of charge samples of material and workmanship proposed to be used in the Works.

Samples shall include all alternative finishes available if required.

In the case of articles of special construction:

- drawings when approved will be retained until the articles concerned are supplied, as a sample

The samples submitted and approved, shall remain the property of the Employer until the completion of the contract.

Approval of the M&E Engineer shall be obtained before equipment is placed on order

- The M&E Engineer will undertake to approve samples within 2 weeks from receipt.

Samples to be submitted:

- affixed to sample board in site office as directed by the Main Contractor subject to M&E Engineer's approval.

Include all alternative finishes available for the following samples:

520.000 OBLIGATIONS AND RESPONSIBILITIES

520.010 GENERAL:
This section details the specific obligations, duties and responsibilities undertaken as part of the contract works.

520.020 OBLIGATIONS:
Undertake responsibility for all works defined in the work sections and shown on the drawings, and in particular the following:

DESCRIPTION	AMOUNT (Rs.)

• Complete the design development
• Undertake the responsibility for resolving final spatial co-ordination
• Check the provisions for, and adequacy of builder's work information previously issued prior to the award of the contract
• Co-ordinating the engineering services, with each other and with the building structure and fabric
• Provide the following drawings as defined elsewhere:
  • Co-ordination
  • Installation
  • Manufacturing
  • Manufacturer's certified
  • Shop drawings
  • Installation wiring drawings
• Provide builders work details based on the installation, manufacturing and shop drawings.
• Negotiate with public and other authorities for provision of necessary incoming services.
• Obtaining final approvals of any appropriate authority.
• Prepare such reports, calculations and details as required for submission to any appropriate authority including the coordination of such information by suppliers, specialists, etc needed to be included in any submission.
• Fully re-evaluate and take full responsibility for all parts of the design and building elements that may be affected by acceptance of alternative plant selections
• Undertake specific detailed design tasks as defined in this work section
• Undertake all on-site co-ordination with all other trades, disciplines, manufacturer's and suppliers
• Provide:
  • suitable accommodation
  • workshops
  • stores
  • clearance on completion
• Supply, deliver to site, unload, store, protect and co-ordinate movement of all plant, equipment and materials required for the works.
  • Including lifting and hoisting.
• Fix and install correctly all plant, equipment and materials and ensuring that all associated works are correctly executed
• Protection of the client's equipment and machinery during the project.
• Undertake the fire stopping of all holes associated with the works
• Install fire barriers where a fire rated partition is penetrated.
• Carryout all builder's and civil works as required for the installation of the M&E services.
• Clean and reinstitute the tenant to original operating condition once works are completed.
• Inspect all plant, equipment and materials as delivered or where specified at the manufacturer's works
  • Inspection and/or tests to be carried out at the works jointly with the M&E Engineer for equipment as defined elsewhere
  • Include for the travel and other expenses of the M&E Engineer for the inspection and/or tests carried out at the works
• Preparation of the operating and maintenance manuals, planned maintenance schedules.	

DESCRIPTION	AMOUNT (Rs.)
• Appoint a specialist responsible for the preparation of the operating instructions and maintenance manual • Undertake the testing and commissioning of the works. • Appoint an independent commissioning specialist responsible for the testing and commissioning of the works. 520.050 CO-ORDINATION OF SERVICES: All aspects of the works require detailed co-ordination to avoid any possible clash or conflict with other trades and disciplines. Undertake such co-ordination in relation to the works. • No extra cost or claim will be allowed due to conflict of works or installations, where full liaison with other trades and disciplines would have prevented such an occurrence. When any new, revised or updated architectural, structural or services information is issued by the M&E Engineer under the authority of an instruction, examine such information and if necessary modify the works accordingly to prevent any clashes or abortive work due to such instruction. • No extra cost or claim will be allowed to cover any clashes or abortive work that result from not requesting an explanation or seeking clarification in respect of any such revision. • No extra cost or claim will be allowed due to conflict of works or installations, where full liaison with other trades and disciplines would have prevented such an occurrence. 520.060 CO-ORDINATION OF SERVICES ON SITE: Allow for co-ordinating the contract works with the works of other trades and installations which may be on site during the period of the contract either during or prior to their incorporation into the works. Where minor clashes of services occur on site that were not foreseeable at the design or co-ordination drawing stage then these clashes or minor co-ordination matters shall be resolved by discussion and agreement with other trades and disciplines. The Main Contractor shall be informed of the action to be taken by an approved means with copy to M&E Engineer. • No instructions will be issued to cover such minor clashes. 520.070 SURVEYS: • Ascertain the nature of the site and all local conditions and restrictions likely to affect the execution of the Works. • Before commencing work, carry out a survey and examination of buildings, structure and engineering services affected by the works. • Examine all available drawings of the engineering services and report any discrepancies to the Main Contractor with copy to M&E Engineer. 520.080 SITE DIMENSIONS AND LEVELS: Install all engineering services using a laser levelling system wherever possible and co-ordinate the measurements with all other trades and disciplines to prevent any clashes. Obtain all dimensions and levels on site for the actual setting out of the works. As the development advances measure on site all works by others that may foreseeably	

DESCRIPTION	AMOUNT (Rs.)
affect the works. These dimensions shall be incorporated into the installation drawings or marked up on revised drawings if already issued. • No extra cost or claim will be allowed for any errors arising from inaccurate setting out or failure to check actual site dimensions. • Reimbursement will be sought for any abortive expenditure. 520.090 MAINTAINABILITY: Demonstrate that all plant and equipment incorporated into the Works can be safely and easily maintained in full compliance with: • Health and Safety legislation. • British Standards. Ensure that adequate space is provided for future replacement of plant or parts and that all access panels/doors are unobstructed. 520.120 STATUTORY AUTHORITIES: Orders for the incoming utility services shall be • included in this contract • Liaise with the Statutory Authorities and provide any test notices required to ensure final connections are made in accordance with the requirements of the programme, in agreement with the Main Contractor. 530.000 LOCAL AUTHORITY REQUIREMENTS AND AIRPORT AUTHORITIES REQUIREMENTS. 530.010 GENERAL: This section details the requirements for compliance with Local Authority By-laws and Airport Authorities Requirements. 720.000 BUILDERS WORK 720.010 BUILDERS WORK PROVIDED: • Where structural and/or architectural facilities or provisions, for engineering services are already indicated check that these are correct, satisfactory and adequate for the purpose and confirm same in writing to the M&E Engineer with copy to the Client. Timescale: • Within weeks of the award of contract (no) 2 720.020 SCOPE OF BUILDER'S WORK: • Builder's work is included in the Works. • Builder's work includes drilling and/or plugging walls, floors, ceilings etc., for fixings for services and such work is included in the works. • Erection of block wall. • Finishing works that include, making good, painting, etc. • Provide the following as necessary for the complete installation • all supporting steelwork associated with Rooftop units and fans • brackets, clamps and fixings 720.030 MARKING OUT OF BUILDER'S WORK HOLES ON SITE: • If approved by the M&E Engineer and the Client, mark on site actual locations of minor non-structural holes through walls, partitions, floors etc and also chases in non fair-faced walls, etc for conduits, pipes and the like in preference to providing drawings	

DESCRIPTION	AMOUNT (Rs.)
of such builder's work requirements. The M&E Engineer is to be given the opportunity to inspect prior to work being carried out. • The M&E Engineer shall inspect all marking out on site prior to work commencing. • Establish a method of working with the Client and subject to M&E Engineer approval to ensure the works may proceed without hindrance. 740.030 STATIC TESTING: Progressive static testing shall include the following tests, but other tests may be required and witnessed: • Insulation resistance • Earth fault loop impedance • Earth continuity • Pressure testing of hydraulic systems The M&E Engineer shall be given the opportunity to witness all static tests. Advance notice of the tests shall be given to the M&E Engineer with copy to Client. Timescale: • days prior to test (no) 7 740.040 PRE-COMMISSIONING CHECKS: Ensure all pre-commissioning examinations and tests have been undertaken and that each system, including components, or item of equipment is complete and in a safe condition prior to start-up. All necessary notices shall be displayed. All costs related for the same are to be included in the tender price. 740.050 FUEL FOR TESTING: Fuel for testing and operating the Subcontract works shall be • included within the contract price and due allowance made within the tender. 740.060 SYSTEM DEMONSTRATION: • Subsequent to the completion of all testing and commissioning to the satisfaction of the M&E Engineer and Client and when directed operate the plant and demonstrate that the overall systems function correctly in accordance with the requirements of the specification. • Fully run and operate the following systems to demonstrate correct function in accordance with the requirements of the specification: • The period of operation shall be: • weeks (no) 1 • carried out during normal working hours. • allowed in the programme. • During this period be responsible for the recording of results and the operation and maintenance of the plant. • Provide the following: • An operational report of the demonstration 740.070 INSPECTIONS AND TESTS: Submit schedules indicating those parts of the contract works for which inspections and tests are required to substantiate conformity with the specification. Should any alternative item be proposed that does not carry appropriate certification, ensure independent testing is carried out at no expense to the contract works to confirm compliance.	

DESCRIPTION	AMOUNT (Rs.)
Provide method statements supported by risk assessments detailing the procedures for carrying out on site tests. Agree in advance with all parties procedures for inspections and tests including periods of notice. Where a test indicates non-compliance with the specification submit immediately details of the non-compliance and details for corrective action. Maintain records of all specified inspections and tests performed including third party and works testing. Maintain all records on site for inspection. 740.080 TEST CERTIFICATES AND RECORDS: Ensure that test certificates include: • project title • details and date of test • instruments used, serial numbers, calibration dates • signature of those witnessing test • installers name • specific location of the item in the contract works The number of copies of each test certificate to be issued to the Client with copy M&E Engineer • (no) 4 Time scale • within working days of the test (no) 3 740.090 ROTATING EQUIPMENT: Immediately prior to practical completion adjust, ease and lubricate moving parts as necessary to ensure easy and efficient operation. Ensure that temporary electrical supplies are provided to enable rotating plant items delivered and/or installed to be run at regular intervals to avoid damage or deterioration. If temporary electrical supplies are not available ensure that rotating plant is hand-turned. 900.000 COMPLETION AND HANDOVER 900.010 GENERAL: This section details the requirements and procedures for completion and handover. 900.020 HANDOVER REQUIREMENTS: As a pre-requisite to Practical Completion in respect of the contract works or part thereof, demonstrate to the satisfaction of the Client and M&E Engineer that: • All the Works are complete. • With the exception of minor snags or limited defects as agreed with the Main Client and M&E Engineer that could be reasonably completed within an agreed programme without causing disruption to the Employer's use of the building or part thereof. • All spares, keys, tools and other consumables as stated elsewhere have been supplied and handed over to the Employer, as approved by M&E Engineer. • The instruction of the Employer's staff in the use and correct operation of the installation has been completed satisfactorily. In particular, safety devices and controls demonstration. • All commissioning and testing completed • including the issue of a final commissioning report signed by an approved competent	

DESCRIPTION	AMOUNT (Rs.)
person • A complete demonstration of the Works with fully functional operational controls tested has been undertaken in the presence and to the satisfaction of the Client and M&E Engineer. • All necessary certification by the Employer's insurers has been completed. • All approved record documentation including record drawings, operation and maintenance manuals, etc is issued • All information required for the health and safety file is issued to the satisfaction of the M&E Engineer and relevant authorities. • All necessary Statutory Authority approvals have been undertaken and written confirmation established • Completion and issue of log books in accordance with Building Regulations. • in accordance with CIBSE TM31 Building Log Book Toolkit (standard templates) • Should adequate record documentation not be available, Practical Completion will not be issued. 900.040 RECOMMENDED SPARE PARTS: Before Practical Completion submit to the M&E Engineer with copy to the Client a schedule of spare parts as stated elsewhere and recommend any that should be obtained and kept in stock by the Employer for maintenance of the installations included in the Works. Time scale • weeks before (no) 2 State against each item the manufacturer's current price, including packaging and delivery to site. Identify those items that are additional to those specified for inclusion as stated elsewhere. 900.070 SUPPLY OF TOOLS: Provide all tools, keys and portable instruments as detailed elsewhere prior to practical completion and additional items if so instructed by the M&E Engineer with copy to Client. Time scale • Weeks before Practical Completion (no) 1 910.000 MAINTENANCE 910.020 PROVISION FOR **12** MONTHS MAINTENANCE CONTRACT: Allow the cost for providing a **12** months comprehensive maintenance contract from the date of Practical Completion for the whole of the works. The maintenance works shall include: ☑ Planned preventative maintenance to maintain the installations in efficient working order including routine checks, adjustments, lubrication and replacement of consumable spares, etc as detailed in the specifications. ☑ Preparation of work schedules and recording activities ☑ Providing breakdown and emergency cover ☑ Planning and undertaking shut-downs for maintenance works ☑ Employing of all necessary specialist maintenance ☑ Attendance on and supervision of specialist maintenance ☑ Carrying out all necessary safety checks ☑ Carrying out system proving of the works to include the measuring, recording, evaluating and reporting on the seasonal performance of the systems against their design values ☑ Liaison with the employer ☑ 24/7 Call out emergency services. ☑ Allow for all spares and replacement of damaged parts as may be required.	

DESCRIPTION	AMOUNT (Rs.)
Emergency maintenance response times during work days, week-ends and public holidays shall be less than 3 hours. Ensure that the maintenance recommendations set out in the appropriate standard can be achieved and are appropriate for the installations. Advise with the tender submission. Total ☑ Prior to Practical Completion submit to the Engineer a detailed planned preventative maintenance programme for the works within 3 weeks of Practical Completion.	
TOTAL FOR BILL NO. 1 CARRIED TO MAIN SUMMARY PAGE (RS.)	

BILL No. 2.1 –Public Health and Allied Works

PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	INFORMATION PROVIDED				
	The project is the refurbishment of an existing office building located at Pope Hennessy Street Port Louis				
	The building, of approximately 4,400m2, comprises of a basement, ground floor, 1st to 6th floors, and space (technical office and room) at roof level. There is a technical block at ground floor at the back of the building forming part of the main building.				
	The bill of quantities form part of and must be read in conjunction with the Specifications, which contain the full descriptions of the work to be done and material and equipment to be used. Unless otherwise described in these bills of quantities, reference should be made to the Specifications for the full meaning of descriptions of work to be done and materials and equipment to be used in this service.				
	The Contractor shall be responsible for interpreting the drawings, making due allowance for offsets to avoid the building structure or other services, whether indicated or not.				
	The Contractor shall take all necessary steps to fully acquaint himself with the nature and extent of the Works by visiting the site and by inspecting the architectural, structural and other MEP services and demolition works drawings.				
	No claim for loss or expense due to the above factors will be considered.				
	All quantities are provisional and shall be subject to remeasurement after execution of works. The contractor shall ensure that drawings are approved for exact quantities.				
	Public Health & Allied Works C10/C20-Removal of Complete Systems & Demolition	**1**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
1	**C10/C20 - REMOVAL OF COMPLETE SYSTEMS & DEMOLITION**				
	Preambles				
	This bill section refers to the dismantling works comprising removal of complete systems & demolition, and builder's work involved in the refurbishment of the Pope Hennessy building at Port Louis for MAUBANK Ltd				
	All dismantled items shall be kept on site for NOT more than 24 to 48 hours, either on the roof or at the back of the building, depending where the items have been dismantled from, as indicated on the site plan.				
	The Client representative shall countersign all assets removed during the refurbishment project in an asset registry.				
	Upon receiving instruction from the Client for carting away of any dismantled parts and equipment, debris, etc., the Client representative shall again countersign on the asset registry and the Contractor shall cart away the asset from the site within 24 hours.				
	The contractor shall be responsible for the dismantling works and proper disposal of all obsolete cables, cable components, and cable containments systems, such as cable trays, wire trays, trunking, etc.				
	The contractor shall be responsible for the safekeeping, stock control of all the existing luminaires, accessories and the like and handover to client at a later stage. Proper records of luminaires and accessories shall be kept and countersigned off before and after handover to Client by Client representative.				
	The contractor shall be required to undertake a pre-bid survey, to access the exact extent of works. All the costs relative to this survey shall be borne by the contractor and shall not be reimbursed by the Client.				
	Public Health & Allied Works C10/C20-Removal of Complete Systems & Demolition	**2**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	The Contractor is required to take all neccesary health and safety measures to ensure the utmost safety of its personnel and people working in the building during the dismantling works.				
	Electrical isolation shall be done before any existing cables and electrical boards are dicommissioned and disconnected. Warning signage shall be used profusely wherever required to warn people and passers by.				
	S10 - COLD WATER SERVICES				
	BASEMENT				
A	*Dismantling of existing cold water pipework and accessories from water tank in basement to cold water booster pump at ground floor in technical room at back of building.*	*item*	*1*		
B	*Decommissioning, Dismantling of existing sump pump c/w all accessories, connecting pipework and accessories up till position of pipe at high level in basement pump room.*	*item*	*1*		
C	*Dismantle, and remove fire tank cover of dimension 900 x 900 mm.*	*nr*	*1*		
D	*Dismantle and remove Ball cock valves in water tanks*	*nr*	*2*		
	GROUND FLOOR				
E	*Decommission, dismantle, and remove existing Cold water transfer pump of make Lowara, model Q120/332/BT c/w pressure vessel, electrical control panel, pipeworks and ancilliaries.*	*item*	*1*		
F	*Decommission, dismantle, and remove existing electrical control panel for sprinkler pump for carting away.*	*item*	*1*		
	ROOF				
G	*Decommission, dismantle, and remove pipeworks from riser to roof water tank.*	*item*	*1*		
H	*Dismantle and remove Ball cock valve in roof water tank.*	*nr*	*1*		
	Public Health & Allied Works C10/C20-Removal of Complete Systems & Demolition	**3**	**Carried to Collection Page**		

To collection page (MUR).....

PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
A	*New cover in galvanised metal sheet & tube of dimension 900 x 900 mm to be installed for roof tank.*	*nr*	*1*		
	RISERS				
B	*Decommission, dismantle, and remove existing pipework from cold water booster pump at ground floor in technical pump room to roof level passing through riser along whole building height.*	*item*	*1*		
	Public Health & Allied Works C10/C20-Removal of Complete Systems & Demolition	**4**	**Carried to Main Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	Description	Unit	Qty	Rate	Amount
	C10/C20 - Removal of Complete Systems & Demolition				
	Collection for Section C10/C20				
	Brought forward from page No:				
		1			
		2			
		3			
		4			
	Public Health & Allied Works S10 - Cold Water Services	5	Carried to Main Collection Page		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
2	**R11/12 - FOUL DRAINAGE ABOVE/BELOW GROUND**				
	BASEMENT				
A	*Decommission, dismantle, and remove 2 Nos existing sump pump, Make: Grundfos, Model: KP 300-1*	*item*	*1*		
B	*Flushing, cleaning and making good of existing installation, checking all stack access points and cleaning of all risers*	*item*	*1*		
C	*Sump pump, 3 phase, with operating point of 8.2 m3/h volumetric flowrate, and 6.1 m head, similar to Ebara DW 75.*	*nr*	*2*		
	Testing & Commisioning, and Sundries				
D	*Contractor to allow a sum for all civil works related to the execution of the new public health works as described in this section. This includes cut-outs in existing blockworks, slabs, etc., coring in existing slabs and walls, protection of existing flooring and walls against inpact of falling debris as a results of these civil works, carting away of debris, making good of newly perforated walls and slabs with appropriate in-situ formworks for fine finish, paint touchups, and the like works.*	*sum*	*1*		
	Public Health & Allied Works R11/12 - Foul Drainage Above/Below Ground	**6**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	Description	Unit	Qty	Rate	Amount
	R11/12 - Foul Drainage Above/Below Ground				
	Collection for Section R11/12				
	Brought forward from page No:				
		6			
	Public Health & Allied Works **R11/12 - Foul Drainage Above/Below Ground**	**7**	**Carried to Main Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
3	**S10 - COLD WATER INSTALLATIONS**				
	Preambles:				
	Background to Project & Scope of Works				
	The project is the refurbishment of an existing office building located at Pope Hennessy Street Port Louis				
	The building consists of a basement, ground floor, 1st to 6th floors, a lower roof level and an upper roof level.				
	The scope of works for the refurbishment are in the following areas of the building (refer to drawings for more details):				
	• Basement around concrete water tanks • Ground floor in existing technical room housing water pumps • In all toilet blocks (2 Nos.) at each floor. • At lower roof level • At upper roof level for roof water tank				
	The scope of works encompasses:				
	• Decommisioning, dismantling and carting away • Builder's works for passing of new services • Making good of existing areas • Installation of new pumpset, pipeworks & ancilliaries				
	The following section represents the installation of a cold water distribution network within the building as detailed in the S10 drawing series.				
	Water shall be stored in two water tanks at Basement level				
	A completetely pressurised cold water network shall be provided. Cold water distribution shall be via a booster pump set located in the pump room.				
	A UV filter shall be provided for the cold water distribution network.				
	Public Health & Allied Works S10 - Cold Water Installations	**8**	**Carried to Collection Page**		

PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	Pipes measured in this section are for cold water pipes running concealed, on surface and buried underground.				
	All cold water pipes on site shall be of HDPE PN10 material and all pipes concealed in floor shall be of PEX-a pipe inside sleeve. All pipes running surface inside riser / false ceiling shall be of uPVC PN10 for cold water and cPVC PN16 c/w insulation for hot water. Contractor shall allow for transitional piece for HDPE to PVC pipe as may required on site and include them in the bid.				
	The contractor is to determine the exact quantity of extra over pipes for uPVC elbows, tees, reducers, couplings which are required to complete the works successfully and include them in the bid in section below.				
	The contractor shall be required to ensure proper coordination of services with respect to other trades.				
	All pipeline fittings, valves and ancillaries shall be of UK origin and have BS Kitemark. They must comply to BS EN 1452 and be WRAS compliant.				
	All quantities are provisional and shall be subject to remeasurement after execution of works.				
	Contractor shall allow for transitional coupling from HDPE to uPVC pipe for above ground as may required on site and include them in the bid.				
	The contractor is to determine the exact quantity of extra over pipes which are required to complete the works successfully and include them in the bid.				
	All quantities are provisional and shall be subjected to re-measurement after execution of works.				
	Public Health & Allied Works S10 - Cold Water Installations	**9**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	BASEMENT				
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN10, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
A	*Dia. 25 mm (for Bibtap)*	*m*	*38*		
	Equipment & Accessories				
	Brass isolating/stop valves with stainless steel lever (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, with compression/threaded joints to the cold water uPVC tubing and hot water c-PVC tubing.				
B	*Dia. 25 mm*	*nr*	*1*		
	Heavy duty Brass diaphragm pattern ball float operated valve to BS1212-2, of make similar or equivalent to Hattersley, as described and specified to match the water feed pipe inlet dia.				
C	*DN 40 mm*	*nr.*	*2*		
D	*Supply and install of a prefiltration unit of average flow rate of 7m3/h, with a working pressure of 10 bar, Max. operating pressure of 16 bar, and maximum operating temperature of 50 deg Celcius.*	*set*	*1*		
	Hose union pattern, brass finish bibtaps of European standard and BS Kitemark, similar or equivalent to "PRESTEX bibtaps, pattern no. 141HU FGK" with compression/screwed joints to the copper tubing (Provisional)				
	Public Health & Allied Works S10 - Cold Water Installations	**10**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
A	*Dia. 20 mm*	*nr*	*2*		
	Servo assisted solenoid valve, flange connection, 12V DC supply voltage and in a normally open position complying to European Standards with brass/ stainless steel valve body, IP65 rated, class F insulation, suitable for cold water supply, c/w float switch control, all related accessories and be energised/ closed when the minimum water level inside tank for FHR reached.				
B	*DN 50 mm*	*nr.*	*1*		
C	*Water level sensor with indicator and alarm panel for watertanks. c/w overflow warning alarm device with sounder.Alarm panel to be c/w cabling to monitor the following:* *- Low Level (Dry Running of pump set)* *- Overflow* *- Warning* *- Water Level*	*set*	*1*		
D	*New cover in galvanised metal sheet & tube of dimension 900 x 900 mm to be installed for fire tank.*	*nr*	*1*		
	GROUND FLOOR				
	Primary Equipments (Located in Pump Room)				
E	*Combined cold water booster & fire hose reel pumpset consisting of 2 pumps, working in duty/stanby/auto changeover, self priming, with variable speed drive pumps, pressure tank 50L capacity, c/w all accessories, control panel, pressure gauges, suction and discharge s/steel manifolds, anti-vibration mountings, flexible couplings, dry contacts & pressure switches, pressure relief valve, float switches, gate and check valves, strainers, prefilters, test points, drain cocks and the like. Control panel to be of same make as pump and to be inclusive of local controller, all as per the schedules, similar and equivalent to Calpeda, Ebara, Wilo series or approved equal*				
F	*1.5 L/s at 7.6 bars*	*set*	*1*		
	Public Health & Allied Works **S10 - Cold Water Installations**	**11**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN10, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
A	*Dia. 25 mm*	*m*	*34*		
B	*Dia. 20 mm*	*m*	*8*		
	Pump room				
	Brass pressure regulating valve, diaphragm operated, with compression/threaded joints, Max. Inlet Pressure: 10 bar and adjustable outlet pressure between 1.5 and 5 bar of European Origin.				
C	*Dia. 50 mm*	*nr*	*1*		
	Bronze pipeline strainer with flanged joints, Y pattern body, minimum 250% screen free area of pipe bore.				
D	*Dia. 50 mm*	*nr*	*1*		
	Butterfly stop valve, gear operated to BS 5155, nylon coated ductile iron body, elastomer encapsulated disc, flanges, secured with leather straps and padlocks, of make similar or equivalent to Hattersley.				
E	*Dia. 50 mm*	*nr*	*1*		
F	*Glycerine vapour pressure type gauges complying with BS EN 837-1, 10 bar scale divisions of 0.2 bar with flanged/ threaded connections, stainless steel case for corrosion resistance, white enameled brass dial face with large numbers for easy reading*	*nr*	*1*		
	Public Health & Allied Works S10 - Cold Water Installations	**12**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	Equipment & Accessories				
	Brass isolating/stop valves with stainless steel lever (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, with compression/threaded joints to the cold water uPVC tubing and hot water c-PVC tubing.				
A	*Dia. 25 mm*	*nr*	*3*		
B	*Solenoid Valve, Dia. 50 mm*	*nr*			
	Brass pressure regulating valve, diaphragm operated, with compression/threaded joints, Max. Inlet Pressure: 5 bar and adjustable outlet pressure between 1 and 2 bar and complying to European standard.				
C	*Dia. 25 mm*	*nr.*	*1*		
	FIRST FLOOR				
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN10, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
D	*Dia. 25 mm*	*m*	*34*		
E	*Dia. 20 mm*	*m*	*8*		
	Equipment & Accessories				
	Brass isolating/stop valves with stainless steel lever (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, with compression/threaded joints to the cold water uPVC tubing and hot water c-PVC tubing.				
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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
A	*Dia. 25 mm*	*nr*	*3*		
	Brass pressure regulating valve, diaphragm operated, with compression/threaded joints, Max. Inlet Pressure: 5 bar and adjustable outlet pressure between 1 and 2 bar and complying to European standard.				
B	*Dia. 25 mm*	*nr.*	*1*		
	SECOND FLOOR				
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN10, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
C	*Dia. 25 mm*	*m*	*34*		
D	*Dia. 20 mm*	*m*	*8*		
	Equipment & Accessories				
	Brass isolating/stop valves with stainless steel lever (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, with compression/threaded joints to the cold water uPVC tubing and hot water c-PVC tubing.				
E	*Dia. 25 mm*	*nr*	*3*		
	Brass pressure regulating valve, diaphragm operated, with compression/threaded joints, Max. Inlet Pressure: 5 bar and adjustable outlet pressure between 1 and 2 bar and complying to European standard.				
F	*Dia. 25 mm*	*nr.*	*1*		
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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	THIRD FLOOR				
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN10, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
A	*Dia. 25 mm*	*m*	*34*		
B	*Dia. 20 mm*	*m*	*8*		
	Equipment & Accessories				
	Brass isolating/stop valves with stainless steel lever (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, with compression/threaded joints to the cold water uPVC tubing and hot water c-PVC tubing.				
C	*Dia. 25 mm*	*nr*	*3*		
	Brass pressure regulating valve, diaphragm operated, with compression/threaded joints, Max. Inlet Pressure: 5 bar and adjustable outlet pressure between 1 and 2 bar and complying to European standard.				
D	*Dia. 25 mm*	*nr.*	*1*		
	Public Health & Allied Works S10 - Cold Water Installations	**15**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	FOURTH FLOOR				
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN10, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
A	*Dia. 25 mm*	*m*	*34*		
B	*Dia. 20 mm*	*m*	*8*		
	Equipment & Accessories				
	Brass isolating/stop valves with stainless steel lever (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, with compression/threaded joints to the cold water uPVC tubing and hot water c-PVC tubing.				
C	*Dia. 25 mm*	*nr*	*3*		
	Brass pressure regulating valve, diaphragm operated, with compression/threaded joints, Max. Inlet Pressure: 5 bar and adjustable outlet pressure between 1 and 2 bar and complying to European standard.				
D	*Dia. 25 mm*	*nr.*	*1*		
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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	FIFTH FLOOR				
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN10, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
A	*Dia. 25 mm*	*m*	*34*		
B	*Dia. 20 mm*	*m*	*8*		
	Equipment & Accessories				
	Brass isolating/stop valves with stainless steel lever (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, with compression/threaded joints to the cold water uPVC tubing and hot water c-PVC tubing.				
C	*Dia. 25 mm*	*nr*	*3*		
	Brass pressure regulating valve, diaphragm operated, with compression/threaded joints, Max. Inlet Pressure: 5 bar and adjustable outlet pressure between 1 and 2 bar and complying to European standard.				
D	*Dia. 25 mm*	*nr.*	*1*		
	Public Health & Allied Works S10 - Cold Water Installations	**17**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	SIXTH FLOOR				
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN10, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
A	*Dia. 25 mm*	*m*	*34*		
B	*Dia. 20 mm*	*m*	*8*		
	Equipment & Accessories				
	Brass isolating/stop valves with stainless steel lever (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, with compression/threaded joints to the cold water uPVC tubing and hot water c-PVC tubing.				
C	*Dia. 25 mm*	*nr*	*3*		
	Brass pressure regulating valve, diaphragm operated, with compression/threaded joints, Max. Inlet Pressure: 5 bar and adjustable outlet pressure between 1 and 2 bar and complying to European standard.				
D	*Dia. 25 mm*	*nr.*	*1*		
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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	ROOF FLOOR				
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN10, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
A	*Dia. 50 mm*	*m*	*7*		
B	*Dia. 25 mm*	*m*	*12*		
	Equipment & Accessories				
	Brass isolating/stop valves with stainless steel lever (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, with compression/threaded joints to the cold water uPVC tubing and hot water c-PVC tubing.				
C	*Dia. 50 mm*	*nr*	*2*		
D	*Dia. 25 mm*	*nr*	*1*		
	Bronze stainless steel spring loaded non return valve to BS 5154 with flanged connections, as appropriate, of make similar or equivalent to Hattersley for cold water supply.				
E	*Dia. 50 mm*	*nr.*	1		
	Drain off cock (ball type-lever operated) to BS 5154, of make similar or equivalent to Hattersley and BS Kitemark, of European standard with compression/threaded joints to the uPVC tubing fix on main water header				
F	*DN 20 mm*	*nr.*	*1*		
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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		**Bill No. 2.1**		**Public Health and Allied Works**	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	Heavy duty Brass diaphragm pattern ball float operated valve to BS1212-2, of make similar or equivalent to Hattersley, as described and specified to match the water feed pipe inlet dia.				
A	*DN 90 mm*	*nr.*	*1*		
B	*Water level sensor with indicator and alarm panel for watertanks. c/w overflow warning alarm device with sounder.Alarm panel to be c/w cabling to monitor the following:* *- Low Level (Dry Running of pump set)* *- Overflow* *- Warning* *- Water Level*	*set*	*1*		
	Hose union pattern, brass finish bibtaps of European standard and BS Kitemark, similar or equivalent to "PRESTEX bibtaps, pattern no. 141HU FGK" with compression/screwed joints to the copper tubing (Provisional)				
C	*Dia. 20 mm*	*nr*	*2*		
D	*New cover in galvanised metal sheet & tube of dimension 900 x 900 mm to be installed for roof tank*	*nr*	*1*		
	RISER				
	Cold water pipes running Surface mounted				
	uPVC pipes for cold water distribution to the floor to BS EN 1452, straight, dark grey, PN16, solvent-welded, running on surface and inside riser ducts, supported with pipe clamps of make Sikla Ratio LS with minimum M8 threaded rod connections and bolt anchors at specified intervals c/w sleeves thru beams, walls & floor slabs, couplings, temporary protection during construction, uPVC PN10 pipe fittings including bends, elbows, tees, couplers, reducers, adaptors, elbows, nipples, swivel nuts, stop ends, connectors, couplings and the like with solvent-welded joints to uPVC tubing, pipework supports, coding and labelling, related accessories, all as described and specified, of make similar or equivalent to PPP.				
E	*Dia. 50 mm*	*m*	*31*		
	Public Health & Allied Works **S10 - Cold Water Installations**	**20**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		**Bill No. 2.1**		**Public Health and Allied Works**	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	Sundries				
A	*Contractor to allow a sum for all civil works related to the execution of the new public health works as described in this section. This includes cut-outs in existing blockworks, slabs, etc., coring in existing slabs and walls, protection of existing flooring and walls against inpact of falling debris as a results of these civil works, carting away of debris, making good of newly perforated walls and slabs with appropriate in-situ formworks for fine finish, paint touchups, and the like works.*	*sum*	*1*		
B	*Testing and commissioning of the whole of the system in accordance with the specifications and demonstration / instruction of operation to the client.*	*item*	*1*		
C	*Purpose made pressure pipe sleeves at least PN10 rated of non-combustible material through walls, floors, ceilings for supply pipes & Fire proof barriers with intumescent material for all pipe perforations and penetrations through walls/slabs.*	*item*	*1*		
D	*Intumescent fire proof stopping compounds to BS 476-22, barriers, seals, mortar, mastic with fire-rated material for all pipe perforations and penetrations through walls/slabs/ceilings of make similar or equivalent to Astroflame and of European Origin.*	*item*	*1*		
E	*Pipework and Valve Colour Coding Identification in strict accordance to BS 1710 - Identification of Pipelines & Services and as specified.*	*item*	*1*		
	Public Health & Allied Works S10 - Cold Water Installations	**21**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
4	**S60-FIRE HOSE REELS**				
	Preambles:				
	This section represents the installation of fire hose reel to BS 5306-1 & BS 671 comprising of GMS pipework and fire hose reels to provide water at suitable pressure for first-aid fire fighting purposes by the occupants of the building.				
	All hose reels shall be of swinging type. Hose reels shall be supplied with 30m hose length of diameter 25mm and a combination jet/spray discharge pattern nozzle of 6.35mm.				
	Fire hose reels shall be fed from the water tank in the basement, through the combined potable and fire hose reel pump set in the pump room.				
	The surface mounted pipe shall be of GMS material and running surface mounted. Underground pipe shall be of HDPE PN16 rated pipe.				
	All quantities are provisional and shall be subject to remeasurement after execution of works.				
	Surface mounted Pipelines				
	Medium weight galvanised mild steel pipework to BS 1387 with welded joints to BS 1965 galvanised after manufacture for pipe sizes up to 50 mm diameter and galvanised mechanical grooved fittings with earth continuity clip of make Victaulic for pipe sizes from 65 mm diameter to above, supported horizontally with Clevis hangers of make Sikla Praktica S and vertically with pipe clamps of make Sikla Ratio LS with minimum M12 threaded rod connections and bolt anchors at specified intervals c/w all related accessories & pipe sleeves through beams.				
A	*DN 50 mm (inside Riser)*	*m*	*30*		
B	*DN 25 mm*	*m*	*20*		
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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
A	*Fire Hose Reel to BS EN 671-1 and BS 5306-1, manually operated, swinging recessed mounted, maximum 10 bar inlet pressure, 25 mm inlet valve connection of make similar or equivalent to Chubb with 30 m length non-kinkable red hose, 25mm hose diameter, 6.35 mm jet/spray chrome-plated brass nozzle conforming to BS 5274, brass nozzle interlocking valve and related accessories, all as detailed and specified.*	*nr*	8		
B	*Supply and installation of semi-rigid Photoluminescent PVC fire signs on Perspex background screwed to background concrete to BS 5499. (Laminated PVC sheet incorporating a photoluminescent layer backed by a rigid white reflective substrate and protected by a tough, clear gloss PVC film, Thickness: 1Amm) Flammability: inherently fire retardant. Luminance performance: in excess of 23mcd/m' @ 10 minutes and 3mcd/m' @ 60 minutes.*	*nr*	*8*		
	Pipeline Ancillaries				
C	*Brass automatic air relief valve and stop valve, DN 50 mm fixed on hose reel pipe termination.*	*nr*	*1*		
	Sundries				
D	*Contractor to allow a sum for all civil works related to the execution of the new public health works as described in this section. This includes cut-outs in existing blockworks, slabs, etc., coring in existing slabs and walls, protection of existing flooring and walls against inpact of falling debris as a results of these civil works, carting away of debris, making good of newly perforated walls and slabs with appropriate in-situ formworks for fine finish, paint touchups, and the like works.*	*sum*	*1*		
E	*Puddle flanged sleeves and masking plates for pipe penetrations through walls, and slabs.*	*item*	*1*		
F	*Intumescent fire proof stopping compounds to BS 476-22, barriers, seals, mortar, mastic with fire-rated material for all pipe perforations and penetrations through walls/slabs/ceilings of make similar or equivalent to make Astroflame.*	*item*	*1*		
	Public Health & Allied Works S60-Fire Hose Reels	**24**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
A	*Any other required equipment/accessories in order to complete the installation as detailed in the specifications, as shown on drawings and as detailed in public health schedules*	*item*	*1*		
B	*Pipework and Valve Colour Coding Identification in strict accordance to BS 1710 and BS 4800. The colour coding band and marking paint used shall be an approved two-pack high-gloss polyurethane paint product. The bands and markings shall be applied in two coats.*	*item*	*1*		
C	*Allow a provisional sum for any additional accessories as may be required by the Government Fire Services (GFS) Mauritius*	*sum*	*1*	*100,000.00*	*50,000.00*
	Public Health & Allied Works S60-Fire Hose Reels	**25**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
	Section S60- Fire hose reels				
	Collection for Section S60				
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	Public Health & Allied Works S60-Fire Hose Reels	26		**Carried to Main Collection Page**	

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
5	**S72-PORTABLE FIRE EXTINGUISHERS**				
	Preambles:				
	This section represents the supply and installation of portable CO2 and ABC powder fire extinguishers to be used by the occupants of the building as first-aid fire-fighting means as shown on S60/S72 drawing series.				
	All portable extinguishers shall be of European origin and must comply to BS 5423, BS EN 3 & BS EN 12416-2.				
	The location of these fire extinguishers shown in the S72 drawing are for guidance only. The contractor will liaise with and convene the Fire Services on site during implementation to have the exact location of these extinguishers. The contractor will also undertake all necessary liaisons with the Fire Services until the granting of the final clearance.				
	All quantities are provisional and shall be subject to remeasurement after execution of works.				
	Equipment				
A	*4 kg portable Carbon Dioxide (CO2) fire extinguisher with minimum 3 m shooting range, 20 secs discharging duration, 55 Bar working pressure and s/steel wall bracket, similar or equivalent to make Chubb.(Carbon dioxide shall be in accordance with BS 5306-4.)*	*nr*	*16*		
B	*4 kg portable ABC fire extinguisher with minimum 3 m shooting range, 12 secs discharging duration, 14 Bar working pressure and s/steel wall bracket, similar or equivalent to make Chubb. (Carbon dioxide shall be in accordance with BS 5306-4.)*	*nr*	*16*		
C	*200 x 80 mm photoluminescent fire extinguisher identification signs incorporating graphical symbols for classes of fire from BS EN3.5: 1996: ABC with minimum 10 m viewing distance.*	*nr*	*16*		
D	*200 x 80 mm photoluminescent fire extinguisher identification signs incorporating graphical symbols for classes of fire from BS EN3.5: 1996: CO_2 with minimum 10 m viewing distance.*	*nr*	*16*		
	Public Health & Allied Works S72-Portable Fire Extinguishers	**27**	**Carried to Collection Page**		

PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
A	*FIRE ACTION NOTICE' signage to give instructions to building occupants of what to do in the event of fire as detailed in schedule.*	*nr.*	*16*		
	Sundries				
B	*Liaison and coordination with the Government Fire Services Dept including organizing site visits & meetings, submission of three sets of Architectural drawings, fire alarm and fire fighting drawings, fire strategy report and relevant test certificates so as to obtain Building Fire Certificate.*	*item*	*1*		
C	*Preparation of drawings including evacuation plan, fire safety related signages, fire fighting equipment and alarm deviceson single drawing for submission to fire services.*	*item*	*1*		
	Public Health & Allied Works S72-Portable Fire Extinguishers	**28**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	Description	Unit	Qty	Rate	Amount
	Section S72- Portable fire extinguishers				
	Collection for Section S72				
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	Public Health & Allied Works S72-Portable Fire Extinguishers	29	**Carried to Main Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	**Description**	**Unit**	**Qty**	**Rate**	**Amount**
6	**TESTING AND COMMISSIONING**				
	Preambles:				
	This section shall allow for the testing, commisioning, handing over and maintenance of the public health works as detailed in this bill.				
	The contractor is responsible to check the installation, set the equipment to work and set up the control system to ensure that everything works correctly in accordance with the system design intent. Provide full documentation on the system installation, components and control.				
A	*The contractor will allow for a full and comprehensive testing and commissioning of the installations including any equipment properly calibrated, materials, qualified personnel that will be required in line with the specifications and preliminaries and general requirements. The contractor will allow in his quote for witnessing AND assisting the testing and commisioning works for the complete system after completion of the works*	*item*	*1*		
B	*Training/ demonstration/ instruction of operation to the client/ facility manager/ personnel for a period of three days. Schedule of training to be provided.*	*item*	*1*		
C	*Allow for labelling of all pipework, accessories and the like in accordance with specifications. Allow for sealing of sleeves through fabrics for all services. Allow for fire proof barrier of 3hrs fire resistance around all pipework through holes, sleeves and openings.*	*item*	*1*		
	Public Health & Allied Works Testing & Commissioning	**30**	**Carried to Collection Page**		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD.					
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1		Public Health and Allied Works	
Item	Description	Unit	Qty	Rate	Amount
	Section - Testing & Commissioning				
	Collection for Section T&C				
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	Public Health & Allied Works Testing & Commissioning	31	Carried to Main Collection Page		

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PRO-DESIGN ENGINEERING CONSULTANTS LTD			
REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD		Bill No. 2.1	Public Health and Allied Works
Collection Page			
Item	**From Section**	**Page Nos.**	**Amount MUR**
1	C10/C20 - REMOVAL OF COMPLETE SYSTEMS & DEMOLITION	5	
2	R11/12 - FOUL DRAINAGE ABOVE/BELOW GROUND	7	
3	S10 - COLD WATER INSTALLATIONS	22	
4	S60-FIRE HOSE REELS	26	
5	S72-PORTABLE FIRE EXTINGUISHERS	29	
6	TESTING AND COMMISSIONING	31	
	Total to Main Summary		

PRODESIGN ENGINEERING CONSULTANTS LTD

REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Main Summary of Tender

Item	Description	Amount
Bill No.1	Preliminaries & General Requiremnts	Rs.
Bill No.2.1	Public Health and Allied works	Rs.
	Provide the sum of MUR 250,000.00 for Contingencies to be expended or deducted in whole or in part at the discretion of the Engineer/Employer.	Rs. 250,000.00
	Total Amount of Fixed Price Tender exclusive of Value Added - Tax (VAT) Carried to Form of Tender	Rs.

Amount in Words: ……
……..……
…… excluding Value Added Tax (VAT)

Dated this…….. Day of ……2023

Signed…….....

Name…….....

In the capacity of…….....

Duly authorised to sign on behalf ……
……

PREAMBLE TO SPECIFICATION

Table of Content

REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

1. PREAMBLES TO SPECIFICATIONS

1.1. Specialist Installations and Supplies:

Where specialist installations and supplies are specified for particular plant or equipment, they shall be completed in accordance with the specification and integrated with all other Works.

The Contractor shall submit maintenance and call out details with the tender, and as requested by the Engineer. Call out periods shall be appropriate for the system/item supplied and its usage as determined by the Engineer.

The Contractor shall submit full commissioning details which shall clearly indicate when support services are to be available and shall agree with the Building Services Contractor time periods in accordance with the main programme.

1.2. Ordering of Materials and Equipment

The Contractor shall:

Require every effort to be made to obtain materials and delivery to accord with the work programme and avoid delays by the early placing of orders following instructions to proceed.

Shall include for submission of alternatives for the Engineers consideration if the possibility of delay exists.

1.3. Materials and Workmanship

The Contractor shall allow for all plant and material to be new, undamaged, free from corrosion, not sub-standard and conform to the requirements of the specification.

Where quality or standard of materials are not specified, they shall be of adequate quality and equivalent standard to specified items.

The contractor shall allow for all work to be carried out by competent staff in an expeditious and workmanlike manner under skilled supervision.

All equipment supplied under this contract shall be fit for its purpose and suitable for the type of application, environment and building where it is installed. All equipment and plant shall be suitable for the office building and clean environment. They shall withstand the variation of temperature and other atmospheric conditions prevailing in Port Louis without affecting their performance and causing any distortion, deterioration or setting up of undue stresses in any part.

All exposed metal works shall be hot dipped galvanised before installation.

Equipment which are easy to maintain shall be selected.

1.4. Inspection and Measurement of Work

The contractor shall include all assistance necessary to enable the Engineer to examine or measure the Works with no section of the Works covered concealed or insulated prior to completion of a witnessed satisfactory test.

The Engineer shall require 15 days' notice to be given when Works which are to be covered or concealed are ready for examination and/or measurement.

The Contractor shall keep on site a full set of testing and measuring equipment for the whole of the works. These shall include but not limited to Insulation testers, multimeters, sound level meters, lux meters, flow meters, thermometers, earth loop testers, soil resistivity testers, tachometers.

1.5. Building in Occupation

The contractor shall be required to comply with any `permit to work' system in operation on the premises.

The contractor shall include in the Tender for carrying out work in existing buildings shown on the relevant drawings whilst the buildings are occupied by staff and/or patients unless otherwise specified.

The Contractor shall take all reasonable steps to keep noise to a minimum particularly in the proximity of patients and staff.

1.6. Existing Engineering Materials

The Contractor shall be required to comply with all of the requirements of Environmental Protection Act 2002 and associated regulations. The contractor shall comply with the guidance given in "Waste Management - The Duty of Care - A Code of Practice" (HMSO 1991 - 1996 Revision).

1.7. Dimensions

Where plant or equipment is to be installed within or close to existing buildings or structures, the site dimensions shall take precedence over dimensions shown on the Contract Drawings or supplied under the Contract, with any discrepancy found drawn immediately to the attention of the Engineer.

1.8. Protection and Storage

The Contractor shall include for adequate and safe storage for all material plant and equipment necessary in respect of own Works.

Purpose made racks for storage of conduits, pipes and similar materials shall be provided to prevent bending and distortion. It shall include purpose made end caps to protect threads, nozzles etc.

The contractor shall include protection by means of paint, tallow or grease for bright and machined surfaces and cleaning and polishing immediately before handover.

Suitable racks and storage for plant, equipment, and materials unable to be stored in huts or buildings shall be provided on site.

The Contractor shall include protection for electrical cables and seal cable ends using methods and materials recommended by cable manufacturers.

Plant and equipment shall be left in a condition ready for painting where specified as part of the work or by others. Parts liable to corrosion shall be painted immediately after removal of temporary protection.

The Contractor shall replace material, plant, or equipment where deterioration or damage has occurred prior to handover.

1.9. Position of Plant and Equipment and Installation to Drawings

Plant and equipment shall be positioned in accordance with the drawings scheduled in the specification which show the layout arrangement and equipment but may not detail the whole work involved and are diagrammatic in certain particulars.

Notwithstanding the provision of the drawings, positions shall be determined by dimensions and particulars taken from site for the work specified.

Installation drawings based on the latest available information shall be submitted for the Engineers consideration at a reasonable time before work is commenced. This shall be under no circumstances be less than 7 working days.

The Contractor shall give due consideration to all services detailed on co-ordination and zoning drawings where provided with the specification.

The Contractor shall provide for contractual distribution of all information and drawings necessary to achieve complete co-ordination. He shall incorporate in his work information provided similarly by other trades and specialist suppliers like medical equipment, public utilities, and the like. The Contractor shall be responsible for the production of coordinated shop drawings including reflected ceiling plans and the like based on the latest architectural and internal designer's layouts. These drawings shall give due regard to the needs of inspection, efficient maintenance, and replacement.

1.10. Positions of Outlet Points

Where detailed integrated layout drawings have not been issued with the tender, the contractor shall allow for fixing outlet points up to 1.5 metre from the position specified or shown on the drawings at no extra cost.

1.11. Alternatives

Alternatives to the make or models specified shall be accepted only when they conform to the same intent, specifications, origin, standards, design, the same details of coordination and be compatible with other elements of work (services or other trades). The cost of such an exercise and/or any subsequent costs arising due to the same purpose directly or indirectly, or due to the changes induced to other equipment and/or work of other trades shall be borne by the Contractor and under no circumstances form any claim.

1.12. Samples for Approval

Samples shall be submitted for the Engineer's consideration and comprise such samples of workmanship, materials and equipment intended for execution of the Works as the Engineer considers necessary. Samples will remain in the possession of the Engineer until contract completion or be embodied in the installation. Mock-ups shall be produced with the samples provided if requested by the Engineer, free of charge.

Samples shall be submitted in sufficient time to allow the Engineer to Consult the Architect or Client representative for approval and comments. The Contractor shall allow for samples to be submitted in the RAL colours requested by the Architect.

The Contractor shall be responsible for the submission of alternative samples until the approval of the Architect and or the Engineer is obtained.

1.13. Technical Submittals

Technical documentation in 3 coloured copies shall be issued for approval to the Engineer for each item of plant and equipment prior to ordering.

Submittal shall highlight the proposed model, demonstrate that it complies to the specified standards, show how selection was undertaken, include noise and efficiency data etc for the Engineer to assess and approve.

The Contractor shall highlight any impact on the design and performance specifications issued by the Engineer by the plant or equipment being proposed.

Alternatives to the specified systems shall not be considered after the tender is awarded.

1.14. Working in Confined Spaces

The attention of the Contractor is drawn to the fact that he may be required to work in confined spaces within the existing building. He shall ensure that a detailed risk assessment is conducted and that the works are carried out by competent persons.

Such works shall be undertaken in accordance with an appropriate 'Permit to Work' procedure where such procedure is in operation on the site. If no 'Permit to Work' System is in operation, it shall be undertaken only after full investigation and resolution of the following matters has been completed and the Engineer informed in writing of the proposals.

- Assessment of the task to be undertaken.
- Identification of the hazards of the task.
- Decision on methods of working to avoid hazards.
- Implementation of a system of work to incorporate these methods.
- Monitoring of the operation of the system of work.

The contractor shall ensure that before commencing work and before personnel enter the space, it has been demonstrated to be safe by testing that no toxic or asphyxiated gases are present and that adequate oxygen levels are present. This shall include an assessment of the likelihood of the conditions remaining as found, the impact of any materials or equipment to be taken into the confined space or found there (deposits, sludge, residues etc.) and the possibility of any hazardous gases or vapours being able to enter the space.

Working in confine space shall be restricted to trained personnel only. It shall be undertaken after consideration of the following: -

- the provision of safe means of access and egress;
- the presence of personnel to keep watch outside;
- the provision of effective communications between personnel inside and outside;
- the provision of suitable protective equipment, including harnesses if possible and self-rescuing breathing apparatus if appropriate;
- the availability of gas detection equipment and staff trained in its use;
- a means of effecting a rescue in the event of an emergency.

1.15. Method Statements

The contractor shall include for preparing detailed method statements and risk assessments prior to undertaking major work packages or work to existing services. This shall include a detailed method statement for the overall project to address the problems of programming, completion to suit specific contractual requirements. It shall address the following issues with regard to each activity.

- Health and Safety
- Method of working
- Programme
- Enabling Works
- Specialist attendances/tools/materials
- Work required by third parties
- Quality assurance
- Contingency measures (i.e., failure of break-in or ability to bring existing service back on-line in accordance with programme)
- Permit to work system

The Contractor shall submit the method statements/risk assessments to the Engineer and site representative within a reasonable time prior to undertaking such work for comment, where applicable. Copies shall be forwarded to client's representative i.e. Energy Services Division. Where requested, the method statements/risk assessments shall be prepared and submitted to the Main Contractor when required for incorporation into the Health and Safety plan.

1.16. Testing of Equipment at Manufacturer's premises.

The Contractor shall arrange for the Engineer to inspect and test / witness tests of equipment at the manufacturer's factory wherever provided in the Bills of Quantities.

The Contractor shall provide the Engineer with fully flexible business class air tickets, accommodation, land transportation and bear all subsistence costs during the stay of the Engineer at the Manufacturer's factories. The Engineer shall be notified well in advance of the proposed dates for such visits and the exact dates of travel shall be at the sole discretion of the Engineer. The Engineer may delegate his representative to attend these tests on his behalf. The Engineer may request the Contractor to provide multiple economy class tickets in lieu of business class tickets if more than one person is to attend these tests.

1.17. Contractor Design and Coordination responsibilities

The Engineer has based his design on specific equipment data based on manufacturers as generally specified in the tender document. The Selection of specific and alternative equipment shall impact on the design and the Contractor shall be responsible for completing the design to take account for these plant selection and alternatives. The following shall be designed and coordinated by the Contractor:

- Brackets, supports and suspension systems-
- Acoustic treatment to meet noise criteria specified
- Resizing of ducts and other services if necessary for spatial coordination based on the design and commissioning information provided by the Engineer.
- Expansion and contraction.
- Interfaces and connections to other equipment and BMS.
- Steel walkways, cat ladders, stairs, handrails and the like in connection with plant and equipment for access and maintenance.
- Plant, equipment, and systems to meet performance criteria where specified.

1.18. Connections to Existing Services

The contractor shall include specified new connections into existing services with, unless otherwise stated, the buildings being assumed to be in full commission.

Works shall be carried out in a manner that does not interfere with the routine working of the buildings and in accordance with the programme for the Works.

The contractor shall include for isolating and reconnecting as required for the permanent and/or temporary connections and making good insulation and decoration affected by the Works.

The contractor shall not isolate any equipment or section of any existing service unless the time and date of isolation has been agreed, via the site procedure for isolation.

The Contractor shall ascertain site procedure for isolations and shall note that on some sites and some systems isolations may only be carried out by site engineers.

The Contractor shall bring to the attention of the Engineer before commencing work if the condition of the existing services is not considered satisfactory for connections to be made.

The identification, draining down, refilling, venting, and balancing of any disturbed piped services shall be allowed for and undertaken immediately after such pipes are disturbed.

1.19. Connections to Appliances

The contractor shall allow for technical co-ordination of connections to all plant and equipment specified and for disconnecting and reconnecting of existing items requiring moving.

1.20. Painting

Painting shall be in general compliance with the recommendations of BS 5493. It shall be where possible include for all installed material to have a factory paint finish and all damaged paintwork to be immediately made good. It shall include for the application of one coat of lead-free rust inhibiting primer on to thoroughly wire brushed and cleaned fabricated steel before erection. Damaged paintwork shall be made good after erection.

All engineering equipment and associated supports in external and damp situations unless intrinsically weatherproofed, shall be hot dipped galvanised.

1.21. Tools and Accessories

The contractor shall provide two complete new sets of any special tools and accessories required for correct running and maintenance of the plant, each set being contained in a steel toolbox fitted with a padlock and two keys. These tools shall be un-used prior to handover. Set of tools shall be provided for all major plant including but chillers, generator, AHU, Pumps, fans and any other such equipment requiring special tools for maintenance and repairs.

1.22. Electrical Interference and Suppression

Shall be provided on all equipment supplied or used for own Works to the requirement of BS 800: 1988 and Health Technical Memorandum 2014 to eliminate interference with electrical, radio and television equipment.

1.23. Deleterious materials

None of the following deleterious materials shall be provided for the works:

- Asbestos based products.
- Calcium silicate bricks or tiles.
- High alumina cement.
- High alkali cement not conforming to British standards.
- CFC's or any product using CFC's in its manufacture.
- Chloride based mixtures unless they comply with BS 8110: Part.1.
- Glass fibre reinforced concrete.
- Timber which is not obtained from a managed regulated sustainable source.
- Lead, except where particularly specified for connection to existing cast iron drainage pipes.
- Asbestos substitutes or any naturally occurring or manmade mineral fibres (including rock-wool or slag wool) with a thickness of 3 microns or less and a length of 200 microns or less or which contain any fibres not sealed or otherwise stabilised to prevent migration of fibres.
- Vermiculite plaster.
- Urea-formaldehyde polyurethane, isocyanurates, polyisocyanurates in foams or materials which may release gases in quantities which may be hazardous, with reference to the limits set from time to time by the Health and Safety Executive.
- Polytetrafluorethylene (known as PTFE) except when used as non-stick sealing with valves or as an isolating tape.
- Materials, which emit Radon gas.
- Other substances which, at the time of Tender, have been publicised by the Health and Safety Executive, Building Research Establishment, British Standards Institution or other Specialist Authority as being deleterious to Health or Safety, shall not be incorporated into any part of the Works.

1.24. Noise Attenuation

Sound attenuation equipment and materials shall be provided to prevent transmission of sound through ducts, pipework and structures as specified in the subsequent sections of the specifications.

The Contractor shall ensure that all tools and equipment being used for the works are fitted with silencers and attenuators so as not to cause any disturbance.

1.25. Guards

Safety guards shall be provided to all moving parts of machinery in accordance with the requirements of the Health and Safety at Work Act. They shall comply with BS 5304 and provide easy access for maintenance together with access to shaft ends for tachometer attachment.

1.26. Plant Drives, Pulleys and Keys

Flexible couplings for flange and vee belt drives for pulleys shall be provided where appropriate. Flange or pulley drives on motors, fans and pumps shall be truly balanced and secured in position by shaft keys or patent locks readily accessible for withdrawal or adjustment.

1.27. Fixing Building Services, Plant, etc to the Building Fabric

No plant or equipment shall be fixed to the building fabric without the approval of the Structural Engineer

All fixing supports, gantries, secondary steel works, channels etc shall be designed by the contractor.

All supports, brackets, clamps, fixings etc that are required for a complete installation, whether or not shown on the tender drawings, shall be provided.

Support to heavy equipment shall be designed by a qualified structural Engineer and all relevant calculations shall be submitted for approval to the Consulting Structural Engineer prior to any works being undertaken on site. These calculations shall be performed in a format to be agreed with the Consulting Structural Engineer.

All fixing elements and support systems shall be hot dipped galvanised after fabrication. Cold galvanising treatment shall be kept to strict minimum, only when on site welding was unavoidable.

All fixing shall be done with proprietary supports like MUPRO, SIKLA, CADDY or equivalent. Samples of all fixing shall be produced for approval.

1.28. Plant Bases and Anti-Vibration Mountings

It shall be ensured that all concrete bases for plant and machinery have a minimum perimeter clearance of 150mm, with each item of plant adequately fixed, supported and aligned, in accordance with the manufacturers' recommendations.

Holding down bolts, for all items of plant, including anti-vibration materials and mountings for units having rotating or moving machinery shall be provided. Anti-vibration material which is to be cast into plinths to have a waterproof membrane on both bearing surfaces and be handed to the building contractor before casting commences.

No equipment shall be solely supported by threaded rod or any resilient support. All plant, equipment, ducting, systems and the like shall be supported with rigid brackets and supports at regular interval in addition to any resilient supports. Anti vibration pads shall be provided between all system and the rigid support.

No part of the pipework, ducting, trays or other engineering services shall be used as support system for other engineering installations. Equipment shall be supported independently of such systems.

All equipment shall operate without any undue vibration being imparted to other or adjacent systems.

1.29. Lubrication

Lubrication shall comprise the supply and servicing of plant and machinery with lubricants to the manufacturer's recommendations before attempting to operate, ensuring lubricant levels are correct and providing a list of the manufacturer's recommended lubricants. This shall include the supply of lubricant dispensers for each pattern of nipple and cup fitted.

Shall be where necessary for purposes of servicing, include extension pipes with lubricant nipples.

1.30. Bonding and Earthing

The Earthing and bonding shall include all necessary materials and connections as described in the drawings and schedules to ensure that all installations and equipment are efficiently and continuously bonded to an earthing system at all times, in accordance with the IEE Wiring Regulations (BS 7671 - Requirements for Electrical Installations).

1.31. Spare Parts

The Contractor shall furnish all spare parts required and recommended by the supplier for the proper running and maintenance of the plant and equipment supplied. Full list of these spares shall be submitted with the tender.

Spares shall be ordered at the same time as orders are placed for the plant and equipment and raise for consideration any spare items which should be added to the Schedule of Spares.

All spares shall comply with the plant specification and be interchangeable with the corresponding parts on the plant.

Parts shall be numbered and described for identification and prepared for storage by protective enclosures and/or greasing or painting.

The Contractor shall produce delivery notes and ensure these are signed by the client’s representative for all spares and tools handed over. Posting or delivery to site of any items without obtaining evidence that they have been received by the client’s representative may result in further spares being required at no additional cost to the contract.

1.32. Colours of Indicator Lights, Push Buttons, Annunciators and Digital Readouts

Shall conform to the conventions of **BS EN 60073**.

1.33. Handover

The Commissioning and Testing is an important and lengthy task to be undertaken prior to handover of a completed project. The contractor shall prepare and submit a Commissioning Programme as part of the Contract Programme, in conjunction with other contractual parties and with agreement of the Engineer, to describe the commissioning/demonstration and instruction Procedures, dates and personnel involved. The Programme to be agreed and distributed at least six weeks before commissioning is due to commence.

The contractor shall make arrangements to enable the Engineer or his representative to witness tests, or test and inspect at site or at the manufacturer's premises. The equipment to be tested at factory premises are indicated further in the specifications. As a general guidance they include the Chillers, Air Handling Units, Standby Generators, Boilers, Main Low Voltage Panel, Fire Alarm Panel. The Contractor shall provide two fully flexible business class tickets to the Engineer and his delegated staff to witness these tests. Five days accommodation shall also be provided for two persons for each of these tests.

The Contractor shall appoint an approved engineer, from the contractor's own staff or an independent commissioning company, (known as the Commissioning Engineer) who is fully conversant with the operation of the Works and competent to supervise the whole of these procedures, which are to be carried out by persons fully trained in the operation of specialist installations and equipment.

The Engineer and his representatives to witness the proceedings, confirm the recorded results and determine whether the specified requirements have been met. The Engineer shall only witness final tests and commissioning procedures. Pre-tests and pre-commissioning procedures shall be undertaken by the Contractor under the supervision and control of the Main Contractor M&E coordinator.

The Engineer shall be given adequate written notice of the date and place of each (or series of) test, inspection, commissioning or demonstration procedure. Tests at manufacturer’s premises outside Mauritius shall be notified 28 days before.

All Testing instruments, meters and recorders shall be calibrated by an approved agency or the manufacturer before testing commence for this project. Any certificate issued 30 days prior to the date of commissioning shall not be considered and new certificates will have to be produced.

The Contractor shall provide within his price for all labour, materials including fuel and energy and apparatus required for carrying out the testing, commissioning.

All testing and commissioning shall be undertaken prior to handing over.

1.34. Testing

The Contractor shall include the provision of a separate set of drawings and/or report sheets to be used to accurately record the following test and inspection information: -

- Plant, section and installation under test.
- Manufacturers reference number where applicable.
- Date, time, duration of test (and weather conditions if appropriate).
- Test results with itemised readings including records of all other checks and tests.
- The Contractor shall allow for the testing of all equipment, material and services installations as detailed elsewhere in the specification and if the first inspection or test fails, repetition of the procedure within a reasonable time, adhering to the time cycles and other requirements as specified for the first test.
- All tests shall be completed before any paint, cladding or similar materials are applied or before services are concealed.

The Engineer will: -

- Give twenty-four hours written notice of his intention to be represented at the test.
- If he decides after inspection or testing, that such plant or any part thereof is defective, or not conforming with the specification, reject such defective parts by written notice within a reasonable time, indicating the area of dispute.
- If he considers the tests are being unduly delayed, arrange for instructions to carry out the tests within 10 days.

1.35. Commissioning

Commissioning shall be following satisfactory completion of the foregoing tests and when the installation is in a safe and satisfactory condition, include for setting it to work and regulation and adjustment as necessary to the design requirements.

Commissioning shall in general terms include the following procedures:

- Shall be setting to work all systems as specified and ensuring that the performance requirements have been achieved.
- Shall be balancing and regulating all systems to meet specified performance requirements.
- Shall be making final adjustments and before practical completion, demonstrating by commissioning procedures detailed elsewhere in this specification, that the provisions of the contract have been met in total by completing the previous testing and setting to work procedures and by showing that the completely integrated installation will function in accordance with the specified performance requirements.
- Shall include records of all test results on the sheets provided, completing all commissioning documents and at all stages ensuring that the Engineer has certified the documents and/or arranged for instructions for any remedial work.

1.36. Commissioning Procedures

The Contractor shall ensure that the following requirements are observed when, commissioning the engineering works: -

- Progressive static testing will be witnessed by the Engineer(s) when the work is presented as ready for testing. This will include Insulation Resistance Tests, Earth Continuity Tests, Water, Gas Pipeline and Air Ducting Tests.
- The Contractor shall complete all pre-commissioning examination and testing to ensure that each system or item of equipment is complete, in a safe condition and all notices displayed before the Engineer (s) are convened for the final testing and commissioning. Completion for operational purposes implies the bulk of the snagging of work has been offered to the Site Engineer(s) and remedial work completed. All fans, pumps etc., will have been checked for operation and all polarity testing, phase sequence testing, loop impedance testing etc., carried out.
- The Engineer, Site Engineer, Commissioning Adviser and other members of the contractual team to discuss the Commissioning Programme (previously prepared) take account of any problems arising, availability of related services, agree access required for controls, agree documentation to be used and adjust programme as necessary for a clear understanding of the position.
- Demonstration of agreed systems and equipment to the programme to be witnessed on behalf of the Employer/Client by the Commissioning Adviser/Site Engineer/Engineer and results examined for final acceptance.
- Instructions to the users staff to be completed by handover.
- Any outstanding final acceptance testing such as for sterilisers, theatre extract/flow systems, boilers, refrigeration and generators are to be listed and dates agreed in the defects liability period when reasonable demands for consumer requirements are available.
- All commissioning shall be undertaken in compliance with the CIBSE Commissioning codes and the BSRIA commissioning manuals. Example pro formas contained in the BSRIA commissioning codes shall be used for all checking, verification, pre-commissioning and final testing and commissioning. The Contractor shall purchase and keep a copy of all these commissioning codes on site for consultation.

1.37. Instruction Period

The Contractor shall, on completion of an installation (or part of) as the programme dictates, the provision by the Engineer of the names of the user Health Authority staff to be involved, in the operation and maintenance, before planning, preparing and formally recording arrangements for the instruction period.

This Shall include instructing the Health Authority's staff in the safe operation and maintenance of all systems and items of equipment and where necessary running, maintaining and supervising, in each case under normal working conditions, for an adequate and reasonable period of time based on manufacturer's recommendations, or alternatively at the manufacturers' works.

1.38. Handover Procedures

The contractor shall prepare the following mechanical or electrical documents to be available not less than one month before Practical Completion of any part of the Contract. It shall include for incorporating the following documents into one or more volumes of durable finish service manuals, with format and contents agreed with the Engineer. Three sets to be provided on completion.

- Index of Contents
- Description of Design Intent & Operational Policy
- Commissioning Documents and Reports
- Manufacturers Operation/Service & Maintenance Manuals
- Manufacturers Spares List & Ordering Procedure
- Operational & Maintenance Routines, Procedures for Fault Finding
- Line Diagrams of Plant Control Systems & Descriptions of Control Operation incorporating all set points.
- Schematic Layouts locating Valves, Switches etc. to Incorporate all Equipment Identification Numbering
- Schedule of Installed Equipment with Specific Commissioned duties
- Description Working Drawings for each main item of plant/equipment, showing safety features etc.
- Emergency call-out service - personnel & telephone contacts
- Copies of all charts posted elsewhere in building
- List of tools, keys & special requirements for handing over
- Guarantees, Test Certificates & Reports
- List of Record Drawings (drawings separately available)
- Health and Safety plan

The documents shall be provided in 3 hard copies and 3 sets of CD.

1.39. Record Drawings

The Contractor shall modify the installation drawings as necessary to record the “as installed” changes which may have occurred and thus form the basis of the final “As Fitted” drawings.

The record drawings which shall be available not less than one month before practical completion of any part of the contract.

The record drawings shall indicate to a suitable scale agreed by the Engineer (which shall be in any case not less than the tender or installation drawings or 1:50) the layout, identity, size and position of all services installed together with valves, control items, plant, conduit routes, lighting fittings, switches, socket outlets, distribution boards etc. The drawings shall show the results of all commissioning tests i.e. air-flow rates as measured at grilles, measured flow rates through calibrated valves, pumps or orifice plates, controls settings media temperatures etc. The size, type and length of each ELV, LV and HV cable (to the nearest metre) shall also be given together with the measured earth fault loop impedance where applicable. All fuse or breaker current rating shall be shown as well as all trip settings.

Inter connections between items of equipment, including those provided by others and terminal numbering and cable core identification of all alarm and control circuits shall be given. The drawings shall be amplified with schedules and/or diagrammatic presentation.

Particular attention shall be paid to the location and depth of buried services including those carried out for Gas, Water or Electrical system etc. Similarly, the drawings shall include all sub-letting and specialist works i.e. medical gases and ventilation ductwork etc., together with a schematic diagram of the application of automatic controls and instruments etc. The diagrams and drawing shall wherever possible have valves etc. marked to coincide with the marking of valves labels etc., called for in the relevant Sections of this Specification.

1.40. Valve Charts and Schematic Diagrams

A chart indicating valve references and identifying valve service and function shall be produced.

The Contractor Shall produce for each system, a schematic diagram indicating plant and its references, pipework/ductwork, commissioning settings, control components and their references, normal operating temperatures and pressures, filter dirty settings and other operational conditions.

Each diagram and valve chart shall be laminated and framed and permanently mounted in the relevant space in a clearly visible position.

1.41. Labelling & Fixing

Table 1: Labelling

Equipment	Colour & Size of Label	Colour & Size of Lettering	Title	Fixing Requirement	Label Material
VALVES	WHITE 80mm x 25mm	BLACK 4mm high		Brass ring fitted around spindle	Brass of ivorine
CONTROL PANELS	WHITE to suit nomenclature 80mm x 25mm	BLACK 6mm high		Brass round head screws	Ivorine, Perspex or laminate
THREE PHASE EQUIPMENT	RED 100mm x 80mm	WHITE 10mm high	DANGER 400 Volts	Brass around head screws	Ivorine, Perspex or laminate
SWITCHGEAR & DISTRIBUTION BOARDS	WHITE 100mm x 80mm	BLACK 6mm high	Circuits and apparatus-controlled cable size	Brass round head screws	Ivorine, Perspex or laminate

Equipment	Colour & Size of Label	Colour & Size of Lettering	Title	Fixing Requirement	Label Material
DISTRIBUTION BOARDS CIRCUIT CHARTS	-	-		Non-flammable transparent pockets sliding into metal channels on inside of cover	Typewritten chart indicating outlets controlled, circuit no, fuse and cable size
BUS BARS	Phase colours	-	-	At all cases points	PVC sleeving
ESSENTIAL SUPPLIES EQUIPMENT	WHITE	RED		As specified in Parts C and D	As specified in Parts C and D
GENERAL EQUIPMENT	WHTIE	BLACK		As specified in Parts C and D	Ivorine, Perspex or laminate

Table 2: Fixing Building Plant to the Building Fabric

Heavyweight equipment or equipment subject to vibration, shock or heavy handling	Normal strength brickwork, masonry and concrete	Dry	Expansion bolts or self-drill anchors
		Damp and/or corrosive	Galvanised or cadmium plated expansion bolts
	Normal strength brickwork, masonry and concrete	Dry	Expansion bolts
		Damp and/or corrosive	Galvanised or cadmium plated expansion bolts
	Poor brickwork, masonry or concrete in which it is difficult to drill neat fixing holes	Dry	Cement-in sockets or bolts
	Any material of low strength per unit area	Any condition	MS brackets and/or plates to spread the load. All brackets to be painted red lead primer and two finishing coats. Bolts to be galvanised, cadmium plated or normal to suit the conditions.
Any fixing and/or clips	Structural steelwork	Any condition	Clamps, finish of clamps and bolts etc. to suit the conditions. All brackets to be painted red lead primer and two finishing coats.

Equipment to be Fixed	Material	Environment	Fixing
Lightweight equipment subject to movement, excessive vibration, shock or heavy handling	Good brickwork, masonry and concrete	Clean, dry	Fibre or plastic plugs, steel woodscrews
		Clean, damp	Plastic plugs, brass woodscrews
	Normal strength brickwork, masonry and concrete	Clean, dry, high temperature	White bronze plugs, steel woodscrews
		Corrosive, any temperature	Proprietary white bronze plugs, cadmium plated steel woodscrews
	Brickwork and masonry with ragged or irregular holes	Any condition	Proprietary plugs compound and woodscrews to suit environment i.e.: - dry - steel damp - brass corrosive – cadmium-plated steel
	Good timber blockboard and plywood exceeding 12.5mm thick	Dry	Steel woodscrews
		Damp	Brass woodscrews
	Sheet and cellular material of high strength per unit area e.g. sheet steel, sheet aluminium, hollow concrete blocks, hollow clays blocks, plywood less than 12.5mm thick chipboard.	Any condition	Threaded brass/neoprene inserts, plated gravity toggles, plated toggles
	Sheet and cellular material of low strength per unit area e.g. building boards, plaster board, laminated plastic	Any condition	Plated gravity toggles, plated spring toggles

PUBLIC HEALTH SPECIFICATIONS

Table of Content

REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

PUBLIC HEALTH SPECIFICATIONS

1 General

1.1 Introduction

1.1.1 The project is the refurbishment of an existing office building located at Pope Hennessy Street Port Louis. The building, of approximately 4,400m2, comprises of a basement, ground floor, 1st to 6th floors, and space (technical office and room) at roof level. There is a technical block at ground floor at the back of the building forming part of the main building.

1.1.2 Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the Engineer (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances and the responsibility to provide a complete installation fit for its purpose-the purpose being an office building.

1.1.3 This specification sets out the standards of materials and workmanship for the project. All materials shall comply to the latest issue of the European Standards, or the Standards specified elsewhere in the Sections / Drawings or Bills of Quantities. All electrical equipment used within the contract shall primarily comply to the Requirements of BS 7671 and MS 63.

1.1.4 The installation shall include for all aspect of Health and Safety for those who are going to operate and maintain the installation.

1.2 Services description

1.2.1 Cold water mains

1.2.1.1 The incoming (potable) water to the building shall be connected to the existing plot connection, recessed in a valve box, and containing a smart water meter and pressure reducing valve.

1.2.2 Cold water services.

1.2.2.1 Distribution pipework on site to the building shall be in pressure rated HDPE PN10 pipe and uPVC PN10 for surface mounted pipes. Connection to sanitary ware shall be in PEX-A pipe cast in slabs running through protection sleeves. The Contractor shall terminate all cold-water services to sanitary wares as required.

1.2.2.2 All draw off points to sanitary appliances shall be fitted with flow restrictors to limit flow to 0.15 l/sec to WHB.

1.2.3 Drainage – general

1.2.3.1 The building foul drainage system shall be connected to the onsite manholes which shall be connected to the main external wastewater reticulation services.

1.2.3.2 All underground gravity sewer pipes shall be of uPVC SN8 material.

1.2.4 Drainage - soil, waste and vent installations

1.2.4.1 A separate soil and waste system shall be installed within the building to serve all sanitary ware. The above ground drainage system shall be installed concealed with rodding eyes provided at strategic location so that potential blockages can removed and easily accessible for maintenance.

1.2.4.2 All waste pipes from the building shall discharge to the soil network via gully traps on site. All soil, waste and ventilation pipework shall be in uPVC. The in-slab/ concealed pipework shall be in pressure rated uPVC PN10.

1.2.4.3 The sanitary ware shall be provided as per the Architect's schedule. The Contractor shall provide the soil and waste system, as necessary, to serve the sanitary ware provided, including terminating services to the sanitary ware.

1.2.4.4 All waste and soil pipes protruding roof shall terminate with a vent cowl at 900mm AFFL.

1.2.4.5 Jetting and pressure testing of the installation shall be included within this contract, including 'in-slab' drainage.

2 Common Public Health services

2.1 General

2.1.1 Scope

2.1.1.1 This specification covers the standard of materials and workmanship for the Public Health Services installations for the project. Particular specifications shall be described further in the specifications and in the schedules. This specification has to be read in conjunction with the Schedules attached.

2.1.2 Standard references

2.1.2.1 The materials, components and completed installations shall conform as applicable with the following Standards, including all amendments, current at the time of tendering. Construction products should comply with European Standards and Technical Specifications (ESTS). Wherever reference is made to a British Standard a corresponding ESTS (generally ISO series) shall be equally acceptable.

2.1.2.2 Where available all materials, equipment etc forming part, or whole, of the services specified in the Contract, should be obtained from BS EN ISO 9000 “Quality Assurance” certified manufacturers and preferably “kite marked” or EC equivalent.

2.1.2.3 The latest dates and amendments of standard references are given at the time of issue of this Section.

British standards

Pipes

BS 21: 1985	Specification for pipe threads for tubes and fittings where pressure tight joints are made on the threads (metric dimensions).
BS 534: 1990	Specification for steel pipes, joints and specials for water, gas and sewage.
BS 1387 1985	Specification for screwed and socketed steel tubes and tubulars and for plain end steel tubes suitable for welding or screwing to BS 21 pipe threads.
BS 2871	Specification for Copper and Copper Alloys. Tubes.
Part 2: 1972	Tubes for general purposes.
Part 3: 1972	Tubes for heat exchangers.

BS EN 1057: 1996	Copper & Copper Alloys - seamless, round Copper tubes for water and Gas in sanitary and heating installations.
BS 3505: 1986	Specification for unplasticised polyvinyl chloride (PVC-U) pressure pipes for cold potable water.
BS 3600: 1997	Specifications for dimensions and masses per unit length of welded and seamless steel pipes and tubes for pressure purposes.
BS 3601: 1987 (1993)	Specification for carbon steel pipes and tubes with specified room temperature properties for pressure purposes.
BS 4127: 1994	Specification for light gauge stainless steel tubes, primarily for water application.
BS EN 545: 1995	Ductile iron pipes, fittings, accessories and their joints for water pipelines – requirements and test methods.
BS EN 598: 1995	Ductile iron pipes, fittings, accessories and their joints for sewerage applications – requirements and test methods.
BS EN 969	Ductile iron pipes, fittings, accessories and their joints for gas pipelines – requirements and test methods.
BS 5391:	Specification for acrylonitrile-butadiene-styrene (ABS) pressure pipe.
Part 1: 1976	Pipe for industrial uses.
BS 5556: 1978 (1986)	Specification for general requirements for dimensions and pressure ratings for pipe of thermoplastics materials (metric series).
BS 6572: 1985	Specification for blue polyethylene pipes up to nominal size 63 for below ground use for potable water.
Flanges	
BS 1560:	Circular flanges for pipes, valves and fittings (class designated).
Part 3	Steel, Cast Iron and Copper Alloy flanges.
Section 3.1: 1989	Specification for Steel flanges.

Section 3.3: 1989	Specification for Copper Alloy and composite flanges.
BS 4190: 1967	Specification for ISO metric black OBSOLESCENT hexagon bolts, screws and nuts.
BS 4320: 1968	Specification for metal washers for general engineering purposes. Metric series.
BS 4504	Circular flanges for pipes, valves and fittings. (PN designated.)
Part 3:	Steel, Cast Iron and Copper Alloy flanges.
Section 3.1: 1989	Specification for Steel flanges.
Section 3.3: 1989	Specification for Copper Alloy and composite flanges.
Fittings	
BS 143 & BS 1256:1986	Specification for malleable Cast Iron and Cast Copper Alloy threaded pipe fittings. Partially replaced by BS EN 10242: 1995 but remains current.
BS 864:	Capillary and compression tube fittings of Copper and Copper Alloy.
Part 2: 1983	Specification for capillary and compression fittings for Copper tubes.
BS 1042:	Measurement of fluid flow in closed conduits.
Part 1:	Pressure differential devices.
BS EN ISO 5167-1: 1997	Specification for square-edged orifice plates, nozzles and Venturi tubes inserted in circular cross-section conduits running full.
BS 1740:	Specification for wrought steel pipe fittings (screwed BS 21 R-series thread).
Part 1: 1971	Metric units.
BS 1965:	Specification for butt-welding pipe fittings for pressure purposes.
Part 1: 1963	Carbon Steel.

BS 4346:	Joints and fittings for use with unplasticised PVC pressure pipes.
Part 1: 1969	Injection moulded plasticised PVC fittings for solvent welding, for use with pressure pipes, including potable water supply.
Part 2: 1970	Mechanical joints and fittings principally of unplasticised PVC.
BS 4368:	Compression couplings for tubes.
Part 3: (1984)	Specifications for light series couplings (metric).
Part 4: 1984	Specification for type test requirements.
BS 5114: 1975	Specification for performance requirements for joints and compression fittings for use with polyethylene pipes.
BS 5245: 1975	Specification for phosphoric acid based flux for soft soldered joints in Stainless Steel.
BS 5392:	Specification for acrylonitrile-butadiene-styrene (ABS) fittings for use with ABS pressure pipe.
Part 1: 1976	Fittings for use with pipe for industrial uses.
Jointing	
BS EN 29453: 1994	Soft solder alloys. Chemical compositions and forms.
BS 1723:	Brazing.
Part 1: 1986	Specification for brazing.
Part 2: 1986	Guide to brazing.
Part 3: 1988	Methods for non-destructive and destructive testing.
Part 4: 1988	Methods for specifying brazing procedure and operator approval testing.
BS 1845: 1984	Specification for filler metals for brazing.
BS 2494: 1990	Specification for elastomeric seals for joints in pipework and pipelines.
BS 2789: 1985	Specification for spheroidal graphite or nodular graphite cast iron.

BS 4346:	Joints and fittings for use with unplasticised PVC pressure pipes.
Part 3: 1982	Specification for solvent cement.
BS 7668: 1994	Specification for weldable structural steel. hot finished structural hollow sections in weather resistant Steels.
BS EN 10029: 1991	Specification for tolerances on dimensions, shape and mass for hot rolled Steel plates 3mm thick or above.
BS EN 10113: 1993	Hot-rolled products in weldable fine grain structural Steels.
10113-1	General delivery conditions.
10113-2	General delivery conditions for normalized rolled Steels.
10113-3	Delivery conditions for thermomechanical rolled Steels.
BS EN 10137:1996	Plates and wide flats made of high yield strength structural Steels in the quenched and tempered or precipitation hardened conditions.
EN 10137-1	General delivery conditions.
EN 10137-2	Delivery conditions for quenched and tempered Steel.
EN 10137-3	Delivery conditions for precipitation hardened Steels.
BS EN 10155: 1993	Structural Steels with improved atmospheric corrosion resistance. Technical delivery conditions.
BS EN 10210: 1994	Hot finished structural hollowsections of non-alloy and fine grain structural Steels.
BS EN 10210-1	Technical delivery requirements.
BS EN 1514	Flanges and their joints – Dimensions of gaskets for PN designated flanges.
EN 1514-1:1997	Non metallic flat gaskets with or without inserts.
EN 1514-2:1997	Spiral wound gaskets for use with Steel flanges.

BS 5245: 1975 (1990)	Specification for phosphoric acid based flux for soft soldered joints in Stainless Steel.
BS 5292: 1980	Specification for jointing materials and compounds OBSOLESCENT for Installations using water, low pressure steam or 1st, 2nd and 3rd family gases. (partially superceded by BS 6956 Parts 1, 5, 6 and 7)
BS EN ISO 9000:	Quality systems
BS 6681: 1986	Specification for malleable Cast Iron.
BS EN 10025: 1993	Hot rolled products of non-alloy structural Steels. Technical delivery conditions.
BS 7786: 1995	Unsintered PTFE tape. General requirements.
Safety Valves	
BS 6759	Safety Valves.
Part 1: 1984	Specification for safety valves for steam and hot water.
Part 2: 1984	Specifications for safety valves for compressed air or Inert gases.
Part 3: 1984	Specification for safety valves for process fluids.
Valves and Gauges	
BS 1010	Specification for draw-off taps and stop valves for water services (screw down pattern).
Part 2: 1973	Draw-off taps and above ground stop-valves.
BS 1552: 1995	Specification for open bottomed taper plug valves for 1st, 2nd and 3rd family gases up to 200 mbar.
BS 1780: 1985	Specification for bourdon tube pressure and vacuum gauges.
BS 2879: 1980	Specification for draining taps (screwdown pattern).
BS 5150: 1990	Specification for Cast Iron gate valves.

BS 5151: 1974	Specification for Cast Iron Gate (Parallel Slide) valves for general purposes.
BS 5152: 1974	Specification for Cast Iron globe and globe stop and check valves for general purposes.
BS 5153: 1974	Specification for Cast Iron check valves for general purposes.
BS 5154: 1991	Specification for Copper Alloy globe, globe stop and check, check and gate valves.
BS 5155: 1984	Specification for butterfly valves.
BS 5156: 1985	Specification for diaphragm valves.
BS 5157: 1989	Specification for Steel Gate (parallel slide) valves.
BS 5158: 1989	Specification for Cast Iron plug valves.
BS 5159: 1974	Specification for Cast Iron and Carbon Steel ball valves for general purposes.
BS 5163: 1986	Specification for predominantly key-operated cast iron gate valves for water work purposes.
BS 5235: 1975	Specification for dial-type expansion thermometers.
BS 5433: 1976	Specification for underground stop-valves for water services.
BS 7350: 1990	Specification for double regulating globe valves and flow measurement devices for heating and chilled water systems.
Pipe Supports	
BS 1494	Specification for fixing accessories for building purposes.
Part 1: 1964	Fixings for sheet, roof and wall coverings.
BS 3974	Specification for pipe supports.
Part 1:	Pipe hangers, slider and roller type supports.
Part 2:	Pipe clamps, cages, cantilevers and attachments to beams.

Miscellaneous

BS 12: 1996	Specification for Portland cement.
BS 729: 1971	Specification for hot dip galvanised coatings on Iron and steel articles.
BS 1710: 1984	Specification for identification of pipelines and services.
BS 3059	Steel boiler and superheater tubes.
Part 2: 1990	Specification for carbon, alloy and austenitic Stainless Steel tubes with specified elevated temperature properties.
BS 3382	Specification for electroplated coatings on threaded components.
Parts 1 & 2: 1961	Cadmium on Steel components. Zinc on Steel components.
BS 3416: 1991	Specification for bitumen based coatings for cold application, suitable for use in contact with potable water.
BS 4027: 1996	Specification for sulphate-resisting Portland cement.
BS 4147: 1980	Specification for bitumen based hot-applied coating materials for protecting Iron and Steel, including suitable primers where required.
BS 4800: 1989	Schedule of paint colours for building purposes.
BS 5493: 1977	Code of practice for protective coating of Iron and Steel structures against corrosion.
BS 5834	Surface boxes, guards and underground chambers for gas and water works purposes.
Part 1: 1985	Specification for guards, including foundation units.
Part 2: 1983	Specification for small surface boxes.
Part 3: 1985	Specification for large surface boxes.
Part 4: 1989	Specification for preformed chambers.

BS 6129	Code of practice for the selection and application of bellows expansion joints for use in pressure systems.
Part 1: 1981	Metallic bellows expansion joints.
BS 6281	Devices without moving parts for the prevention of contamination of water by backflow.
Part 1: 1992	Specification for Type A air gaps.
Part 2: 1982	Specification for Type B air gaps.
Part 3: 1982	Specification for pipe inter-rupters of nominal size up to and including DN42.
BS 6282	Devices with moving parts for the prevention of contamination of water by backflow.
Part 1: 1982	Specification for check valves of nominal size up to and including DN54.
Part 2: 1982	Specification for terminal anti-vacuum valves of nominal size up to and including DN54.
Part 3: 1982	Specification for in-line anti-vacuum valves of nominal size up to and including DN42.
Part 4: 1982	Specification for combined check and anti-vacuum valves of nominal size up to and including DN42.
BS 6700: 1997	Specification for design, installation, testing and maintenance of services supplying water for domestic use within buildings and their cartilages.
BS 7671: 1992	Requirements for electrical installations IEE Wiring Regulations. Sixteenth Edition.
Code of Practice	
BS 1306: 1975	Specification for copper and copper alloy pressure piping systems.
BS 806: 1993	Specification for design and construction of ferrous piping installations for and in connection with land boilers.
BS 5410	Code of practice for oil firing.

Part 2: 1978	Installations of 44 kW and above output capacity for space heating, water and steam supply purposes.
CP 312	Code of practice for plastics pipework (thermoplastics material).
Part 1: 1973	General principles and choice of material.
Part 2: 1973	Unplasticised PVC pipework for the conveyance of liquids under pressure.
Part 3: 1973	Polyethylene pipes for conveyance of liquids under pressure.
BS 6880	Code of practice for low temperature hot water heating systems of output greater than \45kW.
Part 1: 1988	Fundamental and design considerations.
Part 2: 1988	Selection of equipment.
Part 3: 1988	Installation, commissioning and maintenance.
CP 342	Code of practice for centralised hot water supply.
Part 2: 1974	Buildings other than individual dwellings.
BS 8313: 1997	Code of practice for accommodation of building services in ducts.
BS 8010	Code of practice for pipelines.
Part 2:	Pipelines on land: design, construction and installation.
Section 2.1: 1987	Ductile iron.

Welding

BS 639: 1986	Withdrawn and replaced by:
BS EN 499: 1995	Welding consumables. Covered electrodes for manual metal arc welding for non-alloy and fine grain.

Steels. Classification.

BS 1453: 1972	Specification for filler materials for gas welding.
BS 2640: 1982	Specification for Class II oxy acetylene welding of carbon steel pipework for carrying fluids.
BS 2910: 1986	Methods for radiographic examination of fusion welded circumferential butt-joints in steel pipes. Replaced by BS EN 1435: 1997.
BS 2971: 1991	Specification for Class II arc welding of carbon steel pipework for carrying fluids.
BS 3923	Methods for ultrasonic examination of welds.
Part 1: 1986	Methods for manual examination of fusion welds in ferritic steels.
Part 2: 1972	Automatic examination of fusion welded butt joints in ferritic steels.
BS 4872	Specification for approval testing of welders when welding procedure approval is not required.
Part 1: 1982	Fusion welding of steel.
BS EN 970: 1997	No-destructive examination of fusion welds – visual examination.

HVCA – Code of Practice – TR/5 Welding of Carbon Steel Pipework (1990)

HVCA – Code of Practice – TR/3 Jointing of Copper and its Alloys (1990)

STATUTORY REQUIREMENTS

Electricity Act
Health and Safety Act
Building Regulations

OTHER EUROPEAN STANDARDS

BS EN ISO 9002: 1994	Quality Systems – Model for Quality Assurance in Design/Development, Production, Installation and Servicing (for designers of systems)
DIN 2391	Seamless steel precision tube cold drawn or cold rolled

DIN 2393	Welded steel precision tubes
DIN 2394	Welded and sized precision tubes

2.2 Pipework installation

2.2.1 Quality of installation

2.2.1.1 Installations shall be to specification and comprise new materials assembled to a high standard of workmanship under the supervision of qualified personnel. Sub-standard work will not be accepted and the following clauses list examples of materials and work that will be rejected:-

2.2.1.2 The use of damaged parts, incorrect types, standard, sizes, materials, markings, etc.

2.2.1.3 Carbonaceous residues left in the bores of copper pipes by the manufacturer.

2.2.1.4 Damage to parts by tools, soldering, brazing, welding, etc.

2.2.1.5 The use of long screws, back-nuts or reducing bushes.

2.2.1.6 Pipes not cut clean and square with the axis or removed of burrs, or pipes cut with bevel wheel cutters.

2.2.1.7 Pipes or fittings with broken or damaged threads and more than 3 threads extending beyond fittings when screwed up.

2.2.1.8 Joints misaligned or distorted and not true with pipe axis.

2.2.1.9 Pipework runs without the required gradient.

2.2.1.10 Pipes supported from other pipes or not capable of individual removal without disturbing other pipes.

2.2.1.11 Misaligned or distorted supports, fixings and pipework.

2.2.1.12 Insecure supports or restrictive of proper expansion, contraction, or lateral movement as required for the pipeline, or branch pipes used as supports for risers.

2.2.1.13 Pipes supported on the sleeve of fire stopping, or the fire stopping not fitted correctly or to the required Fire Authority standard.

2.2.1.14 Bores of pipes and fittings which are blocked or contaminated by foreign matter.

2.2.1.15 Eccentric fittings assembled the wrong way up-the taper should rise in the direction of flow.

2.2.1.16 Valves difficult for access for operation or maintenance.

2.2.1.17 Any items not installed to manufacturers recommendations.

2.2.1.18 Disregard of requirements for preservation of water quality including use of pastes, compounds, greases or lubricants, on joint faces of hot and cold water services.

2.2.1.19 Inadequate protection against electrolytic action.

2.2.1.20 Other faults may also apply including any disclosed by weld inspections, testing and commissioning.

2.2.2 Pipe ends and cutting

2.2.2.1 Pipes shall be cut clean and square with the axis by machine, pipe cutter or saw as appropriate to materials, but not by flame cutting or bevel wheel cutter.

2.2.2.2 Pipes shall be prepared for capillary fittings on copper and stainless steel pipes by deburring and re-rounding.

2.2.2.3 Pipes shall be prepared for threading of steel pipes by removing burrs.

2.2.2.4 Pipes shall be prepared for butt welded steel pipelines by machining bevels and removing burrs.

2.2.2.5 Pipes shall be prepared on plastic pipelines in accordance with the manufacturer's instructions, to suit solvent or heat fusion techniques for jointing.

2.2.3 Screwed threads

2.2.3.1 Screw threads shall be to BS 21 taper on pipes and adaptors. They shall be cut clean, concentric and unbroken with all oil, swarf, etc removed.

2.2.3.2 Shall be provided by means of capillary screwed adaptors on copper or stainless steel pipes with a limit of 2" BSP maximum.

2.2.3.3 Shall be painted on the exposed threads of mild steel pipes immediately the fitting has been screwed on.

2.2.3.4 Shall be on hot and cold water services, made pressure tight by means of ptfe tape only and without the use of pastes, hemp or similar materials.

2.2.4 Thread sealants

2.2.4.1 For Hot and Cold Water Services:-

- Shall be approved to Water Research Centre tests UK as suitable for potable water and proof against bacterial growth, i.e. ptfe unsintered tape applied with 50% overlap to BS 7786 for threads 2" BSP and below, or jointing materials to BS 5292 (Obsolescent) and BS 6956 parts 1,5,6 & 7.

2.2.4.2 For Other Services:-

- Shall comprise PTFE tape as CWS for steam 1½" BSP and below, or 2"BSP and below for other services.
- Shall consist of proprietary brands of sealants or compounds for threads 2½" BSP and above such as galvanised flanges if PTFE is not suitable.

2.2.5 Pipe unions, flanges and gaskets

2.2.5.1 Unions shall be limited to 2" BSP maximum size, or less if otherwise specified by the Engineer.

2.2.5.2 Unions shall be assembled without the use of pastes or lubricants on the joint faces when used on hot and cold water services.

2.2.5.3 Flanges shall be provided on pipes 65mm diameter and above and on smaller pipes where specified in drawings, to suit particular requirements.

2.2.5.4 Flanges shall be metric sizes to details given on the pipework materials tables.

2.2.5.5 Flanges shall be screwed or welded true and square with pipe axis on steel and ductile iron pipes and have raised joint faces with continuous spiral grooved finish.

2.2.5.6 Flanges shall be composite type on copper or stainless steel pipes with manufacturer's standard finish on joint face.

2.2.5.7 Flanges shall be composite type on plastic pipework, solvent or heat welded on as appropriate.

2.2.5.8 Gaskets shall be free of asbestos materials.

2.2.5.9 Gaskets shall be metric sizes to suit the flanges.

2.2.5.10 Gaskets shall be as recommended by the manufacturer to suit the service conditions and flange finish, to provide an effective seal without the use of jointing compounds.

2.2.5.11 Gaskets shall be provided with non-stick surfaces where flanged joints are required to be easily opened.

2.2.5.12 Gaskets shall be ethylene propylene synthetic rubber, approved by the Water Research Centre (UK) as suitable for potable water and proof against bacterial growth, where used on hot and cold water services.

2.2.5.13 Gaskets shall be assembled without the use of pastes and compounds particularly on hot and cold water services.

2.2.6 Pipe runs, gradients, break points

2.2.6.1 Pipes shall be generally parallel with walls on horizontal runs and set neatly round piers and projections where a good appearance is required.

2.2.6.2 Pipes shall be set plumb and without offsets on vertical runs.

2.2.6.3 Pipes shall be arranged without joints where pipes pass through the thickness of walls, floors and structures.

2.2.6.4 Pipes shall be arranged with adequate clearance of walls and ceilings to allow easy access to valves.

2.2.7 Gradients

2.2.7.1 Provided with the following break points :-

- Unions on pipes 50mm diameter and below (except refrigeration)
- Break points shall be provided at each branch from headers, mains and risers, at connections to plant and equipment, at 18m intervals for unions and 10m for flanges.

2.2.8 Open ends of pipework

2.2.8.1 Shall be temporarily sealed by the use of purpose made plugs, blanking caps, or blank flanges during pipework erection including valves at the end of pipework runs which shall be closed and sealed.

2.2.9 Pipework clearances and segregation

Pipework clearances and segregation	
Ceilings	100mm
Finished Floors	150mm
Adjacent pipes, both insulated	25mm
Adjacent pipes, both uninsulated	25mm
Adjacent pipes, one only insulated	75mm
Insulated pipes adjacent to conduit or trunking	100mm
Uninsulated pipes adjacent to conduit or trunking	150mm
Uninsulated pipes adjacent to electrical cables not in conduit or trunking	150mm
Insulated pipes adjacent to electrical cables not in conduit or trunking	100mm

2.2.9.1 Minimum clearance between uninsulated pipes, finished face of insulation on pipes and adjacent surfaces shall be as follows:

2.2.9.2 The spacing of services shall provide for:

- The application of thermal insulation and valve and flange boxes.
- Increased spacings to accommodate pipeline fittings.
- To pipes and electrical services for ease of installation, maintenance and inspection.
- Layout and segregation of services to be in accordance with BS 8313.
- Cold water pipes to be spaced from hot pipes to minimise heat gain.

2.2.10 Sleeves and cover plates

2.2.10.1 Sleeves shall be provided for pipes passing through walls, floors and partitions of similar material to pipe and copper or steel, for plastic pipes.

2.2.10.2 Sleeves shall be generally one or two sizes larger than pipe as necessary and positioned true with pipe to provide adequate clearance and allow for lateral movements of pipeline if required.

2.2.10.3 Sleeves shall be built in by others after correct positioning around the pipe.

2.2.10.4 Sleeves shall be finished flush with finished face of wall, floor and ceilings.

2.2.10.5 Sleeves shall be project 75mm above floors in wet areas with the gap sealed with waterproof mastic.

2.2.10.6 Sleeves shall be supplied with lugs to locate in floors and ceilings.

2.2.10.7 Sleeves shall be fire-stopped in gap between pipe and sleeve in all fire rated structures to Building Regulations Approved Document B - Fire Spread, using asbestos-free material approved by the Fire Authority, without restricting pipework movement.

2.2.10.8 Sleeves shall have thermal insulation sections stopped short each side.

2.2.10.9 Sleeves shall have caulked in gap between pipe and sleeve in external walls using asbestos-free, weather and vermin proof material.

2.2.10.10 Sleeves shall be oversize if insulation is to be carried through non-fire rated wall or partition as shown on the drawings.

2.2.10.11 Cover plates shall be according to installation materials.

2.2.11 Pipe fittings

2.2.11.1 Shall be low resistance type bends, sweep tees, etc. Fittings shall be square type only on final draw off pipe runs and if necessary, to facilitate venting and draining, or at steam trap sets for venting, draining or relaying.

2.2.11.2 Shall be eccentric pattern on horizontal pipes at changes of diameter to facilitate venting and draining, with the taper of the fitting to rise in the direction of flow.

2.2.12 Draining and venting

2.2.12.1 Draining taps shall be provided at all low points in water systems to facilitate complete and rapid emptying down and at branch valves immediately downstream to facilitate maintenance on the branch.

2.2.12.2 Draining taps shall be Drain cocks on systems containing glycol shall have warning notices affixed prohibiting drainage direct to mains drains loose key operated to BS 2879 lock shield pattern of chromium plated finish, where fitted, to chromium plated tube.

2.2.12.3 Draining taps shall be supplied with three loose keys for each size of drain cock fitted.

2.2.12.4 Air vents shall be provided at all high points in water systems to facilitate complete removal of air.

2.2.12.5 Air vents shall be automatically operated unless specified.

2.2.12.6 Air vents shall be as indicated on the drawings.

2.2.12.7 Air vents shall be run and discharge to a convenient position as indicated on the drawings or to the nearest drain system.

2.2.12.8 Automatic air eliminators shall be fitted to an equal square tee on the main, together with the necessary reducers.

2.2.12.9 Automatic air eliminators shall be of non-ferrous metal with non-corrodible ball valve and seat.

2.2.12.10 Automatic air eliminators shall from the outlet have a male or female iron to copper union adaptor with an 8mm copper bleed pipe to BS EN 1057, R250/R220, arranged to discharge in a convenient position as indicated on the drawings.

2.2.13 Inaccessible or concealed pipe joints within buildings

2.2.13.1 Pipe joints which will unavoidably be built-over or otherwise be difficult for access to be of the welded or capillary type only and satisfactorily tested before concealment.

2.2.14 Flange bolts, nuts and washers

2.2.14.1 Shall be of forged steel 400N/mm² tensile minimum to BS 4504: BS 4320: and be cadmium plated to BS 3382, Part 1 & Part 2.

2.2.14.2 Shall be faced under the head, machined on the shank and screwed ISO metric coarse in the case of bolts.

2.2.14.3 Shall be faced on one side in the case of nuts.

2.2.14.4 Shall be faced on both sides in the case of washers and fitted under both bolt head and nut.

2.2.15 Pipe supports

2.2.15.1 Shall be generally to the following standards with fixings to Part B.01 Appendix II as appropriate:-

- Shall be BS 1494 Part 1, for pipe clips, brackets etc.
- Shall be BS 3974, Part 1 for hangers, sliders and rollers.
- Shall be BS 3974, Part 2 for clamps, cages, cantilevers and beam attachments.
- Shall be as detailed on the drawings and fastened only to the building structure at the specified positions. They shall be proprietary support systems hot dipped galvanised and from a reputed manufacturer like Mupro or Caddy.
- Shall be arranged to support each pipe run independently of others, to permit differential expansion and maintenance without disturbing adjacent pipes.
- Shall be installed so that pipes may expand and contract freely within the design figure and in the intended direction without overstressing pipes, joints or connections to equipment.
- Shall be provided at base of vertical pipes, bends, tees, flanges, unions, and changes of direction, each side of valves, in conjunction with the normally spaced supports on horizontal and vertical runs.
- Shall be fabricated from standard hot dipped galvanised mild steel rolled sections, or alternatively proprietary sections if specified in drawings, where built into walls or floors of ducts and subways.
- Shall be provided oversize with load bearing insulation incorporated as specified in drawings for installation as the pipework is erected on the following services:-
    - Steam, condensate, M & HTHW pipes, of all sizes.
    - Chilled water pipes and refrigeration pipes of all sizes.

- Cold water pipes if the thermal insulation is vapour sealed.

2.2.16 Spacing of supports

TABLE OF MAXIMUM SPACINGS FOR PIPEWORK SUPPORTS

Horizontal Spacings - Metres				Vertical Spacings - Metres		
Nominal Pipe Size mm	**Steel or Iron Pipes**	**PVC or ABS Pipes**	**Copper or Stainless Steel Pipes**	**Steel or Iron Pipes**	**PVC or ABS Pipes**	**Copper or Stainless Steel Pipes**
15	1.8	0.8	1.2	2.4	1.2	1.8
20	2.4	0.8	1.2	3.0	1.2	1.8
25	2.4	0.9	1.5	3.0	1.3	2.4
32	2.4	1.0	1.8	3.0	1.5	3
40	2.4	1.1	1.8	3.7	1.6	3
50	2.4		1.8	3.7		3
65	3		2.4	4.6		3.7
80	3		2.4	4.6		3.7
100	3		2.4	4.6		3.7
125	3.7		3.0	5.5		3.7
150	4.5		3.7	5.5		3.7
200	6		-	8.5		-

2.2.17 Electrolytic action

2.2.17.1 Shall be prevented by ensuring that dissimilar metals are not in contact where the presence of water or moisture could promote electrolytic action.

2.2.17.2 Shall be prevented where copper pipes connect to ferrous cisterns or equipment, whether galvanised or not, by means of approved fibre washers or gaskets, as specified in C07: Heating, hot and cold water systems equipment.

2.2.17.3 Shall be prevented by avoiding the need to join copper pipes to steel pipes.

2.2.17.4 Shall be prevented by using pipe supports as under:-

- Galvanised malleable iron or steel for steel or iron pipes.
- Brass or gunmetal for copper, stainless steel or plastic pipes.

2.2.18 Compression unions

2.2.18.1 Shall be of the single ferrule type and permit a butt flat face to face connection between the body of the union and ferrule.

2.2.18.2 Shall be such that the seal between the union and the ferrule is metal to metal, no washers, gaskets, jointing compound or similar material will be accepted.

2.2.18.3 Shall be installed such that the pipework does not protrude through the ferrule into the body of the union.

2.2.18.4 Shall provide for the attachment of the ferrule to the pipe to be such that the pipe is "necked" rather than being cut or notched by the ferrule.

2.2.18.5 Shall be generally complying with the performance requirements of BS 4368.

2.2.19 Pipework miscellaneous

2.2.20 Expansion devices

2.2.21 Shall be fitted where expansion cannot be accommodated by natural offsets and changes of direction.

2.2.21.1 Shall in the case of expansion bellows, comply with BS 6129 Part 1, be installed strictly to the manufacturer's instructions including the provision of associated guides and anchors, which are approved by the bellows manufacturer.

2.2.21.2 Shall in the case of expansion loops, be manufactured from the same material as the pipe with additional thickness to allow for bending without undue thinning and formed in one length with ends flanged.

2.2.21.3 Shall be marked with a suitable plate giving manufacturers name and detail, maximum working pressure, direction of flow, maximum and minimum working lengths and amount of cold draw.

2.2.22 Cold draw

2.2.22.1 Shall be applied by means of flanges secured to the ends to be pulled together and long high tensile steel bolts and nuts.

2.2.22.2 Shall be checked to the design figure for correct gap plus allowance for gasket thickness before final pull is made.

2.2.22.3 Shall be changed to standard bolting when gap is closed.

2.2.23 Anchors

2.2.23.1 Shall be generally to BS 3974 Part 1 and BS 3974 Part 2 with steel brackets rigidly attached to the building structure or concrete blocks as shown on the drawings.

2.2.23.2 Shall be suitable for test pressure loading.

2.2.23.3 Shall be positioned not nearer than 600mm to welded joints on steel pipes and secured so that the pipe is not deformed or overstressed by clamps, or where welded or brazed attachments are made, which shall be inspected and passed.

2.2.23.4 Shall be provided at stop ends, bends, junctions, valves and gradients steeper than 1 in 6. For buried mains of the non self anchoring type.

2.2.23.5 Shall be provided on polyethylene buried mains as above and at mechanical joints where these are not designed to take end loads.

2.2.24 Guides

2.2.24.1 Shall be incorporated at all roller and slider supports.

2.2.24.2 Shall be provided at expansion joints as recommended and be capable of adjustment to give correct alignment of the pipework and device before being rigidly fixed.

2.2.25 Buried pipework

2.2.25.1 Shall in the case of cold water pipes be copper, polyethylene, buried at a depth of between 1000mm to 1350mm to top of pipe to suit local conditions and requirements of Central Water Authority.

2.2.25.2 Shall in the case of gas services, be in accordance with the recommendations of Local Gas Suppliers, and not less than 600mm, depth.

2.2.25.3 Shall throughout the length of either service, be laid on a bed of well rammed clean sand at least 100mm thick to underside and sides the trench sides to be clear of rocks or any other protruding debris.

2.2.25.4 Shall alternatively for ductile iron pipes, be laid on a bed of similar thickness of graded granular material to DOE Guidance Sheet No 4.08, or on a bed of weak cement sand mix, particularly on steep gradients.

2.2.25.5 Shall be finally backfilled with not less than 100mm thickness of the bedding material well rammed down on pipe before levelling off with soil free of rocks or other harmful debris. The work to be inspected before backfilling is commenced.

2.2.25.6 Shall be protected against possible damage by any future excavation work by the use of proprietary plastic warning marker tapes or 150mm wide mesh laid along the pipe run during backfilling and positioned between 150mm to 225mm below ground level, the tape or mesh to have a stainless steel wire for pipe detection on plastic systems.

2.2.25.7 Shall in the case of mains associated with fire fighting services, be governed also by any particular requirements of the Government Fire services.

2.2.26 Markers for buried pipework

2.2.26.1 Shall be provided at 50m intervals along the pipe run on straight sections and at all changes of direction and each side of roadways.

2.2.26.2 Shall consist of 200mm x 200mm x 50mm formed of reinforced concrete, bearing non-corrodible and durable plates having permanent letters and numbers stamped or cast on stating:-

- pipe size in mm - e.g. 200 -and include direction
- service - e.g. CWS - arrows where this is necessary
- depth of service in mm - e.g. 900 - to indicate pipe run direction

2.2.26.3 Shall be secured to raise concrete marker posts in unmade ground and to flush concrete blocks in lawns, verges or pavements.

2.2.26.4 Shall be attached to buildings at the point of entry.

2.2.26.5 Shall state distance from plate to service in the case of services running parallel to buildings.

2.2.26.6 Shall be located at valve positions and comprise of raised letters cast on the exterior surface of the box cover to indicate type of service, with separate marker plate to indicate the valve function.

2.2.27 Testing

2.2.28 General

- All individual parts forming the pipework circuit shall have been pressure tested by the manufacturers to British Standard or other recognised standards and certificates of soundness provided.
- The installation shall then be pressure tested to prove soundness of joints and of the parts as installed.
- When air pressure tests are conducted or gas pipework is purged with gas the area shall be cleared of personnel.

2.2.29 Flushing out and draining

2.2.29.1 Shall be undertaken before pressure tests are conducted and carried out using water or air as appropriate, with parts that will restrict flow or sustain damage removed.

2.2.29.2 Shall be witnessed to demonstrate that there are no blockages and that no foreign matter remains.

2.2.29.3 Shall be undertaken again when water is drained off or air released after pressure testing to establish that the systems are still clean. On completion, all strainer cages shall be removed and cleaned and all dirt pockets opened up and cleaned.

2.2.29.4 Shall be arranged so that water systems are left dry after testing until setting-to-work and air systems left charged with reduced pressure air, monitored by a gauge to show any damage by other trades up to handover.

2.2.30 Filling

2.2.30.1 Shall be carefully controlled in the case of hydraulically tested systems, to ensure that water hammer does not occur and demonstrated to show that all air has been vented off and the system is full and ready for testing.

2.2.30.2 Shall be similarly controlled when systems are re-filled for regulating, balancing, setting-to-work etc.

2.2.31 Pressure tests

2.2.31.1 Shall be to the pressures as detailed in the appropriate pipework service elements of this specification.

2.2.31.2 Shall be carried out in stages if advantageous and finally on the whole of each completed circuit or system.

2.2.31.3 Shall be undertaken before pipework is concealed by structures, covers, partitions, ceilings, insulation, backfilling over joints, final painting etc and when there is no danger of the water tested systems freezing.

2.2.31.4 Shall be carried out with all parts not designed to withstand the test pressure, removed or blanked off and the pipeline suitably anchored to withstand test pressure load.

2.2.31.5 Shall be witnessed and test certificates signed when the test is satisfactory.

2.2.32 Provision for testing, commissioning, instruments and controls

2.2.32.1 Shall require all necessary connection points to be included as the pipework is erected.

2.2.32.2 Shall require the positions to be shown on the drawings and details agreed with the commissioning engineer or adviser, including positions of regulating valves and metering station.

2.2.32.3 Shall require test plugs to be of the self-sealing type with brass bodies having captive blank closing caps screwed on.

2.2.32.4 Shall require thermometer pockets to be to BS 2765, Part 1, Part 2 and of brass (non-dezincifiable material on hot and cold water services) screwed BSP thread and filled with heat conducting grease.

2.2.32.5 Shall require connection points for chemical dosing to be included where shown.

2.2.32.6 Shall require suitable bosses welded or brazed on to the pipes and screwed to suit pockets, gauges, sensors, etc to details shown on the drawings.

2.2.32.7 Shall require to fit all such controls or test equipment to the pockets/bosses.

2.2.32.8 Shall require all work involved in attaching the bosses and drilling and screwing to be done before the pipework length is installed, so that all oil, swarf, etc can be completely removed.

2.2.32.9 Shall require orifice plates to be to BS EN ISO 5167-1 and made of copper alloy or stainless steel as appropriate.

2.2.32.10 Shall require test and purge points on Natural Gas pipework to be provided in accordance with BGC standards IM/2 and IM/5.

2.2.33 Painting

2.2.33.1 Shall require protection of iron and steel structures in accordance with BS 5493.

2.2.33.2 Shall require all pipework, valves, and fittings, to be supplied with manufacturer's standard finish or protective coating.

2.2.33.3 Shall require all fabricated steelwork and steel pipework other than galvanised to be thoroughly cleaned of all scale, corrosion, grease, etc, after erection and painted with corrosion resistant lead, copper, zinc, tin or aluminium free paint or coating suitable for service conditions.

2.2.34 Service identification

2.2.34.1 Shall require all services to be identified and labelled according to BS 1710.

2.2.34.2 Shall require all valves for the reclaimed water pipes to have labels attached as per WRAS requirements.

2.2.34.3 Shall require the approval of the Engineer before notices and labels are manufactured and attached.

2.2.35 Protection of services

2.2.35.1 Shall be ensured by internal pipework services not being installed until the building envelope is reasonably watertight / weatherproof in order to protect the services from corrosion.

2.3 Welding of low carbon steel pipework

2.3.1 General

2.3.1.1 The inspection, testing and approval of the welders and the welding of low carbon steel pipework must be carried out by an independent inspecting authority .The contractor shall ensure that all welders possess a competency certificate for welding issued by a reputed institution and welders must have at least 5 years of experience. These certificates shall be issued to the Engineer for verifications prior to appointment of welders on site.

2.3.1.2 Oxy-acetylene welding will not be accepted for pipework above 100mm diameter or pipe flanges of any size.

2.3.1.3 Welding shall be in accordance with the recommendations in HVCA Code of Practice TR/5 for pipe not exceeding 200mm size and 20mm wall thickness.

2.3.1.4 Welding shall be to Class II by electric arc process to BS 2971 using welding materials to BS EN 499 for pipe exceeding 200mm size and 20mm wall thickness. BS 2460, (withdrawn and replaced by BS 1709).

OR

2.3.1.5 Welding shall to class II by oxy-acetylene process using welding materials to BS 1453.

2.3.1.6 Welding shall be utilised for all joints on steam, condensate, steel chilled water, and LPHW services located in boiler houses, plantrooms, tank rooms, ducts and concealed spaces together with services run externally or in ceiling voids.

2.3.2 Competency of welders and test welds

2.3.2.1 Welders shall be supervised by the Contractor's qualified welding supervisor.

2.3.2.2 Welders shall have their names and certificate numbers submitted on a list by the Contractor and produce their certificates for inspection by the Engineer before welding commences.

2.3.2.3 Welders shall only be employed on the work on or off site provided that they hold a currently valid Certificate of Competency for Oxy-Acetylene welding Grade 'A' or Metal Arc welding as appropriate to the work in hand or alternatively a currently valid welder’s performance certificate issued by a competent body.

2.3.2.4 Welders shall if holding a currently valid provisional certificate of either of the above, only carry out welding covered by the certificate subject to being under the constant supervision of a person currently competent for the work in hand.

2.3.2.5 Welders shall be required in either case before the work to carry out a specimen butt (without backing) and branch pipe connection fusion test at site in accordance with

BS 4872 Part 1 procedures and acceptance levels for which a welder approval test record to Appendix B of the standard shall be kept for each test.

2.3.2.6 Welders shall be replaced, if unable to meet the requirements of BS 4872: Part 1, by a competent welder who will also be subjected to the same test requirements.

2.3.2.7 Welders shall not be allowed to continue welding on the work on or off site if their standards of workmanship prove to be unsatisfactory.

2.3.3 General welding requirements

2.3.3.1 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have standard fittings to BS 1965 Part 1, without the use of segmental or cut-and-shut bends.

2.3.3.2 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have continuous welding of each weld run of a welded joint, with cleaning and inspection by the welder before further run applied.

2.3.3.3 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have no welding done in extremely severe weather conditions which would affect weld quality.

2.3.3.4 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have faulty weld sections removed and made good by welding-in lengths of pipe not less than 300mm long subject to supervisor/inspector's instructions.

2.3.3.5 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have all branch welds made by the set-on method, with the centres of adjacent branch welds at a distance not less than twice the diameter of the largest pipe as a minimum, in conjunction with a suitable gap between flanges.

2.3.3.6 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have welded joints located not less than 600mm from an anchor point or pipeline guide.

2.3.3.7 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have end faces of pipes and fittings machined and bevelled (not flame cut) at right angles to axis of bore.

2.3.3.8 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have welded-on flanges at intervals of not more than 10 metres to provide break points.

2.3.3.9 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have joint faces of the pipe within 25mm of the face completely cleaned to remove all foreign matter before welding and on completion of the weld, cleaned around the joint for the visual inspection procedure. Finally cleaned and primed within four hours of the inspection, or after satisfactory testing.

2.3.3.10 In addition to the requirements of BS 2971 and HVCA Code of Practice TR/5 the work shall have adjacent to each weld the welders certificate of competency number stamped on the pipe by the welder. Provisional Certificates will not be accepted.

2.3.4 Inspection, testing and rectification of faulty welds

2.3.4.1 Shall require all joints to have a visual inspection of completed weld to BS 2971 and BS EN 970 requirements, this may be carried out by the independent inspection authority to be appointed by the Contractor. Apave or Socotec shall be considered as appropriate independent authority.

2.3.4.2 Shall require where non-destructive testing is specified, a percentage of joints tested in addition to the visual inspection, carried out by the independent inspecting authority.

2.3.4.3 Shall require any weld found not to be stamped with the welder's Certificate of Competence number to be non-destructively tested at the Contractor's expense.

2.3.4.4 Shall require depending upon the method of NDT specified the following standards to apply:-

- BS 2910 for radiographic examination
- BS 3923 Part 1 for ultrasonic examination

2.3.5 Records of inspection and testing

2.3.5.1 Shall require accurate records of inspections, welding procedures, tests and dates to be kept and submitted by the welding inspector and the results made available for inspection within ten days of the test.

2.3.5.2 Shall require each result to have the welders certificate number appropriate to the weld recorded on it and a description of the exact location of the joint by reference to the drawing.

2.3.5.3 Shall require the AOTC welding inspector to advise which welds are satisfactory and which have failed and the extent of rectification work required which he may mark on the actual joint.

2.3.5.4 Shall require the Contractor to satisfactorily carry out the rectification work in accordance with the conditions stated in Part D which may call for an increase in the number of NDT tests until a satisfactory standard is achieved. Rectification work to be carried out at no cost to the client.

2.3.6 Protection of persons and material from weld damage

2.3.6.1 Shall be generally in accordance with Health and Safety Executive (UK) Booklet No 38 (Electric arc welding).

2.3.6.2 Shall comprise opaque screens to be used and positioned around fusion operations to prevent weld flash being visible to persons other than the welder.

2.3.6.3 Shall include for heat-resistant mats to be used to prevent fire and damage to other materials during the welding procedures.

2.3.6.4 Shall include for the provision of two portable fire extinguishers located in the immediate vicinity for emergency use and suitable for type of hazard present.

2.3.6.5 Shall require employment of mechanical extract ventilation where an unacceptable concentration of fumes may occur.

2.3.6.6 Carry out a risk assessment for welding processes in each location.

2.3.7 Failure of welded joints during pressure test

2.3.7.1 Shall be notified immediately to the Engineer and the joint rectified in accordance with his instructions.

2.3.7.2 Shall require a further pressure test to be applied.

2.3.7.3 Shall be entered on the welding and pressure test record sheets with details of repair work carried out.

2.3.7.4 Shall include for all the above work to be carried out by the Contractor at no additional cost to the Client.

2.4 Capillary jointing of copper or stainless steel pipework

2.4.1 Capillary soldered joints

2.4.2 Shall be to BS 864 Part 2 using integral ring fittings with lead-free solder and marked accordingly, for hot and cold water services and for all other services to standardise on site inspection requirements.

2.4.3 Shall be made using the correct grade of flux to suit the service requirements as detailed on the pipework materials tables.

2.4.4 Capillary brazed joints

2.4.4.1 All brazed joints shall be to BS 1723 Part 1and BS 1306. They shall be in accordance with the recommendations in HVCA Code of Practice TR/3.

2.4.4.2 Shall be made and inspected generally in accordance with procedures as specified for capillary soldered joints. This shall exclude bronze weld.

2.4.4.3 Shall be made using the correct grade of silver brazing alloy and flux to BS 1845 to suit the service conditions as indicated on the pipework materials tables and to meet the requirements for potable water quality in the case of hot and cold water services.

2.4.4.4 Shall have brazing of copper water pipework carried out using a filler rod complying with BS 1845 Type CP1, CP2 or CP4 to suit the circumstances involved. Where copper is to be joined these rods may be considered to be self-fluxing, but where copper alloy fittings are to be joined to copper the manufacturer's recommended flux to be used.

2.4.4.5 Shall include for silver brazing on condensate mains assembled from copper tube and heavy duty fittings where a brazing alloy to BS 1845 Type AG14 or AG20 or similar approved filler should be used (the pipe end only being fluxed). The flux to be as recommended by the manufacturer.

2.4.4.6 Where brazing of copper to gunmetal/bronze is required, these shall have joints made using a copper-silver-zinc brazing alloy to BS 1845 Type AG14 or AG20 or similar approved filler together with an appropriate flux as recommended by the manufacturer, the process to be carried out under controlled conditions and in a clean condition suitable for use as appropriate for the service intended, with no traces of flux, grease or other matter on the completed items. Each person producing brazed joints shall be provided with a steel marker die with which to mark all completed joints with his identification symbol.

2.4.4.7 Shall where applicable be tested in accordance with BS 1723 Part 1, and HVCA Code of Practice TR/3 and BS 6443.

2.4.4.8 Shall include the cost for any additional testing of joints required by the Engineer or his representative during the Contract.

2.4.5 Precautions/hazards during brazing

2.4.5.1 Attention is drawn to the Health and Safety at Work etc Act, as the above processes present health hazards, comprising not only the explosion risks from oxygen and fuel gases but also from the vapours from cleaning solvents, fluxes and over-heating filler metals etc.

2.4.5.2 The Contractor shall ensure that the area of operation is safe for carrying out the work involved and free from combustible waste materials etc.

2.4.5.3 The Contractor shall provide adequate heat shielding and where necessary heat sinks.

2.4.5.4 The Contractor shall report to the Safety/Fire Officer on completion of hot work each day where work has been carried out in any void, duct, unoccupied space or any other concealed location.

2.4.5.5 The Contractor shall acquaint himself with the fire drill procedure, be responsible for adequate ventilation of the work area, confirm that all operatives are aware of the

dangers of the misuse of oxygen for ventilation purposes and ensure that there is adequate means of escape from confined spaces.

2.4.5.6 The Contractor shall carry out a risk assessment for each process/location.

2.5 Preservation of water quality

2.5.1 General

2.5.1.1 The Contractor shall provide for all parts of hot and cold water circuits in contact with the water to have clean and disinfected surfaces before being installed.

2.5.1.2 The Contractor shall comply with the local water Authority's by-laws that are based on BS 6700 or any local prevailing standards and guidance.

2.5.1.3 The Contractor shall comply with the Guidance for the General Design and Operation of Water Systems in offices contained in plumbing engineering guide.

2.5.1.4 It shall be required that all materials specified and used to be proof against the following hazards:-

- Dezincification or galvanic action;
- Chlorine treatments;
- Imparting taste or odour to the water;
- Contamination of water by lead, copper or other elements in excess of standards laid down by the WHO.
- Bacterial growth due to nutrients in pipework materials, jointing materials, pastes and compounds, fluxes, solders, thread sealant tapes, gaskets, grommets, tap washers, O Rings, gland packings, valve seats, filters, hoses, greases, lubricants, protective coatings or linings.

2.5.1.5 The Contractor shall include for all materials and fittings to be of an approved type as tested and listed by the Central Water Authority or the Water Research Centre (UK) as suitable for potable water and not capable of promoting bacterial growth.

2.5.1.6 Pipework circuits for cold water shall run below or away from hot pipes to minimise heat gain and keep water temperature below 20°C to prevent the multiplication of Legionella bacteria.

2.5.1.7 The installation shall incorporate backflow prevention devices or air gaps based on BS 6700: 1997 and to BS 6281: 1992 Part 1 and BS 6282: 1982 Parts 2 and 3 and 4 as appropriate.

2.5.2 Desinfecting of hot and cold water systems

2.5.2.1 Shall be carried out following satisfactory flushing as detailed in 03.08 and pressure testing and setting-to-work prior to handover.

2.5.2.2 Shall provide for the whole of each system including cisterns, vessels and pipework to be disinfected with chlorine either by a specialist organisation certified for this type of work.

2.5.2.3 Shall include for the procedures to follow code of practice and BS 6700 as outlined in the following clauses for new installations and for extended or modified systems.

2.5.3 External mains chlorination

2.5.3.1 Shall include for chlorination of pipework under pressure from the mains, to be carried out in accordance with the requirements of the local water undertaking.

2.5.3.2 Shall be through suitable valved filling points located at one end of the system, for the introduction of the chlorine solution.

2.5.3.3 Shall include for chlorine introduced by means of chemical dosing apparatus connected upstream until a concentration of not less than 20 ppm can be measured along the pipe run of new mains.

2.5.3.4 Shall have the main left static for not less than 24 hours before flushing through with fresh water until chlorine cannot be detected above that in the Water Authority and mains.

2.5.3.5 Shall be provided with wash-out valves and valved filling points included in the installation.

2.5.3.6 Shall include for existing mains supplying new distribution systems to be chlorinated. Any insertions or repairs at junctions into an existing pipeline to be disinfected by immersion in a solution of sodium hypochlorite containing 1,000 mg/L of free available chlorine.

2.5.4 Distribution pipework chlorination

2.5.4.1 Shall include for the mains supply to storage cisterns to be chlorinated as necessary, and cisterns cleared of all visible contaminants before services within buildings are treated.

2.5.4.2 The Contractor shall determine the capacities of the systems to be calculated to determine the amounts of chlorine to be added. All water shall be drained off; all draw off points closed and all isolating valves opened except on cistern outflow.

2.5.4.3 After flushing, include for the system to be filled with water and the servicing valve on the supply to the cistern to be closed. Following which the capacity of the system

to be assessed and a calculated quantity of sodium hypochlorite of known strength to be added to the cistern to give a free residual chlorine concentration of 50 ppm to the cistern water content. The chlorinated water to be drawn around the system by successively opening each draw-off fitting, working away from the cistern, and closing it when chlorinated water at 40-50ppm is discharged, the concentration being determined by colorimetric methods. The cistern to be refilled and chlorinated as above during these operations, to maintain a residual chlorine level of 50 ppm in the cistern at all times. The contact time commences when the entire system is filled with chlorinated water, together with the cistern to overflow level.

2.5.4.4 The above procedures to be applied to all cold water services and secondary circuits of hot water systems before heat is applied and with the water cold. Care shall be taken not to use excessive amounts of chlorine which may affect pipework or other materials. Records must be kept of all procedures, checks, tests and witnessing.

2.5.5 Prevention of water stagnation

2.5.5.1 The Contractor shall provide for draining down and re-filling each system on a routine basis twice weekly until handover.

2.5.6 Water quality tests

2.5.6.1 The Contractor shall provide for all systems to have been satisfactorily set to work and disinfected before water samples are taken. The Contractor shall make analysis of each hot and cold water supply system taken from representative sampling points at draw off and storage positions with the systems at working temperatures.

2.5.6.2 The Contractor shall provide for all samples to be tested in accordance with the DOH/DOE Report No 71 - The Bacteriological Examination of Water Supplies Published in the UK, or any method approved and employed by the Public Health Department of the Ministry of Health or any relevant approved Government Body.

2.5.6.3 The Contractor shall have all water samples tested for E.Coli and chemical analysis including copper and lead content. The quality of potable water at outlets, (as sampled) and as supplied by the Water Authority, to be generally to EC Directive, 15 July 1980, 80/778/EEC "Quality of Water intended for Human Consumption".

2.5.6.4 The Contractor shall include for the tests to be carried out by any Government approved Laboratory, preferably from the Ministry of Health.

2.5.6.5 The Contractor shall include for two sets of tests, the first after setting to work and disinfecting and the second in conjunction with the handover date and the date for occupation of the premises.

2.5.7 Legionnaires disease precautions

2.5.7.1 The Contractor shall take all necessary precautions while erecting the installations in accordance with the requirements of HTM 04-01.

2.5.7.2 Shall include for taking water samples for Legionellae bacteria from all hot and cold water systems.

2.5.7.3 Shall provide for the tests to be carried out by the Public Health Laboratories Service on samples taken from representative sampling points when the systems are at working temperature and conditions.

2.5.7.4 Shall include for the temperature of the water (hot or cold) at the sampling point to be recorded at the time of taking each sample.

2.5.7.5 Shall have water samples for analysis taken from three hot and three cold water outlets, the location of the outlets to be determined by the Client.

2.5.7.6 Shall provide for the samples and their analysis to be carried out prior to Practical Completion and the Client notified of the results.

2.5.8 Analysis reports

2.5.8.1 Shall if the results are found to be unsatisfactory due to poor workmanship and/or use of unacceptable components, include for all remedial work to be carried out at the Contractor's expense.

2.5.8.2 Discharge of Waste Water used During Disinfection/Chemical Cleaning Procedures within Buildings

2.5.8.3 The Contractor shall inform authorities responsible for sewers before chlorinated/treated water used for disinfecting/cleaning an installation is discharged. He shall establish an agreed procedure beforehand; this may involve simply dilution of the discharge or de-chlorination / neutralisation.

2.5.8.4 De-chlorination shall be achieved using either sulphur dioxide or sodium thiosulphate (20g of sodium thiosulphate crystals are required to dechlorinate 500 litres of water containing 20mg/l free chlorine).

2.6 Thermometers, altitude/pressure gauges etc

2.6.1 General

2.6.1.1 Similar make and style of thermometers and altitude/pressure gauges are to be fitted, where suitable, to items of plant (e.g. calorifiers/boiler etc.) and/or pipework connections on each side of plant items such as calorifiers/heater batteries/pumps/mixing valves etc. and in positions indicated on the drawing or as specified in Bill of Quantities. All such devices shall be of UK origin.

2.6.2 Thermometers

2.6.2.1 Shall be to BS 5235: mercury in steel dial type with 100mm minimum diameter dial, white faced with black figured scale, complete with integral vertical or centre stem and separate pocket (brass or steel) to suit the immersion position and matt paint finish to casing and bezel.

2.6.2.2 Shall be installed using heat conducting grease.

2.6.2.3 Shall be calibrated in Celsius with divisions at 1°C intervals and numbered at 10°C intervals, the scale ranges being:-

- 0 - 50°C Cold Water Service
- 0 - 100°C Hot Water Service

2.6.2.4 Where a fixed working temperature is being measured, have a loose red pointer set to that point.

2.6.3 Altitude and pressure gauges

2.6.3.1 Shall be generally to BS 1780, with 100mm minimum diameter dial, white faced with black figures scale calibrated in bar or metre head to approximately 1.5 times the working pressure specified in Part D, complete with lever handle (pressure gauges to have a ring or "U" pattern siphon) and adjustable red pointer set at normal working pressure/head of the system.

2.6.3.2 Shall be finished matt paint for both casing and bezel.

2.6.3.3 Shall be calibrated in metres head of water for altitude gauges, bar or millibar for pressure gauges (0.10 bar) and millimetre Hg or kilo Pascals (kPa) for vacuum.

2.6.3.4 Shall be steel tube to BS 3059, Part 2 filled with water prior to being put into service in the case of siphons.

2.7 Pumps

2.7.1 General

2.7.1.1 Pump(s) shall be factory assembled, packaged and tested to meet the required working conditions and test pressure of the system concerned and shall be supplied by one brand name manufacturer.

2.7.1.2 The pumps shall be capable of delivering the required discharge volumes at the duty-point without cavitation, run out, or over-heating.

2.7.1.3 The minimum overall efficiency shall be 60% at the duty point.

2.7.1.4 The pumps shall be minimum 1P55.

2.7.1.5 Pump capacities shall be not less than those specified in the schedules. The Contractor shall submit characteristic curves of the pump performance and such drawings and literature as may be necessary to illustrate and defined the type and details of the equipment offered.

2.7.1.6 Shut-off valves shall be gear type, provided on suction and discharge connections of each pump or on common connection of twin or duplex pumps. Non-return valves and test cock shall be provided on discharge side.

2.7.1.7 All valves shall be suited for opening or closing under maximum working pressures by hand by one person. Non return valves shall he of the ball type suited for horizontal or vertical mounting.

2.7.1.8 Pressure gauges shall be provided in the suction and discharge connections of each pump or in the common suction and discharge connections of duplicate pumps.

2.7.1.9 The pump package and controls shall fully comply with the requirements of BS.767 both during installation and upon completion.

2.7.1.10 Pumps and their drives shall be segregated such that failure of the pump seals shall not result in damage to the drive motor.

2.7.1.11 Pumps shall be quiet, smooth running and effectively isolated from the building fabric. The complete unit shall effectively be balanced to eliminate nuisance noise and vibration.

2.7.1.12 Base plate assembly/ supporting frame shall be in Mild steel, galvanised to BS.719 (coating thickness 610 g/sq.m)/ Hot dipped galvanised complete with height-adjustable rubber-in-shear vibration dampeners

2.7.1.13 Pumps shall be provided complete with a drain plug and, except where the pump is inherently self venting.

2.7.2 Control Panel

2.7.2.1 The control panel(s) and distribution board for the pump shall be constructed from factory made standard size steel plate (minimum 1.5 mm thick) cubicles, which together with a steel framework shall form a robust enclosure structure for cables and equipment. The surface treatment shall be epoxy powder painting giving a design life of minimum often (10) years.

2.7.2.2 In addition to the electrical protection specified elsewhere herein, safety cut-outs for the LV control panels and switchgear shall be provided to protect equipment against any operating conditions which could arise which would be liable to cause damage to the equipment.

2.7.2.3 The internal wiring shall be identified with markers having the same information as the point to he connected to. All equipment shall be clearly marked.

2.7.2.4 Doors shall be provided with a rubber gasket, fixed Jocks with handles and hinges to enable doors to be opened to a minimum of 120°.

2.7.2.5 Enclosure protection shall be a minimum of IP 55.

2.7.2.6 The construction shall ensure high operational reliability and personnel safety.

2.7.2.7 Distribution Boards shall be identified by an engraved non-corrosive metallic name plate. Degree of protection shall be a minimum IP 55.

2.7.3 Motor Protection

2.7.3.1 Motor protection relay units shall be provided for the protection of the motors. The relay units shall incorporate wide range adjustable over-current protection, earth fault units; single phasing, under and over voltage protection etc.

2.7.4 Identification

2.7.4.1 All pumps shall bear the manufacturer's designation plate which shall indicate the type of services and serial number of the unit.

2.7.5 Booster pump set

2.7.5.1 Booster pump(s) shall be factory assembled, packaged and tested to meet the required working conditions and test pressure of the system concerned and shall be supplied by one brand name manufacturer.

2.7.5.2 Each set shall be fixed on a common bedplate and supported with suitable anti-vibration mountings.

2.7.5.3 Each pump shall have isolating valves on suction and delivery, non-return valves on delivery and a test cock.

2.7.5.4 Appropriate flexible connections to suction and discharge pipework shall be provided to the booster set.

2.7.5.5 Suitable pressure gauges shall be provided on the discharge main from the booster set.

2.7.5.6 Integral control panel to IP55, complete with HRC fuses for motor/control circuits, motor starters and overloads, appropriate control interfacing, terminal strips and labeling shall be provided.

2.7.6 Sump pump

2.7.6.1 Sump pump materials shall comply with the schedules.

2.7.6.2 Each pump shall be protected by a non-ferrous strainer on the suction side which can be removed for cleaning.

2.7.6.3 Sump pumps shall operate automatically under level control with provision for an alarm to indicate when normal high water level is exceeded.

2.7.6.4 Bolts, nuts and fastenings shall generally be of stainless steel, and ensure electrical cable entry is of watertight construction.

2.7.6.5 All materials used shall be compatible with the fluid in which they are immersed.

2.7.6.6 Isolating valves, non-return valves and strainers (where shown) of pipeline size not pump connection size shall be provided on the discharge side of the sump pump.

2.7.6.7 Bearings shall either be of sleeve type with oiling ring and reservoir, or ball or roller type with grease lubricator.

2.7.6.8 Preference shall be given to pumps which exhibit design features that allow for ease of maintenance and inexpensive replacement of components liable to wear, such as shaft sleeves, wearing rings etc.

2.8 Cold water service

2.8.1 Scope

2.8.1.1 This section covers pipes, valves and fittings connecting to the outlet of a Water Authority meter to provide mains for fire services and for supplies to storage cisterns with distribution pipework from these to user points, etc. It does not include pumps, cisterns, ball float valves etc which will be as specified in later sections.

2.8.1.2 Pipes, valves and fittings shall be selected from the appropriate tables to suit the different requirements of the service as shown on the drawings and comply with both the Local Water Undertaking Byelaws and lists of approved materials as tested by the Water Research Centre (WRc UK) and listed in the current water fittings and materials directory.

2.8.1.3 No materials used in the construction or assembly of the services shall support microbial growth within the water circuits.

2.8.1.4 All cold water services shall be classed as potable. The installation of potable services should comply with the WHO recommendations.

2.8.2 Pressure testing

2.8.2.1 Shall be generally to BS 6700 and shall be carried out after a preliminary inspection for leakage with the pipework full of water at normal pressure.

2.8.2.2 Shall be applied to completed sections of pipework and finally to the whole installation and comprise the following hydraulic pressures which must be held for not less than four hours after the rectification of any leakages:-

Service pipework (mains pressure)

Test Pressure	=	Twice maximum mains pressure for ductile iron or copper pipes or 10 bar.g whichever is greater and 1.5 x maximum mains pressure for polyethylene pipes or 10 bar.g whichever is greater.

Distribution pipework (cistern supplies)

Test Pressure	=	Twice maximum static head or 4 bar.g whichever is greater.

3 Fire extinguishing installations (if applicable)

3.1 General

3.1.1 Standard references

3.1.1.1 The materials, components and completed installations shall conform as applicable with the following Standards, including all amendments, current at the time of tendering. Construction products should comply with European Standards and Technical Specifications (ESTS). Wherever reference is made to a British Standard a corresponding ESTS (generally ISO series) shall be equally acceptable.

3.1.1.2 Where available all materials, equipment etc forming part, or whole, of the services specified in the Contract, should be obtained from BS EN ISO 9000 - "Quality Assurance" certified manufacturers and preferably "kite marked" or EC equivalent.

3.1.2 Scope

3.1.2.1 This section covers the manufacture, works testing, supply, installation and site testing of the components of fire extinguishing installations, from dedicated pressurised water mains/tanked supply, hose reels and dry rising mains.

3.2 Installation

3.2.1 Temporary notices

3.2.1.1 Shall be displayed, as recommended by the fire authority, with black letters on yellow background and remain until the installation becomes fully operational.

3.2.1.2 Read **'FIRE MAIN OUT OF ORDER'** where an installation is not available for use.

3.2.2 Identification of fire mains

3.2.2.1 Shall be identified in accordance with BS 1710.

3.2.3 Earthing (extraneous conductive requirements)

3.2.3.1 Shall be effected between the main earthing terminal of the electrical installation and to the pipework and other conductive metal work of the Fire Extinguishing Installation by an equipotential bonding conductor in accordance with the IEE Wiring Regulations 17th Edition. Provided by local supplementary bonding connections to pipes and metal work in the absence of permanent metal to metal joints of negligible impedance, to maintain the equipotential zone.

3.2.4 Pipework installation

3.2.4.1 Shall be to the standards of pipework installation specified in this document.

3.3 First aid fire hose reels

3.3.1 Supply pipework

3.3.1.1 Shall be fed from combined fire fighting/domestic pump set.

3.3.1.2 Shall be suitable for working pressure 16 bar.g max - temperature nominal 10°C.

ITEM	NOM SIZE BORE mm	DESCRIPTION	BS NO
Pipe	28 to 100	Half Hard Copper.	**BS EN 10**
Fittings	28 to 67	Copper or non-dezincifiable Copper Alloy. Capillary Type 97/3 Tin/Lead Soft Solder.	864 Part 2 **BS EN 29453**
Fittings	76 and above	Non-dezincifiable Copper Alloy. Capillary Type 2% Silver/Copper/Phosphorous Brazing Metal.	Makers std 1845:1984
Unions	28 to 54	Non-dezincifiable Copper Alloy. Capillary Type 40/60 Tin/Lead Soft Solder. Brass Union Nuts.	864 Part 2 **BS EN 29453**
Flanges	65 and above	MS Flange/Copper Alloy Centre Piece. Capillary Type 2% Silver/Copper Phosphorous Brazing Metal.	Makers std 1845:1984
Gaskets	All size Metric	Ethylene propylene synthetic rubber.	**BS EN 1514-1**
Isolating Valve (as specified)	1" to 2" 25 to 54	Non-dezincifiable Copper Alloy. Wedge Gate Type. NR Stem. Hand wheel or Lockshield PN 16 Bar.	5154
Isolating Valve	65 and above	Cast Iron. Wedge Gate Type. Inside Screws GM Trim, NR Stem. PN 16 Bar. Flanged.	151
Draining Tap	0.5" & 0.75	Copper Alloy. Bush Pattern. Screwdown with loose handle and hose connection.	2879

3.3.2 Hose reels

3.3.2.1 Shall be connected to a minimum 25mm branch pipe, through a union fitting and inlet valve easily accessible local to the unit, generally to BS 5306: Part 1 and as shown on drawings.

3.3.2.2 Shall be finally connected to the hose reel supply branch only after the pipework system has been pressure tested and flushed through satisfactorily.

3.3.2.3 To have the following specification:

Description	FIRE HOSE REEL
Location	Inside fire fighting cabinet provided by the Arch
Type	Swinging
Drum Size	600mm diameter x 200mm deep
Hose Diameter X Length	25mm x 30m
Accessories	Wall bracket
Manufacturers and Model	SRI/Combat
Notes	Fire hose reel to comply to EN 371

3.3.3 Hose reel nozzle

3.3.3.1 Hose reel nozzle to have the following specifications:

Description	Nozzle
Location	Inside fire fighting cabinet
Type	Brass finished jet & spray nozzle
Material	Brass
Finishing	Chrome
Inlet Size	25mm
Flowrate @ 2 Bar	32 L/min
Throw range @ 2 Bar	11m
Manufacturers And Model	SRI/Combat
Notes	Nozzle to comply to EN 371

3.4 Testing

3.4.1 Pressure testing

3.4.1.1 Shall be generally to BS 5306: Part 1, BS 6700/ It shall be carried out on the completed pipework installation or sections of pipework, which shall be subjected to the following hydraulic pressure and the pressure maintained for not less than one hour, or as long as is necessary for satisfactory inspection of the whole of the installation.

3.4.1.2 Shall be one and a half times the system static head or working pressure or a pressure of 10 bar g whichever is the greater - for Internal Rising Mains.

3.4.1.3 Shall be one and a half times the system working pressure or a pressure of 10 barg, whichever is the greater - for Fire Hose Reel Mains.

3.4.1.4 Shall be followed by flushing out of the installation with clean water when pressure testing results are satisfactory.

4 Drainage systems

4.1 General

4.1.1 Sanitary pipework shall be installed in accordance with BS EN 12056-2. Horizontal pipework shall be laid to gradients complying with the above British Standards. Vertical pipework shall be parallel with vertical surfaces. All sanitary pipework shall be uPVC type except for laboratory drainage and drainage form hot water discharge points like sterilisers and disinfectors.

4.1.2 Flexible joints in pipework shall not be made within the thickness of the structure or where they would later be built in. Jointing material shall not project into the bore of pipes, fittings or appliances.

4.1.3 Access caps or plates shall be fitted at ends of all horizontal pipework, at junctions and changes of direction. Access plates shall be fitted at each floor level immediately above the highest connection, at the foot of each vertical stack and at junctions to horizontal connections to enable the system to be internally cleaned and rodded. Access plates shall be provided on vertical stacks, at every level, above the rim of adjacent sanitary ware.

4.1.4 Cleaning eyes shall be provided on the end of horizontal waste floats and rodding eyes at the ends of horizontal soil manifolds, turned up to above the rim of adjacent WC pans. Rodding eyes or access fittings shall be provided at changes of direction on suspended soil or waste pipework. Floor gullies shall be provided with drain access, either internally within the fitting or externally within the pipe run. Soil and waste branches shall be swept type.

4.1.5 Main branch ventilating pipes shall be run above spill over level of fitments except where shown, and if connected to main soil, soil waste or waste pipes, the connection shall be at a point above spill over level of the highest sanitary appliance connected to such pipe.

4.1.6 At the penetration of all roof levels a suitable water seal and weathering shall be provided. Pipe stacks shall be carried up full bore above eaves or roof levels. Termination of soil, waste or ventilation pipework shall not be closer than 3 metres to any opening window, door or ventilation intake. Should this be unavoidable, the pipework shall be terminated 900mm above any such opening.

4.2 Grease trap

4.2.1 The grease trap shall retain solids, grease and oil contained in waste water coming from the kitchen.

4.2.2 Larger solids shall be retained in a stainless steel perforated basket and smaller solids to settle at the bottom to form the sludge.

4.2.3 Grease trap shall be of fibreglass material.

4.2.4 Inlet and outlet dimension of grease trap to be Ø110mm.

4.2.5 The working capacity of the grease trap shall vary from 200Lts to 1000Lts .

4.3 Pipe and fittings

4.3.1 Plastic pipe and fittings

4.3.1.1 Shall comprise UPVC pipes and fittings, manufactured by the injection moulding process. It shall for main soil, ventilation pipes and fittings, internal rainwater pipe and fittings, be UPVC plastic to BS 4514.

4.3.1.2 Shall for branch waste and ventilation pipework and fitting up to and including 50mm diameter, be uPVC plastic.

4.3.1.3 Shall for all branch pipes, be provided with a radius swept in the direction of flow.

4.3.1.4 Shall not be fabricated by means of 'the cut and shut', hot air or solvent welded method.

4.4 Jointing of pipework

4.4.1 Plastics pipe

4.4.1.1 Shall have UPVC plastic pipes and fittings, jointed by the solvent weld method.

4.4.1.2 Shall have spigot ends, squarely cut, ensuring continuity of the internal pipe bore.

4.4.1.3 Shall have excess jointing material removed and not allowed to accumulate on the internal surface of the pipe.

4.4.1.4 Shall accommodate thermal movement, by having joints formed using the joint ring system, with the spigot end of the pipe fitting in the direction of flow. All items forming the joint to be cleaned before assembly.

4.4.1.5 Shall be jointed using the correct solvent or lubricant and be installed to the Manufacturer's information.

4.5 Installation of pipework

4.5.1 General

4.5.1.1 The installation of the above ground sanitation systems shall comply with the requirements of BS 5572 where applicable to design intent.

4.5.2 Pipework installation

4.5.2.1 Shall be installed to the minimum gradients specified in BS 5572 or as indicated on the drawing for all suspended runs.

4.5.3 Pipe clearances

4.5.3.1 Adequate separation from other engineering services and the structure shall be provided to enable maintenance to be carried out in an efficient manner with a minimum of disruption. Plastic pipes shall be distant from heat sources.

4.5.4 Pipe sleeves

4.5.4.1 Where passing through any part of the building fabric not classified as a fire structure, the pipes shall be accommodated in suitably sized sleeves of the same material as the pipe and be of such a diameter as to allow a minimum clearance for the free movement of the pipe.

4.5.4.2 The pipes shall where penetrating a fire resisting structure, shall be accommodated within a fire proof sleeve and which shall be filled with fire proof materials around to comply with Local Fire Services requirement and not less than that prescribed in the Building Regulations of the UK or any other equivalent standard.

4.5.4.3 Shall where passing through sleeves in external walls and ducts, be caulked between pipe and sleeve with lead wool or proprietary sealing compound.

4.5.4.4 Pipe sleeves shall not be used as a means of support to the pipes.

4.5.5 Painting

4.5.5.1 Shall be completed to all ferrous brackets, pipes, supports, nuts, bolts, drop rods and all associated accessories after erection and the witnessing of satisfactory tests, degreasing and washing.

4.5.5.2 Shall be to the recommendations of BS 6150. For cast iron pipes and galvanised items comprise one coat of black bitumen to BS 6949.

4.5.6 Building in of work

4.5.6.1 No pipes shall be concealed within the building structure until satisfactory completion of the inspection and testing procedures.

4.5.7 Traps

4.5.7.1 Shall conform to BS 5572 and all relevant British Standards. They shall be to BS 3943 or the equivalent French Standard. They shall generally be 'P' traps unless otherwise specified in drawings.

4.5.7.2 Shall for all sanitary fittings and equipment be a two piece tubular trap, where exposed under basins be chromium plated copper alloy bottle traps.

4.5.8 Sanitary appliance connections

4.5.8.1 Shall be by a dry seal push fit joint to the drainage system for all connections from sanitary appliance outlets 89mm diameter and above.

4.5.9 Access points – general

4.5.9.1 Shall be provided into the pipe bore to enable testing, inspection and efficient maintenance operations to be carried out. They shall be all fully accessible.

4.5.9.2 They shall have all access plates and caps fitted as the installation work proceeds and remain sealed except for inspection and testing. In the event of an open access point being found at any time during the course of installation, the contractor shall have that section of pipework rodded out and flushed with clean water. Should it be demonstrated that the pipe bore is not satisfactorily finished, the section adjacent to the access point to be stripped out to a location of satisfactory internal finish.

4.5.9.3 Access points on vertical main soil and ventilation pipes of 75mm -160mm diameter, shall be provided in the following positions:-

- Above the spill-over level of adjacent sanitary fittings and a minimum of one metre above finished floor level on all floors.
- Above offsets in vertical stacks.
- At all junctions in suspended runs and in other positions as indicated on the drawings.

4.5.10 Upvc/polypropylene pipe access points

4.5.10.1 Shall be full width and bolted, integral with a purpose made fitting, or cut and located in positions shown on the drawings where located on the side of UPVC and Polypropylene pipes.

4.5.10.2 Shall be solvent welded plugs with screwed caps, where located on the end of UPVC pipes and fixed by compression screwed caps on polypropylene pipes.

4.5.11 Sanitary appliances

4.5.11.1 All sanitary appliances shall be fixed in accordance with BS 8000: Part 13. They shall have all outlets and overflows bedded into the sanitary appliances together with all washers, wedges and other sundries necessary to complete an efficient fixing.

4.5.11.2 All debris shall be removed and the appliance cleaned and protected from damage and abuse on completion of fixing.

4.5.11.3 Sanitary appliances shall be tested by operation of taps to ensure overflow waterways are clear of mastic sealant.

4.5.11.4 Shall be subjected to discharge tests to determine the integrity of trap seal under normal operating conditions as defined in BS 5572: Performance Tests.

4.6 Supports expansion and anchors

4.6.1 Expansion joints and anchor points

4.6.1.1 Shall be provided to accommodate thermal movement of UPVC and Polypropylene pipes between fixed points at the following minimum positions:-

- Be provided on long straight suspended runs at 3m centres.
- Be provided between fixed points if the distance exceeds 1m.
- Be provided on UPVC branch waste pipes if the straight length exceeds 1.8m.
- Be provided on Polypropylene mechanical systems as thermal stress relief units, in both the horizontal and vertical plane to accommodate thermal movement of 4.22mm per 3m length per 10°C.

4.6.2 Anchor points

4.6.2.1 Shall be rigidly fixed brackets with bracing angles and structural fixings to prevent pipe movement in any plane. They shall be provided at expansion joints and branch connections securely fixed on the pipe socket without causing damage or deformation. They shall be positioned to control alignment of the system during expansion.

4.6.3 Pipe supports

4.6.3.1 Shall be provided in accordance with the requirements of BS 5572. They shall be provided with supports located at intervals not greater than the following Table for suspended and vertical pipes :-

Support distance for vertical and suspended pipes			
PIPE MATERIAL	**NOMINAL BORE (mm)**	**VERTICAL RUN (m)**	**HORIZONTAL RUN (m)**
Copper Tube	25	2.4	1.8
	32-40	3	2.4
	50	3	2.7
	65 - 100	3.7	3
Cast Iron	All sizes	3	1.8
UPVC	32-40	1.2	0.5
	50	1.2	0.6
	75 – 100	1.8	0.9
	150	1.8	1.2
*Polypropylene Mechanical Joints	38		0.5
	51	1.2	0.5
	76		1.5
	102		1.8
Glass	40-80	1.2	1.2
	100	1.5	1.4
	150	1.8	1.8

4.6.3.2 Suspended pipe shall be continuously supported where temperatures in excess of 20°C are maintained. They shall be fixed to the structure at two points and have vertical adjustment facilities for suspended pipes.

4.6.3.3 Anchors and supports are provided on suspended and vertical UPVC pipes between fixed points to maintain stability under temperature change.

4.7 Care of pipes

4.7.1 Sealing open ends of pipes

4.7.1.1 Sealing of pipes shall be carried out as the installation proceeds. It shall comprise purpose made metal or plastic plugs, caps or blank flanges. In the event of an open ended pipe being found or a plug removed, the Contractor shall have the section concerned rodded clean and flushed with clean water. If after such clearing operations it can be demonstrated that the pipe bore has not been satisfactorily cleaned, the pipes adjacent to the open end to be stripped out to a location of clean internal finish.

4.7.2 Pipe condition and protection

4.7.2.1 All pipes to be used shall be straight, cleanly finished, round in cross section and without defect.

4.7.3 Pipe cutting

4.7.3.1 Shall include for all pipes to be cut clean and square with axis of the pipe and before installation, the cut ends of the pipe to be made smooth and any burrs removed by filing.

4.7.3.2 Shall include for cast and spun iron pipes to be cut with the correct cutting apparatus or appliance.

4.7.3.3 Shall require care to be taken when cutting cast iron pipe to avoid damage to the internal and external coating.

4.7.4 Storage of pipe and fittings

4.7.4.1 Shall include for plastic pipe fittings, joints, sealing rings and gaskets to be stored in a ventilated space and not exposed to direct sunlight. The Contractor shall provide purpose made racks for storage of pipes and similar materials to prevent bending and distortion. He shall provide suitable racks and storage for plant, equipment and materials unable to be stored in huts or buildings.

4.7.4.2 Shall allow replacement material, plant or equipment to be provided where deterioration or damage has occurred prior to handover.

4.8 Pre-handover and handover procedures and requirements

4.8.1 General

4.8.1.1 The Contractor shall on completion of the pipework installation, and prior to the installation of the sanitary appliances, include for all plugs to be removed and the entire system, including the rainwater system, rodded through and flushed with clean water.

4.8.1.2 The Contractor shall include adequate provision for collection and disposal of the water to ensure that the building fabric or other services are not affected during the operation.

4.8.1.3 Shall provide for all access covers and cleaning eyes to be removed, checked, replaced if damaged, greased, refitted and sealed.

4.8.2 Testing

4.8.2.1 All soil and waste pipes shall be subjected to an air pressure test in the following manner: The section of the installation to be tested to be sealed off by the insertion of expanding rubber, or inflatable stopper testing plugs, (one of which to incorporate a tee fitting complete with an air cock), on each of the free ends of the fittings. One of the air cocks to be connected by means of a flexible tube to a manometer (u gauge) and the other connected to a tube for applying the required air pressure to the system. The air pressure to be applied to the whole section of pipework and fittings under test, this to be equal to 38mm water gauge and to remain constant for a minimum of 3 minutes.

4.8.2.2 The Contractor shall ensure that the installations are tested at the following stages:-

- Prior to concealment by suspended ceilings, duct covers, partition cladding etc.
- On completion of the whole installation.
- On completion of all work, including that of other trades.

4.8.2.3 The Contractor shall also be required that all soil and waste pipes to be tested to the satisfaction of the Local Authority as determined by the Building Inspector.

4.8.2.4 All final commissioning procedures shall be as defined in BS 5572.

5 Pre-commissioning cleansing and water treatment

5.1 General

5.1.1 Open and closed circuit systems shall be flushed through to remove scale and debris collected within the systems. On completion of flushing they shall with the exception of domestic water systems be chemically as necessary.

5.1.2 Domestic water systems shall be disinfected and sterilized.

5.1.3 Closed circuit systems shall if necessary on completion of flushing and chemical cleaning operations be dosed with an agreed chemical treatment.

5.1.4 Strainers, test points, drain points, vents and by-passes shall comply with the pipework section of this specification and be provided as required to allow full compliance with the Guide. Temporary flushing tanks pumps and meters shall also be provided as required

5.1.5 The public health services installer shall employ a water treatment specialist, who shall provide a method statement covering all aspects pre-commissioning works and subsequent water treatment. The statement shall cover each system and must include details of the chemicals proposed. The method statement shall be submitted to the engineer in sufficient time for comment before the work is carried out.

5.1.6 The engineer shall be advised at least five working days before in advance of the commencement of the flushing and cleaning programme so that procedures can be witnessed.

5.2 Water supply

5.2.1 Each closed system shall be provided with a valved connection in the main plant area suitable for flushing and cleaning purposes. A mains cold water connection shall be provided adjacent to the system connection.

5.2.2 The connections shall be adequately sized to permit the flushing velocities recommended in BSRIA Application Guides AG1/2001 and AG2/89.3 to be achieved. The supply and connections shall be capable of providing the required flow rate at a minimum pressure of 3 Bar at the top of the building. Where such a pressure is not available the mechanical services installer shall provide sufficient temporary boosting equipment to ensure that this flow rate and pressure is achieved.

5.2.3 Connections to the system shall meet the requirements of the local water authority and the model water by-laws.

5.2.4 Where the flushing supply is provided from a private source a sample of the intended source shall be analysed via an accredited testing facility. The results of the analysis shall be submitted to the engineer for comment before the commencement of flushing. Before water is taken from a private source or local authority the Contractor shall hold or obtain a licence so to do.

5.3 Drainage

5.3.1 The public health services installer shall ensure sufficient hose is provided to enable the water flushed from the system to be discharged into the foul drainage system if permitted by the local water authority. Where the Mechanical Services Installer is unable to obtain the necessary approval, alternative acceptable arrangements shall be provided.

5.4 Electrical supply

5.4.1 An electrical supply comprising a fused switch and steel wire armoured cable installed as specified in the "Electrical Services associated with Mechanical Plant" section of the specification shall be provided for connection to the temporary pumping equipment. The switch shall be of sufficient capacity to suit the pump motor rating.

5.4.2 The connection to the pumping equipment shall be taken from the nearest mechanical services control panel.

5.5 Filling

5.5.1 On completion of the installation the system shall be filled with water and pressure tested as described elsewhere within this specification. On completion of the testing the system shall be allowed to stand for 48 hours to soften the inclusions. The mechanical services installer shall ensure that all flushing by-pass valves are fully open, equipment and terminal units shall be isolated wherever possible.

5.5.2 On completion of the above process the system shall be drained. All dirt pockets and strainers shall be inspected and cleaned out. The system shall then be refilled and drained twice more with the dirt pockets and strainers checked each time.

5.6 Flushing

5.6.1 Flushing of closed water systems shall be carried out strictly in accordance with BSRIA application Guides AG1/2001 and AG2/89.3. Flushing shall commence within 24 hours of the filling described above being completed.

5.6.2 Systems shall be flushed through as necessary with clean water to thoroughly clean the system. Flushing shall be carried out by the provision of temporary pumping plant with adequate capacity to permit the flushing velocities required by the above guide to be achieved Use of the permanent system pumps will not permitted except in special circumstances and only with the written approval of the Engineer.

5.6.3 The system shall be flushed through in sections in both forward and reverse directions. Sections shall be arranged such that after cleaning they can be isolated to prevent further contamination or to ensure that only clean water passes through the section. Sections shall be selected to permit maintenance of the required flushing velocities. Flushing shall be continued until visual inspection indicates the water is clear.

5.6.4 The mechanical services installer's water treatment specialist shall certify that all flushing has been properly carried out.

5.7 Chemical cleaning

5.7.1 On completion of flushing out all systems other than domestic systems the system water shall be analysed to determine whether chemical cleaning is required. Chemical cleaning shall be applied in accordance with the requirements of BSRIA Application guides AG1/2001 and AG2/89.3. Chemical cleaning shall be carried out immediately after the flushing process is complete.

5.7.2 The mechanical services installer shall employ the services of a specialist company to carry out the chemical cleaning and for subsequently draining flushing out and rinsing the out the system. Upon completion of the process the specialist shall issue a certificate for each system confirming that it has been properly cleaned and rinsed out in accordance with the above guide.

5.7.3 Chemicals used for cleaning shall be manufactured, controlled, stored and handled in strict accordance with the chemical manufacturers and local regulations. The chemicals used shall be approved by the local authority prior to disposal through the drainage system. Where such approval is not forthcoming an alternative acceptable to the local authority shall be used.

5.7.4 Chemicals shall be used in such concentrations as are necessary to ensure the system is properly cleaned and degreased. Inhibitors and neutralising agents shall be provided as necessary to prevent damage to the system due to overreaction.

5.7.5 On completion of the chemical cleaning the system shall be thoroughly flushed to remove any remaining chemicals. By-pass valves shall be closed and equipment isolation valves opened. All dirt pockets and strainers shall be inspected and cleaned out. The system shall then be immediately dosed with a passivating agent in sufficient quantities to neutralise chemical residue.

5.8 Open circuits

5.8.1 Open circuits other than domestic water systems shall be treated as described above. The treatment shall, in addition to the requirements of the preceding paragraphs comply with the requirements CIBSE Guide TM13 together with Health and Safety Guides EH48 and HS(G)70.

5.9 Water samples

5.9.1 Duplicate water samples shall be taken as necessary throughout the process to ensure that operations are being carried out at a level sufficient to thoroughly clean the system without using excessive amounts of chemicals and causing damage to the system.

5.9.2 One of each sample shall be sent for chemical and microbiological analysis by an independent laboratory, within 24 hours of the sample being taken. Initial results are to be provided within 48 hours, with full results within 10 days.

5.9.3 The second sample of each of the system water content shall be handed to the Employer at each stage of the filling flushing chemical cleaning and final dosing processes. Each sample shall be clearly and permanently marked and labelled indicating the stage and date when it was taken.

5.10 Disinfection and sterilisation

5.10.1 All cold hot and mains water service pipework including vessels such as tanks and cylinders shall be sterilised immediately prior to Practical Completion. A certificate of sterilisation shall be provided to the employer. Disinfection work shall be carried out in accordance with BS 6700 Section 13 as a minimum standard.

5.10.2 New water pipes shall be sterilised before any system is brought into use. Before sterilisation pipework storage tanks and equipment shall be cleaned out to remove dirt and debris. Such flushing shall be continued until the drain runs clear. The flushing shall be carried out in sections to ensure adequate flushing velocities throughout.

5.10.3 Before chlorination begins and as part of the flushing process the inside of the tank lid and the sides of the tank from the water line to the top of the tank shall be scrubbed with a strong solution of chlorinated water. These areas shall then be rinsed with a strong solution of chlorinated water to prevent the build up of algae.

5.10.4 No water shall be used for domestic purposes during the flushing operations or until sterilisation has been completed. Mains extensions shall be sterilized first followed by communication and supply pipes, storage tanks and distribution pipes in that order.

5.10.5 Mains extensions communication and supply pipes shall be sterilised by a specialist firm appointed by the mechanical services installer and agreed with the Engineer. All such work shall be to the requirements of the local water authority.

5.10.6 Storage tanks and distribution pipework shall be filled with water and thoroughly flushed out. With draw off taps closed the tank shall be refilled and sufficient sodium hypochloride having 3.5% available chlorine shall be added during filling to ensure that when full the tank contains water having a concentration of 50mg/litre, 50 ppm of chlorine in the solution. The sterilisation chemical shall be prepared in accordance with the manufacturer's instructions.

5.10.7 The supply shall then be stopped and draw off taps on the distribution pipework progressively opened working away from the tank. Each tank shall then be topped up with water and sufficient sterilising chemical to give a concentration of 50mg/litre chlorine. The tank and pipes shall then remain charged for three hours. A sample shall be taken at the end of this period and checked for residual chlorine with a comparator. If less than 30mg/litre is indicated the process shall be repeated until this residue is obtained

5.10.8 Finally all pipework including vessels shall remain charged with chlorinated water for at least a further 16 hours to ensure total disinfection. The system shall then be flushed out with clean water until all traces of chlorine residue are removed.

5.10.9 Draw-off taps on each installation shall be provided with warning labels advising not to use the water whilst sterilisation is in progress.

5.10.10 The mechanical services installer shall pay all charges for all water and electricity used for sterilising and flushing out.

5.11 Chemicals

5.11.1 Sufficient of each water treatment and dosage system chemicals shall be provided to the Employer to give specific protection for a minimum period of 12 months.

5.12 Test certificates

5.12.1 On completion of flushing cleaning dosing and sterilisation the mechanical services installer shall have water samples from each system analysed to show final water quality. The test certificates shall be incorporated into the Operating and Maintenance manuals.

5.12.2 On open circuit domestic water systems samples shall be tested for bacteriological content to ensure the water is of potable quality.

5.12.3 Any system failing to comply with the required standards shall be re-treated and re-tested as required by this Section of the specification.

5.13 Pseudomonas bacteriological infestations of closed pipework systems

5.13.1 Water samples shall be taken from the proposed source of water for testing, flushing and final filling before works commence and shall be tested for Pseudomonas bacteria. The test results shall be issued to the Engineer before any filling of the systems for testing commence.

5.13.2 A sum shall be identified by the tenderer within the tender for undertaking the necessary treatment to overcome a Pseudomonas Contamination and for providing a temporary water treatment plant from initial filling and hydraulic testing to Practical Completion. If no contamination is found by practical completion this sum shall be removed by instruction and the identified tender cost deducted.

5.13.3 On Pseudomonas being detected, a method statement detailing testing, sourcing and treatment regimes shall be agreed with the Engineer in time for the procedures to be incorporated within the construction programme.

5.13.4 Before Practical Completion the Mechanical Services Installer shall commission a final water analysis report from water samples taken in the presence of the Engineer. The report shall demonstrate that the systems do not contain any microbiological activity and are chemically closed in accordance with the specialist water treatment companies' recommendations. If activity is still present, the systems shall be retreated and tested until clear.

6 Inspection, testing and commissioning

6.1 General

6.1.1 The entire Works shall be inspected, tested and commissioned in accordance with all relevant British Standard Specifications and Codes of Practice together with and the details given in this Specification to the entire satisfaction of the Engineer.

6.1.2 Installations shall be inspected and tested in sections as the work proceeds and test certificates issued accordingly. The Engineer or Insurance Company may require inspecting or testing of any equipment during manufacture.

6.1.3 No section of the Works shall be insulated or in any other way concealed prior to testing and inspection. Subsequent concealment, where applicable, shall only take place following written authority from the Engineer.

6.1.4 Commissioning shall be undertaken by a specialist commissioning company who shall pre-commission and commission all systems. The specialist shall be advised to the Engineer at the time of Tender for agreement to their suitability. The specialist shall produce a comprehensive report on all systems.

6.1.5 A "Conduct of Commissioning Certificate" shall be provided, as published by the "Central Heating Information Council", for commissioning of systems in dwellings as required in the Approved Document Part L1 of the Building Regulations.

6.2 Attendance

6.2.1 Tests shall be arranged in co-operation with the Public Health Services Installer and Engineer who shall be given five working days' notice in writing of the time, location and nature of the test to be performed. No test shall be considered valid unless the Engineer or his appointed representative is present.

6.2.2 All necessary skilled and unskilled labour shall be provided for attendance duties during testing and commissioning, including pre- and post-test activities. Test media shall be provided and subsequently disposed of except where specifically stated otherwise. Fuel, water, electricity, gas and other consumables required for testing and commissioning shall be provided by the Electrical Services Installer. All fuel tanks, lubrication systems and the like shall be left fully charged at Practical Completion. Batteries shall be left in a fully charged condition.

6.2.3 Representatives present during inspection and testing shall be fully conversant with the system concerned and the method of system and instrument operation. Manufacturers or specialist's representatives shall attend where indicated elsewhere in the Specification or where necessary to ensure that the Works are tested and commissioned in accordance with the requirements of the specification.

6.2.4 Equipment with electrical supplies shall be certified ready for use.

6.2.5 The commissioning engineer shall attend site regularly during the month prior to commencing work in order to fully familiarise himself with the Works, to monitor the progress of the installation and to ensure that all test points, commissioning valves and other facilities required for commissioning are correctly installed.

6.3 Test equipment

6.3.1 All necessary facilities, measuring and recording instruments including test pumps and gauges for inspection or testing purposes shall be provided and shall be checked or calibrated by the Mechanical Services Installer as necessary before use. The Engineer reserves the right to call for a demonstration of the accuracy of any instruments provided.

6.3.2 Test points necessary to carry out the specified test and commissioning requirements shall be provided including facilities for temperature, pressure, pressure drop, volume flow, velocity, in duct sound power and pressure, humidity or other relevant conditions to be measured. Such points shall be fitted with removable plugs, flanges or other devices appropriate to the service concerned. Permanent test or reading points shall be provided only where specified elsewhere.

6.4 Test certificates

6.4.1 Duplicate signed test certificates shall be provided. Test certificates shall identify the Mechanical Services Installer, the Project name and the date of test. They shall list the apparatus or section under test, maker's number (if any), the nature, duration and conditions of test. The certificate shall include details of the test instrument including serial number and the details of its calibration certificate. The result of the test shall be declared and the certificate signed by the person conducting the test.

6.4.2 Where a test has been independently verified, the witness shall countersign the certificate. The name of the company represented by the witness shall be added.

6.4.3 No test shall be valid until the test certificate is provided.

6.5 Failure of test

6.5.1 Any defects occurring at any time during the test duration shall be made good and a complete re-test carried out.

6.5.2 Where failure during a test, inspection or commissioning process results in damage to the building fabric to any services not provided as part of this Contract, or requires subsequent builders work in connection to be carried out, then the remedial works shall be the responsibility of the Public Health Services Installer.

6.5.3 Leakages shall be repaired by properly remaking or replacing the defective component. Caulking will not be permitted.

6.6 Works tests

6.6.1 The Engineer will be entitled, at all reasonable times during the manufacture, to inspect, examine and test equipment to be provided. The Engineer shall inform the Public Health Services Installer which equipment is to be inspected or tested at works.

6.6.2 The Public Health Services Installer shall give the Engineer written notice of the date and place at which such equipment will be ready, at least 10 working days before such date.

6.6.3 Such inspection, examination or testing shall not release the Public Health Services Installer from any obligation under the Contract.

6.7 Equipment output tests

6.7.1 Equipment, which has a specified output or throughput, shall be tested and the recorded output or throughput, method of calculation and relevant test conditions indicated on test certificates.

6.7.2 Where a British Standard has been published, tests shall comply with the Standard.

6.8 Specialist plant

6.8.1 The Public Health Services Installer shall be responsible for manufacturers attending site to carry out specialist commissioning of all plant items.

6.8.2 Where described elsewhere in this Specification particular items of plant shall be tested and commissioned in accordance with their relevant clauses.

6.9 Commissioning Instruments

6.9.1 Instruments for testing shall be provided including the following:

- Water Flow meter.
- Pressure gauge

6.10 Water circuit balancing

6.10.1 Systems shall be filled with the working fluid, vented as necessary and brought to a state of complete readiness for the system balancing procedures.

6.10.2 Water systems shall be balanced in accordance with the CIBSE Commissioning Codes and BSRIA Commissioning Guide. Balancing shall be achieved by the regulating valves provided and flow rates determined on a pressure drop basis. Where pressure tappings or orifice plates are not provided temperature drop may be used.

6.10.3 Flow through pumps shall be measured by relating the pressure drop across the pump to the manufacturer's tests curves and by summation of relevant commissioning valve readings. A copy of the test curve indicating the final operating point shall be forwarded to the Engineer.

6.11 Commissioning results

6.11.1 On completion of each section of work the results shall be typed in schedule form and submitted to the Engineer for comment. Following comment by the Engineer the tabulated commissioning results shall be incorporated into the Mechanical Services maintenance manuals.

7 Drawings and documentation

7.1 Tender drawings

7.1.1 The Tender Drawings are prepared by the Engineer to show the general arrangement of the plant, equipment and services, which form the intended Contract. The drawings are prepared in sufficient detail to, in conjunction with the Specification, allow competitive Tenders to be submitted.

7.1.2 The Mechanical Services Installer shall be responsible for interpreting the drawings, making due allowance for offsets to avoid the building structure or other services, whether indicated or not. The Mechanical Services Installer shall take all necessary steps to fully acquaint him with the nature and extent of the works by visiting the site and inspecting the architectural, structural and other services drawings.

7.1.3 No claim for loss or expense due to the above factors will be considered.

7.2 Contract drawings

7.2.1 The Contract drawings are issued by the Engineer when the Contract is placed. They will comprise the Tender drawings as described, modified to include any variation to the Contract since the issue of the Tender Drawings.

7.2.2 Variations to the Contract, requiring the further drawing information will be carried out by the Engineer issuing updated copies of the Contract Drawings or supplementary sketch drawings until such times as the working drawings are available for marking up or in such other manner as the Engineer decides.

7.3 Cad data

7.3.1 A CAD copy of the Engineers drawings may be made available to the Mechanical Services Installer to assist in the preparation of the Installers working drawings should a request for the information be made to the Engineer in writing. Disks will be prepared in the current version of Autocad or in DXF format as required. A charge may be made by the Engineer for the provision of such information, the charge being confirmed to the Mechanical Services Installer as soon as the number and size of the drawing files required is known.

7.3.2 The Mechanical Services Installer shall be solely responsible for the modification of the information to provide the working drawings as required by this specification. The modified drawings shall accurately reflect the equipment and installation proposed by the Mechanical Services Installer as if the drawings had been drawn without the benefit of the electronic data. They shall also take account of the most recent Architectural and Structural information. Working drawings prepared from data provided by the Engineer shall be issued with the Engineer's title block replaced by the Installer's own block.

7.3.3 The Mechanical Services Installer's particular attention is drawn to the following conditions which apply to the use of any electronic information provided by the Engineer:-

- Any charge for supplying data for this Project is to be agreed with the Engineer and shall be received prior to release of the data.
- It is an express condition of the contract under which data is supplied that the Mechanical Services Installer is absolutely responsible for verifying its correctness and completeness.
- The Engineer accepts no liability or responsibility whatsoever for any loss or damage suffered by the recipient arising out of or in connection with the use or misuse of this data.
- While all reasonable steps have been taken to ensure that the transfer medium and its contents are free from computer viruses, the Engineer cannot be held responsible for any damage or loss that might from their presence.
- The copyright of the original drawings, of which the data is an electronic copy, belongs to the Engineer. The drawings and data have not been prepared for use by the Mechanical Services Installer and may not fully reflect his needs.
- Measurements taken from information which is not dimensioned on the electronic copy are at the Mechanical Services Installers own risk.

7.3.4 All electronic information passed to the Mechanical Services Installer shall be bound by the conditions set out in the above clause.

7.4 Manufacturers drawings

7.4.1 Four copies of manufacturer's drawings and details of all plant and equipment shall be forwarded to the Engineer for comment. Drawings and details shall be certified by the Manufacturer as being applicable to the particular items being supplied.

7.4.2 Drawings shall include general layouts and assembly drawings, details of materials and construction, methods of support and fixing and electrical wiring diagrams. The information shall be in sufficient detail to allow the Engineer to comment. Where particular requirements for drawings are listed in the appropriate clauses for equipment or systems then these shall also be provided.

7.5 Working drawings

7.5.1 The Mechanical Services Installer shall produce fully detailed and dimensioned working drawings of each service to be installed, including all purpose made plant and equipment. The location of all plant, equipment and services shall be fully dimensioned from each other, from other work and from the building structure.

7.5.2 The Mechanical Services Installer shall ensure that all services, including those provided by others are fully co-ordinated with each other and with the building structure and finishes, including obtaining the necessary information from others and for the indication of the service routes for all trades on composite drawings.

7.5.3 The Tenderer shall allow for plant, equipment, pipework, ductwork or electrical installation to be moved during the preparation of working drawings up to one metre from the position inferred by the Tender Drawings.

7.5.4 Working drawings shall include fully dimensioned details and positions of supports and fixings. They shall clearly define the detail and arrangement of installed equipment and systems including access allowances for service and maintenance. Where plant is to be supported on steelwork, the Mechanical Services Installer shall provide setting out dimensions for the steelwork and fixing details of the particular plant to be supported. Weight of plant items with point loads shall be provided.

7.5.5 Working drawings shall be produced in accordance with a programme which is to be agreed with the Contractor to suit the overall programme for the Works. Reasonable allowance shall be made for incorporating any comments made by the Engineer.

7.5.6 Plant and equipment shall be shown in outline with positions of connections and access space clearly shown including space for withdrawal of internal parts. On 1:50 scale drawings pipework, ductwork or electrical distribution equal to or larger than 100mm shall be shown to scale in double line. Circular distribution shall also have the centre line shown. 1:20 and larger scale drawings shall be similarly detailed, except that distribution equal to or larger than 40mm shall be shown to scale in double line. Where appropriate the thickness of insulation shall also be shown on 1:20 or larger scale drawings.

7.5.7 Dimensions shall be clearly shown to locate plant, equipment and distribution from the building structure or fabric and from each other. Inverts or levels above datum shall be shown for all distribution services.

7.5.8 Drawings shall be produced to a scale suitable for the application but at least to the scale listed above. Only recognized metric scales shall be used. Drawings shall be produced on A1 or A0 sheets as appropriate. A3 or A4 drawings may be used for specific component details such as typical brackets with the agreement of the Engineer.

7.6 Wiring diagrams

7.6.1 The Mechanical Services Installer shall produce fully detailed wiring diagrams of electrical work in connection with the Mechanical Services. The diagrams shall include the following:-

- Field Control Wiring Layouts
- Field Power Wiring Layouts
- Control Panel Wiring Diagrams

7.6.2 Wiring diagrams shall be produced on a minimum of A1 size sheets. Where necessary, to incorporate additional information A0 sheets may be used. Computer generated diagrams on A3 or A4 sheets may alternatively be produced provided the information is clearly legible. Where diagrams have to be produced on more than one sheet then information shall be grouped as far as possible to minimise cross-referencing between sheets. Diagrams which due to non-compliance with the above are difficult to read shall be rejected by the Engineer.

7.6.3 Wiring diagrams shall clearly indicate the extent of the wiring system, including numbers and sizes of cables with loadings and relevant cable identification, layouts of cable trays, trunking and conduits and locations of all equipment requiring electrical connection. The drawings shall fully detail the requirements and location of points of connection of electrical services to mechanical services panels and equipment.

7.7 Builders work drawings

7.7.1 In addition to the working drawings of the engineering services, the Mechanical Services Installer shall be required to produce drawings indicating builders work requirements in connection with the services. These drawings shall include details of penetrations through the structure, builders work supports and bases. Full details of access requirements for commissioning, servicing and maintenance through suspended ceilings and floors, together with access to riser ducts and the like shall also be provided as well as fire stopping arrangements and continuation of thermal insulation through penetration through building fabric.

7.7.2 The drawings shall only be prepared after the working drawings have been finally agreed with the Engineer and shall be based on the detail of these working drawings. The drawing production programme shall take this fully into account.

7.8 Issue of drawings

7.8.1 On completion of working drawings, wiring diagrams and builders work drawings shall be submitted to the Engineer for comment. Four prints of the drawings shall be issued to the Engineer for this purpose. If an electronic document control system is employed for the project this will replace the need for printed copies, if agreed with the Engineer. A period of fifteen working days shall then be allowed for comment on the drawings by the Professional Team.

7.8.2 Where drawings are submitted for comment they will be reviewed by the Engineer and any comments returned, either by marking directly on the drawing, or by correspondence. Drawings will be marked with A, B or C status and the definition of each category is as follows:-

- No comments. The drawing is to be re-issued for Construction.
- Comments provided by the Engineer. The drawing is to amend to incorporate all of the Engineers comments and marked for Construction.
- The drawing is inadequate and is to be redrawn and resubmitted for comment.
- The giving of an 'A' status does not relieve the Mechanical Services Installer from ensuring that the drawings meet the requirements of the contract documentation.

7.8.3 The status of working drawings does not relieve the Mechanical Services Installer from his obligations to progress and complete the works in line with the agreed programme. Should the Mechanical Services Installer elect, in order to meet the programme, to proceed with installation work before 'A' status working drawing is achieved, this shall be at his own risk. Should unacceptable work be installed, it will be the responsibility of the Mechanical Services Installer to ensure it is removed and replaced in a manner acceptable to the Engineer. No claims for delay or payment will be entertained in this respect.

7.8.4 When the drawings have been amended to incorporate any comments four prints and one copy negative shall be issued as the construction issue to the Architect and the Engineer. The same preliminary and construction issue distribution of drawings shall apply to any subsequent revisions of working drawings.

7.9 Dimensions

7.9.1 The Mechanical Services Installer shall take site dimensions during the preparation of the drawings and be responsible for their accuracy. Setting out of the works on site shall be carried out by the Mechanical Services.

7.9.2 Installer and any errors arising from inaccuracies in setting out shall be the Mechanical Services Installers responsibility.

7.9.3 The Mechanical Services Installer shall be solely responsible for the accuracy of the drawings and for any equipment shown being suitable for the purpose for which it is intended and in accordance with the design drawings and specifications.

7.10 Site copies

7.10.1 One set of prints of working drawings, manufacturing drawings and installation drawings as necessary to provide a complete record of the Works shall be kept on site. The drawings shall be available at all times for inspection by the Engineer.

7.10.2 The drawings shall be kept in good condition and be marked up, at least once a week, to show the progress of work on site and incorporate all alterations, omissions, variations and amendments agreed during the progress of the works.

7.11 Schedule of rates

7.11.1 Tenderers shall provide, in triplicate, a make-up of the tender price showing quantities, rates and totals in an agreed form and in such detail as required by the Engineer and Quantity Surveyor.

7.11.2 Responsibility for the accuracy and completeness of the quantities and descriptions will rest with the Tenderer. No adjustments will be made to the tendered price in respect of any inaccuracies. The exclusion of any items in the Schedule of Rates will not relieve the Mechanical Services Installer of any obligations under the Specifications and Drawings.

7.11.3 Schedule of Rates shall be provided within seven days of request from the Engineer or Quantity Surveyor.

7.11.4 The Tenderer shall also provide a schedule of makes and types of all equipment included in his Tender, and a list of all Specialists to be employed on the works.

7.12 Manuals

7.12.1 Manuals should consist of one electronic copy and five sets of printed manuals. Both electronic and printed copies shall incorporate all test certificates and acceptances. Six weeks prior to Practical Completion draft copies of the manuals shall be submitted to the Architect and Engineer for comment. One week before Practical Completion final agreed manuals shall be handed over to the Employer. A sum equivalent to 5% of the tender value shall be retained until this occurs.

7.12.2 Failure to issue the manuals in time for incorporation into the Health and Safety File will result in failure to achieve Practical Completion.

7.12.3 Where a development includes residential units, each individual residential unit shall be provided with its own set of Operating and Maintenance instructions.

7.12.3.1 The manual shall be arranged as follows:-

Section 1 Index

Section 2 Description of the Design Intent

Section 3 Description of the Operation Routine. The description shall include specific instruction for start up, operation and shut down of each system, procedures for emergency shutdown, making safe potentially dangerous plant, precautions necessary to overcome known hazards when operating each system, bringing into operation standby equipment, instructions on fault finding and emergency in case of plant malfunction or equipment failure and control sequences for all systems. Health and safety matters identified in the Health and Safety Plan and relevant to the operation, maintenance and replacement of the installation shall be described with precautions envisaged as necessary.

Section 4 Planned Maintenance Instructions. These shall detail the procedures appropriate to the maintenance tasks. Instructions shall include dismantling and reassembly, replacements, adjustment, calibration and testing, reference to parts, identification lists, special tools, test equipment and auxiliary services, hazards which may arise and precautions to be taken, fault finding routines.

Section 5 Maintenance Schedules. These shall detail recommendations for the nature and frequency of inspections, examinations, tests and maintenance to keep the equipment in a safe and efficient working order. Guidance shall be given on the nature of deterioration and defects to be looked for. Activities shall be listed for daily, weekly, monthly, quarterly, bi-annual and annual routines.

Section 6 Dismantling. Description of the methods and processes to be used in draining down and emptying of all systems including safe disposal of the contents. Description of the methods envisaged for dismantling of systems to comply with health and safety requirements, including schedules of hazardous substances and methods of disposal.

Section 7 Equipment Schedules and Parts Lists. The schedules shall locate each item with details of the design and actual operating conditions, including replaceable assemblies. Sufficient information shall be provided to identify each item, with the source of supply, ratings, dimensions and appropriate standards. Equipment schedules shall include the name and address of the manufacturer, reference number, name and address of supplier, order number, date of purchase and duration of warranty. A separate parts list shall be provided for each item detailed in the equipment schedule. Schedules should be provided electronically in MS Word or MS Excel tabular form.

Section 8 A set of Record Drawings and Test Certificates. If necessary, due to the number of drawings which have to be included in the manual, each drawing shall be photographically reduced in size to suit the manual. There should also be a Master Record Index provided electronically in MS Word or MS Excel, listing drawing numbers, descriptions, category and all related drawings.

Section 9 Emergency Measures. This shall include telephone numbers of Mechanical Services Installer's emergency staff and name, address and telephone number of all manufacturers.

Section 10 Copies of all test certificates and commissioning data for each service and item of plant and equipment. They shall be final copies of the data produced as required by the Inspection, Testing and Commissioning Section of this Specification. Where such data is not available for inclusion in the draft copy of the manual required by paragraph b of this Clause, the draft shall be forwarded without them. Inability to include these items will not be accepted as a reason for non-production of the rest of the draft manual.

7.12.4 Covers shall be substantial, of adequate size, distinctive and of sufficient strength to protect the contents for the life of the installation. The binding shall give a permanent anchorage along the left hand side whilst allowing the text to be flat without damage to the spine.

7.12.5 The contents shall be prepared with an agreed typeface on top quality A4 paper suitable for direct insertion into the manuals.

7.12.6 The front cover and where appropriate the spine shall have the name or logotype of the Employer, the name of the building and details of the services included in the manual clearly displayed in permanent lettering. Where the manual is contained in more than one volume, a volume number shall be added.

7.12.7 The title page shall identify the building, describe the Services referred to in the manual and give the full name and address of the Employer. It shall also contain, date of completion and date of handover of the services to the Employer. The date of issue of the manual with the name and address of the manual author and the Author's reference number

7.12.8 The preliminary pages shall contain the full name, address and telephone number of the Engineer, the Mechanical Services Installer and specialists. A description of how to use the manual with any limitations on its use shall be included. The preliminary pages shall include a contents list, list of supplementary documents and a record of amendments to the manual.

7.12.9 Each section of the manual shall be divided by a stiff divider of the same size as the holder. The divider shall be labelled to identify the section of the manual which is following.

7.12.10 All pages comprising the manual shall be sequentially numbered within each Section.

7.13 Building log book

7.13.1 The Mechanical Services Installer shall produce all required information for the Building Log book to meet the requirements of the Building Regulations Approved

Document in accordance with CIBSE TM31: Building Log Books and Standard Templates.

7.13.2 The Mechanical Services Installer shall issue the required information to the Contractor in good time for onward transmission to the Log book Author to allow the completed log book to be issued one week prior to Practical Completion. Failure to issue the required information may prejudice the issue of the Practical Completion certificate.

7.14 Record drawings

7.14.1 Two sets of paper prints of the Record Drawings shall be provided to the Architect by the Mechanical Services Installer for comment 28 days prior to Practical Completion. If an electronic document control system is employed for the project this will replace the need for printed copies, if agreed with the Engineer.

7.14.2 When agreement with the contents of the Drawings is received from the Architect five sets of paper prints and electronic copies to the current version of AutoCAD or in DXF format shall be issued to the Architect. The Drawings shall comply with the requirements of the Construction (Design and Management) Regulations for incorporation into the Health and Safety File for the Contract.

7.14.3 Record Drawings shall show the work as completed and shall record the following:-

- The location, including levels if buried, of public service connections provided within the Contract, whether installed as part of the Contract or the appropriate authority, together with the points of origin and termination, size and materials of pipes, line pressure, flow and other relevant information.
- The layout, location and extent of all piped services showing pipe sizes, together with all valves for regulation, isolation and other purposes, drain cocks, test pockets, gauges, flow or pressure switches and other instruments.
- Location, identification size and details of all apparatus and controls equipment served by, or associated with, each of the various services.
- The layout, location, extent of air ducts, including those formed in builders work or otherwise, plant, equipment, dampers, acoustic silencers, grilles, diffusers, other air terminals, balancing dampers, access panels, fire dampers, turning vanes, hand holes, test holes, gauges and instruments. Each duct and terminal shall be marked with its size and air quantity flowing. Each terminal unit or grille shall have its duty clearly shown.
- The location and identity of each room including spaces housing plant, machinery or apparatus.

- Detailed general arrangements of boiler houses, machinery spaces, air handling plant rooms, tank rooms, electrical switch rooms and other plant or apparatus, including the location, identity, manufacturer, size and rating of each apparatus.
- Sections, elevations, isometrics and schematics of the plant spaces required to clearly indicate the plant arrangements.
- Control and wiring diagrams, incorporating details of each instrument and equipment item with a written description of the sequence of operation of each system. Diagrams shall include full details of internal panel wiring and connections to field mounted items.
- Layout, location and extent of electrical switchgear distribution boards, cables and termination points.
- The Record Drawings, as described, shall be drawn using the current version of Autocad and shall be printed on quality paper using international A series sizes. Lettering shall be not less than 5mm in height.
- Each Record Drawing shall show the name of the Contract and, where appropriate, the zone or floor designation. They shall include a description of the drawing, drawing number and scale. The name and address of the Mechanical Services Installer and the Engineer shall be included. Each Drawing shall include the words 'Record Drawing' in 18mm upper case lettering in the bottom right hand corner adjacent to the title block.
- A sum equivalent to 5% of the Contract value to cover the production of these Drawings shall be withheld until they are completed to the Engineer's satisfaction and handed to the Employer. Failure to issue the Record Drawings in time to form part of the Health and Safety File will result in failure to achieve Practical Completion.

7.15 Instruction of employer

7.15.1 The Employer's Representatives shall be fully instructed by experienced personnel in the operation, servicing and maintenance of the Works. Instruction shall include the provision of such specialist instruction as is required from any suppliers or specialists.

7.15.2 Such instruction shall be given for a minimum period of one week unless otherwise specified elsewhere in this document. On completion a signed receipt shall be obtained from the Employer stating that such instruction has been received.

7.15.3 A week’s refresher course shall be provided three months after Practical Completion. On completion a signed receipt shall be obtained from the Employer stating that such instruction has been received.

SCHEDULES

PUMP SCHEDULE

1.0 COMBINED BOOSTED, COLD-WATER & FHR PUMP

REFERENCE	TP1
Description	**Combined Boosted, FHR and Cold-water Pump**
Location	Ground Floor Technical Room
System	Cold-water system
No. of pumps	3 no. vertical multistage centrifugal pump on common base plate, to be fixed on new concrete structure. All pumps are to be manifolded in situ to a common manifold.
Control Sequence of Pumps	Duty/ Assist/ Standby (auto-changeover of pump) 2 pump will be working on Duty/ Assist mode and the 3rd pump will be on standby mode. Auto changeover of pump shall be possible. Control panel for pump management to be included.
Total Flow rate per pump	1.6 L/s clw VSD
Total Head	76 m
Pipe Material	cPVC PN16
Existing Connection size (Suction/ discharge manifold) mm	Ø 75mm suction and 2x Ø 50mm discharge
Valves	Flexible connection, flanged butterfly isolating valves, non-return valves, drain valves, pressure gauge etc…
Shaft	Stainless steel
Mechanical seal	Tungsten carbide
O-ring	EPDM
Minimum Operating efficiency	65%
Method of control	1. If the water level is less than critical level in water tank 2 then the pump shuts down 2. The water pump is operated based on timer. During office hours, the pump is turned on, and the system operates on boosted water. 3. Outside office hours, or with input from operator, the pump turns off and is operated on gravity. 4. During a power failure, the system works on gravity with the pump being off. 5. If the water level in the roof water tank is below critical level then the pump is automatically turned on.
Fitted on cabinet	Mains Isolator, MCB's, Runs/trip lights, Hours run meter, Emergency stop push button.
Electrical Rating per pump per Set (kW)	As per supplier
Power Supply (ph/V/Hz)	3 phase/ 400V/ 50 Hz
Method of Starting	Soft start or DOL (Star/Delta)
Pressure vessel	80 L
BMS Interfaces	N/A

REFERENCE	TP1
NOTES	• Control panel to be of the same make as pump set. • Low water level cut-out by control impulse, pressure switch, adjustable stop-time delay on low water. • European origin, similar or equivalent to Grundfos, Ebara, Calpeda, Davey, Pedrollo, Wilo, Samson, Homa, DP pumps.

Pipe Schedules

SERVICE	LOCATION	PIPEWORK MATERIAL	PRESSURE RATING	JOINTING	INSULATION	PROTECTION
Cold Water Pipes	In Riser duct	uPVC	PN16	• Solvent welding	No	No
	Rising to appliances	uPVC	PN16	• Solvent welding	No	No
	On Roof	uPVC	PN16	• Solvent welding	No	Two layers of weatherproof paint
	Underground (On Site)	HDPE	PN10	• Electrofusion joint.	No	Concrete surround where crossroads.

SERVICE	LOCATION	PIPEWORK MATERIAL	PRESSURE RATING	JOINTING	INSULATION	PROTECTION
Soil, waste and vent pipes	In Riser duct	PVC	PN 6	• Solvent welding	No	No
	Underground	PVC	SN8	• Rubber ring joints	No	Concrete surround for road crossing.
	Cast in Slab	PVC	PN10 for pipes	• Solvent welding	No	No
	Inside false ceiling	PVC	PN6	• Solvent welding	Yes (for waste pipes running at HL in ground floor)	No
	In boxing	PVC	PN6	• Solvent welding	No	No

SERVICE	LOCATION	PIPEWORK MATERIAL	PRESSURE RATING	JOINTING	INSULATION	PROTECTION
Condensate Drain Pipe	In Riser duct, floor slab and concealed in blockwork	uPVC	PN 10	• Solvent welding	N/A	N/A

Pipe Schedules

SERVICES	LOCATION	PIPEWORK MATERIAL	JOINTING	SUPPORT
Fire hose reel	Inside Riser duct	Heavy weight galvanised mild steel pipe	• Screwed malleable iron fittings to BS 143 for pipe sizes up to 50 mm diameter. For pipe sizes 65 mm diameter to above the following type of jointing may be used: • Galvanised mechanical grooved end fittings or • Galvanised steel flanges to BS 10 jointed with inside-bolt-circle flat ring composition gaskets, with metric hexagonal headed bolts and nuts with washers.	• Pipe ring with extension rod.
	Connection to puddle flange in water tanks.	Heavy weight galvanised steel	• Galvanised steel flanges to BS 10 jointed with inside-bolt-circle flat ring composition gaskets, with metric hexagonal headed bolts and nuts with washers.	• Pipe ring with extension rod.
	Surface mounted Horizontal run inside fixed to ceiling slab.	Heavy weight galvanised mild steel pipe	• Screwed malleable iron fittings to BS 143 for pipe sizes up to 50 mm diameter. For pipe sizes 65 mm diameter to above the following type of jointing to be used: • Galvanised mechanical grooved end fittings with earth continuity clip or • Galvanised steel flanges to BS 10 jointed with inside-bolt-circle flat ring composition gaskets, with metric hexagonal headed bolts and nuts with washers.	• Clevis hangers similar or equivalent to make Sikla Praktica with minimum M12 threaded rod connections and bolt anchors at specified intervals. • Pipe ring with extension rod.

Valve Schedules

VALVES TYPE	SERVICE	LOCATION	MATERIAL	TYPE OF JOINT	ACCESSORIES
Isolating valve	Cold water supply	Throughout	Brass body, stainless steel lever	Compression/ threaded	-
Isolating valve	Fire hose reel	Throughout	Bronze or brass body, stainless steel lever	Threaded	Leatherstraps and padlock
Stop valve	Fire hose reel	Fire fighting cabinet	Bronze or brass body, stainless steel lever	Threaded	Nozzle interlocking device
Globe regulating valve	Cold water supply	Wash hand basins/ sinks/ washing machines	Chromium plated brass	Compression/ screwed	-
Angle valve	Cold water supply	Hand spray taps	Chromium plated	Compression/ screwed	-
Double Angle valve	Cold water supply	Water closets	Chromium plated	Compression/ screwed	-
Non-return valve	Cold water supply	Throughout	Bronze stainless steel	Flanged	-
Strainer	Cold water supply	Throughout	Bronze	Flanged	-
Float valves		Water tank	Brass		-
Automatic air vent (air release valve)	Cold water supply	Throughout	Brass	Screwed	-
Drain valves	Cold water supply	Throughout	Bronze or brass	Compression	-
Notes:	1. All valves shall be to BS standards and bear the BS kitemark. 2. Valves to be properly labelled with tags. 3. Refer to the public health specifications.				

Fire fighting equipment Schedules

DESCRIPTION	PORTABLE FIRE EXTINGUISHER
Location	Below FHR (as per drawings)
Type	ABC/CO2
Capacity	4.5 kg
Working Pressure	14 Bar
Discharge Time	11.7 s
Body Material	Cold rolled steel
Paint Finish	Signal red
Fire Rating	13A 55B
Type of Fire	A, B, C, E
Manufacturers And Model	SRI/Combat
Note	Fire extinguisher to comply to BS EN 3

DESCRIPTION	FIRE HOSE REEL
Location	Inside building. Located in FHR enclosure provided by Architect
Cabinet	Material: mild steel Colour: Epoxy powder red Thickness:1.2 mm
Type	Swinging type
Length of hose	30
Diameter of hose	25 mm
Nozzle type	Chrome finish jet nozzle
Body Material	Steel
Maximum drum size	600 mm
Body	Plate powder finish red
Manufacturers And Model	SRI/Combat
Mode of operation	Manual
Accessories to be provided	Pressure gauge
	Stop valve with nozzle interlocking device
Note	Fire hose reel to comply to EN 671

Fire fighting equipment Schedules

REFERENCE	DESCRIPTION	SIZE (MM)	VIEWING DISTANCE	GEOMETRIC SHAPE	SAFETY COLOUR	CONTRAST COLOUR	GRAPHICAL SYMBOL COLOUR
Signage Type	Fire extinguisher identification and location signs incorporating graphical symbols for classes of fire from BS EN3.5: 1996: FIRE HOSE REEL.	200x80	10	Rectangular	Red	White	White
	*F*ire extinguisher identification and location signs incorporating graphical symbols: FIRE FIGHTING EQUIPMENT STORED INSIDE - TO BE USED ONLY IN THE CASE OF FIRE	200x200	10	Rectangular	Red	White	White
	Fire extinguisher identification and location signs incorporating graphical symbols for classes of fire from BS EN3.5: 1996: BRECHING INLET.	200x80	10	Rectangular	Red	White	White
	FIRE ACTION NOTICE to give instructions to building occupants of what to do in the event of fire.	200X150	10	Rectangular	Green	White	White
	Safe area signs: SAFE AREA	150 x 450	22	Rectangular	Green	White	White
	Assembly point signs: ASSEMBLY POINT	300 x 300	22	Rectangular	Green	White	White
Material	Photoluminescent rigid PVC fire signs on Perspex background screwed to background concrete to BS 5499. (Laminated PVC sheet incorporating a photoluminescent layer backed by a rigid white reflective substrate and protected by a tough, clear gloss PVC film, Thickness: 1Amm)						
Flammability	Inherently fire retardant. Luminance performance: in excess of 23mcd/m' @ 10 minutes and 3mcd/m' @ 60 minutes.						

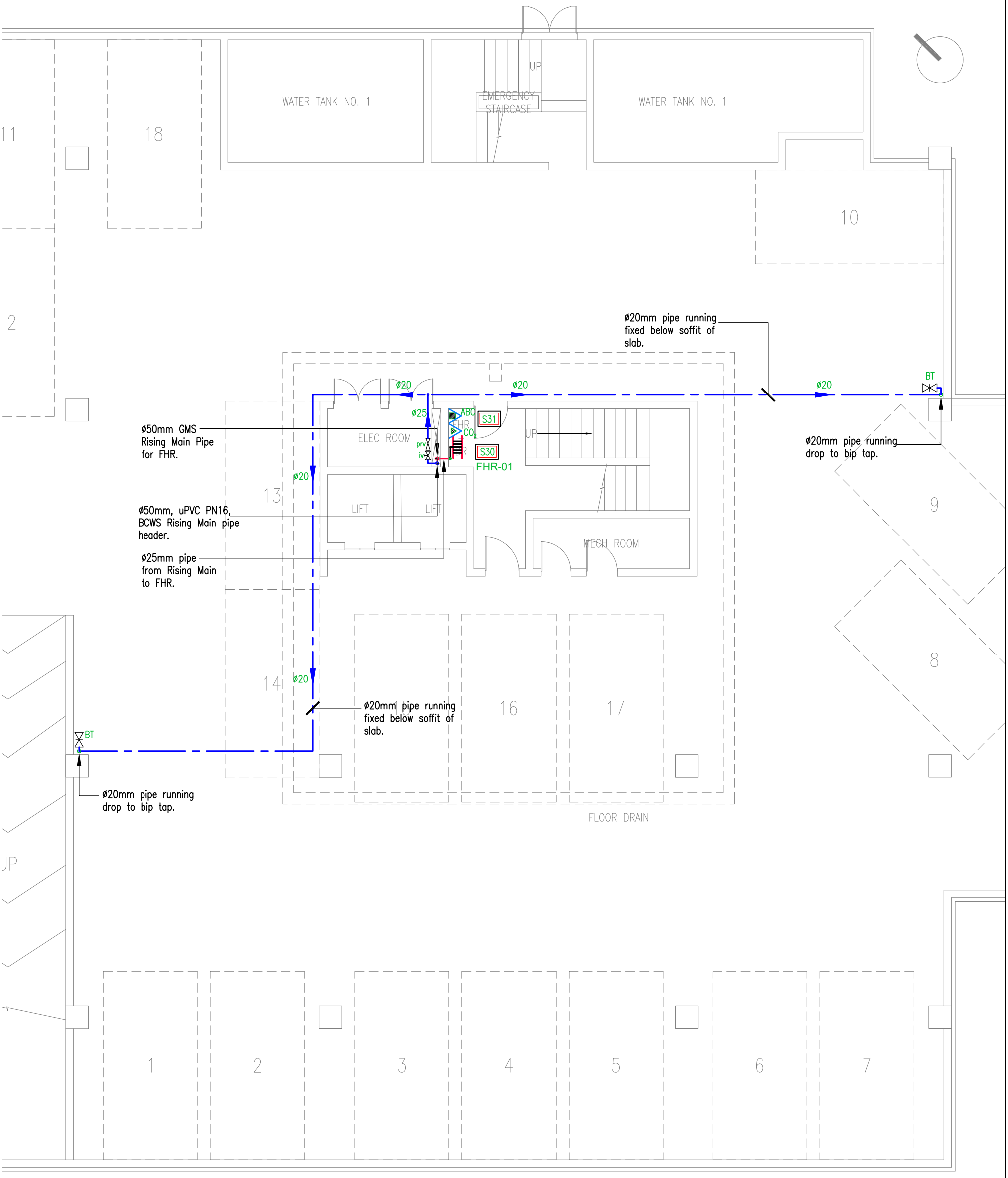
LIST OF TENDER DRAWINGS

PRO-DESIGN ENGINEERING CONSULTANTS LTD					
M&E DRAWING REGISTER				STAGE 4 - TECHNICAL DESIGN	
PROJECT TITLE : REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD			DAY	02	**LATEST**
PROJECT CODE : 22026			MONTH	06	
SERVICE PACKAGE : PUBLIC HEALTH SERVICES			YEAR	23	
Dwg No.:	**Drawing Title:**	**Size:**	**Scale:**		
S10/S60/S72	**COLD WATER, FIRE HOSE REEL & PORTAGE FIRE EXTINGUISHER**				
22026-PDE-MBPH-LB-S10-S60-S72-01	Basement - Layout Plan	A3	1:100	P00	P00
22026-PDE-MBPH-L0-S10-S60-S72-02	Ground Floor - Layout Plan	A3	1:75	P00	P00
22026-PDE-MBPH-L1-S10-S60-S72-03	First Floor - Layout Plan	A3	1:75	P00	P00
22026-PDE-MBPH-L2-S10-S60-S72-04	Second Floor - Layout Plan	A3	1:75	P00	P00
22026-PDE-MBPH-L3-S10-S60-S72-05	Third Floor - Layout Plan	A3	1:75	P00	P00
22026-PDE-MBPH-L4-S10-S60-S72-06	Fourth Floor - Layout Plan	A3	1:75	P00	P00
22026-PDE-MBPH-L5-S10-S60-S72-07	Fifth Floor - Layout Plan	A3	1:75	P00	P00
22026-PDE-MBPH-L6-S10-S60-S72-08	Sixth Floor - Layout Plan	A3	1:75	P00	P00
22026-PDE-MBPH-RF-S10-S60-S72-09	Roof - Layout Plan	A3	1:75	P00	P00
22026-PDE-MBPH-SCH-S10-S60-S72-10	Schematic Diagram	A3	NTS	P00	P00
			Total	**10**	
DISTRIBUTION		**SIGNATURE**	Number of Copies and Format of Distribution: H = Hard copy, X = Issue sheet only, D = Drive/Dropbox, E = Electronic transfer/Email		
I- INFORMATION C- CONSTRUCTION T-TENDER				**T**	**T**
ISSUED FOR					
Client				**E**	**E**
Main Contractor					
Architect					
Project Manager					
Quantity Surveyor					
Structural & Civil Engineer					
Mechanical & Electrical Sub-Contractor					

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

Drawing Number: 22026-PDE-MBPH-LB-S10-S60-S72-01 Revision: P00

Architect Drawing Number: - REV: -



Refer to sheet 22026-PDE-MBPH-L0-S10-S60-S72-02 for Legend & General Notes.

Disclaimer

All design prints and specifications are the property of Pro-Design Engineering Consultants Ltd and cannot be used without permission. Do not scale drawings, use figured dimensions only. All measurements must be checked on site by the contractor and any discrepancies pointed out to Engineers for clarification before proceeding. This drawing indicates design intent only. Contractors shall prepare their own working drawings for areas relating to their own disciplines for execution on site. All site levels & dimensions to be checked on site. Supplier to check dimensions & handle positioning on site before manufacture.

MEP Engineer

PRODESIGN
SUSTAINABILITY & MEP ENGINEERS
1st Floor Building No2 Industrial Building,
Valentina Industrial Estate Phoenix
Tel: (230) 660 4545 | Fax: (230) 606 7070
Email: admin@prodesign.mu
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Architect: -

Client: MAUBANK LTD

Structural Engineer

STAGE 4: TECHNICAL DESIGN

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Title: BASEMENT FLOOR PLAN
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn JC | Checked AVP | Approved

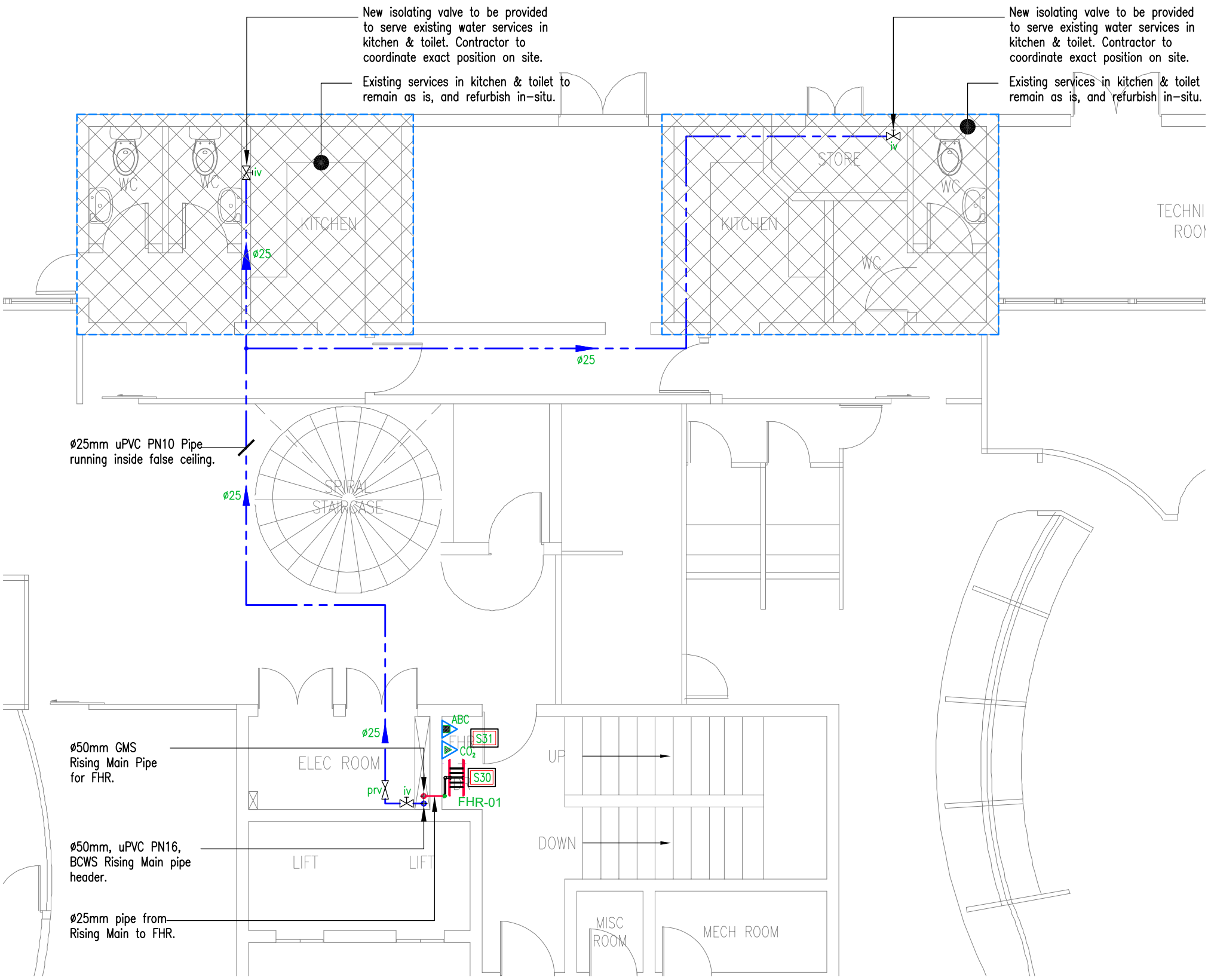
Date 02.06.2023 | Size A3 | Scale 1:100

Drawing Number: 22026-PDE-MBPH-LB-S10-S60-S72-01 Revision: P00

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

Drawing Number: 22026-PDE-MBPH-L0-S10-S60-S72-02 Revision: P00

Architect Drawing Number: - REV: -



Legend:

- uPVC PN10 Pipe running inside false ceiling.
- uPVC PN10 Pipe fixed below soffit.
- uPVC PN16 Pipe
- GMS FHR pipe.
- Demarcation line.
- Wall mounted swinging type hose reel with 30m hose.
- ABC — Portable ABC fire extinguisher c/w signage. (5kg).
- CO_2 — Portable CO_2 fire extinguisher c/w signage. (4.5kg).
- S30 — Signage for hosereel.
- S31 — Signage for portable fire extinguisher.
- iv — Isolating valve.
- prv — Pressure regulating valve.
- Water Rising Mains inside riser.
- BT — Bib tap.

- pg — Pressure Gauge.
- bcv — Ball Cock Valve.
- nrv — Non Return Valve.
- doc — Drain off Cock.
- Combined Boosted cold water supply (BCWS) & Fire Hose Reel (FHR) pump.

General Notes for FHR

1. Pipe supports shall be placed at maximum interval as shown in table below:

Size of pipe (mm)	Spacing for horizontal pipe (mm)
25	2700
50	2700

2. GMS pipe feeding hose reel shall be of 25mm diameter via nozzle interlocking valve.
3. All perforations through walls shall be enclosed by intumescent material or fire stops after passing of services.
4. The fire hose reels shall be swinging type, manually operated and supplied with 30m hose length of diameter 25mm and combination jet/spray discharge pattern 6.35 mm nozzles.
5. Routing of pipework on site to be coordinated with other services.
6. All pipeworks to be galvanised and jointed with screwed and socketed fittings.
7. Rectangular 'Fire hose reel' and 'Portable Fire Extinguisher' notices shall be provided with white wording on a red background. The letter height shall not be less than 50mm and lower case except the initial letters, in accordance with BS 5499-1.
9. A notice giving full operational instructions of hose reel shall be fixed near the fire fighting cabinet.

General Notes for CWS:

1. All pipes to be of uPVC PN10 material unless otherwise stated.
2. All pipes passing through building element to run in sleeves at least one diameter greater than pipe and concealed with fire protecting material.
3. Contractor to ensure proper coordination with respect to other trades.
4. All pipes running inside surface shall be properly supported. Maximum pipe spacing shall be as follows or as stated in drawing.

Diameter {mm}	Spacing on Horizontal Run {m}	Spacing on Vertical Run {m}
16-20	0.4	1.2
25-40	0.5	1.2

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Architect: -

Client: MAUBANK LTD

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Structural Engineer

STAGE 4: TECHNICAL DESIGN

Title: GROUND FLOOR PLAN
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn JC | Checked AVP | Approved

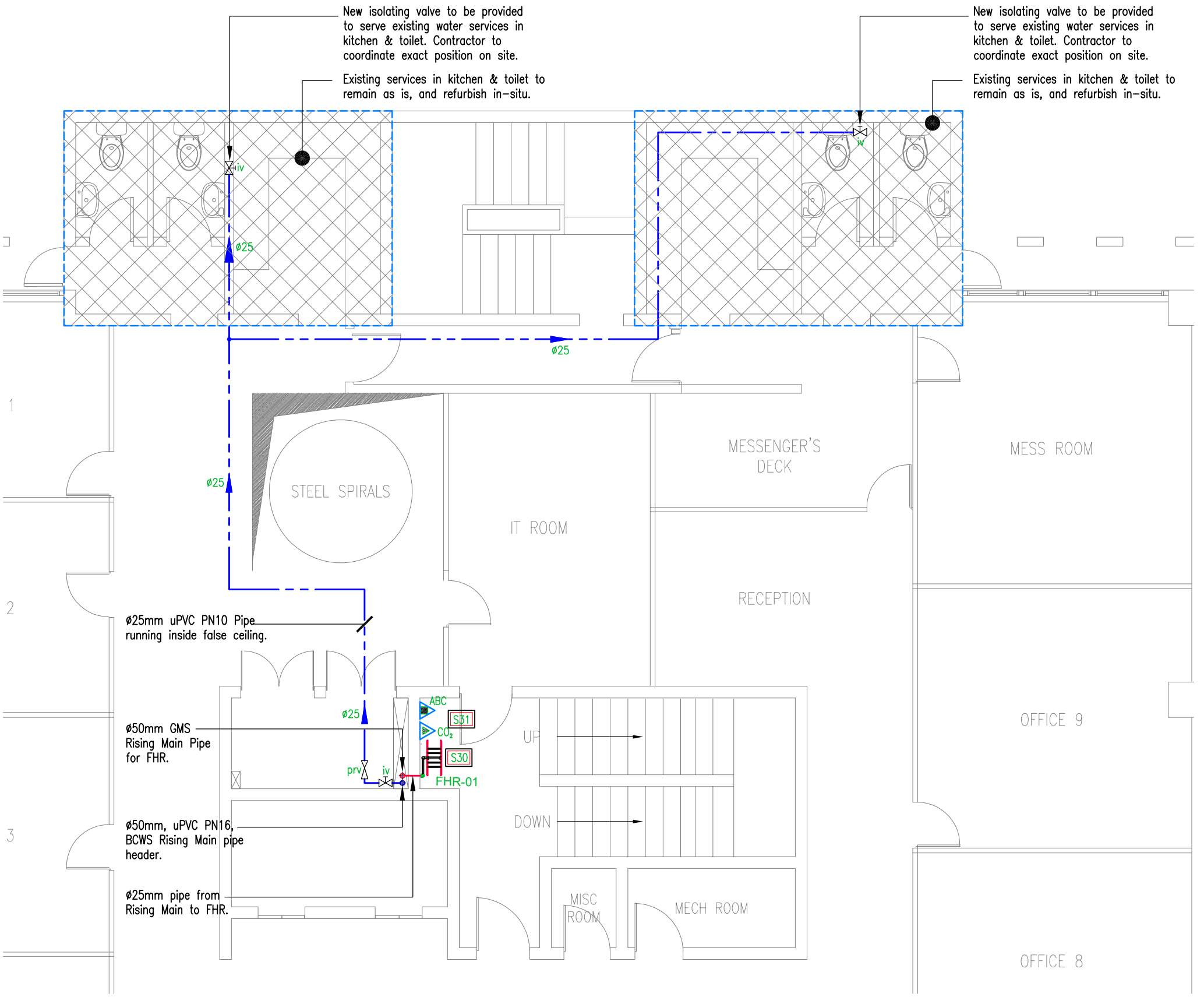
Date 02.06.2023 | Size A3 | Scale 1:75

Drawing Number: 22026-PDE-MBPH-L0-S10-S60-S72-02 Revision: P00

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

Drawing Number: 22026-PDE-MBPH-L1-S10-S60-S72-03 Revision: P00

Architect Drawing Number: - REV: -



Legend:

- uPVC PN10 Pipe running inside false ceiling.
- uPVC PN10 Pipe fixed below soffit.
- uPVC PN16 Pipe
- GMS FHR pipe.
- Demarcation line.
- Wall mounted swinging type hose reel with 30m hose.
- ABC — Portable ABC fire extinguisher c/w signage. (5kg).
- CO_2 — Portable CO_2 fire extinguisher c/w signage. (4.5kg).
- S30 — Signage for hosereel.
- S31 — Signage for portable fire extinguisher.
- iv — Isolating valve.
- prv — Pressure regulating valve.
- Water Rising Mains inside riser.
- BT — Bib tap.

- pg — Pressure Gauge.
- bcv — Ball Cock Valve.
- nrv — Non Return Valve.
- doc — Drain off Cock.
- Combined Boosted cold water supply (BCWS) & Fire Hose Reel (FHR) pump.

General Notes for FHR

1. Pipe supports shall be placed at maximum interval as shown in table below:

Size of pipe (mm)	Spacing for horizontal pipe (mm)
25	2700
50	2700

2. GMS pipe feeding hose reel shall be of 25mm diameter via nozzle interlocking valve.
3. All perforations through walls shall be enclosed by intumescent material or fire stops after passing of services.
4. The fire hose reels shall be swinging type, manually operated and supplied with 30m hose length of diameter 25mm and combination jet/spray discharge pattern 6.35 mm nozzles.
5. Routing of pipework on site to be coordinated with other services.
6. All pipeworks to be galvanised and jointed with screwed and socketed fittings.
7. Rectangular 'Fire hose reel' and 'Portable Fire Extinguisher' notices shall be provided with white wording on a red background. The letter height shall not be less than 50mm and lower case except the initial letters, in accordance with BS 5499-1.
9. A notice giving full operational instructions of hose reel shall be fixed near the fire fighting cabinet.

General Notes for CWS:

1. All pipes to be of uPVC PN10 material unless otherwise stated.
2. All pipes passing through building element to run in sleeves at least one diameter greater than pipe and concealed with fire protecting material.
3. Contractor to ensure proper coordination with respect to other trades.
4. All pipes running inside surface shall be properly supported. Maximum pipe spacing shall be as follows or as stated in drawing.

Diameter {mm}	Spacing on Horizontal Run {m}	Spacing on Vertical Run {m}
16-20	0.4	1.2
25-40	0.5	1.2

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Architect: -

Client: MAUBANK LTD

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Structural Engineer

STAGE 4: TECHNICAL DESIGN

Title: FIRST FLOOR PLAN
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn JC | Checked AVP | Approved

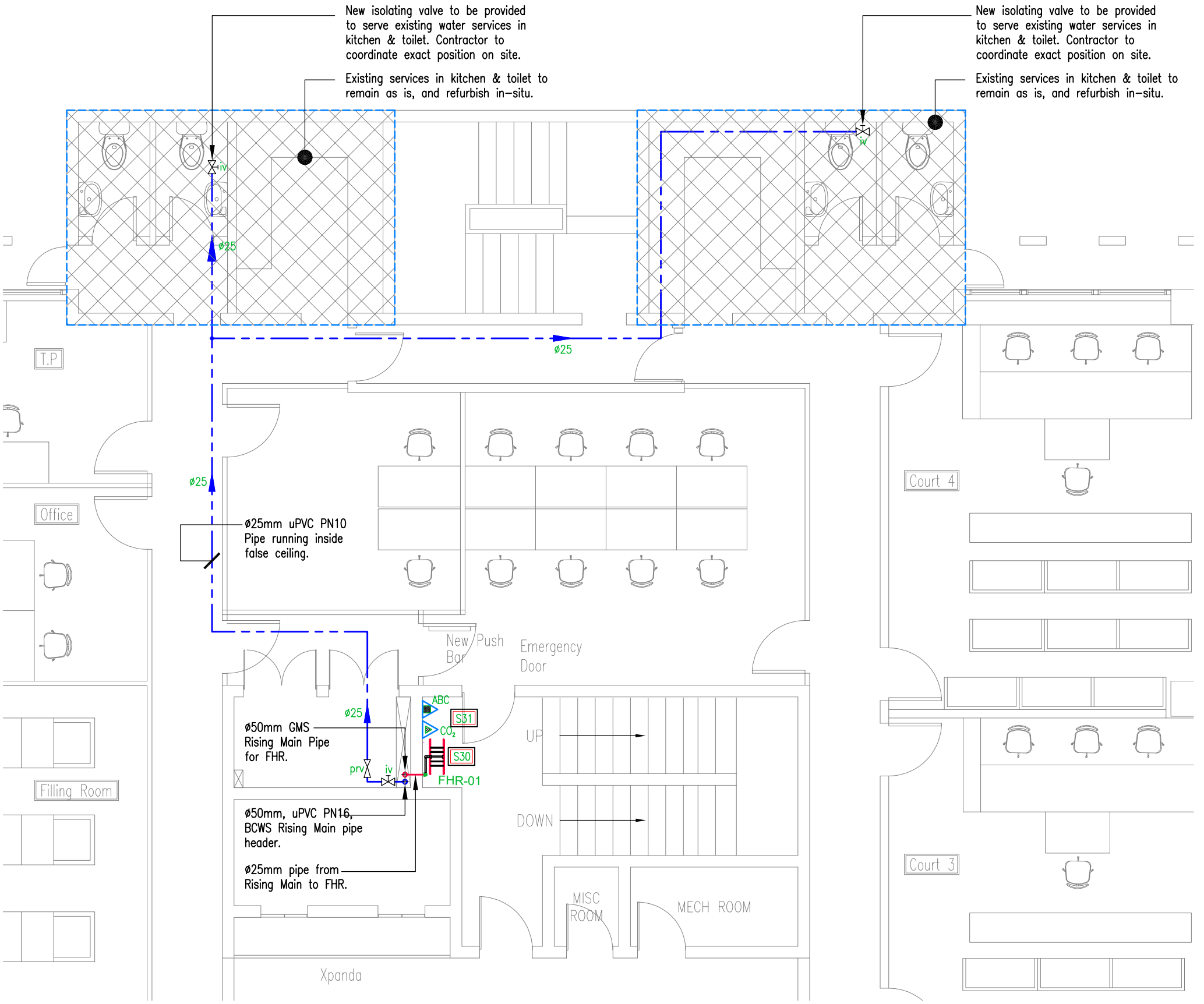
Date 02.06.2023 | Size A3 | Scale 1:75

Drawing Number: 22026-PDE-MBPH-L1-S10-S60-S72-03 Revision: P00

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

Drawing Number: 22026-PDE-MBPH-L2-S10-S60-S72-04 Revision: P00

Architect Drawing Number: - REV: -



Legend:

- uPVC PN10 Pipe running inside false ceiling.
- uPVC PN10 Pipe fixed below soffit.
- uPVC PN16 Pipe
- GMS FHR pipe.
- Demarcation line.
- Wall mounted swinging type hose reel with 30m hose.
- ABC — Portable ABC fire extinguisher c/w signage. (5kg).
- CO_2 — Portable CO_2 fire extinguisher c/w signage. (4.5kg).
- S30 — Signage for hosereel.
- S31 — Signage for portable fire extinguisher.
- iv — Isolating valve.
- prv — Pressure regulating valve.
- Water Rising Mains inside riser.
- BT — Bib tap.
- pg — Pressure Gauge.
- bcv — Ball Cock Valve.
- nrv — Non Return Valve.
- doc — Drain off Cock.
- Combined Boosted cold water supply (BCWS) & Fire Hose Reel (FHR) pump.

General Notes for FHR

1. Pipe supports shall be placed at maximum interval as shown in table below:

Size of pipe (mm)	Spacing for horizontal pipe (mm)
25	2700
50	2700

2. GMS pipe feeding hose reel shall be of 25mm diameter via nozzle interlocking valve.
3. All perforations through walls shall be enclosed by intumescent material or fire stops after passing of services.
4. The fire hose reels shall be swinging type, manually operated and supplied with 30m hose length of diameter 25mm and combination jet/spray discharge pattern 6.35 mm nozzles.
5. Routing of pipework on site to be coordinated with other services.
6. All pipeworks to be galvanised and jointed with screwed and socketed fittings.
7. Rectangular 'Fire hose reel' and 'Portable Fire Extinguisher' notices shall be provided with white wording on a red background. The letter height shall not be less than 50mm and lower case except the initial letters, in accordance with BS 5499-1.
9. A notice giving full operational instructions of hose reel shall be fixed near the fire fighting cabinet.

General Notes for CWS:

1. All pipes to be of uPVC PN10 material unless otherwise stated.
2. All pipes passing through building element to run in sleeves at least one diameter greater than pipe and concealed with fire protecting material.
3. Contractor to ensure proper coordination with respect to other trades.
4. All pipes running inside surface shall be properly supported. Maximum pipe spacing shall be as follows or as stated in drawing.

Diameter {mm}	Spacing on Horizontal Run {m}	Spacing on Vertical Run {m}
16-20	0.4	1.2
25-40	0.5	1.2

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Architect: -

Client: MAUBANK LTD

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Structural Engineer

STAGE 4: TECHNICAL DESIGN

Title: SECOND FLOOR PLAN
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn JC | Checked AVP | Approved

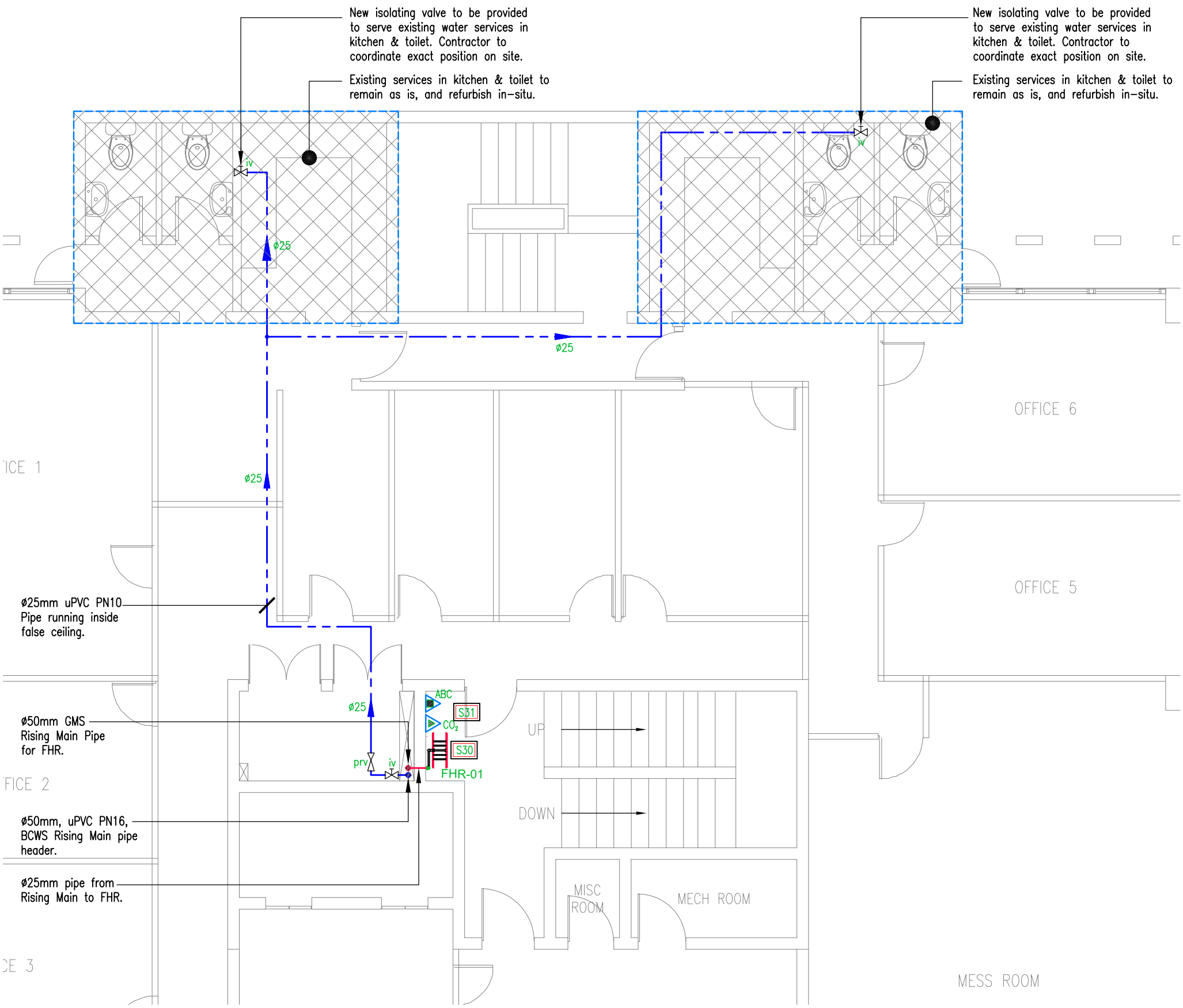
Date 02.06.2023 | Size A3 | Scale 1:75

Drawing Number: 22026-PDE-MBPH-L2-S10-S60-S72-04 Revision: P00

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

Drawing Number: 22026-PDE-MBPH-L3-S10-S60-S72-05 Revision: P00

Architect Drawing Number: - REV: -



Legend:

- uPVC PN10 Pipe running inside false ceiling.
- uPVC PN10 Pipe fixed below soffit.
- uPVC PN16 Pipe
- GMS FHR pipe.
- Demarcation line.
- Wall mounted swinging type hose reel with 30m hose.
- ABC — Portable ABC fire extinguisher c/w signage. (5kg).
- CO_2 — Portable CO_2 fire extinguisher c/w signage. (4.5kg).
- S30 — Signage for hosereel.
- S31 — Signage for portable fire extinguisher.
- iv — Isolating valve.
- prv — Pressure regulating valve.
- Water Rising Mains inside riser.
- BT — Bib tap.

- pg — Pressure Gauge.
- bcv — Ball Cock Valve.
- nrv — Non Return Valve.
- doc — Drain off Cock.
- Combined Boosted cold water supply (BCWS) & Fire Hose Reel (FHR) pump.

General Notes for FHR

1. Pipe supports shall be placed at maximum interval as shown in table below:

Size of pipe (mm)	Spacing for horizontal pipe (mm)
25	2700
50	2700

2. GMS pipe feeding hose reel shall be of 25mm diameter via nozzle interlocking valve.
3. All perforations through walls shall be enclosed by intumescent material or fire stops after passing of services.
4. The fire hose reels shall be swinging type, manually operated and supplied with 30m hose length of diameter 25mm and combination jet/spray discharge pattern 6.35 mm nozzles.
5. Routing of pipework on site to be coordinated with other services.
6. All pipeworks to be galvanised and jointed with screwed and socketed fittings.
7. Rectangular 'Fire hose reel' and 'Portable Fire Extinguisher' notices shall be provided with white wording on a red background. The letter height shall not be less than 50mm and lower case except the initial letters, in accordance with BS 5499-1.
9. A notice giving full operational instructions of hose reel shall be fixed near the fire fighting cabinet.

General Notes for CWS:

1. All pipes to be of uPVC PN10 material unless otherwise stated.
2. All pipes passing through building element to run in sleeves at least one diameter greater than pipe and concealed with fire protecting material.
3. Contractor to ensure proper coordination with respect to other trades.
4. All pipes running inside surface shall be properly supported. Maximum pipe spacing shall be as follows or as stated in drawing.

Diameter {mm}	Spacing on Horizontal Run {m}	Spacing on Vertical Run {m}
16-20	0.4	1.2
25-40	0.5	1.2

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Architect: -

Client: MAUBANK LTD

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Structural Engineer

STAGE 4: TECHNICAL DESIGN

Title: THIRD FLOOR PLAN
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn JC | Checked AVP | Approved

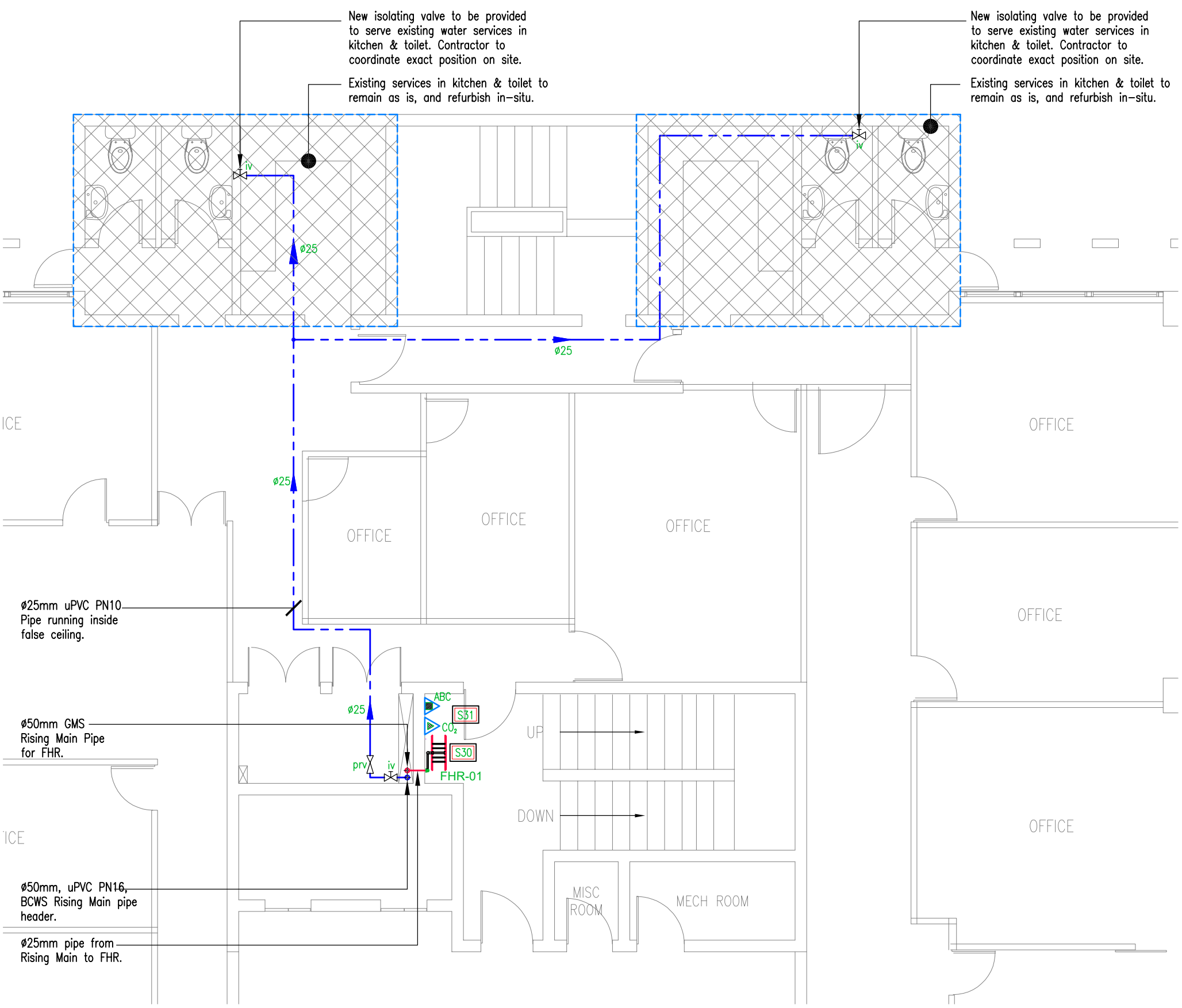
Date 02.06.2023 | Size A3 | Scale 1:75

Drawing Number: 22026-PDE-MBPH-L3-S10-S60-S72-05 Revision: P00

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

Drawing Number: 22026-PDE-MBPH-L4-S10-S60-S72-06 Revision: P00

Architect Drawing Number: - REV: -



Legend:

- uPVC PN10 Pipe running inside false ceiling.
- uPVC PN10 Pipe fixed below soffit.
- uPVC PN16 Pipe
- GMS FHR pipe.
- Demarcation line.
- Wall mounted swinging type hose reel with 30m hose.
- ABC — Portable ABC fire extinguisher c/w signage. (5kg).
- CO_2 — Portable CO_2 fire extinguisher c/w signage. (4.5kg).
- S30 — Signage for hosereel.
- S31 — Signage for portable fire extinguisher.
- iv — Isolating valve.
- prv — Pressure regulating valve.
- Water Rising Mains inside riser.
- BT — Bib tap.
- pg — Pressure Gauge.
- bcv — Ball Cock Valve.
- nrv — Non Return Valve.
- doc — Drain off Cock.
- Combined Boosted cold water supply (BCWS) & Fire Hose Reel (FHR) pump.

General Notes for FHR

1. Pipe supports shall be placed at maximum interval as shown in table below:

Size of pipe (mm)	Spacing for horizontal pipe (mm)
25	2700
50	2700

2. GMS pipe feeding hose reel shall be of 25mm diameter via nozzle interlocking valve.
3. All perforations through walls shall be enclosed by intumescent material or fire stops after passing of services.
4. The fire hose reels shall be swinging type, manually operated and supplied with 30m hose length of diameter 25mm and combination jet/spray discharge pattern 6.35 mm nozzles.
5. Routing of pipework on site to be coordinated with other services.
6. All pipeworks to be galvanised and jointed with screwed and socketed fittings.
7. Rectangular 'Fire hose reel' and 'Portable Fire Extinguisher' notices shall be provided with white wording on a red background. The letter height shall not be less than 50mm and lower case except the initial letters, in accordance with BS 5499-1.
9. A notice giving full operational instructions of hose reel shall be fixed near the fire fighting cabinet.

General Notes for CWS:

1. All pipes to be of uPVC PN10 material unless otherwise stated.
2. All pipes passing through building element to run in sleeves at least one diameter greater than pipe and concealed with fire protecting material.
3. Contractor to ensure proper coordination with respect to other trades.
4. All pipes running inside surface shall be properly supported. Maximum pipe spacing shall be as follows or as stated in drawing.

Diameter {mm}	Spacing on Horizontal Run {m}	Spacing on Vertical Run {m}
16-20	0.4	1.2
25-40	0.5	1.2

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Architect: -

Client: MAUBANK LTD

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Structural Engineer

STAGE 4: TECHNICAL DESIGN

Title: FOURTH FLOOR PLAN
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn JC | Checked AVP | Approved

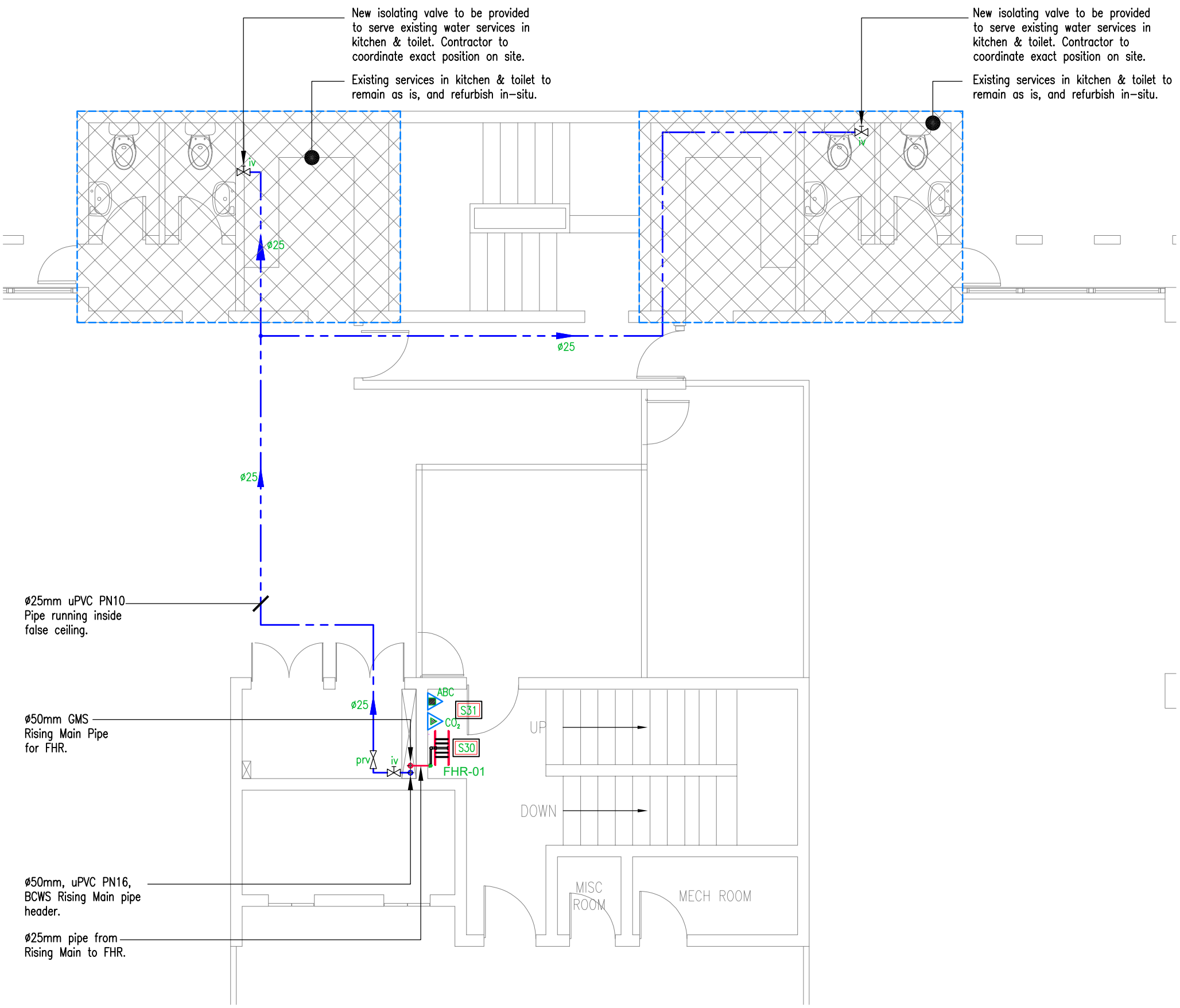
Date 02.06.2023 | Size A3 | Scale 1:75

Drawing Number: 22026-PDE-MBPH-L4-S10-S60-S72-06 Revision: P00

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

Drawing Number: 22026-PDE-MBPH-L5-S10-S60-S72-07 P00 — Revision

Architect Drawing Number: - REV: -



Legend:

- uPVC PN10 Pipe running inside false ceiling.
- uPVC PN10 Pipe fixed below soffit.
- uPVC PN16 Pipe
- GMS FHR pipe.
- Demarcation line.
- Wall mounted swinging type hose reel with 30m hose.
- ABC — Portable ABC fire extinguisher c/w signage. (5kg).
- CO_2 — Portable CO_2 fire extinguisher c/w signage. (4.5kg).
- S30 — Signage for hosereel.
- S31 — Signage for portable fire extinguisher.
- iv — Isolating valve.
- prv — Pressure regulating valve.
- Water Rising Mains inside riser.
- BT — Bib tap.

- pg — Pressure Gauge.
- bcv — Ball Cock Valve.
- nrv — Non Return Valve.
- doc — Drain off Cock.
- Combined Boosted cold water supply (BCWS) & Fire Hose Reel (FHR) pump.

General Notes for FHR

1. Pipe supports shall be placed at maximum interval as shown in table below:

Size of pipe (mm)	Spacing for horizontal pipe (mm)
25	2700
50	2700

2. GMS pipe feeding hose reel shall be of 25mm diameter via nozzle interlocking valve.
3. All perforations through walls shall be enclosed by intumescent material or fire stops after passing of services.
4. The fire hose reels shall be swinging type, manually operated and supplied with 30m hose length of diameter 25mm and combination jet/spray discharge pattern 6.35 mm nozzles.
5. Routing of pipework on site to be coordinated with other services.
6. All pipeworks to be galvanised and jointed with screwed and socketed fittings.
7. Rectangular 'Fire hose reel' and 'Portable Fire Extinguisher' notices shall be provided with white wording on a red background. The letter height shall not be less than 50mm and lower case except the initial letters, in accordance with BS 5499-1.
9. A notice giving full operational instructions of hose reel shall be fixed near the fire fighting cabinet.

General Notes for CWS:

1. All pipes to be of uPVC PN10 material unless otherwise stated.
2. All pipes passing through building element to run in sleeves at least one diameter greater than pipe and concealed with fire protecting material.
3. Contractor to ensure proper coordination with respect to other trades.
4. All pipes running inside surface shall be properly supported. Maximum pipe spacing shall be as follows or as stated in drawing.

Diameter {mm}	Spacing on Horizontal Run {m}	Spacing on Vertical Run {m}
16-20	0.4	1.2
25-40	0.5	1.2

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Architect: -

Client: MAUBANK LTD

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Structural Engineer

STAGE 4: TECHNICAL DESIGN

Title: FIFTH FLOOR PLAN
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn JC | Checked AVP | Approved

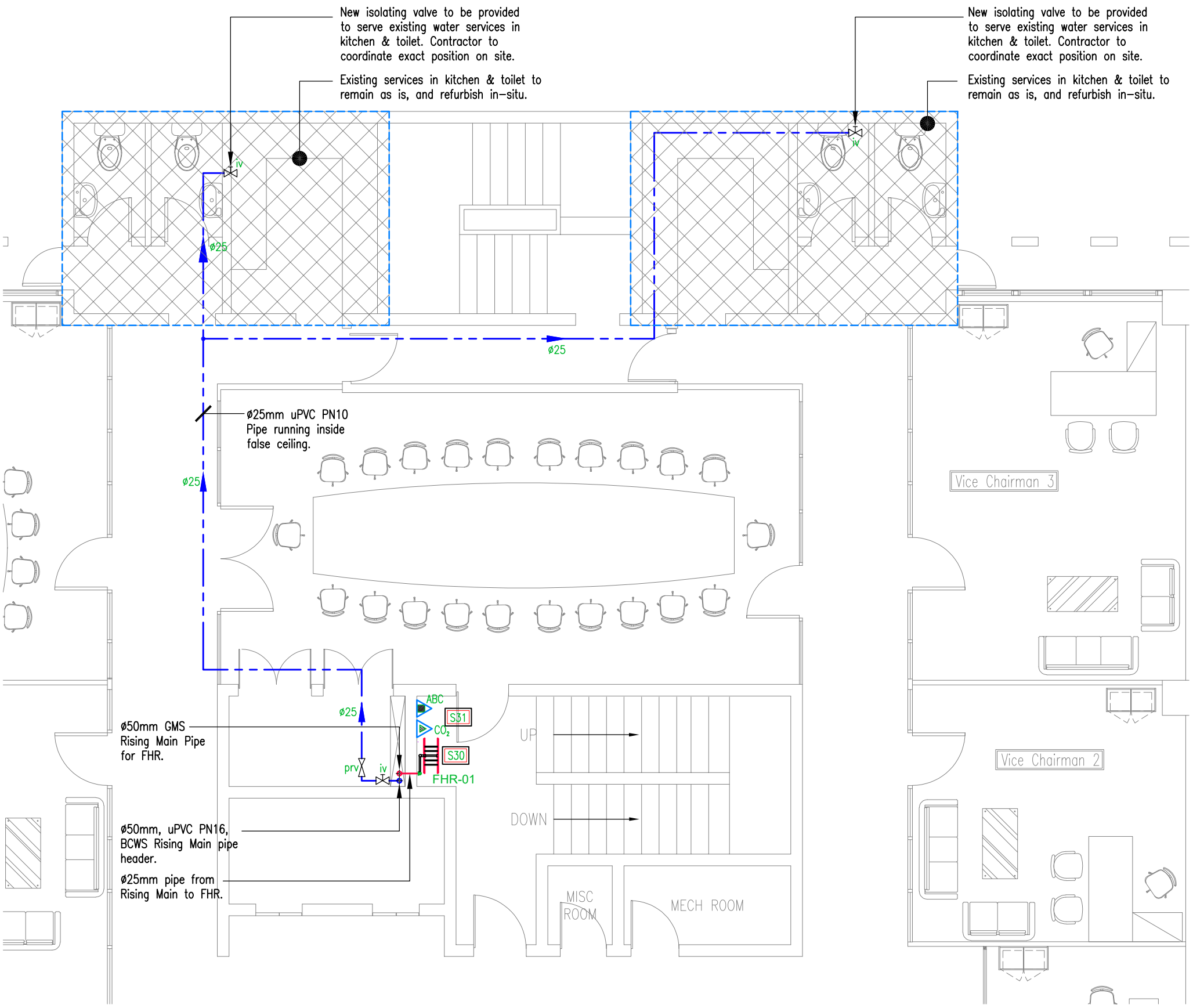
Date 02.06.2023 | Size A3 | Scale 1:75

Drawing Number: 22026-PDE-MBPH-L5-S10-S60-S72-07 P00 — Revision

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

Drawing Number: 22026-PDE-MBPH-L6-S10-S60-S72-08 Revision: P00

Architect Drawing Number: - REV: -



Legend:

- uPVC PN10 Pipe running inside false ceiling.
- uPVC PN10 Pipe fixed below soffit.
- uPVC PN16 Pipe
- GMS FHR pipe.
- Demarcation line.
- Wall mounted swinging type hose reel with 30m hose.
- ABC — Portable ABC fire extinguisher c/w signage. (5kg).
- CO_2 — Portable CO_2 fire extinguisher c/w signage. (4.5kg).
- S30 — Signage for hosereel.
- S31 — Signage for portable fire extinguisher.
- iv — Isolating valve.
- prv — Pressure regulating valve.
- Water Rising Mains inside riser.
- BT — Bib tap.

- pg — Pressure Gauge.
- bcv — Ball Cock Valve.
- nrv — Non Return Valve.
- doc — Drain off Cock.
- Combined Boosted cold water supply (BCWS) & Fire Hose Reel (FHR) pump.

General Notes for FHR

1. Pipe supports shall be placed at maximum interval as shown in table below:

Size of pipe (mm)	Spacing for horizontal pipe (mm)
25	2700
50	2700

2. GMS pipe feeding hose reel shall be of 25mm diameter via nozzle interlocking valve.
3. All perforations through walls shall be enclosed by intumescent material or fire stops after passing of services.
4. The fire hose reels shall be swinging type, manually operated and supplied with 30m hose length of diameter 25mm and combination jet/spray discharge pattern 6.35 mm nozzles.
5. Routing of pipework on site to be coordinated with other services.
6. All pipeworks to be galvanised and jointed with screwed and socketed fittings.
7. Rectangular 'Fire hose reel' and 'Portable Fire Extinguisher' notices shall be provided with white wording on a red background. The letter height shall not be less than 50mm and lower case except the initial letters, in accordance with BS 5499-1.
9. A notice giving full operational instructions of hose reel shall be fixed near the fire fighting cabinet.

General Notes for CWS:

1. All pipes to be of uPVC PN10 material unless otherwise stated.
2. All pipes passing through building element to run in sleeves at least one diameter greater than pipe and concealed with fire protecting material.
3. Contractor to ensure proper coordination with respect to other trades.
4. All pipes running inside surface shall be properly supported. Maximum pipe spacing shall be as follows or as stated in drawing.

Diameter {mm}	Spacing on Horizontal Run {m}	Spacing on Vertical Run {m}
16-20	0.4	1.2
25-40	0.5	1.2

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Architect: -

Client: MAUBANK LTD

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Structural Engineer

STAGE 4: TECHNICAL DESIGN

Title: SIXTH FLOOR PLAN
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn JC | Checked AVP | Approved

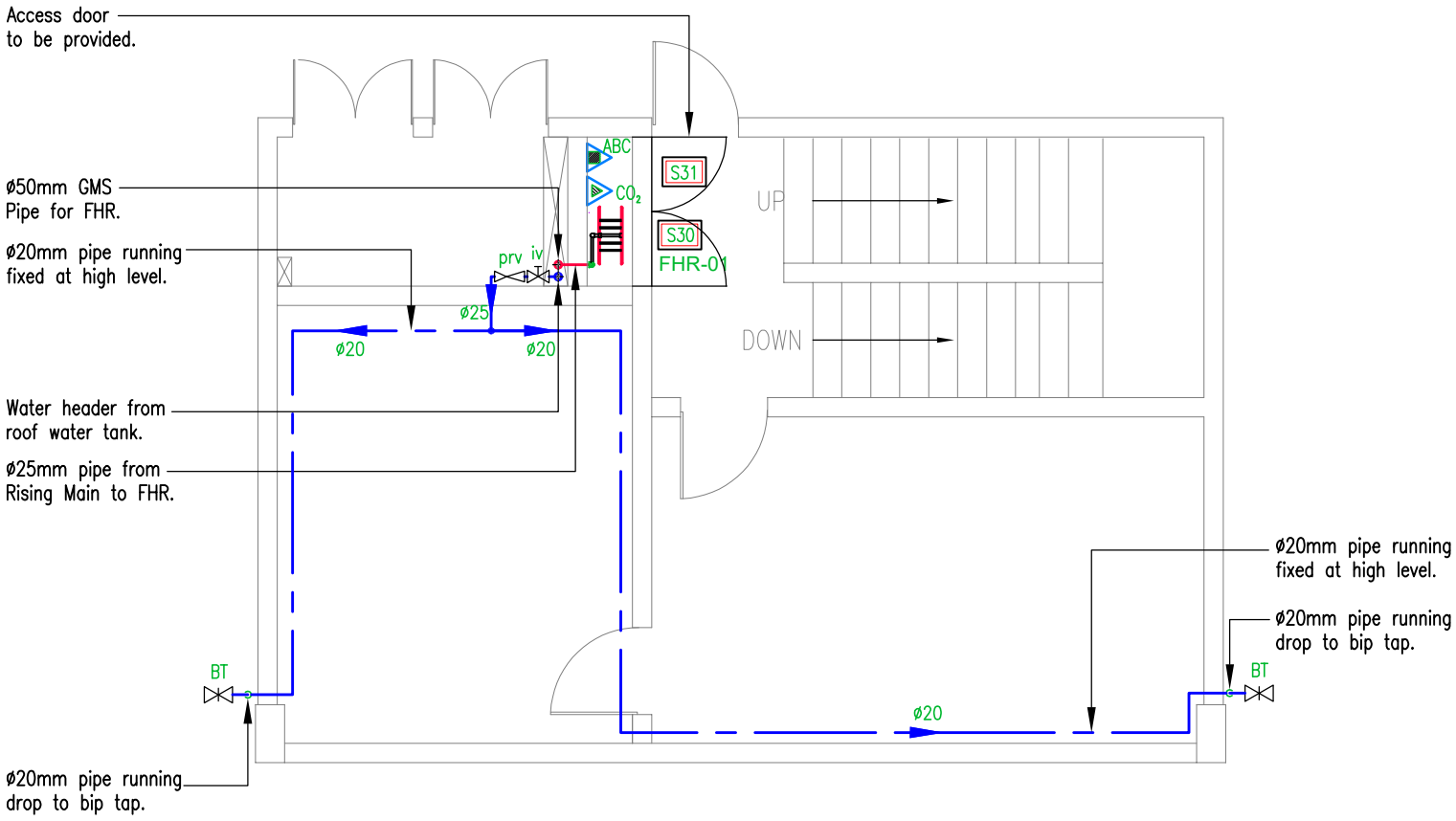
Date 02.06.2023 | Size A3 | Scale 1:75

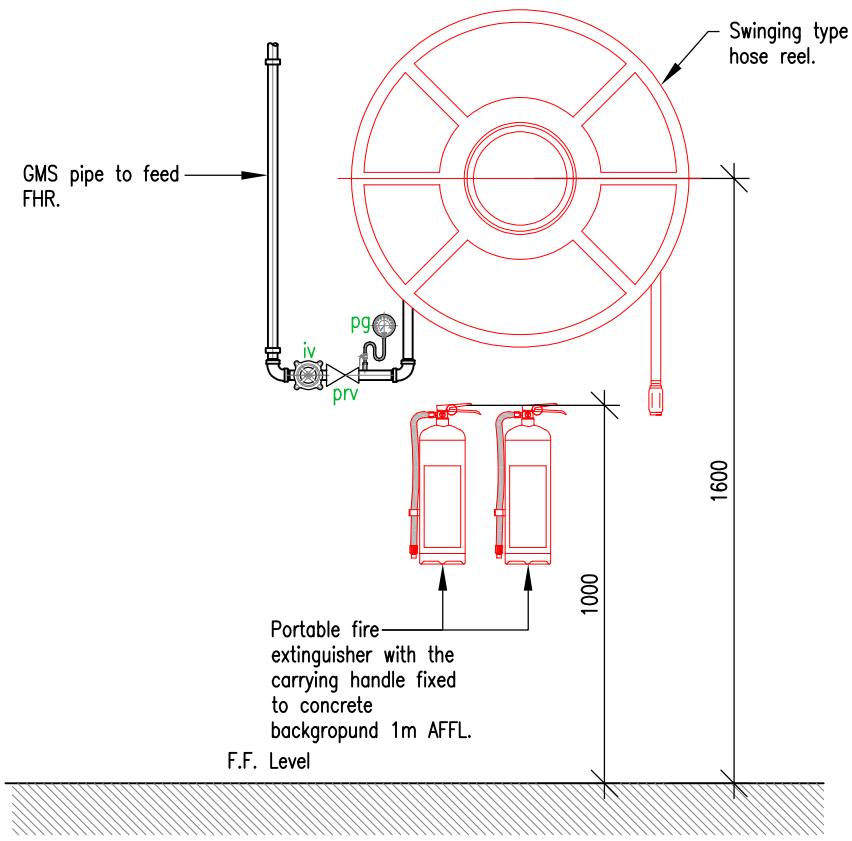
Drawing Number: 22026-PDE-MBPH-L6-S10-S60-S72-08 P00

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

Drawing Number: 22026-PDE-MBPH-RF-S10-S60-S72-09 Revision: P00

Architect Drawing Number: - REV: -





Refer to sheet 22026-PDE-MBPH-L0-S10-S60-S72-02 for Legend & General Notes.

Detail - Typical Fixation Detail of FHR & Portable Fire Extinguisher.
Scale 1:20

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Architect: -

STAGE 4: TECHNICAL DESIGN

Client: MAUBANK LTD

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Structural Engineer

Title: ROOF PLAN
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn JC | Checked AVP | Approved

Date 02.06.2023 | Size A3 | Scale 1:75

Drawing Number: 22026-PDE-MBPH-RF-S10-S60-S72-09 Revision: P00

REV	DATE	DESCRIPTION	ISSUED BY	ISSUED TO
P00	02.06.23	Initial Release	PDE	All

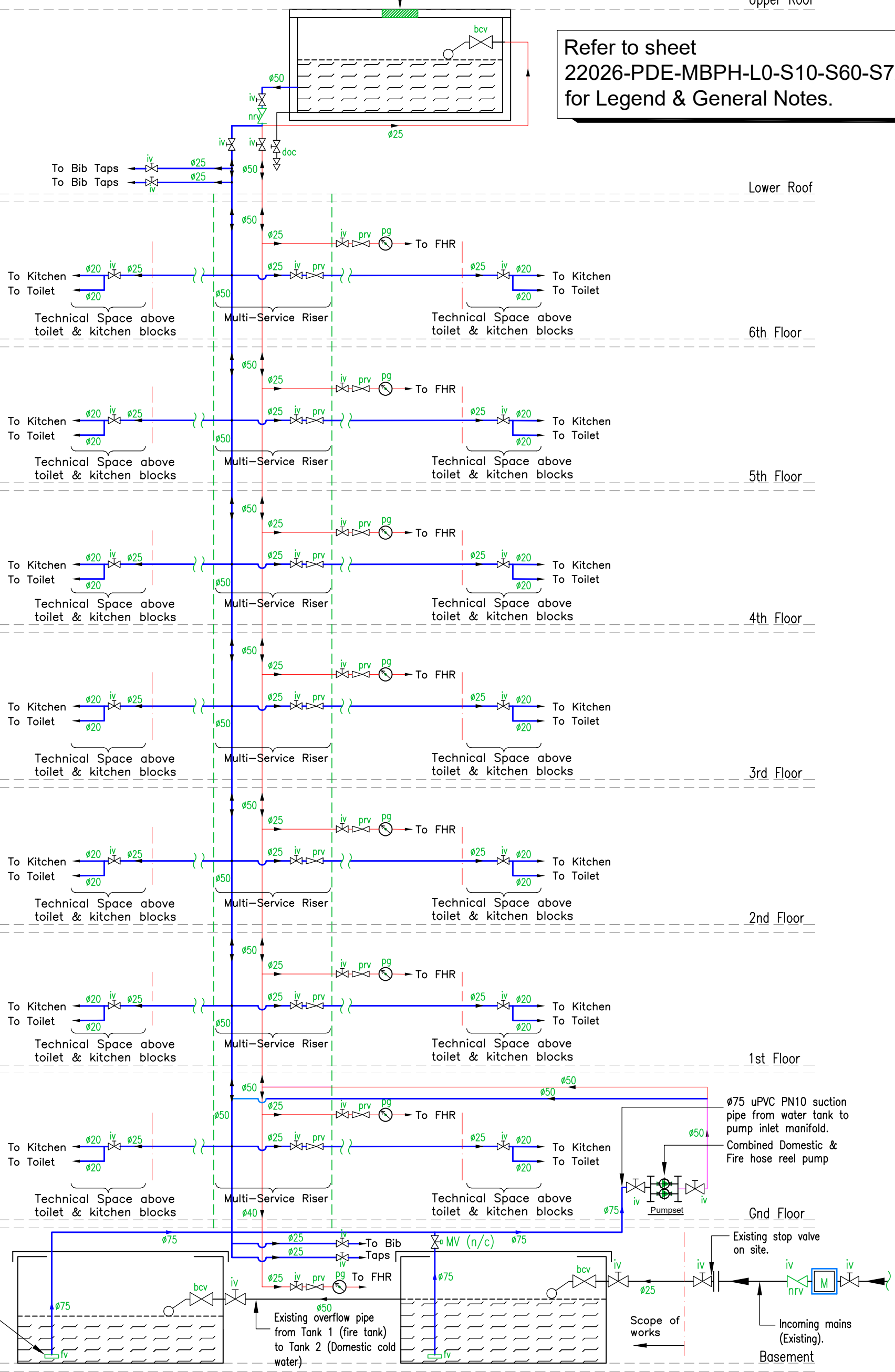
Drawing Number: 22026-PDE-MBPH-SCH-S10-S60-S72-10 Revision: P00

Architect Drawing Number: - REV: -

Roof Tank

Tank cover to be refurbished.

Refer to sheet 22026-PDE-MBPH-L0-S10-S60-S72-02 for Legend & General Notes.



Potable Water Tank

Fire Tank

Disclaimer

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MEP Engineer

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Client: MAUBANK LTD

Project: REFURBISHMENT OF POPE HENNESSY BUILDING AT PORT LOUIS FOR MAUBANK LTD

Structural Engineer

STAGE 4: TECHNICAL DESIGN

Title: SCHEMATIC DIAGRAM
PUBLIC HEALTH SERVICES
COLD WATER, FIRE HOSE REEL & PORTABLE FIRE EXTINGUISHER

Drawn	JC	Checked	AVP	Approved	
Date	02.06.2023	Size	A3	Scale	NTS

Drawing Number: 22026-PDE-MBPH-SCH-S10-S60-S72-10 Revision: P00