Invitation to Tender (ITT)

Location	**Bossaso, Puntland**	PNTB NO	**#PNTB/33/2026**
MONTH	**September/ October 2026**	PR NO	**051**
PROJECT NAME	**CONSTRUCTION OF COASTAL DEVELOPMENT IN THE BOSSASO WATERFRONT PROJECT**		

The Bossaso Municipality, in conjunction with the Puntland Government, invites bidders from eligible construction companies for the above-named project being implemented by the Bossaso Municipality.

It should be noted that bidders are automatically disqualified from participating in this tender if they assisted with any part of this project or tender process, including the preparation of technical documents, or if they are related to a member of the Bid Committee without prior disclosure. Following any disclosure, the Bid Committee will assess whether the conflict is material. Small businesses, minority-owned firms, and women's business enterprises are encouraged to apply.

The mandatory criteria for bidders are as follows. FAILURE TO SUBMIT ANY OF THESE DOCUMENTS WILL LEAD TO AUTOMATIC DISQUALIFICATION:

a) Valid National Certificate of Registration from the Ministry of Commerce, Industries and Investment, Puntland; the Ministry of Public Works, Transport and Housing, Puntland, and the Puntland National Tender Board (Bar Code matches with Certificate Information).
b) Valid Tax Compliance Certificate from the Ministry of Finance, Puntland (with a valid and readable QR Code, if applicable).
c) Filled, Signed, and Stamped Site Visit Certificate, signed at the site by the SINAAN Chief Engineer and stamped by the Bossaso Mayor.
d) Completely Filled out, signed, and Stamped Financial Bid/BOQ. See Attachment M in the Bid Book.
e) Filled and Signed Bidder's Declaration Confirming the Absence of Any Conflict of Interest (See Annex I of the RFP).

Other relevant submission requirements related to the evaluation criteria are:

f) Technical Proposal outlining understanding of the assignment, implementation methodology, and implementation plan.
g) List of previous relevant experience indicating company name, project name, company representative (name, telephone number & email), and evidence (contracts, signed recommendation letters and signed Completion/Successful letters)
h) Audited financial reports and bank statements for the last three (3) years.

Submission (Physical & Electronic): Completed bid documents should be submitted in sealed envelopes addressed to: **The Bid Committee, Construction of Coastal Development in the Bossaso Waterfront Project (PR 051)**

Bids are to be delivered to and received at **the Bossaso Municipality Office on or before 12 October 2026 at 10:00 am (East African Time).** Bidders are also required to submit their bids by email (sinaan.tender@dt-global.com) as two separate PDF files - Technical Proposal and Financial Proposal. Both files **MUST** be **password-protected**, with the passwords to be provided in person on the day of bid opening at the Bossaso Municipality Office in Bossaso. Bids received after the deadline date and time will not be considered and shall be returned to the bidders unopened.

Offers are to remain valid for 180 days from the closing date of this tender. The Bid Committee reserves the right to vary the quantity of work/materials specified in the tender document without any change in unit price or other terms and conditions, and to accept or reject any, all, or part of submitted offers.

Site Visit: Bidders are expected to be at the site on **Wednesday, 16 September 2026, from 08:00 am to 12:30 pm (East African Time)** where the bidder is expected to provide the Site Visit Certificate (mandatory document) to be signed by the Chief Engineer as well as to be signed and stamped by the Bossaso Mayor.

Bidder's Conference: All bidders interested in applying will be required to attend the Bidder's Conference on **Thursday, 17 September 2026, from 9:00 am to 12:30 pm (East African Time) at the Bossaso Municipality Office**.

Questions Deadline: All questions relating to this solicitation must be submitted electronically via email to the SINAAN Procurement Team at sinaan.procurement@dt-global.com, no later than **Sunday, 27 September 2026, at 5:00 pm (East African Time)**.

Question Response: All questions received electronically via email to the SINAAN Procurement Team at sinaan.procurement@dt-global.com will be responded to bidders who attended the site visit on **Wednesday, 30 September 2026.**

Bid Opening: Bids will be opened at the **Bossaso Municipality office in Bossaso on 12 October 2026 at 10:30 am (East African Time)** in the presence of the Bid Committee and applicants who wish to attend.

Evaluation Criteria: Offers will be evaluated against criteria including, but not limited to, financial and technical criteria, past performance, and integrity. Offers will NOT be awarded on the basis of Lowest Priced Technically Acceptable, but rather on a Trade-off/Value-for-Money evaluation process.

Women-owned construction companies are strongly encouraged to apply.

SINAAN Programme

Request for Proposals

Solicitation No.	**RFP #051 and #PNTB/33/2026**
Title:	**Construction of Coastal Development in the Bossaso Waterfront Project (PR 051)**
Issue Date:	**Friday, 4 September 2026**
Closing Date:	**Monday, 12 October 2026**
Closing Time:	**1000 Hrs (10 am) East African Time**
Questions Due:	**Sunday, 27 September 2026**
Question Response:	**Wednesday, 30 September 2026**
Closing Time:	**1000 Hrs (10 am) East African Time**
Subject:	**FCDO Contract No. 6215 SINAAN Programme**

DT Global, the implementer of the SINAAN Programme under FCDO Contract No. **6215**, invites proposals for the Construction of the Coastal Development in the Bossaso Waterfront Project (PR 051) as described in Attachment I, "Statement of Work."

The period of performance for this activity is anticipated to commence on 12 November 2026, and end on 15 September 2027 (excluding a 6-month DLP). The issuance of a subcontract is subject to the availability of funds, the successful negotiation of the subcontract terms and budget, and the receipt of FCDO's Contracting Officer subcontract consent, if required. The Contract resulting from this award is envisioned to be a FIRM FIXED PRICE (FFP) CONTRACTUAL AGREEMENT.

DT Global encourages your organisation to indicate its interest in this procurement by submitting a proposal in accordance with the instructions in Attachment II, "Instructions to Bidders". Proposals will be evaluated based on the evaluation criteria established in Attachment III of this solicitation. An award will be made to the Bidder whose proposal represents the best value to the project after evaluation in accordance with the criteria stated in the solicitation.

To be considered under the solicitation process, the Bidder should submit a complete proposal by the means indicated herein no later than the closing date and time indicated above. Bidders should ensure that the proposals are well written, easy to read and follow, and contain only the requested information.

Proposals shall be submitted in sealed envelopes and delivered to the Bossaso Municipality Office no later than **12 October 2026 at 1000 Hrs (East African Time)**. Bidders shall sign the bid receipt register upon delivery to confirm submission. The envelope shall be clearly addressed to:

The Bid Committee
Construction of Coastal Development in the Bossaso Waterfront Project (PR 051)

In addition to the physical submission, bidders shall submit an electronic copy of their proposal by email to **sinaan.tender@dt-global.com** no later than the submission deadline. The electronic submission shall consist of two separate password-protected PDF files:

- Technical Proposal
- Financial Proposal

Bidders shall provide the passwords to the Bid Committee at the bid opening session at the Bosaaso Municipality office. Bidders who are unable to attend may nominate an authorised representative to provide the passwords on their behalf.

Bids received after the submission deadline will not be considered.

Bidders are responsible for ensuring that both the physical and electronic submissions are received by the submission deadline.

The sealed physical submission and the electronic submission **must** be identical in all material respects, and during the bid evaluation, the physical submission shall prevail for evaluation purposes.

Technical and Financial Proposals shall remain separate throughout the evaluation process. Financial Proposals shall only be opened in accordance with the procedures set out in the Bid Book.

If all envelopes are not sealed and marked as required, SINAAN Programme will assume no responsibility for the misplacement or premature opening of the Bids.

The solicitation number above must also be mentioned in the subject of the email.

All questions relating to this solicitation must be submitted **electronically** via email to:

> Procurement Team at sinaan.procurement@dt-global.com, no later than **27 September 2026** at **1700 Hrs (5 pm)** East African Time.

Unless otherwise notified by an amendment to this RFP, no questions will be accepted after this date. No questions/clarifications will be entertained if received by means other than the specified email address. The solicitation number should be stated in the subject line.

Proposals must be submitted separately via two different documents. The first document shall include the technical proposal as an attachment and should be named "Technical Proposal – Name of Company", and the second document shall include the cost/business proposal and should be named "Business Proposal – Name of Company."

Attachments:

- Attachment I: Statement of Work
- Attachment II: Instructions to Bidders
- Attachment III: Evaluation Criteria
- Attachment IV: Guidance for Provision of Insurance Quotation with Policy Information
- Annex I: Filled and Signed Bidder's Declaration Confirming the Absence of Any Conflict of Interest
- Annex II: Bid Book

Sincerely,

SINAAN Procurement Team

ATTACHMENT I

STATEMENT OF WORK

Provided in the Bid Book

ATTACHMENT II

INSTRUCTIONS TO BIDDERS

General Instructions

These Instructions to Bidders will not form part of the offer or of the Subcontract. They are intended solely to aid Bidders in preparing their proposals.

- The proposals and all corresponding documents related to the proposal must be written in the English language unless otherwise explicitly allowed.
- No costs incurred by the Bidders in preparing and submitting the proposal are reimbursable by the SINAAN Programme. All such costs will be at the Bidder's expense.
- Proposals and all cost and price figures must be presented in Pounds (GBP). All prices must be inclusive of all applicable taxes, duties, VAT, levies, fees, and other charges, which must be separately identified in the financial proposal.
- The Bidder must state in its Proposal the validity period of its offer. The minimum offer acceptance period for this RFP is **180 days** from the closing date of this tender. Offers with a shorter acceptance period will be rejected. This tender does not obligate DT Global to award a subcontract.
- Responsibility Determination: Award shall only be made to "responsible" prospective Bidders. To enable DT Global to make this determination, the Bidder must briefly describe in the Attachment Section of the proposal that it:

    - has adequate financial resources, including appropriate insurance coverage to perform the work stated herein, or the ability to obtain them;
    - is able to comply with the required or proposed delivery or performance schedule, taking into consideration all existing commercial and governmental business commitments;
    - has a satisfactory performance record;
    - has a satisfactory record of integrity and business ethics;
    - has the necessary technical capacity, equipment and facilities, or the ability to obtain them; and
    - is otherwise qualified and eligible to receive an award under applicable laws and regulations.
- Taxes: The SINAAN Programme is not exempt from the cooperating country taxes and duties. Therefore, Bidders must show taxes separately, but the evaluated bid price will be the total price inclusive of all applicable taxes, duties and fees. Any fees, costs, taxes, duties, or other charges not disclosed in the quotation will not be considered for reimbursement or payment by the SINAAN Programme.
- Eligibility: By submitting an offer in response to this RFP, the Bidder certifies that it and its principal officers are not debarred, suspended, or otherwise considered ineligible for an award by the UK Government. DT Global will not award a contract to any firm that is debarred, suspended, or deemed ineligible by the UK Government.
- Late Offers: Bidders are wholly responsible for ensuring that their offers are received in accordance with the instructions stated herein. SINAAN Programme reserves the right to reject any offer not submitted by the indicated deadline, even if it was late due to circumstances beyond the Bidder's control.
- Modification/Withdrawal of Offers: Bidders have the right to withdraw, modify, or correct their offer after it has been emailed to SINAAN at the email addresses stated above, provided that the request is made before the RFP closing date.

- Disposition of Proposals: Proposals submitted in response to this RFP will not be returned. Reasonable efforts will be made to ensure the confidentiality of both Cost and Technical Proposals received from all Bidders. This RFP does not seek information of a highly proprietary nature, but if such information is included in the Bidder's proposal, the Bidder must alert SINAAN Programme and must annotate the material by marking it "Confidential and Proprietary" so that these sections can be treated appropriately.
- Regardless of the method used to submit the proposal, the Technical Proposal and Cost Proposal must be kept separate. Technical Proposals **must not** reference cost or pricing data so that the technical evaluation may be conducted strictly on the basis of technical merit.
- Clarification and Amendment to the RFP:
    - Any question raised regarding this solicitation should be received no later than 1700 Hrs (5 pm) East Africa Time (EAT) on **Sunday, 27 September 2026**. All questions must be **in writing and** emailed to the email addresses specified in the cover letter. No questions/clarifications will be entertained if they are received by means other than the aforementioned email addresses. The solicitation number should be stated in the subject line. Responses to questions received will be compiled and emailed to potential Bidders.
- If Bidder intends to submit a proposal in response to this solicitation and wishes to receive any updates thereto, Bidder is encouraged to confirm receipt of this solicitation by email to the email address specified in the cover memo.
- The Bidder's email message should state the solicitation number in the subject. Also, the email should include the name of your organisation, the name of the contact person, the email address, and the telephone number.
- SINAAN Programme anticipates that discussions with Bidders will be conducted following vendor Technical and Cost Proposal submission; however, SINAAN Programme reserves the right to make an award without discussions. Therefore, it is strongly recommended that Bidders submit their best offer as their initial Technical and Cost proposal.
- SINAAN Programme may waive informalities and minor irregularities in proposals received.

Submission of Proposal:

- Proposals must be submitted in an electronic format as an email attachment, sent to the email address specified in the cover letter, no later than the date and time specified in the cover letter.
- The email should state the solicitation number in the subject line as well as title.
- The file attachment should be in one of the following formats: PDF, MS Word, MS Excel, MS PowerPoint, or ZIP. The submission of attachments in any other format may result in the disqualification of the offer.
- Please note that the DT Global email server has a 20MB limit on the total attachment size per email. It is strongly recommended that the size of ALL attachments per a single email be less than 20MB.
- The technical and business proposals should be submitted as two separate documents. The first should be named "Technical Proposal – Name of Company" and the second "Business Proposal – Name of Company." If the submission is sent in several emails, the emails should be sequentially numbered to indicate the total number of emails to be submitted (e.g., 1/4, 2/4, 3/4, and 4/4).

Content of Proposal:

The proposal shall consist of five (5) sections. 1) The Cover Page-Technical, 2) The Technical Proposal, 3) The Cover Page-Cost, 4) the Cost/Business Proposal, and 5) The Attachments

1. The Cover Page-Technical:

The cover page should be on the Bidder's letterhead and MUST contain the following information:

- Solicitation Number
- Company's Name:
- Company's Address
- Name of the Company's authorised representative
- Telephone No, Cellular Phone #, Email address
- Validity of Proposal
- Signature, Date and time

Below is the template to be filled, signed and submitted together with the proposal:

Proposal Cover Letter

[On Firm's Letterhead]

<Insert date>

TO: DT GLOBAL- SINAAN Programme

We, the undersigned, provide the attached proposal in accordance with **RFP PR 051 Construction of Coastal Development in the Bossaso Waterfront Project (PR 051)** issued on 4 September 2026. Our attached quoted proposal has fixed prices.

I certify that our proposal is valid for **180** days from the closing date of this tender. Upon award, our proposal price shall be binding upon us, subject to the modifications resulting from any discussions and final negotiations. I certify our financial responsibility, as well as certify that we have the ability to pre-finance.

We understand that the SINAAN Programme is not bound to accept any proposal it receives.

Yours sincerely,

Signature

Name of Authorised Representative
Title of Authorised Representative
Company Seal/Stamp

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2. Technical Proposal:

The technical proposal shall describe how the Bidder intends to carry out the statement of work. It will also address the Bidder's corporate capabilities to carry out the work and the extent to which the Bidder has a demonstrated ability to provide the required services.

The Bidder will also include the CVs of all proposed personnel. The Bidder shall provide information about past performance in implementing similar work globally, and, in particular, in Puntland, within the last 3 years. Capacity to undertake the technical and administrative backstopping of all interventions described in the Scope of Work. The Bidder should also provide a detailed description of existing goods and services in Puntland.

The technical proposal should be divided into three sections, following the same order as the technical evaluation criteria in Attachment III. Failure to respond to any section will be the basis for disqualification of the Bidder from further consideration.

3. The Cover Page - Cost/Business:

The cover page should be on the Bidder's letterhead and MUST contain the following information:

- Solicitation Number
- Company's Name:
- Company's Address
- Name of the Company's authorised representative
- Telephone No, Cellular Phone #, Email address
- Total Proposed Price
- Validity of Proposal
- Acceptance of Tax Withholding Statement
- Name and address of the Government Audit Agency and name and phone number of the auditor
- A valid Business License or National Registration Certificate (with Readable QR Code)
- A valid Tax Compliance Certificate (with Readable QR Code)
- Signature, Date and Time

4. The Cost Proposal/BOQ:

The cost proposal/BOQ shall be submitted separately from the technical proposal. The budget will present the cost for performing the work specified in this solicitation. A template is provided for the pricing in the Bid Book (Annex II). At a minimum, the cost proposal will include the following information:

- A detailed cost breakdown of the proposed budget to the maximum extent practical, including using the template provided.
- A detailed and comprehensive budget narrative explaining the basis for the cost estimates.
- Valid certificate of registration from the Ministry of Commerce, Industries and Investment, Puntland; the Ministry of Public Works, Transport and Housing, Puntland, and Puntland National Tender Board (Bar Code matches with Certificate Information).
- Valid Tax Compliance Certificate from the Ministry of Finance, Puntland (with a valid and readable QR Code, if applicable).

- Completely filled out, signed and stamped Financial Bid/BOQ (please refer to Bid Book – Annex II for a budget template for the cost proposal).
- Filled and Signed Declaration Confirming the Absence of Any Conflict of Interest.
- If the Bidder does not have a cognisant audit agency, the Bidder must provide audited balance sheets and profit & loss statements for the last two complete years and current year-to-date.
- The most recent three fiscal-year pool and base cost compositions, along with derived rates, the bases for allocating these rates, and an independent certified audit of these rates by a certified accounting firm.

5. Attachments

This section will include any information or document that was not listed in the above sections and that the Bidder finds necessary to include in the proposal. In this section, the Bidder will also include the information that will assist the SINAAN PROGRAMME in determining the Bidder's responsibility. The following are **mandatory** documents to be submitted with the proposal:

a) Valid National Certificate of Registration from the Ministry of Commerce, Industries and Investment, Puntland; the Ministry of Public Works, Transport and Housing, Puntland, and the Puntland National Tender Board (Bar Code matches with Certificate Information).
b) Valid Tax Compliance Certificate from the Ministry of Finance, Puntland (with a valid and readable QR Code, if applicable).
c) Filled, Signed, and Stamped Site Visit Certificate, signed at the site by the SINAAN Chief Engineer and stamped by the Bossaso Mayor.
d) Completely Filled out, signed, and Stamped Financial Bid/BOQ. See Attachment M in the Bid Book.
e) Filled and Signed Bidder's Declaration Confirming the Absence of Any Conflict of Interest (See Annex I of the RFP).

This solicitation in no way obligates DT Global to award a subcontract, nor does it commit DT Global to pay any costs incurred in preparation and submission of a proposal in response to the RFP. Furthermore, DT Global reserves the right to reject any and all offers if doing so is in the best interests of DT Global.

Instructions for the Preparation of the Cost/Business Proposal

The subcontract type will be FIRM FIXED PRICE (FFP) CONTRACTUAL AGREEMENT.

A Firm Fixed Price Subcontract is an award for the provision of specific services, goods, or deliverables and is not adjusted if actual costs are higher or lower than the fixed price amount. Bidders are expected to include all costs, direct and indirect, in their total proposed price.

The Bidder must provide a completed budget using the provided template. If an Excel file, it should NOT be 'read only' or 'protected'. The proposal must include any necessary supporting information to substantiate the proposed costs. The Bidders must submit a detailed budget narrative that supports and clarifies, item for item, the cost estimates proposed in its budget. Narratives for individual cost items must include a discussion of any estimated escalation rates, where applicable. Estimated costs proposed to exceed ceilings imposed by FCDO or FCDO procurement policy must be fully explained and justified.

ATTACHMENT III

EVALUATION CRITERIA

Provided in the Bid Book

ATTACHMENT IV

GUIDANCE FOR INSURANCES REQUIRED TO PROVIDE INSURANCE QUOTATION WITH POLICY INFORMATION

The Bidder is required to engage a well-known, established tier 1 insurance company to provide a quotation with policy information. Bidder is required to provide a quotation from the insurance company with information for review and approval.

To enable the Bidder to engage the insurance company, the table below provides guidance on the recommended insurance to assist in determining the premiums for this activity and enable the Bidder to share a quotation with policy information from the insurance company.

Insurance Type	Y / N / N/A	Limits	Somali Insurance sufficient?	Notes
Employer's Liability / Workers' Compensation – Covering technicians and supervisors	Y	£15,000/ person	Y	Not including medical evacuation & repatriation. Only Somali national staff
Construction all risk insurance covering: The cost of unforeseen loss or damage to building works. Machinery and equipment movement. Public liability. Tools and Plant owned by the policy holder. Plant hired in. Equipment erection	Y	£1,000,000	Y	For 12 months after project ending. Alternatively consider Contractor All Risk Insurance, if available.
Motor / Vehicle Insurance – For project vehicles and transport to/from site	N	N/A	N/A	No transport provided
Marine / Transit Insurance – For equipment moved into Somalia	N	N/A	N/A	All material will be procured locally
Professional Indemnity – Including long-tail risk and run-off cover	Y	£1,000,000	Y	Including 12 months run-off
Environmental / Pollution Liability – Groundwater, contamination, drilling fluids	Y	£100,000	Y	For damages waste management, soil disturbance, dust/noise

ANNEX II:

BID BOOK

Location	**Bossaso, Puntland**	PNTB NO	**#PNTB/33/2026**
MONTH	**September/October**	PR NO	**051**
PROJECT NAME	**CONSTRUCTION OF COASTAL DEVELOPMENT IN THE BOSSASO WATERFRONT PROJECT**		

BID BOOK

Summary of Bid Documentation

Attachment #	Instructions to Bidders	Attached or Filled, Stamped & Signed Checklist
A	Form of Bid	☐
B	Certification to Additional Agreements as Part of the Bid	☐
C	Company Registration	☐
D	Certificate of Bidder's Site Visit	☐
E	Certificates of Compliance to FCDO Regulations	☐
F	Summary of Past Performance, Experience & Technical Capability	☐
G	Key Site Staff (CV and Certificates Must be attached)	☐
H	List of Equipment	☐
I	Value of the works currently under contract (On-going Works)	☐
J	List of Local Labourers	☐
K	Methodology and Work Schedule	☐
L	Bank Details for Payments	☐
M	Cost Proposal - Bills of Quantities (to be filled, signed and stamped)	☐

Location	**Bossaso, Puntland**	PNTB NO	**#PNTB/33/2026**
MONTH	**September/October**	PR NO	**051**
PROJECT NAME	**CONSTRUCTION OF COASTAL DEVELOPMENT IN THE BOSSASO WATERFRONT PROJECT**		

Instructions to Bidders

Scope of Bid

SINAAN PROGRAMME invites qualified construction bidders to submit a best-price proposal for this work funded by the UK Government as described in this bid document. Bidders are responsible for ensuring that their proposals are received by SINAAN PROGRAMME in accordance with the instructions, terms, and conditions described in this RFP. Failure to adhere to the instructions set out in this RFP may lead to disqualification of the proposal and/or Bidder from further consideration.

Source of Funds

The Works are carried out under the SINAAN PROGRAMME.

Eligible Bidders

The main criteria for admission to the tender are as follows:

a) All registered Businesses located or represented in Ministry of Commerce, Industries and Investment, Puntland; the Ministry of Public Works, Transport and Housing, Puntland, and Puntland National Tender Board, as well as a valid tax compliance certificate from the Ministry of Finance, Puntland - a copy to be attached to the bid documents and able to perform under the conditions required for the work covered by this RFP.
b) Bidders that comply with the applicable UK Government/ FCDO certifications.
c) Signed technical submission form and financial proposal.
d) Completed, filled and signed BOQ.
e) Filled, Signed and Stamped Site Visit Certificate.
f) Provide a company profile with a list of names of directors.
g) CVs of company's Key staff personnel (written into the bid book is acceptable).
h) Must have a minimum of 5 years of experience as a construction company in Puntland.
i) Adequate Equipment list.
j) Good track-record and references from previous clients.
k) A company bank account.

Ineligible to participate in the bidding process are:

1. Bidders (including all subcontractors which will be engaged) must not currently be associated with or have been associated with (or the affiliates of a business or company) the consultants or company which developed the specifications, plans, measurements, and other documents used in previous RFPs or as part of this RFP.
2. Bidders who are bankrupt or insolvent as determined by a judicial decision other than bankruptcy, resulting, in accordance with the applicable legislation, in total or partial seizure by the Administration and disposition of its property;
3. Bidders who are seriously guilty of false statements regarding information required for its participation in a Request for Quotations or an RFP;
4. Bidders who have not substantiated being in compliance with the Tax and Labour Administration;
5. Bidders who are related to a person employed by DT Global or the SINAAN PROGRAMME, or who is related to a person having a relationship with a person employed by DT Global or the SINAAN PROGRAMME.
6. Bidders who have connections with terrorist organisations or who finance acts of terrorism.

Location	**Bossaso, Puntland**	PNTB NO	**#PNTB/33/2026**
MONTH	**September/October**	PR NO	**051**
PROJECT NAME	**CONSTRUCTION OF COASTAL DEVELOPMENT IN THE BOSSASO WATERFRONT PROJECT**		

One Bid per Bidder	A firm shall submit only one bid in the same bidding process, either individually as a bidder or as a partner in a joint venture (with joint venture documentation). No firm can be a subcontractor while submitting a bid individually or as a partner of a joint venture in the same bidding process. A bidder who submits or participates in more than one bid will cause all the proposals in which the bidder has participated to be disqualified.
Cost of Bidding	The bidder shall bear all costs associated with the preparation and submission of its Bid. SINAAN PROGRAMME and the Bid Committee will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process. No fees may be charged for the collection of a bid book.
Site Visit (Mandatory)	The bidder is advised to visit and examine the Site of Works and its surroundings and obtain, as their own responsibility, all information that may be necessary for preparing the bid and entering into a contract for construction of the Works. The costs of visiting the site shall be at the bidder's own expense. Bidder is expected to be at the site on **Wednesday, 16 September 2026, from 8:00 am to 12:30 pm,** where the vendor is expected to fill in and sign a site visit attendance sheet and will provide the Site Visit Certificate to be signed by the Chief Engineer as well as to be signed and stamped by the Bossaso Mayor. There is no cost to be incurred for the signature of the site visit form.
Bidder's Conference	All bidders interested in applying will be required to attend the Bidder's Conference on **Thursday, 17 September 2026 from 9:00 am – 12:30 PM (East African Time)** at the **Bossaso Municipality Office.**
Language of Bid	The language of the bid shall be in English ONLY.
Annexes Incorporated by Reference	The bidder is responsible for becoming familiar with Annex 1 (Quality Assurance Plan to be followed during construction)
Packaging and Delivery of Bids	Bid documents are to be delivered to and received at the **Bossaso Municipality Office** on or before **12 October 2026 at 10:00 am.** Bids received after this time will not be considered and shall be returned to the bidders unopened

RFP# - 051
Construction of Coastal Development in the Bossaso Waterfront Project

DUE: 12 October 2026, 1000 Hrs (East African Time)

Documents included in the Bid

The Bidder shall fill all the information requested in the Bidding Documents. The documents to be included in the bid are:

The Following describes the contents of the Technical Proposal:

Attachment A - Form of Bid
Attachment B - Certification to Additional Agreements as Part of the Bid
Attachment C - Company Registration
Attachment D - Certificate of Bidder's Site Visit
Attachment E - Certificates of Compliance to FCDO Regulations
Attachment F - Summary of Past Performance, Experience & Technical Capability
Attachment G - Key Site Staff (CV and Certificates Must be attached)
Attachment H - List of Equipment
Attachment I - Value of the works currently under contract (On-going Works)
Attachment J - List of Local Labourers
Attachment K - Methodology and Work Schedule (To be submitted)

The Following describes the contents of the Cost Proposal:

Attachment L - Bank Details for Payments (Vendor Payment Information Form (to be Filled, stamped and signed)
Attachment M – Cost Proposal – Certificate of BOQ Quantities and Bills of Quantities (to be Filled, stamped and signed)

Bid Prices

Bidders are responsible for checking the accuracy of the BOQ. If significant deficiencies are identified, the bidder should reflect those discrepancies in the BOQ **as a separate line item and should bring to the attention of the evaluating committee with a foot note**. The Contract shall be for the whole Works computed based on the unit rates and prices in the Bill of Quantities submitted by the bidder. The bidder shall fill in prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the bidder will not be paid for when executed and shall be deemed covered by the rates for other items and prices in the Bill of Quantities.

Currency of the Bid and Payments

The currency of the Bid and payment for works executed shall be in Pounds (GBP).

Filling and Signing of the Bid

The bidder shall fill all the information requested in the bid documents. If additional pages are required, the same can be inserted and paged accordingly. All the information shall be typed or written in indelible ink and shall be signed by a person or persons duly authorised to sign on behalf of the bidder.

All pages of the bid where entries or amendments have been made shall be initialled by the person or persons signing the bid.

Bid Validity

The Bid shall remain valid for a period of 180 days from the closing date of this tender. Bidders may not alter their bids after submission.

Evaluation of Bids

The Bid Committee will have the responsbility to review, evaluate and qualify each of the criteria of all the offers received. As a result of the evaluation, the Bid Committee will jointly recommend the Bidder to be awarded the contract/contracts.

Please note that if there are significant deficiencies regarding responsiveness to the requirements of this RFP, a proposal may be deemed "non-responsive" and thereby disqualified from consideration.

TECHNICAL EVALUATION: The offers will first be evaluated on technical merits. The technical evaluation assesses the capacity of the company on the basis of submitted technical documents. Points will be allocated to a maximum indicated in the table below. If a company gains less than 70 points (out of 100), it will not be taken into consideration for financial evaluation.

S-1 Methodology and Work Schedule (15 points)

The Bidder should prepare a work schedule which shall describe a detailed breakdown of activities that will allow supervision to monitor weekly progress as well as should propose a payment schedule based on progress for each BOQ line item. The schedule should include breakdown by procurement, mobilisation to project site (including materials delivery and project office and housing for workers), all construction activities (excavation, demolition, floors, walls, ring beam, ceiling, finishing, water supply and distribution system, electrical supply and distribution system, and landscaping) and the duration for each activity with a planned start and end date.

S-2 Past Performance and Reference List (40 Points: 20 points [4 points for each valid project]; 15 points for turnover and current liquidity; and 5 points for Local Credibility)

- Projects identified should be at least five (5) current or previous contracts/projects of a similar type, with at least three (3) of these being in the last three (3) years of a similar size and value to the project activity.
- Projects identified should be of a similar type in nature such as construction of a park, government and commercial buildings, schools, community buildings, international or non-governmental organisation offices or compounds, health units or clinics, etc.
- Bidders must provide the location and contact details, phone number and email addresses, for any project listed. SINAAN PROGRAMME reserves the right to visit any site for inspection to evaluate a Bidder's technical capability.
- The Bidder is required to distinguish, between works performed as the prime Subcontractor or subcontractor; monetary values should be based on the portion of the project performed, i.e., works performed as a subcontractor should only include the monetary amount of the subcontract and not the prime contract.
- Projects identified should be of a monetary value equal to or greater than the magnitude for this RFP; less weight will be given for projects identified that are lower than the estimated value of this RFP.
- Recently completed (past 3 years) or current works will be given greater consideration than older projects and completed projects greater consideration than current projects. References for projects completed must be submitted on client letterhead to be considered valid.
- Turnover & Current Liquidity – Provide signed and stamped audited financial reports and bank statements for the last 3 years that have an annual average turnover of £1,500,000.

S-3 List of Key Personnel (20 points to be divided among requested key personnel)

The Bidder should describe the proposed technical and managerial team and attach copies of the CVs for the following key personnel:

- **Company Director**
- **Project Manager:** Should possess at least a bachelor's degree in civil engineering/ project management or its equivalent and preferably registered with the relevant registration bodies. Minimum of 8 years' experience including experience as a Site Agent / Subcontractor representative in construction projects of similar nature or large-scale buildings.
- **Site Engineer:** at least bachelor's degree in civil engineering with minimum 7 years of experience. The site engineer will remain at the site throughout the project duration.
- **Construction Foreman (on-site supervisor):** Should possess at least a Diploma in construction or civil engineering with experience in handling earth works, electrical, plumbing and sewerage network, pavements and concrete works. Proven experience as construction foreman of not less than 5 years. Ability to read drawings, plans and blueprints. Problem-solving abilities.
- **Health and Safety Officer** – Bachelor's degree in environmental science and additional qualification in Occupational Health and Safety from a reputable institution, or bachelor's degree in occupational safety and health from a reputable institution. At least 3 years' experience in supervising infrastructure of similar scope.
- **Electrical Supervisor:** Diploma or equivalent in electrical engineering with 5 years of experience in electrical wiring and solar installations.
- **Admin and Logistician:** Certificates or equivalent in business administration or procurement/logistics with 3 years' experience in administration or procurement/logistics.
- Any other key personnel proposed by the Bidder.

Note: If one individual fills more than one of these roles, please state this in the proposal. Identifying an individual in the staffing plan and not utilising them in that capacity during the performance of the works may be grounds for Termination for Default of any contract resulting from this RFP.

S-4 List of Equipment (20 points)

It is anticipated that significant equipment, tools and materials are required for proper completion of the Construction of Coastal Development in the Bossaso Waterfront Project. The Bidder will confirm the availability of equipment as listed in Attachment H. The bidder will mention the make and model (brand), year of manufacture, indicate if it is in proper functioning condition, as well as ownership (or rental) of each required piece of equipment. SINAAN Team reserves the right to inspect the equipment and its documentation during due diligence.

The Bidder should also include information where all materials will be sourced and delivered to the project site, including specific borrow location for sand and aggregate materials, or clearly indicate that you do not have this information. Equipment used by the Bidder not listed in Annex 4 must be clearly marked and a detailed description/justification for their use should be provided. Failure to complete all blanks on this document may reflect negatively on a Bidder's proposal during the technical evaluation.

S-5 Number of Labourers (5 points)

The Bidder shall provide a realistic number of labourers proposed for each activity during project implementation. The recruitment and employment of local unskilled labour is highly encouraged. The number of women labourers shall not be less than 5% of the total workforce. Points will be awarded based on the adequacy and realism of the labour allocation for each activity, the percentage of women labourers, and the roles assigned to women on the project.

Schedule	Category	
	Technical	**Max Points**
S1	**Methodology and Work Schedule**	**15**
	Bidder demonstrates an understanding of the activities to be undertaken, the order in which they should occur and timeline by which they should be completed, through the submission of a Methodology and Work Schedule (Methodology 5 points; Work Schedule 10 points)	
S2	**Past Performance and Reference List**	**40**
	Bidder will be evaluated on quality of completed projects which are similar in size, complexity, and value. Bidder should list at least five (5) current or previous contracts/projects references undertaken in the region (Puntland), particularly at least 3 projects identified of a similar size, complexity and value in the last 3 years. Bidder is required to indicate company name, project name, company representative (name, telephone number & email), and evidence, that is contracts, signed recommendation letters and signed Completion/Successful letters. (4 points for those of similar size, complexity and value per project)	20
	Turnover & Current Liquidity – Bidder demonstrates an annual average turnover of £1,500,000 with the provision of signed and stamped audited financial report and bank statements for the last 3 years (15 Points)	15
	Local Credibility (5 points)	5
S3	**List of Key Personnel**	**20**
	Bidder's proposed technical and managerial staff has skills, education and experience necessary to complete the project. Points are awarded on the basis of the presentation of CVs signed and dated by key personnel, copies of diplomas, letters of commitment, and description of personnel allocation.	20
S4	**List of Equipment**	**20**
	Evaluation of the type, capacity, quantities, proof of availability, age and location of relevant equipment that the Bidder can use for the work.	
S5	**Number of Labourers**	**5**
	Number of local semi-skilled and skilled labours proposed for the project - list skills and level of effort needed	
	TOTAL MARKS	**100**

Once the Bid Committee has finished evaluating the technical proposal, it will proceed to evaluate the cost proposal (financial evaluation for those offers that present the best qualifications and reached a minimum score of **70 points**). Proposals that do not reach the minimum score will be disqualified and will not be considered for further evaluation.

Financial Evaluation

The Financial Evaluation will assess the reasonableness, realism, completeness, and value for money of each Cost Proposal against the Engineer's/Programme's Independent Cost Estimate (ICE).

The Independent Cost Estimate will be used as a benchmark to:

- Assess whether proposed prices are realistic and feasible for successful delivery of the works;
- Identify abnormally low or abnormally high bids that may present implementation risks;
- Evaluate the reasonableness of individual BOQ line items;
- Support clarification and negotiation of costs where necessary; and
- Determine overall value for money in conjunction with the Technical Evaluation.

Bids will not be awarded solely on the basis of the lowest price. The Bid Committee will consider both technical quality and cost to determine the proposal that offers the best overall value for money.

Where a bid is significantly above or below the Independent Cost Estimate, the Evaluation Committee may request clarification and supporting justification from the bidder. If the explanation provided does not demonstrate that the proposed price is realistic and achievable, the bid may be considered non-responsive and excluded from further consideration.

The passing technical bids shall be checked for any arithmetic errors and corrections made as follows:

a) Where there is a discrepancy between the amounts in figures and words, the amount in words will govern;
b) Where there is a discrepancy between the unit rate and the line item total derived from multiplying the unit rate by the quantity, the unit rate as quoted will govern unless in the opinion of the Bid Committee, there is an obviously gross misplacement of the decimal point in the unit rate, in which case the line-item total as quoted will govern and the unit rate will be corrected;

<u>If a bidder does not accept the correction of arithmetic errors, the bid shall be rejected and shall not be considered for award</u>

Award

The Bid Committee will recommend a bidder whose bid has been determined to:

- Be substantially responsive to the bidding documents.
- Received at least 70 points and above in the technical evaluation
- Presents the **<u>best value/value for money</u>** to the programme

SINAAN PROGRAMME shall then notify the successful bidder in writing that their Bid has been accepted before the expiry of the period of Bid validity. The Letter of Acceptance sent to the Bidder shall state the sum payable to the Bidder for execution, completion and maintenance of Works as per the Bid.

The Bid Committee will also propose as second and third alternatives the offers that occupy the second and third place in descending order.

SINAAN PROGRAMME shall then send the Subcontract Agreement to be signed by the selected Bidder. The Bidder should return the signed Contract Agreement within seven days of receiving the contract.
The Bidder attests to their ability to mobilise on site with all specified equipment within ten days of award and subsequent contract signing.

SINAAN PROGRAMME reserves the right to conduct any of the following:

- Conduct cost negotiations with Bidders and request best and final offers, and/or request clarifications from any Bidder prior to award.
- While preference will be given to Bidders who can address the full technical requirements of this RFP, SINAAN PROGRAMME may issue a partial award or split the award among various Bidders, if in the best interest of the programme.
- Cancel this RFP at any time.
- Reject any and all offers, if such action is considered to be in the best interest of SINAAN PROGRAMME or FCDO.

Bidders are reminded that DT Global is not obligated to award a negotiated subcontract based on lowest proposed cost or to the Bidder with the highest technical evaluation score. DT Global will make an award to the Bidder whose proposal offers the best value to the SINAAN Programme considering both technical and cost factors. When competing technical proposals are considered essentially equal, cost will become the determining factor.

Unsuccessful Bidders will be notified by email and provided with a seven (7) working days standstill period following notification. During this period, Bidders may submit any procurement complaints or challenges relating to the procurement process in writing to the SINAAN Tender email address (sinaan.tender@dt-global.com). Any complaints received within the standstill period will be reviewed in accordance with the SINAAN Programme's procurement procedures prior to contract award.

Modifications to the Contract

This is a fixed price Subcontract Agreement that can only be modified for the following reasons:

- When additional scope has been identified that was not contemplated in the original SOW and BOQ as necessary, modifications cannot exceed 15% of the contract value. Line items cost will be used as a base to calculate value of modification. It can only be modified by written instrument signed by both parties. The parties' right to modify or amend this Subcontract may be subject to approval by FCDO.
- DT Global may make adjustments for substitution of works that do not affect the total value of the contract. Only those changes in the works that are approved on a written change order by the Team Leader, shall be binding on the Subcontractor within the general scope of the Contract.

Performance outside Scope of Subcontract

The Subcontractor shall receive technical direction from the SINAAN PROGRAMME Team Lead (TL), SINAAN PROGRAMME Deputy Team Lead (DTL), or the SINAAN PROGRAMME Chief Engineer as authorised in writing. In no event shall any direction from SINAAN PROGRAMME (other than a formal, written modification issued by either SINAAN Programme or FCDO based on the threshold of the contract) increase the Not-to-Exceed cost of this Agreement. Evaluation shall not be compensated or reimbursed by SINAAN PROGRAMME for services performed or materials provided beyond those required to carry out the works.

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Documents to be included in the Bid Package

Attachment A - Form of Bid

To, The Bid Committee:

1. Having visited the above project site and examined the required bidding documents for the above-mentioned works, we offer to execute, complete and remedy any defects to the works therein for the sum of GBP £ _____ (Insert amount in figures)

   _____

   _____ .
   (insert amount in words)

2. We undertake, if our bid is accepted, to mobilise on site with all respective equipment required to facilitate works and to begin said work within _____ calendar days of signing the official contract. We hereby further agree to complete and deliver the works in accordance with the contract within _____ calendar months calculated from the date of starting the works. Failure to maintain the approved timeline for delivery and schedule of works may result in the assessment of liquidated damages and possibly termination of the contract for cause. We understand and agree that DT Global and its SINAAN PROGRAMME representatives are not responsible for facilitating transport of equipment into areas of designated works.

3. We understand and accept that the Committee is not bound to choose the lowest price or any bid that may be received, and that any or all bids may be rejected without assigning any reason for such rejection.

4. The bid validity period is 180 days from the closing date of this tender, and we agree to abide by this from the date fixed for receipt of the same.

5. Unless and until a formal Agreement is prepared and executed, this bid, together with your written acceptance thereof, shall constitute a binding contract between us.

Dated (day) _____ Day of (month)_____ (Year) 20_____

Signature_____ in the capacity of (Title) _____

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Attachment B - Certification to Additional Agreements as Part of the Bid

Type of Contract to be Awarded	Fixed Price
Defects Liability Period	6 Months
Defects Liability	10 % to be presented at the end of the contract. DT Global will hold the retention payment till the successful completion of Defect and Liability period and fully signed Final Completion Certificate.
Percentage of Retention	10% from each deliverable payment (To be released upon presentation of fully signed Final Completion Certificate)
Time Allotted for Payment(s) once Payment Certificate is Approved	Forty-Five (45) Days from Receipt of Official Invoice
Local labour to be hired under the contract	50%
Percentage of Women to be Hired Under the Contract	Minimum of 5%
Late delivery; Liquidated Damages	For the first fifteen (15) calendar days of delay, liquidated damages shall be applied at a rate of 0.05% per calendar day of the outstanding contract value. For delays extending from day 16 to day 30, the daily liquidated damages rate shall increase to 0.10%. For delays extending from day 31 to day 45, the daily liquidated damages rate shall increase to 0.15%, each calculated against the outstanding contract value at the time the penalty is imposed. If the cumulative liquidated damages reach fifteen percent (15%) of the total contract value, DT Global reserves the right to terminate the contract for default.
Project Cancellation	Contract will be terminated for cause if Subcontractor defaults on agreement and will occur once all liquidated damages have been assessed and collected/deducted accordingly.
Contract Duration	_____ Months

Terms and Conditions of Award

The subcontract award will include, but not be limited to, the following provisions:

TYPE OF SUBCONTRACT

This is a Fixed Price subcontract. This fixed price includes, but is not necessarily limited to, all of the Subcontractor's labour, supervision, insurance, transport, fuel, oil, materials, tools, equipment, loading and offloading, handling, maintenance, testing, taxes, quality control, security, waste removal and other obligations to which the Subcontractor may be entitled, as well as all indirect costs such as overhead and profit. Payments to the Subcontractor cannot exceed the total contract award.

The subcontractor agrees that they shall bear the financial responsibility for any fines, fees, penalties, or corrective costs that result as a consequence of the subcontractor's failure to meet the local environmental city regulations concerning demolition and disposal in a manner consistent with the terms of this subcontract.

Any fines, fees, penalties, or corrective costs that are not paid by the Subcontractor directly, shall be deducted from the final contract value.

LIQUIDATED DAMAGES

Subcontractor shall adhere to the delivery schedule set forth in the contract. When the Subcontractor is delinquent in fulfilling its contractual obligations, DT Global may terminate the contract or impose a fine for each calendar day of delay, in accordance with the following:

> For the first fifteen (15) calendar days of delay, liquidated damages shall be applied at a rate of 0.05% per calendar day of the outstanding contract value. For delays extending from day 16 to day 30, the daily liquidated damages rate shall increase to 0.10%. For delays extending from day 31 to day 45, the daily liquidated damages rate shall increase to 0.15%, each calculated against the outstanding contract value at the time the penalty is imposed.

When the cumulative liquidated damages reach fifteen percent (15%) of the total contract value, DT Global reserves the right to terminate the contract for default.. The percentage of the fine previously established, shall apply to the total Contract value on the date the fine is imposed. The above penalties shall be determined and imposed following a meeting with the Subcontractor. The Subcontractor will be notified in writing of the meeting. Failure to attend the meeting will result in a forfeiture of any rights to discuss, contest, or negotiate the imposition of fines. DT Global's supervisory firm in the field will report indicating lack of satisfactory completion beyond the agreed and signed Delivery Schedule,

Unless the delay in completing the work arises from unforeseeable causes beyond the control and without the fault or negligence of the Subcontractor the fine will not be applicable. Examples of such causes include Acts of God or the public enemy, acts of the government in either its sovereign or contractual capacity, fires, epidemics, quarantine restrictions, security strikes, unusually severe weather or delays of Subcontractor at any tier arising from unforeseeable causes beyond the control and without the fault or negligence of both DT Global and the Subcontractors.

Signature of Bidder: _____ Date _____

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Attachment C - Company Registration

Certificate of National registration from (Bar Code matches with Certificate Information) from the Ministry of Commerce, Industries and Investment, Puntland; the Ministry of Public Works, Transport and Housing, Puntland, and Puntland National Tender Board; as well as a valid tax compliance certificate from the Ministry of Finance, Puntland - a copy to be attached to the bid documents

Name of Business or Firm: _____

Place of registration: _____

Exact Address: _____

Telephone: _____

Mobile: _____

Email: _____

Validity Date: _____

Principal Place of Business: _____

Name of Director: _____

Provide original or certified copy of all mandatory administrative documents: All valid registered Businesses located or represented in the region from the (Bar Code matches with Certificate Information) from the Ministry of Commerce, Industries and Investment, Puntland; the Ministry of Public Works, Transport and Housing, Puntland, and Puntland National Tender Board; as well as a valid tax compliance certificate from the Ministry of Finance, Puntland.

I do hereby certify that the **information** contained herein is **accurate**. I authorise DT Global to verify, as the need arises, the accuracy of this information, either through on-site visits to my place of business, or by enquiries through relevant and competent services.

Signed on (Date)_____ Name: _____

_____ Title: _____

Signature of authorised agent

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Attachment D - Certificate of attendance of Bidders' site meeting signed by the Chief Engineer and signed and stamped by the Bossaso Mayor/Municipality.

Certificate of Bidder's Visit to Site

This is to certify that

(Name/s): _____

Being the authorised representative(s) of (Name of Bidder/Organisation Representative):

_____

Name of Bidder/Organisation: _____

_____

Participated in the organised visit to the works site for the above-named project, held on

_____ (date)

Signed & Stamped: _____ Signed: _____

Mayor, Bossaso Municipality Chief Engineer, DT Global/SINAAN

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Attachment E- Certificate of Compliance to FCDO Regulations

Certification Regarding Knowledge of FCDO Compliance

To: Team Leader, SINAAN PROGRAMME

I, _____ (FIRST NAME, LAST NAME),

as _____ (TITLE), a legally Authorised representative of

_____ (ORGANISATION NAME)

do hereby certify that, by signing below, we provide certification and assurance for the following:

(1) Organisational Conflicts of Interest Representation
(2) Disclosure of DT Global/FCDO-approved supplier declarations: sanctions, terrorism financing, fraud/bribery, modern slavery, safeguarding/SEA, conflicts of interest and eligibility.
(3) Key Individual Certification Narcotics Offences and Drug Trafficking
(4) The Sexual Abuse and Exploitation in Transition Assistance Operations

These certifications and assurances are given in consideration of and for the purpose of obtaining any and all UK Government/ FCDO grants, loans, contracts, property, discounts, or other UK Government/ FCDO financial assistance extended after the date hereof to the Bidder by DT Global, including instalment payments after such date on account of applications for UK Government/ FCDO financial assistance which was approved before such date. The Bidder recognises and agrees that such UK Government/ FCDO financial assistance will be extended in reliance on the representations and Subcontracts made in these assurances, and that the UK Government/ FCDO will have the right to seek judicial enforcement of these assurances. These assurances are binding on the Bidder, its successors, transferees, and assignees, and the person or persons whose signatures appear below are authorised to sign these assurances on behalf of the Bidder.

I, we, understand that a false, or intentionally misleading, certification could be the cause for possible actions ranging from being found not responsible for this award to suspension or debarment of this organisation in accordance with the provisions of FCDO Regulations.

I declare under penalty of perjury that the foregoing is true and correct.

Signature: _____

Date: _____

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ORGANISATIONAL CONFLICTS OF INTEREST REPRESENTATION

1. (a) The Bidder represents that, to the best of its knowledge and belief, the award of this Subcontract or the modification of an existing contract does ☐ or does not ☐ (tick where appropriate) involve an organisational conflict of interest.

(b) The term "organisational conflict of interest" means that a relationship exists whereby a Bidder (including its chief executives, directors, proposed Bidder or Bidders) has an interest which (A) may diminish its capacity to give impartial, technically sound, objective assistance and advice or may otherwise result in a biased work product, or (B) may result in an unfair competitive advantage. It does not include the normal flow of benefits from the performance of a contract.

2. If the Bidder indicates that there are organisational conflicts of interest in the "Organisational Conflicts of Interest Representation", the Bidder shall provide a statement which describes in a concise manner all relevant facts concerning any present or current planned interest (financial, contractual, organisational, or otherwise) relating to the work to be performed in the proposed contract and bearing on whether the Bidder has a possible organisational conflict of interest with respect to being able to render impartial, technically sound, and objective assistance or advice, or being given an unfair competitive advantage. The Bidder may also provide relevant facts that show how its organisational structure and/or management systems limit its knowledge of possible organisational conflicts of interest relating to other divisions or sections of the organisation and how that structure or system would eliminate or neutralise such organisational conflicts.

Name: _____

Title: _____

Signature: _____

Date: _____

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ATTACHMENT F - SUMMARY OF PAST PERFORMANCE, EXPERIENCE & TECHNICAL CAPABILITY
(Information to be provided by Bidder as part of the technical proposal)

Name of Business or Firm:

_____

Previous works undertaken as prime Subcontractor, for works of similar type and size, from 2023 to 2026. Express monetary values in GBP £

Project name	Client name	Types of works and year of completion	Value of works (In USD)	Equivalent Value of works (In GBP)	Certificate of completion Or copy of the contract attached (Yes/No)
1.					
2.					
3.					
4.					
5.					

[Include either a signed and stamped copy of each certificate of completion and a signed and stamped copy of the contract for each project listed, please take note that, if not included, no points/scores will be awarded]

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For each project listed above, please complete a table such as that presented below and attach separately evidence of the signed agreement:

Project #1	
Project Name/Title	
Description Of Work	
Cost in GBP £	
Site Location (Region/District)	
Client	
Reference Name:	
Email:	
Telephone:	
Type of Contract (e.g. fixed price, time-and-materials, cost plus fixed fee, etc.)	
Were You a Prime Subcontractor or a Sub Subcontractor?	
Quality Assured Contract (Yes/No)	
Contract Awarded Value and Final Cost	
Start Date – End Date	
Contract Commencing Date	
Contract Period (No. Of Months)	
Actual Date of Practical Completion	
Applicant Performance Report Available?	
Delays – External Factors (Working Days)	
Delays – Internal Factors (Working Days)	
Final Completion/ Certificate of completion attached (yes/no)	

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Project #2	
Project Name/Title	
Description Of Work	
Cost in GBP £	
Site Location (Region/District)	
Client	
Reference Name:	
Email:	
Telephone:	
Type of Contract (e.g. fixed price, time-and-materials, cost plus fixed fee, etc.)	
Were You a Prime Subcontractor or a Sub Subcontractor?	
Quality Assured Contract (Yes/No)	
Contract Awarded Value and Final Cost	
Start Date – End Date	
Contract Commencing Date	
Contract Period (No. Of Months)	
Actual Date of Practical Completion	
Applicant Performance Report Available?	
Delays – External Factors (Working Days)	
Delays – Internal Factors (Working Days)	
Final Completion/ Certificate of completion attached (yes/no)	

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Project #3	
Project Name/Title	
Description Of Work	
Cost in GBP £	
Site Location (Region/District)	
Client	
Reference Name:	
Email:	
Telephone:	
Type of Contract (e.g. fixed price, time-and-materials, cost plus fixed fee, etc.)	
Were You a Prime Subcontractor or a Sub Subcontractor?	
Quality Assured Contract (Yes/No)	
Contract Awarded Value and Final Cost	
Start Date – End Date	
Contract Commencing Date	
Contract Period (No. Of Months)	
Actual Date of Practical Completion	
Applicant Performance Report Available?	
Delays – External Factors (Working Days)	
Delays – Internal Factors (Working Days)	
Final Completion/ Certificate of completion attached (yes/no)	

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Project #4	
Project Name/Title	
Description Of Work	
Cost in GBP £	
Site Location (Region/District)	
Client	
Reference Name:	
Email:	
Telephone:	
Type of Contract (e.g. fixed price, time-and-materials, cost plus fixed fee, etc.)	
Were You a Prime Subcontractor or a Sub Subcontractor?	
Quality Assured Contract (Yes/No)	
Contract Awarded Value and Final Cost	
Start Date – End Date	
Contract Commencing Date	
Contract Period (No. Of Months)	
Actual Date of Practical Completion	
Applicant Performance Report Available?	
Delays – External Factors (Working Days)	
Delays – Internal Factors (Working Days)	
Final Completion/ Certificate of completion attached (yes/no)	

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Project #5	
Project Name/Title	
Description Of Work	
Cost in GBP £	
Site Location (Region/District)	
Client	
Reference Name:	
Email:	
Telephone:	
Type of Contract (e.g. fixed price, time-and-materials, cost plus fixed fee, etc.)	
Were You a Prime Subcontractor or a Sub Subcontractor?	
Quality Assured Contract (Yes/No)	
Contract Awarded Value and Final Cost	
Start Date – End Date	
Contract Commencing Date	
Contract Period (No. Of Months)	
Actual Date of Practical Completion	
Applicant Performance Report Available?	
Delays – External Factors (Working Days)	
Delays – Internal Factors (Working Days)	
Final Completion/ Certificate of completion attached (yes/no)	

Location	**Bossaso, Puntland**	PNTB NO	**#PNTB/33/2026**
MONTH	**September/October**	PR NO	**051**
PROJECT NAME	**CONSTRUCTION OF COASTAL DEVELOPMENT IN THE BOSSASO WATERFRONT PROJECT**		

ATTACHMENT G - KEY SITE STAFF (CV AND CERTIFICATES MUST BE ATTACHED)

Please provide CVs indicating number of years of experience together with Educational and Technical Certificates and photo id.

#	Key Site Staff
1	Name: Title/ Position: Description of Education Qualification: Description of Relevant Work Experience:
2	Name: Title/ Position: Description of Education Qualification: Description of Relevant Work Experience:

3	Name: Title/ Position: Description of Education Qualification: Description of Relevant Work Experience:
4	Name: Title/ Position: Description of Education Qualification: Description of Relevant Work Experience:

5	Name: Title/ Position: Description of Education Qualification: Description of Relevant Work Experience:
6	Name: Title/ Position: Description of Education Qualification: Description of Relevant Work Experience:

I hereby certify that all CV's are attached.

SIGNED: _____

Location	Bossaso, Puntland	PNTB NO	#PNTB/33/2026
MONTH	September/October	PR NO	051
PROJECT NAME	CONSTRUCTION OF COASTAL DEVELOPMENT IN THE BOSSASO WATERFRONT PROJECT		

ATTACHMENT H - LIST OF EQUIPMENT

The Bidder will state the make and model (brand), year of manufacture, confirm whether each required piece of equipment is in proper working order, and indicate ownership (or rental) of each required piece of equipment.

Bidder MUST attach proof of lease or ownership documentation.

#	Equipment Name	Min Number required	Model	Year of manufacture	# allocated for the project	Owned/ Hired
1	Excavator/Backhoe	1				
2	Motor Grader	1				
3	Wheel loaders	1				
4	Vibrator Roller Compactor	1				
5	Concrete Batching Plant	1				
6	Concrete Transit Mixer	2				
7	Concrete Mixer	2				
8	Vibrator	2				
9	Mobile Water Tanker	1				
10	Hand tools such as Shovels, pickaxe (Set)	1				
11	Wheelbarrows	10				
12	Water pump	2				
13	Generator	1				
14	Welding plant	1				

15	Electrical Tools (Set)	2				
16	Dump Truck	3				
17	Pick up	1				
18	Surveying equipment: Total station GPS survey equipment Auto level / laser level Measuring tapes and marking tools	1 Set				
19	Crane	1				
20	Set of form work for concrete at least to cast 25m of retaining wall per day	1				

We hereby certify that notwithstanding the list of equipment detailed above, we will provide sufficient, suitable and adequate equipment in good working order for the successful completion of works.

Signature of Bidder

Date

Location	**Bossaso, Puntland**	PNTB NO	**#PNTB/33/2026**
MONTH	**September/October**	PR NO	**051**
PROJECT NAME	**CONSTRUCTION OF COASTAL DEVELOPMENT IN THE BOSSASO WATERFRONT PROJECT**		

ATTACHMENT I - VALUE OF THE WORKS CURRENTLY UNDER CONTRACT (ONGOING WORKS)

The bidder is to list the construction projects which he is currently executing, their value and the expected completion date.

#	Project Name	Date Completed	Contract Sum (Indicate GBP)	Clients' Name and Address
1				
2				
3				
4				
5				
6				
TOTAL				

Signature of Bidder

Date

Location	Bossaso, Puntland	PNTB NO	#PNTB/33/2026
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ATTACHMENT J - LIST OF LOCAL LABOURERS

The bidder having worked a detailed methodology should have a clear view of the amount of labour effort required in completion of the works. It is recommended to use local labour as far as practicable in the works and additional scores will be obtained on use of female labour.

Type of Local Labour	Total Number of Local Males	Total Number of Local Females
Skilled		
Unskilled		
TOTAL LOCAL LABOUR		

Signature of Bidder

Date

Location	**Bossaso, Puntland**	PNTB NO	**#PNTB/33/2026**
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ATTACHMENT K - METHODOLOGY WORK SCHEDULE

K.1 Methodology (describe major activities and how will they be implemented: procurement, mobilisation to project site (including materials delivery and project office and housing for workers), and all construction activities excavation, demolition, floors, walls, ring beam, ceiling, finishing, water supply and distribution system, electrical supply and distribution system, latrines, and landscaping) The duration for each activity with a planned start and end date, How supervision will be monitored weekly, proposed a payment schedule base on progress for each BOQ line item .

Major Activities (please describe how they will be implemented).

Supervision and Quality Control (please describe how is to be done)

Location	**Bossaso, Puntland**	PNTB NO	**#PNTB/33/2026**
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K-2 Work Plan-The bidder shall break down their tasks and prepare a detailed resource-based programme of works on a Gantt chart to ensure completion within the stated time frame in the format shown below.

Note, the below is <u>ONLY A SAMPLE</u> and the bidder is required to prepare their programme and attach here.

ATTACHMENT L - BANK DETAILS FOR PAYMENTS (VENDOR PAYMENT INFORMATION)

VENDOR PAYMENT INFORMATION

Vendor/Beneficiary Information:	
Vendor Name:	
Vendor Address:	

Beneficiary Bank/Account Information:	
Bank Name:	
Bank Address:	
Full Name on the Account:	
Account Number:	
Routing Number:	
SWIFT Code:	
IBAN:	

Intermediary Bank Information:	
Bank Name:	
Bank Address:	
Account Number:	
Routing Number:	
Other Information:	

Special Instructions/Other Information:

SECTION 3: SUPPORTING DOCUMENTATION (Tick as applicable)

☐ Bank-stamped confirmation letter
☐ Copy of cancelled cheque
☐ Recent bank statement (amounts may be masked)
☐ Certificate of Registration

Location	**Bossaso, Puntland**	PNTB NO	**#PNTB/33/2026**
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PROJECT NAME	**CONSTRUCTION OF COASTAL DEVELOPMENT IN THE BOSSASO WATERFRONT PROJECT**		

SECTION 4: DECLARATION

I hereby confirm that the bank details provided above are accurate and correspond to the attached official bank documentation. I understand that providing incorrect information may result in payment delays. The organisation shall not be held liable for payments made to the bank account details provided in this form.

Authorised Signatory Name: _____

Title: _____

Signature: _____

Date: _____

Location	Bossaso, Puntland	PNTB NO	#PNTB/33/2026
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PROJECT NAME	CONSTRUCTION OF COASTAL DEVELOPMENT IN THE BOSSASO WATERFRONT PROJECT		

ATTACHMENT M - COST PROPOSAL – BILL OF QUANTITIES (TO BE FILLED)
Bills of Quantities - Preamble

1. The Bill of Quantities shall be read in conjunction with the Instructions to Bidders, Conditions of Contract, Technical Specifications, Designs and Drawings.
2. The rates and prices bid in the Bill of Quantities should include all labour, supervision, materials, equipment, erection, maintenance, insurance, **taxes, and duties**, together with all general risks, liabilities, and obligations set out or implied in the Contract.
3. A rate or price shall be entered against each item in the Bill of Quantities, whether quantities are stated or not. The cost of Items against which the Bidder has failed to enter a rate or price shall be deemed to be covered by other rates and prices entered in the Bill of Quantities.
4. The whole cost of complying with the provisions of the Contract shall be included in the Items provided in the un-priced Bill of Quantities, and where no Items are provided, the cost shall be deemed to be distributed among the rates and prices entered for the related Items of Work.
5. General directions and descriptions of work and materials are not necessarily repeated nor summarized in the Bill of Quantities. References to the relevant sections of the Contract documentation shall be made before entering prices against each item in the Bill of Quantities.
6. The method of measurement of completed work for payment shall be in accordance with CESMM - Civil Engineering Standard Method of Measurement.

Errors will be corrected by the Employer for any arithmetic errors in computation or summation as follows: Where there is a discrepancy between amounts in figures and in words, the amount in words will govern; and the total amount derived from the multiplication of the unit price and the quantity, the unit rate as quoted will govern, unless in the opinion of the Bid Committee, there is an obviously gross misplacement of the decimal point in the unit price, in which event the total amount as quoted will govern and the unit rate will be corrected.

CERTIFICATE FOR VERIFICATION OF DRAWINGS AND BOQ QUANTITIES

Project PR Number: PR 051

Project Title: Construction of Coastal Development in the Bossaso Waterfront Project

Bidder's Name: _____

Bidder's Address: _____

Bidder's Telephone: _____

Bidder's E-mail: _____

Date: _____

BOQ Amount: GBP £ _____

THE UNDERSIGNED CONTRACTOR HEREBY CERTIFIES THAT:

1. The Contractor has reviewed the "Bid Price" section in the bid book and fully understands the following:

   i. Bidders are responsible for checking the accuracy of the BOQ. If significant deficiencies are identified between the BOQ and Drawings, the bidder should reflect those discrepancies in the BOQ as a separate line item and should bring the discrepancies to the attention of the evaluating committee with a footnote. The Contract shall be for the whole Works computed based on the unit rates and prices in the Bill of Quantities submitted by the bidder. The bidder shall fill in prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the bidder will not be paid for when executed and shall be deemed covered by the rates for other items and prices in the Bill of quantities. The costs provided have been satisfactorily agreed upon by the vendor and are considered fair and reasonable rates.

   ii. Should the contract be awarded, the contractor agrees not to make any claims or request variations due to site visit conditions or discrepancies found between the drawings and the BOQ during the execution of the work.

BILL OF QUANTITY (BOQ)

Program Name:	**SINAAN**
Project Name:	**Coastal Development in the Bossaso Waterfront Project**
Project No:	**PR 051**
Project Location:	**Bossaso, Somalia**

All quoted price shall include materials mobilization, transportation labor cost and applicable taxes.

The Bidder MUST provide Excel file and signed and stamp PDF copy of this document

Name of Organization/Firm:

BILL SUMMARY

S#	ITEM DESCRIPTION	AMOUNT (GBP)
1	Preliminaries	-
2	Cars Parking	-
3	Existing Water way	-
4	Entrance	-
5	Retaining Walls	-
6	Ablutions - 3 Nos	-
7	Kiosks - 12 Nos	-
8	Walkways and Sitting area	-
9	Out Door Lighting and Electrification	-
10	Out door Plumbing and under ground water tank	-
11	Sewarage and Septic Tank	-
12	Installation of PV System - 3 sets	-
13	Contractors All Risk Insurance Provide Quotation from well know and established Insurance Company with Policy Information to be Provided as per guidance in Attachment IV In the RFP)	
GRAND TOTAL		**-**

SIGNATURE _____

STAMP

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

Preliminaries and General Items

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
PRELIMINARY AND GENERAL ITEMS					
	Testing of Materials				
1.1	Concrete, block, sand, water, soil and any other tests as directed.	Item	1.00		-
	Temporary Works				
	Generally: The Contractor shall be responsible for the construction, maintenance and removal of all temporary works, and shall be responsible for ensuring the safety of such works and compliance with appropriate regulations and Codes of Practice.				
	Mobilization/Demobilization				
1.2	Mobilization of equipment/plant and personnel including all associated costs and demobilizing of the same	Item	1.00		-
	SAFETY GEAR ASSORTED				
1.3	Reflector Jackets	L.S	1.00		-
1.4	Safety Shoes	L.S	1.00		-
1.5	Helmet	L.S	1.00		-
1.6	Safety Glasses	L.S	1.00		-
1.7	Gloves	L.S	1.00		-
GRAND TOTAL					**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

Public Car Parking

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A1	Site Clearance, levelling , Cut and fill depth and Setting out	m^2	2505.00		-
A2	Back filling with approved selected granular material, placed in layers not exceeding 200 mm thick, each layer watered and mechanically compacted to a minimum of 95% of the Maximum Dry Density (MDD) as determined by the applicable Standard Proctor test, unless otherwise specified, including supply, loading, transportation, spreading, grading, compaction, and all associated labour, plant and equipment, complete to the required levels and profiles.	m^3	1252.50		-
A3	Compaction of existing subgrade to 95% M.D.D.	m^2	2505.00		-
A4	Supply, spread and compact to 95% M.D.D. (AASHTO T.180) and shape to level and tolerance 250mm thick well graded base course as shown on drawings.	m^3	560.75		-
A5	Providing and laying natural cobblestone paving for car parking areas, using approved quality, colour, shape and size cobblestones, 80–100 mm thick, laid over a properly prepared and compacted granular base, including preparation and levelling of the formation, provision of suitable bedding layer of clean sand, laying and alignment of cobblestones to the required pattern, filling of joints with fine sand, mechanical compaction using suitable plate compactor, edge restraints where required, cutting and fitting around edges and obstructions, final levelling and cleaning, and all materials, labour, plant, equipment and incidentals necessary to complete the work in accordance with the drawings and Engineer's instructions.	m^2	2243.00		-
A6	Back filling of central part with Agricultural Soil	m^3	78.60		-
	Total for Parking Area				**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

Pond Area

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A	**EARTHWORKS**				
A1	Site Clearance, levelling by cut and fill for existing water way	m^2	22667.00		-
A2	Compaction of existing subgrade to 95% M.D.D.	m^2	22667.00		-
	Total for Pond Area				**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

Entrance - 4 Nos

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A	**EARTHWORKS**				
A1	Excavation and back fill in all kind of sub-surface material complete in all respects as shown on the drawings, specifications and/or as directed by the Engineer. Surplus materials should be removed from the site or as advised by Construction Supervisor.	m^3	28.32		-
A2	Provide and lay 300 thick hard core compacted to 98% modified Proctor density under column and strip footing. The hardcore should be placed and compacted in two layers not exceeding 150mm thickness	m^3	4.25		-
	Total A				**-**
B	**SUB STRUCTURE**				
B1	Providing and laying Blinding plain cement concrete mix to obtain 1500 psi (Cylinder Strength at 28 days) (1:3:6) using coarse sand and screened graded and washed aggregate, in required shape and design, including formwork, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.)	m^3	1.33		-
B2	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Strip Footing.**	m^3	1.55		-
B3	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Strip Foundation**	Kg	63.87		-
B4	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Column Footing.**	m^3	4.50		-
B5	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Column Base**	Kg	162.35		-
B6	Construction of Hollow Concrete masonry unit (CMU) wall of 200mm thickness blocks (Compressive strength 2000Psi as per ASTM C90-16a) bedded in cement/sand mortar mix 1:3 filled with 1:2:4 concrete and 10mm vertical steel reinforcement at every 600mm c/c originating from Strip footing to Grade beam. Note: Blocks to be cured for at least 14 days and tested prior to laying in for the wall as per the drawings	m^2	3.44		-
B7	**Grade Beam**				
B7(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Grade Beam.**	m^3	1.30		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
B7(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	1.50		-
B8	**Fill materials**				
B8(a)	Provide and lay hard core 300mm compacted to 98% modified Proctor density for Grade Slab	m^3	4.85		-
B8(b)	Provide and lay 100mm Murram Blinding for Grade Slab	m^3	1.62		-
B9	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using sulphate resistant cement coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for **Slab on Grade**	m^3	3.23		-
B10	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position	Kg	316.11		-
	Total B				**-**
C	**SUPER STRUCTURE**				
C1	Construction of Solid Concrete masonry unit (CMU) wall of 200mm thickness blocks (Compressive strength 2000Psi as per ASTM (C90-16a) bedded in cement/sand mortar mix 1:4. Note: Blocks to be cured for at least 14 days and tested prior to laying in for the wall as per the drawings	m^2	75.83		-
C2	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for **Column**	m^3	2.20		-
C3	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Column**	Kg	1235.00		-
C4	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for **Slab at lower roof**	m^3	0.38		-
C5	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Slab at lower roof**	Kg	74.01		-
C6	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for**Slab at upper roof**	m^3	2.40		-
C7	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Slab at upper roof**	Kg	421.49		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
C8	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for **Lintel**	m^3	0.17		-
C9	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Lintel**	Kg	38.56		-
C10	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for **Beam B1**	m^3	0.45		-
C11	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Beam B1**	Kg	62.92		-
C12	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for **Beam B2**	m^3	0.85		-
C13	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Beam B2**	Kg	100.70		-
C14	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for **Beam B3**	m^3	1.28		-
C15	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Beam B3**	Kg	117.20		-
C16	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for **Beam B4**	m^3	0.45		-
C17	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Beam B4**	Kg	62.92		-
C18	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for **Beam B5**	m^3	0.45		-
C19	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Beam B5**	Kg	62.92		-
C20	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). for **Gate Arch-B6**	m^3	0.70		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
C21	High tensile deformed steel bars to ASTM A615 Grade 60 (60000 psi) :- including bending, hooking, tying wire, cutting spacers and supporting all in position for **Gate Arch**-B6	Kg	106.75		-
C22	Providing and laying 80mm thick reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete for coping of wall and columns top	m^3	0.65		-
	Total C				**-**
D	**WALLS AND FINISHING**				
D1	20 mm thick Cement Sand plastering (1:3) finished smooth surface with wooden float for the internal and external walls, Columns , Grade beams and ring beams of the building including curing.	m^2	152.00		-
D2	Prepare surface, apply filler, apply one coat of primer and two coats of weather resistant at external faces of walls (Contractor will submit the sample for Color and manufacturer approval)	m^2	152.00		-
	Total D				**-**
E	**ELECTRICAL INSTALLATIONS**				
	Note : unless other wise stated rates in Bill of quantities shall include all necessary material, cables, conduits, PVC sunk box, Bulbs switches etc. and labor required to complete the electrical installation. Testing and commissioning of electrical installations is to be carried out by contractor and cost of such testing and reports to be included in rates. All types of fittings shall be approved by engineer prior to installation				
E1	Supply and Install Wall mount Solar powered LED floodlight. LED Lamp: 400pcs 2835 SMD LED. Solar Panel: 6V 25W Polycrystalline. Battery: Lithium-Ion 3.2V 26AH. Charging 4-6h, discharge 10-15h. Or approved equivalent.	No	16.00		-
	Total E				**-**
F	**Ladder**				
F1	Providing, fabricating and installing a galvanized/mild steel fixed vertical access ladder, **7.30 m high and 450 mm overall width**, complete with 50×6 mm steel side members, Ø25 mm solid steel bar rungs at 300 mm c/c, safety cage comprising 25×5 mm flat-bar hoops at approximately 1.20 m c/c, wall brackets at 1.50 m c/c, anchor bolts, bottom support, all welded connections, fixing accessories, surface preparation, anti-corrosion primer and two coats of approved finishing paint, complete in all respects as per drawings and Engineer's approval.	No	1.00		-
	Total F				**-**
G	**Gate**				
G1	Providing, fabricating and installing a 3.85 m wide × 2.75 m high double-leaf mild steel swing gate, comprising 100×50×3 mm RHS perimeter frame, 50×50×2 mm SHS horizontal slats, heavy-duty welded hinges, centre drop bolt with floor socket, gate stoppers, fixing accessories and all necessary welding, cutting, grinding, alignment and installation. Complete with cleaning, one coat anti-rust primer and two coats approved finishing paint, including all materials, labour, hardware and accessories, complete as per drawings and Engineer's approval.	No	1.00		-
	Total G				**-**
GRAND TOTAL FOR 1 ENTRANCE					**-**
GRAND TOTAL FOR 4 ENTRANCE					**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

Retaining Walls

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A	**EARTHWORKS**				
A1	Excavation and back fill in all kind of sub-surface material complete in all respects as shown on the drawings, specifications and/or as directed by the Engineer. Surplus materials should be removed from the site or as advised by Construction Supervisor.	m^3	3282.90		-
A2	Provide and lay 300 thick hard core compacted to 98% modified Proctor density under column and strip footing. The hardcore should be placed and compacted in two layers not exceeding 150mm thickness	m^3	523.86		-
	Total A				**-**
B	**SUBSTRUCTURE**				
B1	Providing and laying 80mm thick Blinding plain cement concrete mix to obtain1500 psi (Cylinder Strength at 28 days) (1:3:6) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for the below.				
B1(a)	Under the Retaining Wall 80cm Thick	m^3	139.69		-
B2	**Concrete Slab Toe wall**				
B2(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Toe wall.**	m^3	523.86		-
B2(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	22394.51		-
	Total B				**-**
C	**SUPERSTRUCTURE**				
C1(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Stem wall. The Stem wall should be provided with 50mm dia weeping holes @ 2000mm c/c as shown on drawings**	m^3	395.81		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
C1(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	18390.23		-
	Total C				**-**

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
D	**Stone Masonary Walls**				
D1	Excavation and back fill in all kind of sub-surface material complete in all respects as shown on the drawings, specifications and/or as directed by the Engineer. Surplus materials should be removed from the site or as advised by Construction Supervisor.	m^3	945.35		-
D2	Provide and lay 200 thick hard core compacted to 98% modified Proctor density under column and strip footing. The hardcore should be placed and compacted in two layers not exceeding 150mm thickness	m^3	157.55		-
D3	Providing and laying 80mm thick Blinding plain cement concrete mix to obtain1500 psi (Cylinder Strength at 28 days) (1:3:6) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.)under Block masonary wall	m^3	63.02		-
D4	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Strip foundation.**	m^3	157.55		-
D5	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works for Strip foundation	Kg	11544.06		-
D6	Providing and constructing tapered stone masonry wall, 700 mm wide at base and 500 mm wide at top, using approved sound, hard and durable natural stones laid in cement-sand mortar of specified mix, including selection, dressing and proper bonding of stones; maintaining required line, level, alignment and profile; forming neat and well-packed joints; and providing neatly dressed/finished clear exposed faces on both sides and a clear, even finished stone face on top, including all materials, labour, tools, equipment, scaffolding, curing, transportation, wastage and all incidental works necessary to complete the masonry in accordance with the drawings, specifications and Engineer's approval.	m^3	1249.22		-
D7	Providing and fixing approved quality natural stone slate cladding to exposed faces of concrete retaining walls, including preparation and cleaning of the concrete surface, hacking/roughening where required, application of bonding agent, and fixing stone slates in approved pattern using cement-sand mortar and/or approved tile/stone adhesive. Rate shall include cutting, trimming, alignment, maintaining uniform joints, pointing/grouting of joints with matching cement mortar, cleaning and finishing of completed surfaces, all materials, labour, tools, equipment, scaffolding, wastage, transportation, and all incidental works necessary to complete the installation in accordance with the drawings, specifications, and Engineer's approval.	m^2	1140.86		-
	Total D				**-**
GRAND TOTAL					**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

ABLUTIONS BLOCKS - 3 Nos

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A	**EARTHWORKS**				
A.1	Excavation , dewatering (If required) and back fill in all kind of sub-surface material complete in all respects as shown on the drawings, specifications and/or as directed by the Engineer. Surplus materials should be removed from the site or as advised by Construction Supervisor.				
	Building Foundation	m^3	43.03		-
A2	Provide and lay 300 thick hard core compacted to 98% modified Proctor density under column and strip footing. The hardcore should be placed and compacted in two layers not exceeding 150mm thickness	m^3	6.86		-
	Total A				**-**
B	**SUBSTRUCTURE**				
B1	Providing and laying 80mm thick Blinding plain cement concrete mix to obtain1500 psi (Cylinder Strength at 28 days) (1:3:6) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for the below.				
B1(a)	Column Footing	m^3	0.63		-
B1(b)	Foundation Wall	m^3	1.20		-
B2	**Column and Strip Footing Concrete**				
B2(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Column Footing.**	m^3	2.70		-
B2(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	120.75		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
B2(c)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Strip Footing.**	m^3	3.87		-
B2(d)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	154.81		-
B3	**Foundation Wall**				
B3(a)	Construction of Hollow Concrete masonry unit (CMU) wall of 200mm thickness blocks (Compressive strength 2000Psi as per ASTM C90-16a) bedded in cement/sand mortar mix 1:3 filled with 1:2:4 concrete and 10mm vertical steel reinforcement at every 600mm c/c originating from Strip footing to Grade beam. Note: Blocks to be cured for at least 14 days and tested prior to laying in for the wall as per the drawings				
	Building Foundation	m^2	31.80		-
B4	**Grade Beam**				
B4(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Grade Beam.**	m^3	2.66		-
B4(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	345.44		-
B5	**Fill materials**				
B5(a)	Provide and lay hard core 300mm compacted to 98% modified Proctor density for floor and ramp	m^3	8.98		-
	Provide and lay 50mm Murram Blinding for Floor Slab and ramp.	m^3	1.50		-
B6	**Floor slab and ramp**				

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
B6(a)	Providing and laying 100 mm thick reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using,coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for floor slab and Ramp. The ramp should have broom finish.**	m^3	4.20		-
B6(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	359.18		-
B6(c)	Damp Proof Membrane (DPM) Gauge 1000	m^2	34.81		-
	Total B				**-**

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
C	**SUPERSTRUCTURE**				
C1	**Main wall**				
C1(a)	Construction of Solid Concrete masonry unit (CMU) wall of 200mm thickness blocks (Compressive strength 2000Psi as per ASTM (C90-16a) bedded in cement/sand mortar mix 1:4. Note: Blocks to be cured for at least 14 days and tested prior to laying in for the wall as per the drawings	m^2	79.76		-
C1(b)	Construction of Solid Concrete masonry unit (CMU) wall of 100mm thickness blocks 2.7m high (Compressive strength 2000Psi as per ASTM (C90-16a) bedded in cement/sand mortar mix 1:4. Note: Blocks to be cured for at least 7 days and tested prior to laying in for the wall as per the drawings	m^2	15.66		-
C2	**Columns**				
C2(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). Columns as shown on drawings.	m^3	1.52		-
C2(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	kg	378.62		-
C3	**Ring Beam**				
C3(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). Ring beam as shown on drawings.	m^3	2.36		-
C3(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	kg	314.52		-
	Total C				**-**
D	**ROOF**				
	Supply and construct roof including wooden truss members,Joint boards ,as per below specifications and drawings				
D1	Truss - 5 Nos				
D1(a)	Bottom Chord 150x50mm or (2x150x25mm)	m	32.50		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
D1(b)	Top Chord 100x50mm or (2x100x25mm)	m	34.65		-
D1 (c)	Internal Web Members 80x80mm	m	58.50		-
D1(d)	Top Purlins 80x40mm	m	87.00		-
D2	100x50mm wall plate fixed onto blockwork with approved bolts and nuts as per Engineers detail	Lm	22.80		-
D3	Supply and Install galvanised iron sheets with at least 150mm overlapping gauge 28 complete with all necessary fitting.	m^2	38.35		-
D4	Supply and install good quality 300mm x300mmx 20mm Gypsum ceiling boards on timber framing (size of timber 25mm x50mm) dimensions as per the satisfaction of the engineer finished with minimum of two coats of approved oil paint (Cost of paint with all necessary surface preparation should be included).	m^2	30.80		-
D5	225x25mm thick fascia board fixed in place including priming and finishing it in approvedweather resistant paint	Lm	11.80		-
	Total D				**-**
E	**FITTINGS (DOORS, WINDOWS AND VENTS)**				
E1	Supply and install UPVC, 900x2100mm, UPVC door, 3 pairs of stainless steel hinge and complete fittings	No.	2.00		-
E2	Supply and install UPVC, 1000x2100mm, UPVC door, 3 pairs of stainless steel hinge and complete fittings	No.	2.00		-
E3	Supply and install-, 1200x2100mm, hard wood framed door, 1 1/4" thick Imported wooden door sashes with a 200x50mm wood timber frame, 3 pairs of hinges. The door should have all necessary finishings such as painting, polishing as shown on drawings.	No.	2.00		-
E4	Supply and Install,2100x600mm pre cast concrete vent as per drawings	No.	2.00		-
	Total E				**-**
F	**FINISHES**				
	Plastering/Rendering				
F1	Apply 20mm thick cement sand plaster mortar mix (1:3) smoothly finish the surface in wooden float to internal walls. All walls must be cured for 7 days.	m^2	106.86		-
F2	Apply 20mm thick cement sand rendering mortar mix (1:3) smoothly finish the surface in wooden float to external walls. All walls must be cured for 7 days.	m^2	89.88		-
	Painting: Rates shall include for preparation of surface(sanding), protection of floors and fittings, and cleaning upon completion.				
F3	Prepare the surface by sanding and apply 1^{st} coat of undercoat paint, smoothly skim the surface with white cement and/or lime and apply 2^{nd} coat of undercoat. Finally apply two coats of vinyl silk emulsion paint. for internal walls. (Contractor will submit the sample of colors and manufacturer for approval)	m^2	106.86		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
F4	Prepare the surface by sanding apply filler where necessary to ensure smooth and even surface , two coats of undercoat paint and final three coats of weather guard paint for external walls. (Contractor will submit the sample of color and manufacturer for approval).	m^2	89.88		-
F5	**Floor and Wall Tiles**				
F5(a)	30mm thick Cement Sand floor screed (1:3) finished smooth for tiles and Supply and fixing of 600mm x 600mm no slippery-Ceramic floor tiles with approved tile bond as per drawings	m^2	30.80		-
F5(b)	Supply and fix 300mm x 300mm Ceramic tiles over 1:3 cement sand mixture (all inclusive) in bathrooms walls upto1.5 m height	m^2	55.50		-
	Total F				**-**
G	**ELECTRICAL INSTALLATIONS**				
	Note : unless other wise stated rates in Bill of quantities shall include all necessary material, cables, conduits, PVC sunk box, Bulbs switches etc. and labor required to complete the electrical installation. Testing and commissioning of electrical installations is to be carried out by contractor and cost of such testing and reports to be included in rates. All types of fittings shall be approved by engineer prior to installation				
G1	Lighting points wired in 3x1Cx1.5mm2 Cu/PVC/SC cables drawn in concealed 20mm dia. HG. PVC conduit complete with all wiring accessories for 1-way and 2-way switches, but excluding the switches and the luminaires.	No	6.00		-
G2	Type B fitting - Washroom - Surface mount LED downlight; 1600lm, 20W, 80 lm/W, 4000 K, Polycarbonate, IP54; dust accumulation-protected, splash-proof, IK02 (0.2 J) standard, Safety class II, 2 cables 0.15m with connectors 2-pole. As Tronic Round White LED Warm White Bulkhead 20 Watts or approved equivalent.	No	6.00		-
G3	10A switches complete with boxes and face plate, white colour, as Panasonic W2 type, or approved equivalent:				
	1 gang 1 way	No	6.00		-
G4	6-way SPN MCB Consumer Unit as CU.AB.01 flush-mounted on the wall complete with 100A DP MCB integral isolator and all protective devices as Schneider Electric Easy 9 type or approved equivalent. All MCBs are Easy 9 Type C and as shown in the schematic wiring diagram.	No	1.00		-
G5	10A SP MCB - Lighting	No	1.00		-
G6	Blanking plates	No	2.00		-
G7	**Testing and Commissioning, to include:**	Sum	1.00		-
	Develop Site Acceptance Test Schedule for the installation				
	Contractor's testing (labour and special test requirements)				
	Conduct SATs under Engineer's Supervision				
	Final Commissioning				
	Handover and soak test				
	Total G				**-**

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
H	**MECHANICAL WORKS AND ASSOCIATED SERVICES**				
	SANITARY FITTINGS INSTALLATIONS:Supply, deliver and install the following sanitary fittings including all the necessary fittings and jointing. IDEAL STANDARD has been used as benchmark for the selection.Tenderers to note that ANY ALTERNATIVE will ONLY be considerd if they MATCH of exceed the specified items interms of TECHNICAL capabilities and MUST be accompanied with PRODUCT CATALOGUES				
H1	**Squatting Water Closet** Squatting Vitreous China Water Closet in white Color as Duravit or any equal and approved equivalent.	No.	2.00		-
H2	7 Ltrs High level flushing tank complete with 32mm Dia Flush pipe & handle Valve for the above WC Pan or any other approved equivalent.	No.	2.00		-
H3	**Disabled Toilet Suite** Disabled Floor Standing Gravena White Magic Close Coupled Toilet complet with Cistern in 'Vitreous China' , back inlet water closet pan in white Color, Horizontal outlet Complete with Soft Closing heavy-duty seat and cover complete with metal hinges or any equal and approved equivalent, 540mm Wide Wash Hand Basin with Semi-Pedestal, 2No. Straight Grab Rail, Adjustable Grab Rail, Arabic Showeer, Mirror, Paper Towel Dispenser and Soap Dispenser.	No.	2.00		-
H4	WC "S" or "P" connector to drain pipe for horizontal outlet WC Pan.	No.	2.00		-
H5	**Arabic Shower** Hansgrohe Shaffata Arabic Shower unit or any approved equivalent. Complete with flexible hose, angle valve, Non-Return Valve, shower head and any other necessary fittings for complete installation.	No.	2.00		-
H6	**Wash Hand Basin Tap:** Docol Single lever WHB Tap or an approved equivalent	No.	6.00		-
H7	Installation of **Concrete wash up trough** as per drawings length 2.5 m. width 400mm, Height 900mm	No	2.00		-
H8	**Paper Towel Dispenser:** Supply and installation of wall-mounted paper towel dispenser, fabricated from durable ABS plastic or stainless steel (304 grade), suitable for C-fold/M-fold paper towels, complete with locking mechanism, viewing window, fixing accessories, and all necessary fittings.	No.	2.00		-
H9	**Receptable Bin**: 20Liters Plastic Receptable Bin as Kenpoly in White, with self closing lid, free standing or any other approved equivalent.	No.	4.00		-
H10	15mm dia Angle valves as Pegler or any equal and approved.	No.	12.00		-
H11	15mm dia 300mm Long Flexible pipe connector to Engineers approval.	No.	6.00		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
	INTERNAL PLUMBING INSTALLATIONS: Supply, deliver and install cold water polypropylene PP-R PN-16 pipes and fittings to relevant B.S DIN and local standards. Tenderers must allow in their pipework prices for all the couplings, unions, connectors, joints, bypass bends, loop expansion bends, etc. in running lengths of pipes. All pipe diameters are internal diameters. Only approved brands shall be accepted only with the Engineers approval. Tenderers must allow in their prices for all couplings, connectors, holding brackets expansion joints as required in the running lengths of pipes and sleeves through the structural members such as slabs and beams.				
H12	**Pipes**				
	a) 15mm Bore diameter PP-R pipe (25mm Outer Pipe diameter)	LM	6.00		-
	b) 20mm ditto (32mm ditto)	LM	12.00		-
	c) 25mm ditto (40mm ditto)	LM	4.00		-
H13	**Elbow and Bends**				
	a) 15mm Bore diameter PP-R elbow/bend (20mm Outer Dia)	No.	6.00		-
	b) 20mm ditto (32mm ditto)	No.	4.00		-
	c) 25mm ditto (40mm ditto)	No.	2.00		-
H14	**Reducers**				
	a) 25x20mm ditto	No.	2.00		-
	b) 20x15mm ditto	No.	6.00		-
H15	Tees				
	a) 20mm diameter PP-R equal tee	No.	2.00		-
H16	**Female threaded joints**				
	a) 15mm diameter PP-R Female threaded joint	No.	6.00		-
H17	**Male threaded joints**				
	a) 15mm diameter PP-R Female threaded joint	No.	6.00		-
H18	**Isolation Valves**				
	a) 50mm diameter isolation valves as Pegler or any other approved brand	No.	2.00		-
	INTERNAL DRAINAGE INSTALLATIONS: Supply, Install, Test and Commission the installation in Upvc grey pipework as per BS 4660 with the wall thickness of minimum 3.8mm. All pipes to be as “Key Terrain” or “Metro” and prices to include connectors, adapters, socket, reducers, etc. The manufacturer`s recommendations shall be fully complied with.				
H19	**Pipes**				
	a) 100mm diameter UPVC Grey pipe (heavy duty)	LM	8.00		-
	b) 50mm ditto	LM	6.00		-
	c) 32mm ditto	LM	4.00		-
H20	**Bends**				
	a) 100mm diameter UPVC Long Radius sweep bend	No.	4.00		-
	b) 50mm ditto	No.	4.00		-
	c) 32mm ditto	No.	2.00		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
H21	**Tees**				
	a) 100mm diameter sweep tee	No.	2.00		-
	b) 50mm ditto	No.	2.00		-
	c) 32mm ditto	No.	1.00		-
H22	**Inspection Plugs/Access caps**				
	a) 100mm diameter inspection cap	No.	2.00		-
H23	100X50mm Dia 4-Way Floor Trap with Stainless Steel Floor Drain Cover	No.	4.00		-
H24	100mm dia UPVC Vent Cowl	No.	2.00		-
H25	Weathering Slate	No.	2.00		-
H26	100mm Upvc Gulley Trap complete with Cover	No.	2.00		-
	Total H				**-**
I	**RAIN WATER ROOF DRAINAGE SYSTEM**				
	Rainwater goods: Unplasticized Polyvinyl Chloride (UPVC) Pipes, Gutters and Fittings Joined in Accordance with the Manufacturer's Instructions:-				
I1	300mm Wide Dome Shaped PVC Roof Fulbora / Roof Gullycomplete with all fixing brackets and accessories to approval :	Lm	5.90		-
I2	100 mm Diameter Rain water down pipes complete with all fixing brackets and accessories to approval at site	Lm	8.00		-
	Total I				**-**
TOTAL					**-**
GRAND TOTAL FOR 3 X ABLUTION BLOCKS					**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

KIOSKS

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A	**EARTHWORKS**				
A1	Excavation and back fill in all kind of sub-surface material complete in all respects as shown on the drawings, specifications and/or as directed by the Engineer. Surplus materials should be removed from the site or as advised by Construction Supervisor.				
A1(a)	Building Foundation	m^3	17.43		-
A2	Provide and lay 300 thick hard core compacted to 98% modified Proctor density under column and strip footing. The hardcore should be placed and compacted in two layers not exceeding 150mm thickness	m^3	4.90		-
	Total A				**-**
B	**SUBSTRUCTURE**				
B1	Providing and laying 80mm thick Blinding plain cement concrete mix to obtain1500 psi (Cylinder Strength at 28 days) (1:3:6) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for the below.				
B1(a)	Column Footing	m^3	0.39		-
B1(b)	Foundation Wall	m^3	2.75		-
B2	**Column and Strip Footing Concrete**				
B2(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Column Footing.**	m^3	1.94		-
B2(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	97.50		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
B2(c)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Strip Footing.**	m^3	1.10		-
B2(d)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	42.75		-
B3	**Foundation Wall**				
B3(a)	Construction of Hollow Concrete masonry unit (CMU) wall of 200mm thickness blocks (Compressive strength 2000Psi as per ASTM C90-16a) bedded in cement/sand mortar mix 1:3 filled with 1:2:4 concrete and 10mm vertical steel reinforcement at every 600mm c/c originating from Strip footing to Grade beam. Note: Blocks to be cured for at least 14 days and tested prior to laying in for the wall as per the drawings				
	Building Foundation	m^2	10.80		-
B4	**Grade Beam**				
B4(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **sulphate resistant cement coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for Grade Beam.**	m^3	0.36		-
B4(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	Kg	90.20		-
B5	**Fill materials**				
B5(a)	Provide and lay hard core compacted to 98% modified Proctor density for floor	m^3	1.51		-
B5(b)	Provide and lay 50mm Murram Blinding for Floor Slab and ramp.	m^3	0.25		-
B6	**Floor slab**				

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
B6(a)	Providing and laying 100 mm thick reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using sulphate resistant cement,coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). **for floor slab .**	m^3	0.75		-
B6(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	kg	70.34		-
B6(c)	Damp Proof course (DPM) Gauge 1000	m^2	6.23		-
	Total B				**-**
C	**SUPERSTRUCTURE**				
C1	**Main wall**				
C1(a)	Construction of Solid Concrete masonry unit (CMU) wall of 200mm thickness blocks (Compressive strength 2000Psi as per ASTM (C90-16a) bedded in cement/sand mortar mix 1:4. Note: Blocks to be cured for at least 7 days and tested prior to laying in for the wall as per the drawings	m^2	11.96		-
C2	**Columns**				
C2(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using **coarse sand and screened graded and washed aggregate**, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.). Columns as shown on drawings.	m^3	1.05		-
C2(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	kg	314.90		-
C3	**Ring Beam**				
C3(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.).. Ring beam as shown on drawings.	m^3	0.36		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
C3(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	kg	90.20		-
C4	**Concrete Counter**				
C4(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) usingcoarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.).).Concrete Counter as shown on drawings.	m^3	0.17		-
C4(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	kg	13.45		-
C5	**Lintel beam Over door**				
C5(a)	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.)..Concrete Counter as shown on drawings.	m^3	0.10		-
C5(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.	kg	16.00		-
	Total C				**-**
D	**ROOF**				
	Supply and construct roof including wooden truss members, as per below specifications and drawings				
D1	Truss - 3 Nos				
D1(a)	Bottom Chord 150x50mm or (2x100x25mm)	m	9.70		-
D1(b)	Top Chord 100x50mm or (2x100x25mm)	m	11.15		-
D1 (c)	Internal Web Members 80x80mm	m	12.40		-
D1(d)	Top Purlins 80x40mm	m	28.00		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
D2	100x50mm wall plate fixed onto blockwork with approved bolts and nuts as per Engineers detail	Lm	10.60		-
D3	Supply and Install galvanised iron sheets gauge 28 complete with all necessary fitting.	m^2	14.75		-
D4	Supply and install good quality 300mm x300mmx 20mm Gypsum ceiling boards on timber framing (size of timber 25mm x50mm) dimensions as per the satisfaction of the engineer finished with minimum of two coats of approved oil paint (Cost of paint with all necessary surface preparation should be included).	m^2	5.50		-
D5	225x25mm thick fascia board fixed in place including priming and finishing it in approved paint	Lm	5.60		-
	Total D				**-**
E	**FITTINGS (DOORS, WINDOWS AND VENTS)**				
E1	Supply and install 2300mmx 2050mm,manually operated Aluminum Shutter at front side of Kiosk	No.	1.00		-
E.2	Supply and install , 900x2100mm, Steel door, 3 pairs of stainless steel hinge and complete with frame and fittings as shown on drawings. The door should be painted with minimum 3 coats of anti rust paint	No.	1.00		-
	Total E				**-**
F	**FINISHES**				
	Plastering/Rendering				
F1	Apply 20mm thick cement sand plaster mortar mix (1:3) smoothly finish the surface in wooden float to internal and external walls. All walls must be cured minimum for 7 days.	m^2	27.80		-
F2	**Painting: Rates shall include for preparation of surface(sanding), protection of floors and fittings, and cleaning upon completion.**				
F3	Prepare the surface by sanding and apply 1st coat of undercoat paint, smoothly skim the surface with white cement and/or lime and apply 2nd coat of undercoat. Finally apply two coats of vinyl silk emulsion paint. for internal walls and two coats of undercoat paint and final three coats of weather guard paint for external walls. (Contractor will submit the sample of colors and manufacturer for approval)	m^2	27.80		-
F4	**Tiles**				
F4(a)	30mm thick Cement Sand floor screed (1:3) finished smooth for tiles and Supply and fixing of 600mm x 600mm no slippery-Ceramic floor tiles with approved tile bond as per drawings	m^2	5.50		-
F4(b)	Supply and Fix 10 mm thick ceramic tile for counter slab top and sides	m^2	1.73		-
	Total F				**-**
G	**ELECTRICAL INSTALLATIONS**				

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
	Note : unless other wise stated rates in Bill of quantities shall include all necessary material, cables, conduits, PVC sunk box, Bulbs switches etc. and labor required to complete the electrical installation. Testing and commissioning of electrical installations is to be carried out by contractor and cost of such testing and reports to be included in rates. All types of fittings shall be approved by engineer prior to installation				
G1	Lighting points wired in 3x1Cx1.5mm2 Cu/PVC/SC cables drawn in concealed 20mm dia. HG. PVC conduit complete with all wiring accessories for 1-way and 2-way switches, but excluding the switches and the luminaires.	No	1.00		-
G2	Type C Tronic LED Recessed Downlight 16 Watts Daylight or approved equivalent.	No	2.00		-
G3	10A switches complete with boxes and face plate, white colour, as Panasonic W2 type, or approved equivalent:				
	a) 1 gang 1 way	No	1.00		-
	b) Fan switch controller	No	1.00		-
G4	4-way SPN MCB Consumer Unit as CU.KK.01 flush-mounted on the wall complete with 50A DP MCB integral isolator and all protective devices as Schneider Electric Easy 9 type or approved equivalent. **All MCBs are Easy 9 Type C and as shown in the schematic wiring diagram.**	No	1.00		-
G5	10A SP MCB - Lighting	No	1.00		-
G6	20A SP MCB - Socket Outletss	No	1.00		-
G7	Blanking plates	No	2.00		-
G8	Twin socket points wired in 3x1Cx2.5mm^2 Cu/PVC/SC cables drawn in 25mm dia. HG PVC conduit concealed within the wall.	No	2.00		-
G9	**Testing and Commissioning, to include:**	Sum	1.00		-
	Develop Site Acceptance Test Schedule for the installation				
	Contractor's testing (labour and special test requirements)				
	Conduct SATs under Engineer's Supervision				
	Final Commissioning				
	Handover and soak test				
	Total G				**-**
H	**MECHANICAL WORKS AND ASSOCIATED SERVICES (PLUMBING & SANITARY)**				
	SANITARY FITTINGS INSTALLATIONS: Supply, deliver and install the following complete with all necessary fittings and jointing, as shown on the P600 Cold Water Supply detail. NOTE: the Kiosk contains a service sink at the counter only - no WC, floor trap, gully trap or vent stack is required (toilet facilities are provided separately at the Ablution blocks - see 'Ablutions' sheet).				
H1	Stainless steel counter-mounted wash-up sink bowl complete with waste, plug and overflow, as shown on P600 Cold Water Supply detail.	No.	1.00		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
H2	Single lever sink tap: Docol Single lever tap or an approved equivalent.	No.	1.00		-
H3	15mm dia Angle valve as Pegler or any equal and approved.	No.	1.00		-
H4	15mm dia 300mm Long Flexible pipe connector to Engineer's approval.	No.	1.00		-
H5	25mm (1") diameter isolation valve as Pegler or any other approved brand.	No.	1.00		-
	INTERNAL PLUMBING INSTALLATIONS: Supply, deliver and install cold water polypropylene PP-R PN-16 pipes and fittings to relevant B.S DIN and local standards. Tenderers must allow in their pipework prices for all the couplings, unions, connectors, joints, bypass bends, loop expansion bends, etc. in running lengths of pipes. All pipe diameters are internal diameters. Only approved brands shall be accepted only with the Engineers approval. Tenderers must allow in their prices for all couplings, connectors, holding brackets expansion joints as required in the running lengths of pipes and sleeves through the structural members such as slabs and beams.				
H6	Pipes				
	a) 20mm Bore diameter PP-R pipe (32mm Outer Pipe diameter)	LM	3.00		-
	b) 15mm ditto (25mm ditto)	LM	2.00		-
H7	Elbows and Bends				
	a) 20mm Bore diameter PP-R elbow/bend (32mm Outer Dia)	No.	1.00		-
	b) 15mm ditto (25mm ditto)	No.	2.00		-
H8	Tees				
	a) 20mm diameter PP-R equal tee	No.	1.00		-
H9	Reducers				
	a) 20x15mm ditto	No.	1.00		-
H10	Female threaded joints				
	a) 15mm diameter PP-R Female threaded joint	No.	1.00		-
H11	Male threaded joints				
	a) 15mm diameter PP-R Male threaded joint	No.	1.00		-
	INTERNAL DRAINAGE INSTALLATIONS: Supply, Install, Test and Commission the installation in Upvc grey pipework as per BS 4660 with the wall thickness of minimum 3.8mm. All pipes to be as "Key Terrain" or "Metro" and prices to include connectors, adapters, socket, reducers, etc. The manufacturer`s recommendations shall				
H12	Pipes				
	a) 50mm diameter UPVC Grey pipe (heavy duty)	LM	2.00		-
H13	50mm diameter UPVC Long Radius sweep bend.	No.	1.00		-
H14	50mm diameter UPVC inspection plug/access cap.	No.	1.00		-
H15	Testing and Commissioning, to include:	Sum	1.00		-
	Develop Site Acceptance Test Schedule for the installation				

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
	Contractor's testing (labour and special test requirements)				
	Conduct SATs under Engineer's Supervision				
	Final Commissioning				
	Handover and soak test				
	Total H				**-**
I	**RAIN WATER ROOF DRAINAGE SYSTEM**				
	Rainwater goods: Unplasticized Polyvinyl Chloride (UPVC) Pipes, Gutters and Fittings Joined in Accordance with the Manufacturer's Instructions:-				
I1	300mm Wide Dome Shaped PVC Roof Fulbora / Roof Gullycomplete with all fixing brackets and accessories to approval :	Lm	2.80		-
I2	100 mm Diameter Rain water down pipes complete with all fixing brackets and accessories to approval at site	Lm	7.00		-
	Total I				**-**
TOTAL					**-**
GRAND TOTAL FOR 12 X Kiosks					**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

Out door walkways and Sitting area

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A	**Walk Ways**				
A1	Setting out and levelling and compaction of existing ground	m^2	12404.28		-
A2	Back filling with approved selected granular material, placed in layers not exceeding 250 mm thick, each layer watered and mechanically compacted to a minimum of 95% of the Maximum Dry Density (MDD) as determined by the applicable Standard Proctor test, unless otherwise specified, including supply, loading, transportation, spreading, grading, compaction, and all associated labour, plant and equipment, complete to the required levels and profiles.	m^3	2356.50		-
A3	Supply, spread and compact to 95% M.D.D. (AASHTO T.180) and shape to level and tolerance 250mm thick well graded base course as shown on drawings.	m^3	2356.50		-
A4	Providing and laying 50–60 mm thick natural stone slate paving for walkways, of approved quality, colour, texture and size, laid over prepared and compacted base/sub-base on a suitable cement-sand mortar bed, including cutting, dressing, levelling, alignment, jointing with cement-sand mortar, filling of joints, proper compaction, curing, cleaning and all necessary materials, labour, tools, equipment and incidentals, complete as per drawings and Engineer's instructions.	m^2	12404.28		-
	Total A				**-**
B	**Supply and Installation of Kerb Stones for Walkways and Parking area**				
B1	Excavation in all kind of sub-surface material complete in all respects as shown on the drawings, specifications and/or as directed by the Engineer. Surplus materials should be removed from the site or as advised by Construction Supervisor.	m^3	33.21		-
B2	Providing and laying 120mm thick Blinding plain cement concrete mix to obtain1500 psi (Cylinder Strength at 28 days) (1:3:6) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for the below.	m^3	39.85		-
B3	Supply and Install 1000mmx200mmx300mm concrete kerb stones as shown on drawings on a cement mortar bed of ratio 1:3	m	1328.42		-
B4	Painting of kerb stones with two coats of approved-quality exterior-grade Yellow and black paint, including cleaning and preparation of the kerb surface, removal of loose material, application of primer where required, and all necessary labour, materials, tools, equipment, protection, and finishing to achieve a uniform and neat appearance, complete as directed by the Engineer.	m^2	850.18		-
	Total B				**-**
C	**Seating areas**				

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
C1	Supply and installation of 1800mm long precast reinforced concrete bench with terrazzo finish, including all concrete, reinforcement, moulds/formwork, casting, curing, grinding and polishing to achieve a smooth, uniform and high-quality terrazzo finish, with approved aggregate and colour as selected by the Engineer/Architect, including chamfered/rounded edges, stainless-steel or hot-dip galvanized fixing/anchoring components, transportation, unloading, positioning, levelling and secure fixing to the prepared foundation, complete with all labour, materials, tools, plant, equipment and incidentals, all as per approved drawings and Engineer's instructions				
C1(a)	In triangular section	Nos	9.00		-
C1(b)	In Circular section	Nos	18.00		-
C2	Cast in Situ of mass concrete bench with terrazzo finish, including all concrete, moulds/formwork, casting, curing, grinding and polishing to achieve a smooth, uniform and high-quality terrazzo finish, with approved aggregate and colour as selected by the Engineer/Architect, including chamfered/rounded edges,complete with all labour, materials, tools, plant, equipment and incidentals, all as per approved drawings and Engineer's instructions	m^3	29.19		-
	Total C				**-**
D	**Planter POT**				
D1	Constructing a 2.40 m × 2.40 m planter pot (outer dimensions) at site using 400 mm thick natural stone masonry walls, constructed with approved locally available stone in cement-sand mortar, including setting out, excavation, preparation of foundation, laying and bonding of stone masonry, cement mortar, internal plaster/rendering with waterproofing treatment, formation of suitable drainage outlets, provision of drainage layer and geotextile where required, filling with approved planting soil, and all necessary materials, labour, tools, plant and equipment, complete as per approved drawings and Engineer’s instructions.The planter shall have a properly finished and level top edge, adequate drainage to prevent water accumulation, and internal waterproofing suitable for continuous contact with moist soil. (9 Nos)	m^3	25.92		-
	Total C				**-**
GRAND TOTAL					**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

Out Door Lighting and Electrification

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A	**SOLAR LIGHTS**				
A1	Exacavtion for foundation of the pole, in all kinds of soil and not exceeding 1.5m depth and the Area is (1.0X1.0) m², including dressing of bottom and sides of trenches. Stack excavated soil clear from edges of excavation, disposal of surplus soil out of site as directed by engineer.	m³	58.50		-
A2	Reinforced Cement concrete using **Sulphate Resistant Cement** for foundation of pole including 15mm dia, 1.5 m long anchor bolts bars welded/ tied with Y10 stirrups @ 200mm c/c to hold the base plate of the pole, depth for Anchor bolts bar is 0.8m inside the hole plus 0.7m above the ground level, at the top the area is $(0.7*0.7)m^2$ and total area up to the surface is (1.0*1.0)m². The strength of foundation concrete should not be less than 3000 Psi (1 cement : 1.5 clean coarse sand : 3 stone aggregate of 25mm down). The rate shall include Bindling/welding of stirrups 10 numbers Y10mm dia steel bar, stirrups @20cm c/c including centering and shuttering complete.	m³	72.59		-
	PURCHASE, SUPPLY AND INSTALLATION OF COMPLETE STANDARD STREET LIGHT SET (Fixture + Panel + Battery + 6m pole + Wiring)				
A3	LED Luminaire: 150W, >150 lm/W efficacy, 5000K-6500K CCT (cool white), IP66, aluminum alloy housing.	Pcs	39.00		-
A4	PV panel: 150Wp mono-crystalline, 20% efficiency, 18V nominal voltage, tempered glass/anodized aluminum frame with all necessay fittings	Pcs	39.00		-
A5	Battery: 12.8V 150Ah LiFePO4, 80% DOD, >2000 cycles, pole	Pcs	39.00		-
A6	Controller: 10A MPPT with automatic dusk-to-dawn activation and comprehensive electrical protections.	Pcs	39.00		-
A7	Pole: 6 m HDG steel; baseplate 300×300×20 mm; 4×M24 anchor bolts, wind load compliant, integrated bracket for PV and luminaire.	Pcs	39.00		-
A8	Supply and installation 2/24 V DC , with a mimum detection range of 15m, weatherproof passive infrared (PIR) motion sensor suitable for outdoor solar street lighting applications, fully compatible with solar charge controller and LED luminaire. Sensor shall enable automatic light intensity control based on motion detection. Includes mounting, cabling, programming, testing, and commissioning complete in all respects.	Pcs	39.00		-
GRAND TOTAL					**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

Elevated Water tank Tower & Out Door Plumbing

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
	Elevated Water Tank-Two Towers				
A	**Preliminaries and Site Clearance**				
A1	Site Clearance, levelling and Setting out	m^2	16.00		-
	Total A				**-**
B	**Earth Works**				
B1	Excavation and backfilling in all kinds of sub-surface material for the four (4) reinforced concrete foundation bases of the elevated 5,000-litre water tank, including setting out, excavation to the required depth, trimming and levelling of bottoms, removal of surplus excavated material from the work area, and all labour, tools and equipment complete as specified. Excavation based on 4 No. foundations × 1.20 m × 1.20 m × 1.20 m deep.	m^3	13.82		-
B2	Backfilling around completed foundations with approved selected excavated material, placed in layers, watered and mechanically/hand compacted to the required density, including filling around foundation bases after concrete has achieved the required strength.	m^3	10.36		-
	Total B				**-**
C	**Sub Structure**				
C1	Providing and laying Blinding plain cement concrete mix to obtain 1500 psi (Cylinder Strength at 28 days) (1:3:6) using coarse sand and screened graded and washed aggregate, in required shape and design, including formwork, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for the below.				
C1(a)	Footing/bases	m^3	0.58		-
C2	**Footing/bases**				
C2(a)	Provide reinforced cement concrete for four Base Type A foundations, 1.20 m x 1.20 m x 0.30 m thick, using Sulphate resistant cement of 3000 psi cylinder strength at 28 days (or approved equivalent). Include approved mix design, batching, transport, placing, vibration/compaction, construction joints, curing, cube/slump tests where specified, finishing, protection and all labour/plant. Reinforcement is measured separately; formwork and dimensions shall follow approved structural drawings.	m^3	3.46		-
C2(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) as per drawings	Kg	102.40		-
C3	**Pedestal**				
C3(a)	Provide reinforced cement concrete pedestals, each 300 mm x 300 mm x 900 mm, above the base foundations for the steel tower columns. Include setting out, concrete of specified strength, placing, vibration, curing, finishing and protection; coordinate pedestal elevations, column/base-plate interface and any holding-down bolts/embedded items with approved shop drawings. Reinforcement, bolts and connection plates are measured/separately detailed where applicable.	m^3	0.65		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
C3(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) as per drawings				
	Y16	Kg	131.44		-
	Y8 Stirrups @200mm c/c	Kg	25.60		-
C4	**Ground Beam**				
C4(a)	Provide reinforced cement concrete ground beams, 200 mm x 450 mm, interconnecting the four foundation locations. Include setting out, formwork to line/level, specified concrete, placing, vibration, curing, finishing, stripping and protection; coordinate with reinforcement and embedded connections. Reinforcement is separately measured. Beam lengths, joints and final levels shall comply with approved structural drawings	m^3	1.44		-
C4(b)	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) as per drawings				
	Y16	Kg	25.28		-
	Y12	Kg	14.22		-
	Y8 Stirrups	Kg	14.34		-
	Total C				**-**
D	**Super Structure- Steel Tower, Plateform and Access**				
D1	Supply, fabricate, deliver and erect 100 x 100 x 4 mm SHS vertical steel columns for the elevated tank tower. Include verified cutting, end preparation, shop fabrication, lifting, positioning, plumbing/levelling, temporary bracing, welding or bolted connections to approved details, touch-up of damaged coatings and completion. Base plates, anchors, weld sizes, connection design and steel grade are subject to approved shop drawings	kg	243.36		-
D2	Supply, fabricate and install 50 x 50 x 4 mm SHS horizontal/secondary framing members forming the tank support frame, including measured cutting, mitres, welding/bolting, alignment, lifting, temporary works, fit-up and final secure fixing. Provide all connection accessories shown or required by approved fabrication drawings; verify support levels and interface with tank platform before final fixing	kg	264.00		-
D3	Supply, fabricate and erect 50 x 50 x 4 mm SHS EAS diagonal bracing to the steel tower, including diagonal cuts, end connections, welding/bolting, erection, tension/alignment, temporary support and complete integration with the main frame. Bracing configuration, gusset plates, welds/bolts and tolerances shall follow approved shop drawings; protect all worked surfaces before handover	kg	288.64		-
D4	Supply, fabricate and install 150 x 76 x 6 mm channel sections forming the tank support/platform framing, including cutting, drilling, end preparation, lifting, alignment and welded/bolted connections complete. Coordinate member orientation, bearing arrangement, edge distances and interfaces with chequered plate/tank supports to approved fabrication drawings. Include all labour, erection plant, fasteners and making good of protective coating	kg	658.56		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
D5	Supply, fabricate and erect 254 x 102 mm having web thickness 5.8mm and flange thickness 7.8mm structural beams of 22 kg/m nominal mass, including cutting, end preparation, lifting, positioning, line/level adjustment, welding or bolting to approved connection details, and all temporary bracing and access. Confirm steel grade, exact section designation, connection plates, weld/bolt sizes and bearing details by approved shop drawings before fabrication.	kg	11.20		-
D6	Provide and fix 3 mm thick chequered steel plate to the tank access/support platform, cut to suit the approved platform layout. Include templates, cutting, edge dressing, support fixing by approved welds/fasteners, joints, sealing where specified, flush/secure finish and protection against damage. Verify openings, drainage, edge treatment and support spacing from approved shop drawings prior to manufacture.	m²	15.68		-
D7	Supply, bend/fabricate and install 25 mm diameter x 1.5 mm CHS handrail to the platform perimeter/access edge, including posts, returns, brackets, welds, caps, fixing to structural steel, grinding of sharp edges and touch-up protection. Handrail height, post spacing, rail arrangement and safety compliance are subject to approved shop drawings and applicable project safety requirements	m	16.00		-
D8	Supply, fabricate and install 25 mm diameter x 1.5 mm CHS ladder side rails, securely fixed to the tower/platform structure. Include straightening, end closures, brackets, welds/bolts, alignment, protective treatment and all accessories. Ladder geometry, clearance, top/bottom termination, fall protection and fixing detail shall be confirmed by approved shop drawings and safety requirements	m	10.40		-
D9	Supply, fabricate and install 25 mm diameter x 1.5 mm CHS ladder rungs between rails, including cutting, spacing, welding/secure mechanical fixing, grinding, anti-slip treatment where specified and coating repair. Provide a safe, rigid ladder complete with all labour and accessories. Exact rung spacing, ladder width and number of rungs are subject to approved shop drawings	m	8.80		-
D10	Provide all steelwork connection accessories not separately measured, including base plates, gusset plates, cleats, stiffeners, holding-down bolts, nuts, washers, welding consumables, shims, packings and sealant as required by approved shop drawings. Include fabrication drawings, material certificates, weld inspection and erection tolerances. for both towers	LS	1.00		-
	Total D				**-**
E	**Water tank , Accessories and Plumbing**				
E1	Supply, deliver, install and commission one 5,000 litre elevated water storage tank complete with manufacturer's standard lid, inlet, outlet, overflow, drain and tank support interface. Include handling, lifting, placement on the completed support platform, alignment, protection from damage and vendor installation requirements. Tank material, dimensions, fittings, warranty and support arrangement are subject to approved vendor data and shop drawings.	No	2.00		-
E2	Provide tank connection and plumbing accessories as shown/approved, including pipework, fittings, isolating valves, non-return/float valves where required, overflow and drain arrangements, supports, sleeves, sealants, jointing, labelling and integration with incoming/outgoing services. Carry out pressure/leak testing and rectify defects.				

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
E2 (a)	Provide and install UV-stabilised HDPE PE100 PN16 water-supply inlet pipe, conforming to ISO 4427, 32 mm nominal diameter, from incoming water-service connection to tank inlet. Include cutting, jointing by compatible compression/electrofusion fittings, pipe supports, bends, adaptors, testing and completion.	m	24.00		-
E2 (b)	Provide and install UV-stabilised HDPE PE100 PN16 water-distribution outlet pipe, conforming to ISO 4427, 40 mm nominal diameter, from tank outlet to outgoing service connection. Include cutting, jointing, fittings, supports, valves interface, testing and completion	m	24.00		-
E2 (c)	Provide and install UV-stabilised HDPE PE100 PN16 overflow pipe, conforming to ISO 4427, 50 mm nominal diameter, from tank overflow outlet and discharging visibly to a safe approved location. Include bends, brackets, supports, secure termination and complete installation	m	12.00		-
E2 (d)	Provide and install UV-stabilised HDPE PE100 PN16 drain/scour pipe, conforming to ISO 4427, 32 mm nominal diameter, from tank drain outlet to approved discharge point. Include fittings, supports, secure termination, testing and completion	m	12.00		-
E2 (e)	Provide and install 32 mm brass full-bore ball valve on tank inlet line, including threaded/compression adaptors, unions, fittings and accessible operation	No.	2.00		-
E2 (f)	Provide and install 32 mm float-operated tank inlet valve, compatible with the 5,000 litre tank inlet and 32 mm HDPE pipework, including float mechanism, adaptors and complete operational adjustment	No.	2.00		-
E2 (g)	Provide and install 32 mm non-return valve on incoming water line, including unions, adaptors and fittings, to prevent reverse flow from the tank to the supply line	No.	2.00		-
E2 (h)	Provide and install 40 mm brass full-bore ball valve on tank outlet line, including adaptors, unions, fittings and accessible operation	No.	2.00		-
E2 (i)	Provide and install 32 mm brass full-bore ball valve on tank drain/scour line, including adaptors, fittings and secure discharge arrangement	No.	2.00		-
E2 (j)	Provide compatible tank connection adaptors, threaded adaptors, HDPE compression/electrofusion fittings, elbows, tees, reducers, sockets, couplings, unions and end caps for complete connection of inlet, outlet, overflow and drain pipework	Set.	2.00		-
E2 (k)	Provide and fix galvanised steel pipe brackets, clamps, saddles, anchors and protective packing for all exposed pipework fixed to the steel tower/platform, at maximum 2.0 m centres	No.	40.00		-
E2 (l)	Provide sleeves, weatherproof sealants and protective penetration details at pipe crossings through steel platform, support members or other construction interfaces	No.	8.00		-
E2 (m)	Provide durable pipe and valve identification labels, including line function and flow-direction arrows, for inlet, outlet, overflow and drain/scour installations	Set.	2.00		-
	Total E				**-**
F	**Bore hole and Submersible Pump**				
F1	Drilling of 200 mm diameter borehole to a maximum depth of 30 m, through all encountered strata, including mobilization and demobilization of drilling equipment, temporary casing, permanent uPVC casing and screen as required, gravel packing, sanitary seal, borehole development, cleaning and yield/pumping test to demonstrate a minimum water discharge of 10 m^3/hour, complete in all respects as per drawings, specifications and Engineer's instructions.	Item	1.00		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
F2	Submersible Borehole Pump: Supply, installation, testing and commissioning of submersible borehole pump, suitable for 200 mm diameter borehole, with a minimum discharge capacity of 10 m³/hour at the required total dynamic head, complete with 1.5–2.2 kW submersible motor, stainless steel/approved corrosion-resistant construction, control panel with overload and dry-run protection, level control, non-return valve, rising main, electrical cable, cable joints, fittings and all accessories required for complete and reliable operation, including connection to the 2x,000-litre overhead water tank, complete as per specifications and Engineer's instructions.	Nos	1.00		-
F3	SOLAR POWER SYSTEM FOR NEW PUMP: Supply, deliver, install, connect, test, and commission a complete solar photovoltaic system sized to power a 5 kW horizontal high-pressure multistage booster pump. The system includes approximately 9 × 600 W monocrystalline PV panels, suitable inverter (≥ 6 kW), smart meter, DC and AC isolators, distribution board, combiner boxes, DC and AC cabling, cable trays, signal cabling, earthing, lightning protection, mounting structures, all associated accessories, and all civil, electrical, and mechanical works to deliver a fully operational system as per Engineer's requirements.and fully operational for powering the booster pump installation to the satisfaction and approval of the Engineer	Nos	1.00		-
	Total F				**-**
G	**Anti Rust Protective Coating**				
G1	Prepare and protect all exposed structural-steel surfaces, including degreasing, removal of rust/scale, surface preparation to the approved system, compatible primer and finishing coats, stripe coating to edges/welds, repair of damaged areas and final inspection. Include access, masking, environmental protection, drying/curing and coating thickness/adhesion tests where specified. Colour, preparation standard and coating system are subject to approved specification by Chief Engineer/Site Supervisor.	LS	1.00		-
	Total G				**-**

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
H	**Main Water Supply Line from Tank**				
	Setting out entire pipeline route, taking and recording invert levels upon excavation and preparation of As Built Drawings to be submitted for approval to the Engineer.				
H1	Excavation and backfill for main pipe trench, min. 500mm cover per average trench 300mm wide x 600mm deep.	m^3	83.80		-
H2	Provide, transport to site, place and compact with imported selected fill (granular material) for bed and surround to pipes not less than 150mm thick or as specified and as directed by the Engineer.	m^3	41.92		-
H3	40mm dia. (1½") PPR/uPVC main distribution pipe, PN16, complete with all couplings, laid per P200/P300 (main line serving all 3 ablution/kiosk clusters from the site water supply point to the future extension point).	m	465.80		-
H4	40mm dia. (1½") isolation valve (Main Isolation Valve, one per cluster at the "From Water Supply" entry point) as Pegler or approved equivalent, complete with valve box.	Nos	3.00		-
H5	25mm (1") isolation valve on branch to Male/Female concrete wash-up trough and each Kiosk counter, as Pegler or approved equivalent (matches Ablutions item H18 and Kiosk item H5 - included here for the outdoor branch/main-tie-in valve only, not the internal block-side valve already priced in those sheets).	Nos	18.00		-
H6	25mm (1") PPR branch pipe from main line to each isolation valve (Male/Female wash-trough and Kiosk branches).	m	54.00		-
H7	40x25mm PPR reducing tee at each branch take-off from the main line.	Nos	18.00		-
	Total H				**-**
I	**DRIP IRRIGATION SYSTEM**				
I1	Supply, deliver, lay, install, test and commission 16mm diameter UV-stabilized LDPE drip irrigation lateral pipes @0.4m with factory-integrated pressure-compensating emitter holes at 0.4m spacing, each emitter hole releasing approximately 2l/hr, complete with all fittings and accessories including connectors, tees, elbows, end caps, take-offs, grommets, stakes/anchors, flushing valves, and 120-mesh inline screen/disc filters to prevent clogging of emitter holes, including connection to sub-mains, flushing, testing, and commissioning complete to the satisfaction of the Engineer.	Acre	1.50		-
I2	**Emitter** - Irrigation Quick Coupling Valve Box – Supply and install complete 32 mm quick coupling valve assembly in plastic valve box, including gate valve, brass hose adapter, swivel elbow, epoxy-coated riser pipe, GI elbow, compression fittings, concrete base, gravel drainage layer, and connection to irrigation main, complete and functional.	Nos	30.00		-
	Total I				**-**
J	**Testing and Commissioning**				
J1	Testing and Commissioning of the Pipeline and water tank including flushing and sterlising in accordance with the Specification	LS	1.00		-
	Total J				**-**
Total for Out Door Plumbing works, Water Tank, Water Pump					**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

Sewerage and Septic Tank - 3 Nos

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A	**Setting Out as per Drawings**				
	Setting out entire pipeline route, taking and recording invert levels upon excavation and preparation of As Built Drawings to be submitted for approval to the Engineer.				
A1	Excavation and back fill in all kind of sub-surface material complete in all respects as shown on the drawings, specifications and/or as directed by the Engineer. Surplus materials should be removed from the site or as advised by Construction Supervisor for Sewer Pipes.	m^3	13.05		-
A2	Excavation and back fill in all kind of sub-surface material complete in all respects as shown on the drawings, specifications and/or as directed by the Engineer. Surplus materials should be removed from the site or as advised by Construction Supervisor for Manholes.	m^3	2.06		-
A3	Provide,fill and compact with excavated selected fill (granular material) for bed and surround to pipes not less than 300 mm thick or as specified and as directed by the Engineer,	m^3	3.00		-
	Total A				**-**
B	**MAN HOLES**				
B1	Providing and laying Blinding plain cement concrete mix to obtain 1500 psi (Cylinder Strength at 28 days) (1:3:6) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for the Manhole base.	m^3	0.40		-
B2	Provide & place precast manhole molds made of reinforced concrete class 25/20 with minimum cube crushing strength of 25N/mm2 at 28 days in : - Rate to Include Purchase of Concrete man holes all inclusive with fasteners, bolts , cover etc inclusive complete casting of the manhole rings and covers	m^3	15.00		-
	Total B				**-**
C	**PIPEWORK - FITTINGS AND VALVES**				
C1	Supply and lay 100mm DWC "push fit' jointed for sewer line in trenches depth not exceeding 1.5 m	m	24.00		-
C2	Supply and lay 150mm DWC "push fit' jointed for sewer line in trenches depth not exceeding 1.5 m	m	18.00		-
	Total C				**-**
D	**SEPTIC TANK**				
D1	Excavation and back fill in all kind of sub-surface material complete in all respects as shown on the drawings, specifications and/or as directed by the Engineer. Surplus materials should be removed from the site or as advised by Construction Supervisor for Septic tank	m^3	27.00		-

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
D2	Providing and laying Blinding plain cement concrete mix to obtain 1500 psi (Cylinder Strength at 28 days) (1:3:6) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.) for the base of Septic Tank	m^3	1.05		-
D3	Providing and laying reinforced cement concrete mix to obtain 3000 psi (Cylinder Strength at 28 days) (1:1.5:3) using coarse sand and screened graded and washed aggregate, in required shape and design, including forms, moulds, shuttering, lifting, compacting, curing, rendering and finishing exposed surface, complete (including cost of form work, its fabrication and placing in position, etc.).				
D3(a)	Base Slab 150mm thick	m^3	2.87		-
D3(b)	Roof Slab 100mm thick	m^3	1.88		-
D3.(c)	30cmx30cm columns	m^3	0.12		-
D3(d)	Ring Beam (30cmx40cm)	m^3	2.18		-
D4	Supply and Fabrication of High Tensile Steel deformed bars conforming to ASTM-A615 Grade 60 (60,000psi) reinforcement for cement concrete, including cutting, bending, laying in position, over lapping, making joints, fastenings, wastage and including cost of binding wire & labors charges for binding of steel reinforcement in place (also includes removal of rust from bars) .Contractor will submit bar bending schedule for approval before commencing the steel works.				
D4(a)	**Bottom Slab**				
	Y14 @200 c/c in each way	kg	231.59		-
D4(b)	**Roof Slab**				
	Y12 @200 c/c in each way	kg	111.00		-
D4 (c)	**Column (30cmx30cm)**				
	4Y14	kg	38.72		-
	Y8 @200 c/c	kg	13.33		-
D4(d)	**Ring Beam**				
	4Y12	kg	387.88		-
	Y8 @200 c/c	kg	44.93		-
D5	**Masonary Work**				
D7	Construction of 400mm thick masonary stone wall bedded in cement/sand mortar mix 1:4. Note: Blocks to be cured for at least 7 days and tested prior to laying in for the wall as per the drawings (Septic Tank)	m^2	8.12		-
D8	Plaster walls internally with 1:4 - 20mm thick in two layers each 10mm of Sikagard - 63 N, 2-PART EPOXY PROTECTIVE COATING	m^2	20.25		-
D9	Supply and Install for the chamber accesses as shown in the Septic Tank Drawing, inclusive of all associated items 600 X 450 X 200mm opening	Nos	2.00		-
	Total D				**-**
Total for Out door Sewarage and Septic Tank					**-**
Total for Out door Sewarage and Septic Tank- 3 Nos					**-**

SINAAN

Coastal Development in the Bossaso Waterfront Project

PR 051

BILL OF QUANTITY (BOQ)

PV SYSTEM AND BESS 5 KW

Item	Description	Unit	Qty	Unit Price (GBP)	Total Price (GBP)
A1	Supply, and deliver of JINKO 66HL4M-BDV or Equivalent, 575 - 625Wp N-type mono-crystalline solar photovoltaic (PV) modules/arrays, with a minimum total installed capacity of 5 kWp	Each	9		-
A2	Supply and deliver anodized Aluminum PV modules/Array mounting frames/structures, Specifically AA 6063 T6, AL 6005-T5, or 6061 for item (1) above c/w accessories and stainless steels fittings (bolts, nuts etc) for on-roof mounting.	Per Kwp	5		-
A3	Supply and deliver of hybrid smart solar PV inverter system, minimum 10 kW. The inverters shall be capable of parallel operation to achieve a combined minimum system capacity of 5 kW, delivering single-phase AC output at 415V. The system shall be modular and expandable to allow future capacity increase without major system modifications. Including certified bi-directional energy meter, protection devices and monitoring.	Nos	1		-
A4	Supply, deliver and Installation of 10 KWh Lithium-Iron Phosphate ($LiFePO_4$) Battery Energy Storage System (BESS) , each with rated capacity of not less than 10KWh, including battery inverter/chargers, enclosure or rack-mounted type, scalable and compatible with future expansion.	Per Kwp	10		-
A5	Supply and installation of a 32-way consumer unit / distribution board (DB) for municipal loads, complete with main isolator, MCBs/MCCBs, RCDs/RCBOs where required, surge protection devices (SPDs), neutral and earth bars, enclosure, labeling, and circuit schedules, compliant with IEC standards.	Lot	1		-
A6	Supply and deliver all balance of system (BOS) components, “The BOS shall include, but not be limited to, all electrical (AC/DC Wiring), mechanical, civil, earthing, protection, communication, safety, testing, commissioning, and auxiliary items necessary for a fully operational, compliant, and warrantable system, whether or not individually itemized in the BOQ	per kw	5		-
A7	Installation & Commissioning (Labor, testing, commissioning)	per kw	5		-
Total for PV System and BESS					**-**
Total for PV System and BESS - 3 Nos					**-**

Specifications – Builders Works

The works shall involve the Construction of Coastal Development in the Bossaso Waterfront Project as detailed in the drawing and outlined in the BOQ.

The Bidder shall undertake the Construction of Coastal Development in the Bossaso Waterfront Project as shown on the designs and drawings in conformity with the Specifications. The Bidder shall at all times use the best available materials and use only suitable construction methods.

SINAAN PROGRAMME will provide detailed Specifications for Construction of Coastal Development in the Bossaso Waterfront Project after the contract is awarded. No separate payment and mode of measurement will be made and given to any separate payment rather than contract payment.

ANNEXES – The following annexes are incorporated as reference as they will apply to the contract award.

Annex 1 - Scope of Work (SOW) & Technical Specifications
Annex 2 - Design Drawings
Annex 3 - Quality Assurance & Control Plan (Template)
Annex 4 - Environmental Mitigation Requirements
Annex 5 - Health, Environmental, Safety & Security Plan (HESSP) Guide

ANNEX 1- Statement of Works (SOW) & Technical Specifications

THE SCOPE OF WORK (SOW)

COASTAL DEVELOPMENT IN THE BOSSASO WATER FRONT PROJECT

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ACRONYMS

CC	Construction Contractor
CFR	Code of Federal Regulations
CIP	Construction Implementation Plan
EMMP	Environmental Mitigation and Monitoring Plan
ERR	Environmental Review Report
FAA	Fixed Amount Award
GIS	Geographic Information Systems
HSSP	Health, Safety and Security Plan
POC	Point of Contact
QA	Quality Assurance
QC	Quality Control
QCP	Quality Control Plan
RFP	Request for Proposals
FC	Field Coordinator
SMT	Senior Management Team
SOW	Scope of Work

SCOPE OF WORKS

Project Name: **SINAAN**

Sub Project: Coastal Development in the Bossaso Waterfront Project

Location: Bosasso

Project Geographic Coordinates: Latitude: 11.281331°, Longitude: 49.161779°

A. GENERAL DESCRIPTION

The Sinaan Programme, supported by the UK Government, is a transformative initiative aimed at improving urban development in Somali cities. The programme addresses rapid urbanization, climate risks, and governance issues by transforming clusters of Somalian cities into inclusive, resilient, and sustainable economic hubs.

B. BACKGROUND

The programme aims to promote equitable service delivery, nature-based solutions (NbS), and economic opportunities for all socioeconomic groups, adopting both an inclusive and transformational approach.

The programme aims to unlock access to climate-resilient basic services and promote green economic opportunities in Somalian cities through:

- Resilient urban planning that reduces conflict, enhances climate resilience and supports integration of Internally Displaced Peoples (IDPs).
- Developing a pipeline of climate-resilient infrastructure projects that drive systemic change and promote economic growth; and,
- Mobilizing finance (including climate finance) for sustainable, inclusive and climate-resilient infrastructure to support green growth.

The programme aims to enhance access to sustainable services, strengthen resilience among IDPs and the urban poor, and reduce long-term displacement risks. The initiative seeks to identify opportunities in Somali cities to catalyze investments from the government, private sector, development partners, non-governmental or not-for-profit organizations, aligned with the UK's International Development Strategy and the International Climate Finance Strategy.

The programme has three pre-identified outcomes, including:

- Improved urban planning, land use control and decision making.
- Improved institutional processes and systems.
- Increased sources of finance (including climate finance) for sustainable, inclusive and resilient urban infrastructure and ecosystems.

C. OBJECTIVE OF THE SUB PROJECT

The main objective of the Coastal Development in the Bossaso Waterfront Project is to create a safe and environmentally sustainable public space where people of all ages and backgrounds can come together to

engage in recreational, cultural, social, and healthy activities, thereby strengthening community cohesion and social harmony.

The beach front is envisioned as a multifunctional community hub that promotes physical well-being, mental health, and social interaction through a diverse range of facilities and activities in multiple phases of construction, including:

- Construction of a multi-use promenade with pedestrian tracks to encourage non-motorized mobility and healthy lifestyles
- Creation of beachfront seating
- Installation of climate-resilient landscaping featuring native and drought-tolerant species.
- Provision of essential urban amenities and safety features, including rest areas, toilets, and solar-powered streetlights.

Through the integration of recreational, cultural, spiritual, and social facilities within a green and accessible environment, the Bossaso beach front promenade aims to foster social inclusion, promote healthy lifestyles, preserve cultural identity, and strengthen bonds among community members, making it a vital public asset for the city of Bossaso.

D. EXPECTED OUTCOMES AND TARGETS

- Ground Preparation, levelling of the complete site
- Retaining wall
- Entrance gate
- Walkways and sitting areas
- Ablutions 3 Nos
- Kiosks 12 Nos)
- Water supply and plumbing network
- Sewage and Septic Tank
- Electrical works
- Car Parking
- Solar powered Street Lights

E-ACTIVITIES

E.1. MAIN CONSTRUCTION ACTIVITIES

The main activities that will be performed to complete this job include:

- **Site clearance & setting out** of buildings as per the issued drawings. Excavations for foundation trenches to proceed after the SINAAN site engineer has approved and signed off.
- **Leveling** off the field to get proposed elevations to be signed off by the SINAAN site engineer.
- **Excavation** of trenches for the foundation of all proposed structures as per drawings and BOQs
- **Construction** of Substructure (Foundations) and superstructure (Walls above grade) of all proposed structures as per issued drawings and specifications
- **Backfilling after leveling set** Compaction of soil with maximum compaction and to 98% MDD.
- **Ring beams** of wall, Forms, Ironwork and PCC concrete work of all proposed structures
- **Construction of Roof Structure** including Installation of trusses GI sheets for roofing & Internal false ceiling of all proposed structures as per issued drawings and specifications
- **Finishing for walls** and floor of all proposed structures
- **Electrical work** of all proposed structures as per issued drawings and specifications

- **Installations of Windows and Doors** of all proposed structures as per issued drawings and specifications
- **Mechanical and Plumbing** works for all structures of all proposed structures as per issued drawings and specifications
- **Septic tanks/Soak Pits** and all connections of Plumbing as per issued drawings and specifications
- Any Other construction structures as shown on drawings, and other activities as directed by the DT GLOBAL- SINAAN

E.1.1 SUPPLY AND INSTALLATION OF SOLAR STREET LIGHTS

The Contractor shall carry out, but not be limited to, the following activities:

- Site clearance and setting-out
- Civil works including excavation and foundation construction
- Supply and installation of poles, PV modules, batteries, controllers, and luminaires
- Electrical wiring & Conduits, protection, and system integration as per the design
- Testing and commissioning of each streetlight unit
- Training of designated personnel
- Operation and Maintenance during the DNP

E.2. SITE SECURITY DURING CONSTRUCTION

The main activities that will be performed to ensure site security during construction include:

- Enclose the job site with a security fence.
- Provide night time lighting of the site.
- Provide limited access to the site at all times, preferably with lockable gates.
- Maintain a clear zone adjacent to fencing.
- Post warning signs to help keep unauthorized persons off the site.
- Use only high quality locks – never leave keys in locks or leave locks in an open position.
- Inspect the site at the end of each day before securing it, to assure nothing has been compromised.
- Provide parking areas outside of the site for employees and visitors.
- Use security guards, and have them patrol the site on designated rounds. Provide all security guards with a means of communication.
- Consider limiting vehicle access to the site to one designated entrance through which all vehicle traffic flows.
- Providing light, warning boards and refluxing plates and tools to be visible near to excavations and risk area.

E.3. SAMPLING AND TESTING

The main activities that will be performed to conduct adequate sampling and testing of materials and works during construction include:

- Taking samples of sand, aggregate from different sources and sending them to a well-known and qualified laboratory to determine their qualities to be used in concrete. Sampling should be done according to **AASHTO** and **ASTM.** The testing laboratories will be verified by **DT GLOBAL SINAAN** before any testing to be undertaken.
- Performing onsite tests for determining the slump of concrete and laboratory test for the strength of the concrete.

No	Tests Description	Standard
1	Sieve Analysis Coarse & Fine Aggregate	AASHTO- T27 ASTM- C136
2	Moisture Density Relationship	AASHTO- T199 ASTM- D1557
3	Atterberg Limits	AASHTO- T89, T90 ASTM- D4318
4	Soil Density in place by Sand-Cone Method	AASHTO- T70 ASTM- D1556
5	Compressive Strength Test (incl. Sampling and Curing)	AASHTO- T22 ASTM- C39
6	Slump Test	AASHTO- T119 ASTM- C143
7	Specific Gravity	AASHO T 228 ASTM-D-70
8	Water	AASHO T 55 ASTM-D-95
5	Distillation	AASHO T 78 ASTM-D-402
6	Penetration	AASHO T 49 ASTM-D-5
7	Ductility	AASHO T 51 ASTM-D-113
8	Solubility in Trichloroethylene	AASHO T 44 ASTM-D-2042
9	Water	AASHO T 55 ASTM-D-95
10	Thin Film Oven Test	AASHO T 179 ASTM-D-1754

E.4. OTHER ANTICIPATED ACTIVITIES

As per request by DT GLOBAL SINAAN, sub-contractor shall provide sufficient site security for DT GLOBAL SINAAN site teams to do their site works as to be defined by the Health, Safety and Security Plan (HSSP).

The Contractor shall be entirely responsible for the security of all the works, stores, materials, plant, personnel, etc., both his own and any sub-contractors and shall provide all necessary watching, lighting, site and other precautions as necessary to ensure the security and the protection of the public as mentioned in section E.2.

F. MONITORING AND EVALUATION

F.1. CONTRACTOR QUALITY CONTROL PLAN (QCP)

DT GLOBAL SINAAN will provide the CC with the QCP Template as guidance for preparing QCP specific to the technical specifications and site characteristics unique to this construction activity.

A comprehensive QCP that follows this template shall be prepared by and to be submitted for approval to DT GLOBAL SINAAN. The CC shall acquire written approval of the QCP from DT GLOBAL SINAAN before commencing construction activities.

The QCP shall include all quality control (QC) activities for this project. Non-specific Plans that do not include testing plans, materials submittal plans, schedules, personnel, and other non-project-specific information will be rejected. Construction work will not be allowed to proceed without a project-specific, DT GLOBAL SINAAN approved QCP. The CC shall carefully review all QC requirements shown in the Specification for use as the basis for developing the QCP.

All activities and workmanship, labors and construction materials shall be continuously checked and monitored by qualified QC engineers employed by the CC. DT GLOBAL SINAAN reserves the right to demand the replacement of unqualified CC's QC personnel.

The minimum requirements of the CC's QCP are as follows:

- Organization Chart and Responsibilities of Key Management Staff
- Individual responsibilities with regard to QC for the following:
    - Director of the Company
    - CC's Quality Control Manager (QCM)
    - CC's Quality Control Engineer (QCE)
    - Project Manager
    - Outside Organizations (if any)
- Activities and Procedures adequate to demonstrate that all of the quality control requirements of the Specifications will be met by the procedures, schedules, and personnel shown in the plan.
- Testing Plan
- Testing Laboratory Information
- Procedures for completing Deficiencies/Rework Items
- List of definable features of work (DFOW)
- Procedures for Three Phase Control system.

F.2. HEALTH, SAFETY & SECURITY PLAN (HSSP)

DT GLOBAL SINAAN will provide the CC with the HSSP Template as guidance for preparing HSSP specific to the technical specifications and site characteristics unique to this activity.

A comprehensive HSSP that follows this template shall be prepared by and to be submitted for approval to DT GLOBAL SINAAN. The CC shall acquire written approval of the HSSP from DT GLOBAL SINAAN before commencing sub project physical activities.

At a minimum the CC's HSSP plan should address the following:

- Compliance with laws, rules, and regulations, including any updates.
- Duties and responsibilities of CC's Construction Manager and Safety Officer/representative, etc.
- Infractions of safety rules (timely correction, serious hazards; defined at first safety meeting, etc.)
- Details on Personal Protective Equipment (PPE) for all skilled and unskilled labor on the job site
- Housekeeping (continuous cleaning, final clean-up, designated staging plan, etc.)
- Means of implementing the program (weekly toolbox meeting, emergency procedures, emergency phone numbers, project bulletin board w/policies, Employees first aid info, tracking and report keeping procedure, etc)
- Accident investigation (investigation and reporting procedure, notification and distribution manuals, etc.)
- Safety Training for both skilled and unskilled laborers on the job site.

- The CC must maintain a well-equipped First Aid's Kit that contains all necessary medicines and medical tools should be provided on work site, and a person shall be trained to use first aid's kit, properly.
- A car must always be present in the site to transfer the injured person to the nearest hospital or clinic in the case of serious injury.

The HSSP will include the following plans for the CC's Site Security Program:

- Project site entry control and entry restrictions to be maintained.
- Site security services
- Security Organization Chart
- CV of a head security staff person
- Provided facilities/ equipment
- Emergency procedures
- Procedural manual for movement of vehicles
- Parking of Machinery at site
- Procedures to ascertain the nature of security threats in advance.
- Reporting requirements
- Evacuation Plan.

F.3. ENVIRONMENTAL MITIGATION AND MONITORING

The CC must consider potential environmental impacts of construction related activities and implement the Environmental Mitigation and Monitoring Plan (EMMP) provided by DT GLOBAL SINAAN.

In order to document implementation of mitigation measures in compliance with the EMMP, the CC will complete Daily and Weekly Environmental Monitoring Checklists provided by DT GLOBAL SINAAN.

At a minimum, the EMMP will include specific mitigation measures that the CC must implement for the following:

- Hydrology, Floodplains, and Impacts to Surface Water Quality:
    - If project activities are located within floodplains or nearby surface water bodies, design structures appropriately to not cause upstream or downstream impacts, and design to withstand flood situations.
- Waste, Soil and Groundwater Contamination:
    - If chemicals are used during construction or if there is an oil or gas leak from the machinery, collect impacted soil and dispose of in approved municipal disposal area.
    - Avoid areas near wells and surface water, as well as areas that could drain into waterways or other sensitive areas.
    - Dispose of solid waste including machinery maintenance materials, such as oily rags, used oil filters, and used oil, as well as spill cleanup materials in the approved municipal disposal area.
- Borrow Pits and Quarries:
    - Document the quantity of construction material needed and its potential sources, based on the quantity and quality of material at various sites.
    - Identify locations, specify amounts to be removed from each site, and provide specific instructions for rehabilitation at each site.
    - Borrow pits must be located outside of an active watercourse, or located away from sensitive areas and agricultural land, and be collected in a manner that does not damage existing natural resources, if possible, locate on barren land.
- Dust Control:
    - Use water trucks/water to spray down dusty surfaces to reduce fugitive dust emissions.

- Erosion Control:
    - Use hay bales and silt fences for Erosion and Sedimentation Control
    - Replant vegetation of previously vegetated areas and embankments
    - Use riprap, gabions, fiber mats to control erosion and wash-out
    - Compensation for loss of land and resources, if negotiated with private parties

H. SPECIAL INSTRUCTIONS

- In order to complete this job in anticipated time duration, the CC should use well-equipped work teams simultaneously.
- The line items in the BOQ for the QCP and HSSP plans MUST include, at a minimum, costs related to all requirements detailed in this SOW.
- Unskilled labor will be recruited and employed from the region to the maximum extent practical. It is highly preferred that 100% of all unskilled labor be from the local District; however, should this prove unfeasible, under no circumstances may the unskilled labor rate from the province be below 90%, and the CC must demonstrate to the satisfaction of DT GLOBAL SINAAN why the rate is below 100%.
- The CC will pay all the related taxes or fees to Govt for all the material for the project and this point to be specified in the bid documents.
- Bidders will be required to attend a bidder's conference physically or virtually in order for bids to be considered.

I. DELIVERABLES

The following deliverables are required:

- QCP
- HSSP
- Work Schedule
- Machinery and Equipment List with documents proving they are available for the duration of project.
- Weekly and Monthly Progress Report including photos with embedded date and time.
- Weekly Environmental Monitoring Checklists to document compliance with the EMMP
- Imported Construction materials certificates (Cement, Steel, Pipes, Paints, etc.)
- Materials Testing Results
- Proposal for Changes, Revisions, Time Extension, etc.
- Complete Invoices According to DT GLOBAL SINAAN requirements.
- Documents such as ad hoc Special Reports, justifications, Prices of Construction Materials and Human Resources in Work Site, Agreements, and Certificates of CC's subcontractors, etc.
- Request for a final check of the punch list
- Final Status report.

J. SUBMITTALS

- A complete set of drawings provided by DT GLOBAL SINAAN include the followings:
- Cover Sheet,
- Typical Section Sheet,
- Project Plan,
- Building Elevations and Sections
- Relevant Structural Drawings

- Necessary Detail Drawings.
- Necessary Building Massing Views
- Necessary pictures and related notes,

All materials shall be new and free of defects and in good condition. The final product, materials, and construction must meet the minimum standards as described in the contract documents and technical specification. The DT GLOBAL SINAAN may call for the contractor to provide and supply samples of all materials and equipment proposed for this work in order to review and approve them on site.

The contractor shall obtain DT GLOBAL SINAAN written verification for all submittals before installation. Material product sheets for all materials shall be delivered to DT GLOBAL SINAAN.

The Subcontractor shall also maintain a record of all these material and equipment specification sheets.

K. PERIOD OF PERFORMANCE

- The Subcontractor shall complete this assignment within a period as per the Project Schedule Timeline from the time of issuance of Notice to Proceed and shall expeditiously work to complete the project to the standards and quality that the contract stipulates.
- The subcontractor shall prepare detailed work plans (Schedule) for each item for submission to DT GLOBAL SINAAN during the pre-construction meetings.

L. ANTICIPATED PAYMENT SCHEDULE

1	Mobilization, Submission of QCP, HESP, Security Plan, Work Schedule, Machinery and Equipment List	1 week from NTP	
2	Progress Payment #1 on BOQ amounts of actual quantities verified by DT GLOBAL SINAAN	2 weeks from NTP	
3	Progress Payment #2 on BOQ amounts of actual quantities verified by DT GLOBAL SINAAN	1 month after NTP	
4	Progress Payment #3 on BOQ amounts of actual quantities verified by DT GLOBAL SINAAN	2 months after NTP	
5	Progress Payment #4 on BOQ amounts of actual quantities verified by DT GLOBAL SINAAN	3 months after NTP	
6	Progress Payment #5 on BOQ amounts of actual quantities verified by DT GLOBAL SINAAN	Completion of all physical works anticipated in 6-8 months	
7	Final Retention Payment pending expiration of the warranty period	Warranty period as per contract	
		Total	100%

Progress Payments invoices and reports need to be submitted latest by 25th day of each month.

M. COORDINATION

The CC shall attend a "Pre-construction Conference with DT GLOBAL SINAAN to discuss the Start Date, Schedules for Submittals, Quality Control Plan, HSSP and Site Security, EMMP and overall project implementation plan and schedule.

During construction, the CC shall have in his possession on site a copy of the SOW, the Drawings, Technical Specifications, the HSSP, the EMMP and Environmental Monitoring Checklists, and other documents which will be required by DT GLOBAL SINAAN.

N. APPLICABLE CODES AND STANDARDS

In the absence of other Standards being required by the Specifications and Contract Documents, all work and materials shall meet the requirement of the International Building Code (IBC), and/or applicable British Construction Standards (BS) CODES, American Society for Testing Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO) Specifications, American Concrete Institute Manual of Concrete Practice and American Institute of Steel Construction (AISC) Manual relevant to the Works. Where the abbreviations listed below are used, it refers to the latest code, standards, or publication of the following organizations:

BS	British Standards
AASHTO	American Association of State Highway and Transportation Officials
ACI	American Concrete Institute
AISC	American Institute of Steel Construction
ANSI	American National Standards Institute
ASA	American Standard Association
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Material
AWS	American Welding Society
CFR	Code of Federal Regulation
IBC	International Building Code
ICAO	International Civil Aviation Organization Practice
FIDIC	Fédération Internationale Des Ingénieurs-Conseils
FAA	Federal Aviation Administration
PCA	Portland Cement Association
UBC	Uniform Building Code

Should the CC, at any time and for any specific reasons, wish to deviate from the above standards or desires to use materials or equipment other than those provided for by the above standards, then he shall state the exact nature of the change giving the reasons for making the change and shall submit complete specifications

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These are the General Technical specifications for the all phases of the work however the contractor will only follow the specifications relevant to scope of work in Sub contract.

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1. GENERAL

1.1 EXTENT OF CONTRACT

The works included in this contract shall include all general works preparatory to the construction of the works all things requisites and work of any kind necessary for the due and satisfactory construction completion and maintenance of the works to the intent and meaning of the drawings and this specification and further drawings and orders that may be issued by the Engineer from time to time. full compliance by the contractor of all conditions of contract whether specifically mentioned or not in the clauses of this specifications all materials apparatus plant machinery tools fuel water strutting timbering and tackle of every description transport offices stores workshops staff labour and the provision of proper and sufficient protective works temporary fencing lighting watching required for the safety of the works and adjoining land first aid equipment sanitary accommodation for the staff and workmen the effective and maintenance of all insurances the payment of all wages salaries fees royalties duties and taxes or other charges arising out of the erection of the works and the regular clearance of rubbish litter reinstatement and clearing of the site and leaving perfectly clean on completion.

1.2 DRAWINGS

The drawings issued at the time of tendering are listed in section of specifications.

1.3 UNITS OF MEASUREMENTS

In general, the units of measurements that shall be used in this contract shall be SI (Kg m s) system. In case reference is made to imperial units as in some BSS and direct conversion from the imperial to equivalent metric units of measurements shall apply.

1.4 INFORMATION FROM GEOTECHNICAL AND SOIL SURVEY

The contractor is warned that information given without guarantee of its correctness. and any conclusion which the contractor may draw from such information are entirely his responsibility. In particular the levels classifications or descriptions of strata are not to be considered to be binding to the engineer or employer. The contractor will satisfy himself by his own investigations and experience as to the strata and ground conditions actually occurring must allow for such in his rates and prices and shall arrange for his methods of working to take account of such strata and natural or artificial variations which may occur.

1.5 ORDER OF WORKS

The contractor shall execute the works in a logical and practical order such that the works are completed within the time limits laid down in a manner satisfactory to the engineer. For this purpose, the contractor shall specify order of works in his submitted work plan.

1.6 PROGRAMME FOR EXECUTION OF WORKS

(a) In implication of the requirements of the conditions of contract the particulars to be supplied by the contractor shall include the following detailed: -

(i) A statement giving the numbers and categories of supervisors and technical staff and skilled and unskilled Labour to be employed on the works.

(ii) A list and type details of construction plant including vehicles which the contractor proposes to employ on the works.

(iii) Details of contractors proposed method of working for all operations.

(iv) A statement giving the proposed for the location of base camps accommodation offices workshops and stores.

(b) The programme will be deemed to be considered climatic conditions to provide for the completion of the works in the order and time specified therein and shall be in bar chart format using Microsoft project.

(c) The contractor shall supply together with his programme the expenditure in a superimposed manner.

(d) The provision of operation and maintenance of temporary works plant, equipment and cash flow required for the works shall be the responsibility of the contractor in regard to construction type sufficiency and safety and approvals by the engineer and the contract prices shall be held to include for any reasonable and necessary adjustments required by the engineer during the course of the works.

(e) The order in which it is proposed to execute the permanent works shall be subject to adjustments and approval by the engineer and the contract price shall be held to include for any reasonable adjustments required by the engineer during the course of the works.

(f) The contractor shall carry out the contract in accordance with programme agreed with engineer but he shall be in no manner released of his obligations by the Engineers approval of the programme to complete the works in the prescribed order and by prescribed completion date, and he shall from time to time review his progress and make such amendment to review his rate of execution of the works and make such amendments to his rate of execution of the works as may be necessary to fulfil these obligations.

(g) Once the proposed programme is approved by the engineer the contractor shall not depart from the programme without written consent of the engineer. In the event of unforeseen circumstances or arising disturbances with the advice of the engineer., he shall advice the engineer in writing of such occurrence without delay and submit proposals for remedial measures for which he shall obtain the engineers approval before putting such measures into effect.

1.7 NOTICE OF OPERATIONS

The contractor shall give full and complete written notice of all-important operations to the Engineer sufficiently in advance to enable the engineer make such arrangements as the engineer may require or consider necessary for inspection and for any other purpose. The contractor shall not start any important operations without the written approval of the engineer.

1.8 NATURE OF GROUND AND CONDITIONS OF WORKS

The contractor must satisfy himself as to the general circumstances and conditions at the site and any other obstructions thereon, the sitting and shape of existing surface of the ground and nature of the materials to be excavated the possibility of subsidence from soft grounds and bad and broken materials, and falls of rocks in or arising out of the work and the possibility of floods and landslides and the rates and prices in the Bill of Quantities will be held to cover all such contingencies.

1.9 LANDS FOR CAMP SITES AND CONTRACTOR'S OWN PURPOSES INCLUDING TEMPORARY WORKS

I). Besides the camp site for the Resident Engineer 's office laboratory etc., which will be situated at work site or nearest center, will be allocated as contractors camp-site for himself his senior staff junior staff houses offices labour accommodation etc. The contractor shall obtain the approval of the engineer to the detailed layout of the Resident Engineer and contractors camp sites before any work upon them is commenced.

ii). The contractor shall be responsible for obtaining any other land required by him for his temporary works including his additional own camp sites etc., or for any other purposes.

iii). No separate payments shall be made to the contractor on account of these items and the contractor must make due allowances for them in his rates.

1.10 COMPENSATION FOR LAND AND ENTRY UPON LAND

The land within the boundaries as stated in the contract will be provided by the employer.

1.11 PRESERVATION AND MAINTENANCE OF FENCES AND GATES

The contractor shall be responsible for ensuring the safety of persons and property on the site of the works, and particularly for ensuring that livestock cannot stray as a result of his works. When existing fences and gates and gates have to be removed or altered for the proper execution of the works, the contractor shall at his own expense erect temporary fencing and gates and if necessary, provide watchman to ensure the livestock cannot stray as a result of his works. When existing fences and gates have to be removed or altered for proper execution of the works the contractor shall at his own expense erect temporary fencing and gates and if necessary, provide watchmen to ensure that livestock cannot stray. No separate payment shall be made for temporary fences gates watchmen or like necessary for safety of life or property and the contractor shall include in his rates for fencing and gates or elsewhere in the Bill of Quantities for taking all precautions necessary to comply with this clause the conditions of contract and the specifications. The contractor shall discipline his staff to ensure that no fence or gate except where these are required to be removed or be altered for the proper execution of works s damaged and that n are left open which may allow livestock to stray

1.12 LIAISON WITH LOCAL GOVERNMENT

The contractor shall keep in close contact with the local Government officials of the area regarding their requirements in the control of traffic and other matters and shall provide all assistance or facilities that may be required by such officials in the execution of their duties.

1.13 BUILDING REGULATIONS

All buildings erected by the contractor upon the site and camp site or sites and the layout of the building and then sites shall conform to the Laws of Somalia and all bye laws in so far as they are applicable.

1.14 USE OF EXPLOSIVES

Use of explosives is not allowed for this project.

1.15 WATER SUPPLY

It is the contractor's responsibility to provide water for both construction purposes and also for the camp, Residential Engineers' offices, workshops etc., including the provision of storage tanks or water conveyance where necessary payment for all fees and water charges and the satisfactory removal of all such provisions as ordered on completion of the work. The quality of water must be to the satisfaction of the Engineer. The contractor's attention is drawn to the fact that no separate payment shall be made for the provision of water and the contractor shall include in his rates and lump sum items for the provision of all water required for the works.

1.16 SANITATION

The contractor shall provide adequate waterborne sanitation and refuse removal and disposal, complying with the Laws of Somalia and all local bye laws and to the satisfaction of the Employer for all houses offices workshops etc., erected on the camp site or sites.

In addition, on all sites where work is on progress suitable latrines shall be provided and other sanitary arrangements to the satisfaction of local health authorities and the Engineer. The contractor shall be responsible for the sanitary discipline of the labour and staff employed by him on the works.

The contractor's attention is drawn to the fact that no separate payments will be made for the provision and maintenance of sanitation refuse collection and disposal and the contractor shall include in his rates and lump sums items for the provision and maintenance of these services.

1.17 POWER SUPPLY

The contractor shall make his own arrangements for the supply of power to all houses, offices, workshops, etc erected on site and maintain it in such manner that no interruptions of power shall be made in the provisions and maintenance of power supply and the contractor shall include in his rates a lump sum provision for provision of all electricity required in and for the works.

1.18 REMOVAL OF CAMPS

On the completion of the contract, the contractor shall take down and remove all structures connected with his own or resident engineers camp with exception of engineers accommodation and office paid for by Employer which will revert to ownership by Employer, water supply, drains and culverts , fill up trenches, latrines soak pits soak ways and other sewage disposal excavations and shall restore the site as far as is practicable to its original condition and leave it neat and tidy, and to the satisfaction of the Engineer and Employer.

1.19 TEMPORARY WORKS IN CONNECTION WITH STRUCTURES

The contractor shall allow in his rates where appropriate the provision and maintenance of any temporary structures and deviations and for the provision erection and maintenance of road signs for the safe passage of traffic when the structures are being constructed.

The contractor shall provide a coffer dam or take such other measures as may be necessary for the execution of the works in the exclusion or removal of temporary works against floods. The contractor must avoid any measures likely to intensify flooding upstream of the site or to endanger the safety of property or persons downstream of the site and shall indemnify the employer against any claims so arising thereof. The contractor shall allow in his prices for all expenses involved including labour pumping materials tools plant supervision overheads and profit.

The contractor shall submit to the engineer drawings and particulars of all temporary works including construction pits he intends to construct at least 14 days before the commencement of such works but approval by the Engineer shall in no way relieve the contractor of his responsibility.

1.20 SUPPLIES OF MATERIALS

Before ordering any materials of any description intended for the permanent works the contractor shall submit for approval of the engineer the names of the manufacturers or suppliers proposed and details of their place of origin and specification. If requested by the engineer, the contractor shall provide a copy of the order so placed to the engineer for record and retention.

1.21 FIRST AID AND WELFARE

The contractor shall provide equip and maintain an adequate first aid station on site of the works at all times when work is in progress all in accordance with the Laws of Somalia and which shall be staffed by competent personnel approved by the Engineer.

The contractor shall allow in his rates and be responsible for the costs of all welfare arrangements and health requirements. He shall submit the name of the person in charge of the First Aid Station in writing to the engineer for approval. The person must be educated in and be qualified and be experienced in First Aid.

1.22 COMPLIANCE WITH STATUS AND REGULATIONS

In additional to requirement of clause 26 of the general conditions of contract the contractor shall be responsible for acquainting himself with the current valid statutes ordinances or bye laws or regulations which may affect the works and shall include in his unit rates all costs arising from compliance with same. This applies in particular to the taxes and levies for which no claims on the part of the contractor will be entertained.

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

1.23. THE SITE

1.23.1 General

Access to Site

a) Before commencement of any part of the works the contractor shall make temporary access tracks including all necessary temporary diversions to the site concerned all to the approval of the engineer. The Contractor shall maintain such access tracks in a condition suitable and safe and easy passage of plant and vehicles until they are no longer required for the purpose of the contract.

b) During the construction of the structures in existing access roads or tracks the contractor shall provide and manage provisions to allow safe passage of third-party users in undisturbed passage of the works.

c) The contractor shall make a record of the conditions of any private land or any public cultivated or maintained land over which access to the Site lies before use for access and he shall keep surfaces in a reasonable state of cleanliness and repair during the execution of the works. On the termination of the contractor's use of such access he shall restore he shall restore the condition equal to that obtaining before his first entry on them.

In the event of the contractor making use of any additional accommodation made available by the Employer for the purpose of the contract the land in which such accommodation is situated shall be deemed to be part of the site as defined in clause I of the conditions of contract.

1.24. MATERIAL AND WORKS STANDARDS

All materials, equipment and testing apparatus etc. to be furnished and works to be executed by the contractor in this Contract shall conform to the requirements of the latest Bureau of Standards (SBS), International Standard Organization (ISO), British Standard Specification (BSS) or other approved applicable standard in Somalia, unless otherwise specifically stated.

Equipment to be purchased shall be from well- recognized manufacturers whose products are standardized and controlled by any recognized standard organization. All dimensions and measurement units shall be of Standard International (S.I.) units.

The Contractor may propose to the Engineer an alternative Standard other than specified, in which case he shall submit six (6) copies of English translation of the proposed standard and all other information required for the materials, equipment and testing, together with the written proof that his proposed standard is equivalent in all significant respects to the standard specified.

The equipment to be employed by the Contractor shall have sufficient performance capacity and durability as to secure the completion of the works within the construction period stipulated under the Contract. All materials and equipment shall be subject to inspection or tests by the Engineer at any time and in any state of completion both off - site and on-site, as he deems necessary. The Contractor shall furnish promptly, without additional charge, all facilities, labour, and materials reasonably needed for performing such inspection and test as may be required by the Engineer.

The Contractor shall make diligent efforts to procure the specified materials, but when the materials specified are unavailable, for reasons beyond the control of the Contractor, substitutes may be used with prior written approval of the Engineer.

1.25 PROVISION OF SURVEY EQUIPMENT

Supply and install Survey equipment		
(a)TOTAL STATION survey equipment: Topcon electronic digital TOTAL STATION, pulse GTS 751, 1 second accuracy Survey Equipment or similar approved complete with batteries, tripod, carrying case and all accessories	Nr	1
(b) Reflectors and targets for (a) above	Nr	2
(c)Topcon Automatic level Model AT-G6 or similar approved Complete with tripod carrying case and all accessories	Nr	1
(d)Levelling staff 3m long telescopic calibrated \in metric units including staff level and levelling plate	Nr	1
(e)Steel measuring tape 100m long	Nr	1
(f)Steel measuring tape50m long	Nr	1
(g)Steel measuring tape 3m long	Nr	3
(h)Ranging rods length 2m	Nr	6
(I)Spirit level	Nr	1
(j). Survey Umbrellas	Nr	2

1.26 OFFICE FOR THE CONTRACTOR

The Contractor shall have an office on the site which shall be open and attended at all hours during which work is in progress.

1.27 CONTROL OF TRAFFIC

In the event of single way traffic becoming necessary on any particular section of the works, or on the approaches to the works, the Contractor shall, in maintaining through traffic routes, provide a width of at least 3 meters for single way traffic. He shall also ' provide approved signals for traffic control on each of the affected sections and any additional traffic signs as may be directed in accordance with Clause 106. Signal lights are to be operated by competent operators provided by the Contractor, if and when required by the Engineer. Manually operated "Stop-Go" signs will only be permitted if approved by the Engineer, and shall be of the size, colour and type authorized. The Contractor shall be responsible for liaison with Police.

1.28 TEMPORARY TRAFFIC SIGNS

The contractor shall erect and maintain on the works and at prescribed points on the approaches to the works, all traffic signs necessary for the warning, direction and control of traffic and the size of all such signs and the lettering and wording thereon shall be reflectorized and adequately illuminated at night by approved means.

1.29 PROTECTION WORKS

The Contractor shall carefully protect from injury by the weather all work and materials which may be affected thereby.

1.30 SURVEY BEACONS

During the progress of the works, the Contractor shall not remove, damage, alter or destroy in any way whatsoever, any plot or survey beacons. He shall notify the Engineer of the need to interfere with any beacon. The Engineer shall authorize any removal and reinstatement that he considers necessary. Should any beacons be found to be above or below the level of the finished work, the Contractor shall immediately report the same to the Engineer.

Should any beacon be damaged or destroyed, the Contractor shall forthwith report the damage to the Engineer and to the Director or surveyors and shall be liable for the cost of reinstatement thereof.

1.31 DAMAGE TO LANDS

Except where specified for the proper execution of the works the Contractor shall not interfere with any fence, tree, land or crop within, upon or forming the boundary of the site or elsewhere. In the event of such interference, the Contractor shall make good to the satisfaction of the owner and Engineer and shall pay to the owner such damages as the Engineer may determine.

1.32 TEMPORARY WORKS

The Contractor shall provide, maintain and remove on completion of the works all temporary works suitable in every respect to carry all plant required for the work or for providing access or for any other purposes.

Details of Temporary works shall be submitted in advance to the Engineer for his approval and the approval shall no relieve the Contractor of complete responsibility for their safety and satisfactory operation.

1.33 LIGHTING AND GUARDING OF TRENCHES

The details of the method of signing and guarding the trenches at site for the execution of the works shall be submitted to the Engineer for approval before that portion of the works is commenced.

1.34 WATER SUPPLY

The Contractor shall provide for all purposes of the work, an adequate supply of water from the suitable source or source approved by the Engineer. He must pay the water charges, if any, and make arrangements for supply, transport and distribution.

1.35 ADDITIONAL LAND

The Contractor shall select and arrange at his own expenses for any temporary occupation of land outside the site (if required), which he requires for the efficient execution of the works. The Contractor must comply fully with by-laws and Regulations currently in force in the area.

1.36 USE OF HEAVY PLANT:

In the event of the Contractor desiring to use heavy machinery or plant, he shall first satisfy the Engineer that they will be of such size and used in such a manner as not to cause any disturbances to the existing utilities. The Contractor will be held liable for any damages or disturbances and shall pay the full costs of any reinstatements, relaying, repairing as may be required, as agreed between the Engineer and the owner affected.

1.37 PROVISION OF INSTRUMENTS AND LABOUR

The Contractor shall provide at his own expenses all instruments, materials, tools and other things which the Engineer considers necessary for his proper supervision of the works and shall maintain the same in good order. He shall also provide materials and labour for attendance on the Engineer and his representatives in carrying out operations connected with the supervision of the works. All charges arising out of such services shall be deemed to be included in his rates in the Bill of Quantities.

1.38 POLLUTION

The Contractor shall ensure that during the course of his operations no pollution of the atmosphere, rivers, reservoir catchments areas or ground water is allowed to take place.

1.39 TREE PROTECTION

Trees within the permanent and temporary easement are the property of owners. Specific trees will be identified by the Engineer, prior to construction, and the Contractor shall neither remove nor cut in their roots unless otherwise directed by the Engineer. If the roots of such trees appear within the trench areas, the Contractor shall handle the roots with maximum care so that no portion of the roots will be damaged. During the excavation of the trench, the exposed roots may be moved to the position that will not damage the roots and will not interfere with the pipe laying. During the Construction, the roots shall be thoroughly protected by appropriate cover and wetted as directed. After the pipes are laid, the moved roots shall be placed back to the original locations and backfilled carefully be the selected soft soil, which can support vegetation.

1.40 GEOLOGICAL DATA

If any geological data is made available to the Contractor, relevant to the Works, will be for his guidance only and no guarantee is given that other ground conditions will not be encountered. No claims based on the geological data provided shall be entertained by the Engineer. The Contractor have to made site visit and any investigation required before submission of the Tender.

1.41 WATCHING, FENCING AND LIGHTING

The Contractor shall arrange to employ watchmen to guard the Works both during the day and night from the commencement of the Works until the substantial completion of the works.

Any excavation or other obstruction likely to cause injury or damage to any person or domestic animals must be fenced off as directed by the Engineer.

1.42 DISPOSAL OF SURPLUS MATERIAL

The Contractor shall be responsible, at his own expense, for disposal of all spoil or other rubbish collected during the construction of Works. Any surplus excavated material not required shall also be carted away to the designated site identified by the local Government.

1.43 TROPICALISATION

In choosing materials and their finishes, due regard shall be given to the tropical conditions of the site to which they will be subjected. The Contractor shall submit details of his practices, which have proven satisfactory, and which he recommends for application of the parts of the works which may be affected by the tropical conditions.

1.44 MONTHLY SITE MEETINGS

Throughout the project period, site meetings will be held with SINAAN Engineers and Technical working group once every calendar month to discuss due progress of the work, schedule for the ensuing month, methods of construction, procurement, transportation, labours, etc. These meetings can be called at any other time intervals at the request of the Contractor or as directed by the Engineer.

1.45 MATERIAL SAMPLES FOR APPROVAL

Before incorporating in the finished work any materials or articles which he supplies under the terms of the Contract, the Contractor shall submit to the Engineer's Representative for his approval a sample of each respective material or article, and such samples shall be delivered to and kept at his offices for reference. All the respective kinds of materials and articles used in and upon the Works shall be at least equal in quality to the approved samples. Each and every sample shall be a fair average of the bulk material or of the article, which it represents. The Engineer's Representative may decide the method by which each sample to be taken from bulk shall be obtained.

1.46. RESPONSIBILITY FOR ORDERING MATERIALS AND MANUFACTURED. ARTICLES AND SAMPLES OR TESTING

The responsibility for ordering and delivering materials and manufactured articles and samples that they may be tested sufficiently far in advance of the work as not delay it, shall rest upon the Contractor, he shall not be entitled to any time credit for delay occasioned by his neglect to order sufficiently well in advance or to payment of any costs he may incur as the result thereof.

With regard to any item in the Bills of Quantities, the Contractor shall notify the Engineer of his requirements in ample time for the Engineer to make necessary arrangements so that no delay occurs in the progress of the work.

1.47 TESTS OF MATERIALS AND MANUFACTURING ARTICLES BEFORE

Any or all of the materials and manufactured articles supplied by the Contractor for use on any of the Works throughout this Contract shall be subject in advance to tests as may be specified in the relevant Standard Specifications as may from time to time be deemed necessary by the Engineer. Samples of all such materials and manufactured articles, together with all the necessary labour, materials and manufactured articles shall be supplied by the Contractor at his own expenses. The cost of special tests ordered by the

Engineer to be carried out by an independent person at a place other than site or place of manufacture or fabrication shall be borne by the Contractor.

1.48 REJECTED MATERIALS

Should any material or manufactured articles be brought on to the site of the Works which are in the judgment of the Engineer "unsound or of inferior quality' or in any way unsuited for the work in which it is proposed to employ them, such materials or manufactured articles shall not be used upon the works but shall be branded if, in the opinion of the Engineer, this is necessary and shall forthwith be removed from the site of the works, all at the Contractor's expenses and in each case as the Engineer shall direct.

1.49 QUALITY OF MATERIALS AND WORKMANSHIP

The materials and workmanship shall be of their respective kinds and shall be to the approval of the Engineer. In the reading of this specification the Works "to the approval of the Engineer" shall be deemed to be included in the description of all materials incorporated in the works, whether manufactured or natural and in the description of all operations for the due execution of the Works.

1.50 CONSTRUCTION PROGRAMME

The Contractor shall submit a revision of the Construction Programme attached to the Tender to the Engineer for approval in the following manner:

a. Within thirty (30) days after receiving Letter of Acceptance, the Contractor shall submit to the Engineer for approval a detailed programme based on the key date stated hereinafter or other dates which will be given in the Letter of Acceptance in the form of a Critical Path method (hereinafter referred to as CPM Network) showing the order of procedure in which he proposes to carry out the Works including design, manufacture, delivery to the site, transport, storage, survey, construction, commissioning and maintenance. This programme shall clearly indicate all activities and its duration along with the earls and the latest event, times and the first and last dates of the submission of the Drawings and each date of shop inspection by the Engineer for the section or portion of the works. The programme so prepared shall be rearranged in the form of a Time Bar-Chart Schedule. This time Bar-Chart Schedule shall be submitted to the Engineer together with CPM network.

b. The CPM network shall be in accordance with commonly accepted practice and shall show graphically with each other from the start of construction to the completion of the Contract. The Time Bar-Chart Schedule shown in weeks shall list all main activities and its applicable sub-activities.

c. In preparing the CPM network and the Time Bar-Chart the Contractor shall make due allowances for possible delays. Under no circumstances shall the CPM network or the Time Bar-Chan Schedule show a completion in excess of the "Time for Completion" stated in the form of Tender.

d. The Programme once approved by the Engineer shall thereafter be referred id be the Contractual Programme. The Engineer's approval of such programme shall not relieve the Contractor of any of his duties or responsibilities under the Contract.

The Contractual Programme approved shall supersede all other programmer and shall be deemed to be the programme on which the Contractor has based his Contract Sum and in accordance with which he will undertake the execution of the works. This programme shall become part of the Contract.

The Contractor shall pay his full attention on Works especially Electrical and Mechanical Works which may be carried out by the Electrical/Mechanical Contractor, intimately related with the overall works under the Contract for efficient execution of the Works and shall clearly indicate them on the construction program.
The Contractor shall also describe the conditions of working shifts, if necessary, to execute works and night and / or on Sundays and holidays, to be applied in the particular Works of his construction programme. Whenever the Contractor proposes to change the Contractual Programme, approval of the revision shall be taken in writing from the Engineer. If the Contractor has fallen behind the approved Contractual Programme or could foresee delay(s) therein, he shall, immediately after such default or event occurred or be foreseen or at the request of the Engineer submit the reasons of such delay and the proposed measures to recover such delay or to complete the works on time, for the approval of the Engineer.

2. SITE CLEARANCE

2.1 CLEARING SITE

The Contractor shall demolish, break up and remove buildings, walls, gates fences, advertisements and other structures and obstructions, grub up and remove Trees. hedges, bushes and shrubs and clear the site of the works at such time, and: the extent required by the Engineer. The materials so obtained shall so far as suitable be reserved and stacked for further use; all rubbish and materials for unsuitable for use shall be destroyed or removed from the site, as directed by the Engineer.

Where top soil has to be excavated this shall be removed and stacked on site. After completion of construction, it shall be spread over the disturbed ground, any surplus being disposed of as directed by the Engineer.

Underground structures and chambers where required to be demolished, as directed. They shall be properly cleaned out and backfilled and compacted with suitable material to the directive and approval of the Engineer.

2.2 VEGETATION

No allowance will be made for the cutting and removal of the crops, grass, weeds and similar vegetation. The cost of all such work will be held to be included in the rates entered in the Bills of Quantities for excavation.

2.3 BUSHES AND SMALL TREES

All bushes and small trees, the main stem of which is less than 500 mm girth at 1 meter above ground level shall be uprooted (unless otherwise directed by the Engineer) and burnt or otherwise disposed of as directed by the Engineer.

2.4 HEDGES

Where directed by the Engineer hedges shall be uprooted and disposed-off in appropriate way.

2.5 FELLING TREES

Where shown on the Drawings or directed by the Engineer, trees shall be uprooted or cut down as near to the ground level as possible, and the rates entered in the Bills of Quantities shall include for cutting down, removing branches and foliage, cutting useful timber into suitable lengths, loading, transporting no more than 1 km and stacking or disposing of all as directed by the Engineer.

For the purpose of measurement trees cut down shall be classified according to their girth at 1 meter above ground level, the cost of grubbing roots shall be deemed to be covered by the rate for felling trees.

2.6 GRUBBING-UP ROOTS

Stumps and tree roots shall, unless otherwise directed, be grubbed up, removed and disposed of in approved dumps, where directed by the Engineer, the holes resulting from grubbing up shall be filled with approved materials, which shall be deposited and compacted in layers not exceeding 225mm loose depth, to the same dry density as that of the adjoining soil. For the purpose of measurement, tree roots shall be classified according to the mean diameter of the stump measured across the cut.

2.7 WEED CONTROL

The Contractor shall take all necessary precaution against the growth on the site of weeds and remove them as necessary throughout the period of works and maintenance

2.8 REMOVAL OF STRUCTURES, FENCES E.T.C

a. The contractor shall also carefully take down and clear only such buildings, fences or other structures which in the opinion of the engineer require demolition.

b. The components shall be dismantled, cleaned and stacked in separate heaps. Materials which in the opinion of the engineer are not fit for reuse shall be removed from the site to a tip provided by the contractor at his own expense. Materials which are re-usable shall remain the property of the employer and shall be preserved and protected by the Contractor until removed by the Employer or until the expiration of the Contract.

c. The contractor shall, at his own expense, make good any damage done to other property during the removal of these buildings, fences and other structures and, if necessary, pay compensation.

2.9 PROTECTION OF FENCES, TREES & HEDGES, E.T.C

a. All existing paths, fences, walls, hedges, trees, shrubs, lawn and other features, which the Engineer instructs shall not be removed or otherwise dealt with, shall be protected from damage and upon completion of the Works shall be handed over in a proper state to the satisfaction of the engineer.

b. Where fences, walls and other structures are damaged by the Contractor they shall be made good at the Contractor's expenses to the satisfaction of the Engineer.

2.10 BASIC SURVEY & SETTING OUT.

a. The Engineer will set out salient points of the alignment of the feeder -canal and outfall structure.
b. The Engineer will supply the Contractor with the levels of the already established benchmarks.
c. After this basic survey and setting out has been handed over by the engineer, the Contractor shall be responsible for its maintenance and re-establishment of any portion lost or destroyed unless the destruction is approved in writing by the engineer.
d. The contractor shall establish station points at the right bank at sites as will be directed by the engineer at 200 m intervals and shall provide the engineer with a schedule of their levels.
e. Reference and station points established by the Contractor shall be made of steel pipes, 750 mm long and 12 mm diameter set 12 mm proud in situ class A concrete blocks cast 0.50 m into the ground and at least with dimensions of 250x250 mm. The chainage, level and other markings required by the Engineer, shall be scratched or clearly marked with paint on the surface of the concrete or otherwise clearly marked to the satisfaction of the Engineer.

f. Should the contractor discover any error in line or level in the basic setting out he shall at once notify the engineer who will then issue amended drawings or instructions regarding the correction of the error.

g. Should the contractor discover any error in line or level in the basic setting out he shall at once notify the engineer who will then issue amended drawings or instructions regarding the correction of the error.

h. Any abortive setting out or construction resulting from survey errors on the part of the Contractor shall not entitle the Contractor to any additional payment.

2.11 DETAIL SETTING-OUT

a. The Contractor shall be solely responsible for the detailed setting out and construction of the works accurately in accordance with the geometrical data shown on the Drawings or s amended by the Engineer in writing. Such setting out shall be completed not less than 14 days prior to commencement of work upon any section of the works. The Engineer shall check the accuracy of the setting out to his own satisfaction and may order the Contractor to make such adjustments or amendments as he considers necessary and the Contractor shall have no claim for additional payment provided such adjustments or amendments are notified to him in writing by the Resident Engineer on Site not less than 7 days prior to the Contractor's intended date of commencement of works.

b. The setting out shall generally be by pegs 50mmx50mm in section, 600 mm long, driven 400 m firmly into the ground, creosoted below ground and white painted above ground. The offset from center-line shall be marked by a small nail 20 mm to 25 mm long with its head driven flush with the top of the peg. Chainage offset and reference elevation above or below grades elevation shall be clearly indicated on the sides of the peg to the satisfaction of the Engineer. All reference pegs shall be maintained for as long as they are required by the Engineer to check the accuracy of the Works.

2.12 LEVELS TO BE AGREED IN ADVANCE

Prior to the construction of any earthworks, excavation, the levels of the existing ground shall be agreed between the Contractor and the Engineer. if the Contractor fails to tell the requisite levels, then the ground levels shown on the drawings or determined by the Engineer shall be taken as correct.

2.13 SURVEY BEACONS

a. During the progress of the Works, the Contractor shall not remove, damage, alter or destroy in any way any plot beacons or survey beacons of the Survey Department, Government of Somalia. Should the Contractor consider that any survey beacon will be interfered with by the Works or will ultimately be above or below the final level of the finished Works, he shall notify the Engineer who, if he considers necessary, will make arrangements for the removal and replacement of the beacon.

b. If the Contractor removes or disturbs a beacon without the prior permission of the Engineer, he shall be liable for the full cost of its replacement.

3. EARTHWORKS

3.1 GENERAL

3.1.1 DEFINITIONS

a. "Rock" shall include all material which, in the opinion of the Engineer, requires the use of metal wedges and a hammer or the use of compressed air drilling for its removal or cannot be extracted by ripping with a tractor of at least 180 h.p. and rear mounted heavy-duty ripper. Individual boulders greater than 0.2 m^3 in volume shall be included in this class when their nature and size are such that they cannot be removed without recourse to one of these methods.
   Where a portion of excavation contains 50% or more by volume of boulders of this order, such portion shall be considered as "Rock" throughout.

b. "Normal" or "Soft Material" shall include all material not being considered as "Rock" according to paragraph (a) of this Clause.

c. "Fill-Material" shall mean material deposited in accordance with these specifications from any of the classes specified in paragraph (a) and (b) and approved by the Engineer in order to build up an earthworks construction as shown on the drawings or as ordered by the Engineer.

d. "Crossfill-Material" shall mean material from any of the classes specified in paragraph (a) and (b), deposited within a distance of not more than 25m in any direction from its point of excavation, and used to build up an earthworks construction as shown on the drawings or as ordered by the Engineer.

e. Fill material will be obtained from either of two sources, "cut" or "borrow". "Cut" areas are defined as areas where excavations are necessary to build up an earth works construction. "Borrow" areas are defined as areas where excavation is selected to obtain material additional to that found in "cut" areas for the purposes of building up "fill".

f. " Spoil-Material" shall mean material deposited in accordance with these specifications from any of the classes specified in paragraph (a) and which, being obtained from "Cut" is unsuitable according to the Engineer or surplus to the requirements of the works.

g. The Contractor shall identify the sources of his earthwork material and note that no payment will be made for transporting the material to site. The earthwork rates should include transporting from source.

3.1.2 COMPACTION STANDARDS

a. The terms used for compaction shall be ascribed to them the meaning given in B.S. 1377/61, PART I, General.

b. The standard of compaction used throughout the work shall be the British Standard test as described in B.S. 1377/61; shall be the British Standard text of the Specification the expression "X% B.S. Compaction" is used it shall mean a standard of compaction such that the dry density of the compacted material is X% if the maximum dry density ascertained from the afore-mentioned British Standard Compaction Test.

3.1.3 NOTICE BEFORE COMMENCEMENT

The Contractor shall give the Engineer at least seven days written notice of his intention to commence earthworks on any part of the Site so as to enable the Engineer to be furnished with all ground levels and other particulars he may require for the purpose of measurement. The earthworks shall not be commenced until written approval has been received by the Contractor from the Engineer.

3.1.4 EARTH WORKS TO LINES AND LEVELS

The whole of the earthworks for the several parts of the Works shall be carried out to the dimensions and levels shown on the Drawings or to such other dimensions and levels as may be ordered by the Engineer. Dimensions which are based on, or relate to, ground levels or chainages shall be referred to the Engineer before commencing earthworks at any location.

3.1.5 EXCAVATION OF UNSOUND MATERIALS

a. If any unsound material occurs the Contractor shall remove and dispose of it to the satisfaction of the Engineer. Unsound material shall include roots, organic matter, mud, and other deleterious substances or having a low soil property pertaining to the use into the Works. Unless otherwise specified or ordered by the Engineer, the Contractor shall refill the voids in the foundation so formed with concrete embankments and roads.
b. If the Contractor encounters any material which in his opinion may be unsound, he shall immediately inform the Engineer who will instruct the Contractor in writing as to whether or not the said material shall be treated as unsound. The cost of dealing with the unsound materials shall be borne by the Contractor if the opinion of the Engineer the unsoundness is due to failure of the contractor to comply with the Specification including keeping the excavation free from water.

3.1.6 SLIPS AND FALLS

The removal of materials in slips, falls, slides or subsidence and over breaks of rock extending beyond the lines and slopes or below the levels shown on the drawings or required by the Engineer will not be paid for unless such occurrences were, in the opinion of the Engineer, beyond the control of the Contractor, and could not have been prevented by the exercise of due care and diligence. Where payment is made for the removal of such materials, it will be at the appropriate rate inserted in the Bill of Quantities having regard to the condition and situation of the material at the time of removal and regardless of its condition prior to the deterioration.

3.1.7 QUARRIES

a. A "Quarry" shall be defined as an open surface working from which natural materials are removed for construction of the Works.
b. The Contractor shall give the Engineer at least four weeks' notice of his intention to open a quarry. No quarry site shall be entered until the express approval of the Engineer is given and levels have been agreed between the Engineer and Contractor.
c. All quarries shall be drained and kept drained.
d. Where in the opinion of tile Engineer, the heights of any face of the quarry is likely to be a danger either to the public or to animals, the Contractor shall provide, erect and maintain a stocky-proof fence and gates to prevent unauthorized access to the quarry and the top of the working face.

e. On completion of work in the quarry, the sides of the excavation shal1 be neatly trimmed to such slope as shall be stable and safe for pedestrians and animals.

f.

3.1.8 BORROW PITS

a. A "Borrow-pit" shall be defined as a site from which natural materials are removed for constructing the Works, the haulage from which under normal working practice, would be affected by a "scraper" or similar operation.

b. If the Contractor wishes to use borrow, he shall obtain the approval of the Engineer to the siting of all borrow pit areas. The Engineer may instruct that borrow be used to improve the quality of the earthworks. In such instance, the Engineer will locate the pit.

c. On completion of excavation the Contractor shall trim, grade and leave the borrow -area in a tidy condition to the satisfaction of the Engineer and if ordered shal1 carry out any further earthworks necessary to prevent accumulation of water in the area.

3.1.9 SPOIL DUMPS

a. A "Spoil-dump shall be defined as a site upon which surplus natural materials, arising out of the construction of the works, are dumped.

b. The Engineer shall indicate to the Contractor the siting of the spoil dump.

c. No material shall be spoiled without the consent of the Engineer; The Contractor shall give the Engineer at least 18 hours' notice of his intention to spoil. Spoil areas shall be chosen and prepared and all spoil material shall be deposited in such a way as to facilitate subsequent measurement of spoil and in al1 instances shall be to the satisfaction of the Engineer.

d. The Engineer may direct that the materials be dumped in special order, such as rock at the bottom and top soil at the top.

3.1.10 PRELIMINARY TRIALS AND COMPACT FILL

At least two weeks before commencing compaction of the fill in the Permanent Works, the Contractor shall submit to the Engineer details of the method and Constructional Plant proposed to be used, and shall make trials on site. The Contractor shall make such tests of the materials before and after compaction as the Engineer considers necessary, both of the trials and the Permanent Works, to ascertain to his satisfaction that the degree of compaction specified is attained.

3.1.11 COMPACTION TO FILL

a. Compacted fill and backfill shall consist of approved material spread and compacted in layers approximately horizontal and of uniform thickness with a slight outward slope and of a compacted depth not exceeding 0.15m. The moisture content of the soil shall be carefully controlled either by natural drying or wetting with fine spray. Compaction shall be carried out by mechanical rollers, rammers, vibrators and other approved plant so as to produce a dry density of not less than 95% B.S. Compaction or such other minimum dry density as may otherwise be specified or ordered by the Engineer.

b. The Contractor shall exercise control of the moisture content of the fill material prior to and during compaction such that it lies within a range of values established during the said trials to the approval of the engineer, suitable for the fill material and the method of compaction adopted.

3.1.12 SCARIFYING GROUND SURFACE

Where fill in embankment is to be compacted, the surface of the ground under the embankment shall be scarified to a depth of 0.10m so as to provide a satisfactory bond between the ground and the fill. The

moisture content of the scarified surface shall be carefully controlled either by natural drying or by wetting with a fine spray. If, for any reason, progress in compacting the fill in interrupted for an unreasonable time, the surface of the fill shall be scarified before compaction continues.

3.1.13 ALLOWANCE FOR SETTLEMENT

The Contractor shall make due allowance for consolidation and settlement of fill and specially compacted fill, such that the levels, widths and dimensions of the finished surfaces at the end of the Period of Maintenance are in accordance with the Contract.

3.1.14 DRAINAGE WORKS

a. All cuttings, embarkments and borrow pits shall be kept free of standing water and drained during the whole of the construction.
b. Should water accumulate on any part of the earthwork either during construction or after construction until the end of the maintenance Period, giving rise to soaking or eroding conditions in the earthworks, the Engineer may order the Contractor to remove and replace at the Contractor's expense any material which has not been so affected.
c. All drains shall be maintained throughout the Contract in proper working order.
d. Well in advance of commencing earthmoving operations over swampy or waterlogged areas, the Contractor shall cut drains and ditches and carry out any other works as are necessary to assist in draining the ground

3.2 EMBANKMENT

3.2.1 EXCAVATION AND DISPOSAL

a. Before construction of the new profile all soil not suitable to be used as fill material as directed by the Engineer to be excavated and to be spoiled.
b. Soil excavated shall be placed along-side in associated embarkments or, if excess spoil is available over and above that required for associated embarkments, it shall unless otherwise directed by the Engineer be placed in other embarkments requiring additional fill.
c. Soil excavated shall prepare a plan of earthworks operation for each particular part of the Works to be constructed at any one time, detailing the location of the programme of excavation and of placing the spoil in embarkments. The Contractor shall submit ills proposed plan of operation at least three days before the intended date to commence earthworks on each particular part of the Works for the Engineer's approval.

3.2.2 FILLS AND EMBANKMENTS

a. Where slopes have to be constructed in fill the width of the fill shall be at least 3m to facilitate compaction by mechanical means. Widening of the area to be filled, if necessary.
b. Fills and embarkments shall be constructed only materials approved by the Engineer obtained from the excavation or borrow-pits; and undesirable material shall not be used unless specifically directed by the Engineer.

c. The Engineer may direct those certain soils be excluded and other soils set apart or obtained from borrow and used for specified parts of the Works, in which case the Contractor shall comply with the Engineer's directions and shall allow in his rates for such selection of materials.

d. Fills and embarkments shall be constructed in horizontal layers, not exceeding 0.30m in depth before compaction, unless otherwise agreed by the Engineer and compacted throughout to a minimum relative density of 100% B. S. Compaction for other fills and embarkments. While the materials are being spread and compacted it shall be graded to level and thickness. Compaction to be executed by mechanical means to be approved by the Engineer. Where water needs to be added it shall be applied in an even matter. The rate of application shall be such that no transverse or longitudinal flow occurs.

3.2.3 TOLERANCE ON EARTHWORKS

a. Tolerance permitted in the levels will be +0 mm and -30 mm while the tolerance for the bed width is limited to +30 mm or -30 mm.

b. In the final trimmed slopes, a tolerance of 1/8 will be permitted, i.e., the acceptable slopes shall not be steeper than 1 in 13/8 or slacker than 1 in 15/ x for a specified slope of 1 in 11/2.

c. Tolerances in the levels and dimensions of other works will be limited to -0 mm to +50 mm while for the slopes of these earthworks a tolerance of 1/4 will be permitted.

3.2.4 GAPS IN EMBARKMENT

Where necessary at the sites of structures and were ordered by the Engineer, the Contractor shall leave gaps in the embankments. On completion of the Works for which the gaps have been left or as otherwise ordered by the Engineer the Contractor shall make good the gaps to the approval of the Engineer.

3.2.5 OVER-EXCAVATION

Should any part be excavated beyond the tolerances specified, the Contractor shall form the specified cross-section or such other section as the Engineer may direct at the Contractor's expenses.

3.3 STRUCTURES

3.3.1 METHOD OF EXCAVATION

If required by the Engineer, the Contractor shall submit his proposed method of excavation including details of necessary supports, if any, for the excavation, to the Engineer for his written approval.

3.3.2 EXTEND OF EXCAVATION

a. The excavation of building-pits shall be limited by the area of the foundation-floor extended by 0.40m to allow for a working-space for timbering, sheeting and shuttering. The sides of the excavation shall be with slopes of 1 in 1 unless otherwise directed by the Engineer.

b. At the request of the Contractor the Engineer may approve a deviation of the measurements as stated in paragraph (a).

3.3.3 HAND TRIMMING OF FORMATION LEVEL

Where the formation level of any excavation is to receive concrete the final 0.15m of the excavation shall be trimmed by hand, or such other method as may be approved or ordered by the Engineer, after removal of any slurry and immediately before the placing of the concrete.

3.3.4 TEST ON FORMATION LEVEL

On reaching the level for hand trimming the Engineer may order either in-situ or other tests as specified to determine the nature and strength of the soil. The rates shall include for any interruptions or delays which may occur in the constructions due to the carrying out of these tests.

3.3.5 EXCAVATION TO BE KEPT DRY

a. All excavations shall be kept dry and the Contractor shall provide and maintain a sufficient number of pumps to adequately deal with any inflow of water.
b. Where required by the Engineer, the sumps from which the pumps operate shall be constructed outside the area of the foundation base.
c. Where in the opinion of the Engineer, the foundation has become soft and additional excavation is required due solely to the Contractor's method of working, the additional excavation required and backfilling with approved material or concrete Class D as may be directed by the Engineer, shall be at the Contractor's expenses.

3.3.6 FOUNDATIONS CAST AGAINST THE IN-SITU MATERIAL

Where shown in the drawings or directed by the Engineer that the foundation shall be cast against the existing soil, the excavation shall be neatly excavated to the shape required. Where the foundation is inadvertently over -excavated, the space between the foundation and the soil face shall be back-filled with concrete class D as directed by the Engineer at the Contractor's expense.

3.3.7 OVER-EXCAVATION

Any extra excavation beyond the limit specified or ordered shall be filled by the Contractor at his own expense with concrete class D or approved compacted fill· as the Engineer may require.

3.3.8 BACKFILL

a. No filing around a structure shall commence neither shall be loaded without the approval of the Engineer but despite this approval the Contractor shall at all times be responsible for any damage done to the structure.
b. The sequence of filling behind and around a structure and the maximum difference in height at any time between the backfill levels shall be as directed by the Engineer.
c. Backfilling shall be of selected material, as directed by the Engineer brought up in horizontal layers not exceeding 0.15m loose thickness. Each layer shall be thoroughly mixed, watered or dried as necessary and compacted to a minimum of 105% B.S. Compaction.

4. CONCRETE

Scope of Section

This section covers the materials, design of mixes, mixing, transport, planning, compaction and curing of concrete and mortar required in the Works. It also covers frame work and reinforcement for concrete.

Definitions

Structural concrete in any class of concrete which is used in reinforced, pre -stressed or unreinforced concrete construction, which is subject to stress.

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

A formed surface is a face which has been cast against formwork.

An unformed surface is a horizontal or nearly horizontal surface produced by screeding or toweling to the level and finish required.

A pour refers to the operation of placing concrete into any mould, bay or formwork, etc and also to the volume which has to be filled. Pours in vertical succession are referred to as lifts.

4.1 THE DESIGN OF CONRETE MIXES

a. Classes of concrete

The Classes of structural concrete to be used in the works shall be those shown on the Drawings and designated in table 4.1 in which the class designation includes two figures. The first figure is the nominal strength at 28 days expressed in N/mm2 and the second figure is the maximum nominal size of aggregate in the mix expressed in millimeters

b. Design of Proposed Mixes to BSS5328

The Contractor shall design all the concrete mixes called for on the Drawings, making use of the ingredients which have been approved by the Engineer for use in the works and in compliance with the following requirements: -

i The aggregate portion shall be well graded from the nominal maximum size of stone down to the 150-micron size.

ii The cement content shall be such as to achieve the strengths called for in table 4.1 but in any case, not less than the minimum necessary for impermeability and durability shown in Table 4.1 but generally 42.5N/mm2 strength for structural and other works.

iii The workability shall be consistent with ease of placing and proper presence of reinforcement and other destructions.

iv The water/cement ratio shall be the minimum consistent with adequate workability but in any case, not greater than that shown in Table 4.1 taking due account of any water contained in the aggregates. The Contractor shall take into account that this requirement may in certain cases require the inclusion of a workability agent in the mix.

The drying shrinkage determined in accordance with BS1881 shall not be greater than 0.05 per cent.

TABLE 4.1 - MINIMUM CEMENT CONTENT				
Class of Concrete		**Minimum Cement Content kg/m3 of compacted concrete**		
	Moderate Exposure		**Intermediate Exposure**	**Severe Exposure**
10/75; 15/75		200	220	270
15/40;	20/40, 25/40			
30/40		240	270	290
15/20; 20/20, 25/20				
30/20		260	300	330
40/20		300	320	330
20/10; 25/10, 30/10		300	340	390
40/10		340	340	390

Note: The minimum cement contents shown in the above table are required in order to achieve impermeability and durability. In order to meet the strength requirements in the Specification higher contents may be required.

The categories applicable to the works are based broadly on the factors listed hereunder:

Moderate Exposure: Surface sheltered from sewer rain Buried concrete, concrete continuously under water

Intermediate Exposure: Surface exposed to driving rain; alternate wetting and drying: corrosive fumes: heavy condensation

Severe Exposure: Surface exposed to sea water, moorland water having a pH of 4.5 or less, groundwater containing sulphates.

c. Trial Mixes

At least six weeks before commencing placement of concrete in the Permanent Works trial mixes shall be prepared for each class of concrete Specified.

For each mix of concrete for which the Contractor has prepared a design, He shall prepare three separate batches of concrete using the materials which have been approved for use in the works and the mixing Plant which he proposes to use for the Works. The volume of each batch shall be the capacity of the concrete mixes proposed for full production.

Samples shall be taken from each batch and the following action taken, all in accordance with BS1881: - or Local Standards

(i) The slump of the concrete shall be determined.

(ii) Six test cubes shall be cast from each batch. In the case of concrete having a maximum aggregate size of 40mm of less, 130mm cubes shall be used. In the case of concrete containing 75mm of larger

aggregate. 200mm cubes shall be used and in addition any pieces of aggregate retained on a 53mm standard sieve shall be removed from the mixed concrete before casting the cubes.

(iii) Three cubes from each batch shall be tested for compressive strength at seven days and the remaining three at 28 days.

(iv) The density of all the cubes shall be determined before the strength tests are carried out.

Until compliance with the Specification has been established the frequency of sampling shall be three times that stated above or such lower frequency as may be instructed by the Engineer.

d. Testing

(i) The slump or compacting factor of the concrete shall be determined for each batch from which samples are taken and in addition for other batches at the frequency instructed by the Engineer.

The slump of the concrete in any batch shall not differ from the value established by the trial mixes by more than 25mm or one third of the value, whichever is the greater.

The variation in value of the compacting factor, if used in place of a slump value, shall be within the following limits.

For value of 0.9 or more +0.03

For value of between 0.8 and 0.9 +0.04

For values of 0.8 or less +0.05

(ii) The water/cement ration as estimated from the results of above, determined by samples from any batch shall not very by more than five per cent from the value established during the trail mixes.

(iii) The air content of air entrained concrete in any batch shall be within 1.5 units of the required value and the average value of four consecutive measurements shall be within 1.0 unit of the required value, expressed as a percentage of the volume of freshly mixed concrete.

(iv) When test cube results are available for at least 20 consecutive batches of any class of concrete mixed in any one plant, the average of any four consecutive results at 28 days shall exceed the nominal strength by not less than half the current margin (see below) and each individual result shall not be less than 85 percent of the nominal strength.

The current margin shall be defined as 1.64 times the standard deviation of cube tests on at least 20 separate consecutive batches produced from one plant over a period exceeding five days but not exceeding six months or on at least 50 separate consecutive batches produced from one plant over a period not exceeding 12 months. If both figures are available, the smaller shall be taken.

The current margin shall in any case not be less than the figure given below: -

Minimum Current Margin for and above				
	Batches	10N/mm2	15N/mm2	20N/mm2 and above
After 20 Batches		3.3	5	7.5
After 20 Batches		1.7	2.3	3.8

Failure to comply with requirements if any one test cube result in a group of four consecutive results is less than 85% of the nominal strength but the average of the group of which it is part satisfies the strength requirement, then only the batch from which the failed cube was taken shall be deemed not to comply with the Specification. If more than one cube result in a group of four consecutive results is less than 85% of the nominal strength or if the average strength of the group fails to satisfy the strength requirement, then all the batches between those represented by the first and last cubes in the group shall be deemed not to comply with the Specification, and the Contractor shall immediately adjust the mix design subject to the agreement of the Engineer to restore compliance with the Specification. The Contractor shall take necessary action to remedy concrete which does not comply with this Specification. Such action may include but is not necessarily confined to the following:

i Increasing the frequency of sampling until control is again established.

ii Cutting test cubes from the concrete and testing in accordance with BS1881.

iii Carrying out strengthening or other remedial work to the concrete where possible or appropriate

iv Carrying out non-destructive testing such as load tests on beams.

TABLE 4.2: CONCRETE GRADES

Concrete Grade	Characteristic Compressive Strength at 28 Days (MPa)	Typical Use
C10	10	Blinding concrete, trench fill
C15	15	Non-structural concrete works
C20	20	Domestic slabs, foundations
C25	25	Reinforced foundations and slabs
C30	30	Structural concrete, pavements
C35	35	Heavily loaded structural members
C40	40	Industrial and commercial structures
C45	45	High-strength structural elements
C50	50	Heavy-duty reinforced concrete
C55	55	Special structural applications
C60	60	High-performance concrete

4.2 MIXING CONCRETE

Before any plant for batching mixing transporting, placing, compacting and finishing concrete is ordered or delivered to site, the Contractor shall submit to the Engineer full details including drawings of all the plant which he proposes to use and arrangements he proposes to make.

Concrete for the Works shall be batched and mixed in one or more central plants unless the Engineer agrees to some other arrangement. If the Contractor proposes to use ready mixed concrete, he shall submit to the Engineer for his approval full details and test results of the concrete mixes. The Engineer may approve the use of ready mixed concrete provided that: -

i The proposed mixes, the material to be used and the method of storage and mixing comply with the requirements of the Specification and

ii Adequate control is exercised during mixing Approval to the use of ready mixed concrete may be withdrawn if the Engineer is not satisfied with the control of the materials being used and control during mixing.

Batching and mixing plants shall be modern efficient equipment complying with the requirements of BSS 1305 and capable of producing a uniform distribution of the ingredients throughout the mass.

Truck mixes shall comply with the requirements of BSS 8110 and shall only be used with the prior agreement of the engineer. If the plant proposed by the Contractor does not fall within the scope of BSS 8110, it shall have been tested in accordance with BSS 3963 and shall have a mixing performance within the limits specified in BSS1305.

All mixing operations shall be under the control of an experienced supervisor.

The aggregate storage bins shall be provided with drainage facilities arranged so that drainage water is not discharged to the weigh hoppers. Each bin shall be drawn down at least once per week and any accumulation of mud or silt removed.

Cement and aggregate shall be batched by weight. Water may be measured by weight or volume.

The weighing and water dispensing mechanisms shall be maintained in good order. Their accuracy shall be maintained within the tolerances described in BSS1305 and checked against accurate weights and volumes when required by the Engineer

The weights of cement and of each size of aggregate as indicated by the mechanisms employed shall be the respective weights per batch agreed by the Engineer.

The Contractor shall provide standard test weights at least equivalent to the maximum working load used on the most heavily loaded scale and other auxiliary equipment required for checking the satisfactory operation of each scale or other measuring

device. Tests shall be made by the Contractor at least once a week or at intervals to be determined by the Engineer and shall be carried out in his presence. For the purpose of carrying out these tests, there shall be easy access for personnel to the weigh hoppers. The Contractor shall furnish the Engineer with copies of the complete results of all check tests and shall make any adjustments, repairs or replacements necessary to ensure satisfactory performance. The nominal drum or pan capacity of the mixer shall not be exceeded. The turning speed and the mixing time shall be as recommended by the manufacturer but in addition, when water is the last

ingredient to be added, mixing shall continue for at least one minute after all the water has been added to the drum or pan.

The blades of pan mixers shall be maintained within the tolerances specified by the manufacturer of the mixer and the blades shall be replaced when it is no longer possible to maintain the tolerances by adjustment.

Mixers shall be fitted with an adjustment recorder registering the number of batches discharged.

The water to be added to the mix shall be reduced by the amount of free water contained in the coarse and fins aggregates. This amount shall be determined by the Contractor by a method agreed by the Engineer immediately before mixing begins each day and thereafter at least once per hour during concreting and for each delivery of aggregates during concreting. When the correct quantity of water, determined as set out in the Specification has been added to the mix, no further water shall be added, either during mixing or subsequently.

After mixing for the required time, each batch shall be discharged completely from the mixer before any materials for the succeeding batch are introduced.

Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before any fresh concrete is mixed and thereafter the first batch of concrete through the mixers shall contain only half the normal quantity of coarse aggregate. This batch shall be mixed for one minute for one minute longer than the time applicable to a normal batch.

Mixers shall be cleaned out before changing to another type of cement.

4.3. HAND - MIXED CONCRETE

Concrete for structural purposes shall not be mixed by hand. Where non-structural concrete is required, hand mixing may be carried out subject to the agreement of the Engineer.

The mixing shall be done on hard impermeable surface. The materials shall be turned over not less than three times dry; water shall then be sprayed on and the materials again turned over not less than three times in a wet condition and worked together until a mixture of uniform consistency is obtained.

For hand mixed concrete the specified quantities of cement shall be increased by 10% and not more than 0.5 cubic meters shall be mixed at one time. During windy Weather efficient precautions shall be taken to prevent cement from being blown away during the process of gauging and mixing.

4.4 TRANSPORT OF CONCRETE

The concrete shall be discharged from the mixer and transported to the works by means which shall prevent adulteration, segregation or loss of ingredients, and which shall ensure that the concrete is of the required workability at the point and time of placing. The loss of slump between discharge from the mixer and placing shall not exceed 25mm.

The time elapsing between mixing and placing a batch concrete shall be as short as practicable as and, in any case, not longer than will permit completion of placing and compaction before the onset of initial set. If the placing of any batch of concrete is delayed this period, the concrete shall not be placed in the Work.

4.5 PLACING OF CONCRETE

a. Consent for Placing

Concrete shall not be placing in any part of the works until the Engineer's consent has been given in writing and the Contractor shall give the Engineer at least 1 full working days' notice of his intention to place concrete.

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

b. Preparation of surface to receive concrete.

This work shall consist of preparing all existing ground, subgrade, rock, soil, previously cast concrete, masonry, or other surfaces that are to receive new concrete, to ensure proper bond, uniform support, and compliance with the contract requirements. The following materials and equipment are required for cleaning the surface for concrete

- Mechanical brushes, wire brushes, air compressors, water jets, and approved cleaning equipment.
- Approved bonding agents where specified on drawings or directed by the Engineer.
- Water for cleaning and pre-wetting surfaces shall be clean and free from harmful substances.

All surfaces receiving concrete shall be thoroughly cleaned and prepared immediately before concrete placement. Surfaces shall be free from loose material, dust, dirt, mud, oil, grease, laitance, curing compounds, paint, organic matter, standing water, and other deleterious substances that may impair bond or concrete quality.

Earth and Subgrade Surfaces

The subgrade shall be trimmed to the required lines, grades, and cross-sections.

Soft, loose, unstable, or unsuitable materials shall be removed and replaced with approved material compacted to the specified density. The prepared surface shall be firm, uniform, and adequately compacted. Immediately prior to concreting, the subgrade shall be lightly moistened as required, without leaving standing water.

Rock Surfaces

Loose, fractured, weathered, or unsound rock shall be removed.

Rock surfaces shall be cleaned of dust and debris by air blasting, water jetting, or other approved methods.

Depressions and irregularities shall be treated as directed by the Engineer.

Existing Concrete Surfaces

Existing concrete intended to bond with new concrete shall be roughened to expose sound aggregate and remove laitance and weak surface material.

The surface shall be cleaned by approved mechanical or water-blasting methods.

Prior to placing new concrete, the prepared surface shall be brought to a saturated surface-dry (SSD) condition unless otherwise specified.

Bonding agents or cement grout shall be applied where indicated in the design documents or directed by the Engineer.

Reinforcement and Embedded Items

Reinforcement, dowels, anchors, inserts, and embedded items shall be securely fixed in position and free from rust scale, oil, mud, paint, or other contaminants.

Any loose rust or foreign matter shall be removed before concrete placement.

Inspection and Approval

No concrete shall be placed until the prepared surface has been inspected and approved by the Engineer.

Any deterioration or contamination occurring after approval and before concrete placement shall be corrected at the Contractor's expense.

Quality Requirements

The prepared surface shall provide adequate support and bonding for the concrete.

Surface preparation shall comply with the project drawings, applicable standards, and the Engineer's instructions.

Concrete placement shall commence as soon as practical after surface preparation to avoid contamination or deterioration of the prepared surface.

c. Placing Procedures

The concrete shall be deposited as nearly as possible in its final position. It shall be placed so as to avoid segregation of the concrete and displacement of the reinforcement, other embedded items, or formwork. It shall be brought up in layers approximately parallel to the construction joint planes and not exceeding 300mm in compacted thickness unless otherwise permitted or directed by the Engineer, but the layer shall not be thinner than four times the maximum size of aggregate.

Layers shall not be placed so that they from feather edges nor shall they be placed on a previous layer which has taken its initial set. In order to comply with this requirement, a layer may be started before completion of the preceding layer.

All the concrete in a single bay or pour shall be placed as a continuous operation. It shall be carefully worked round all obstructions, irregularities in the foundations and the like so that all parts are completely full of compacted concrete with no segregation or honeycombing. It shall also be carefully worked round and between water stops, reinforcement, embedded steelwork and similar items which protrude above the surface of the completed pour. All work shall be completed on each batch of concrete before its initial set commences and thereafter the concrete shall not be disturbed before it has set hard. No concrete that has partially hardened during transit shall be used in the Works and the transport of concrete from the mixer to the point of placing shall be such that this requirement can be complied with

Concrete shall not be placed during rain which is sufficiently heavy or prolonged to wash mortar from coarse aggregate on the exposed faces of fresh concrete. Means shall be provided to remove any water accumulating on the surface of the placed concrete. Concrete shall not be deposited into such accumulations of water.

In drying weather, covers shall be provided for all fresh concrete surfaces which are not being worked on. Water shall not be added to concrete for any reason.

When concrete is discharged above its place of final deposition, aggregation shall be prevented by the use of chutes, down pipes, trunking, baffles or other appropriate devices, as approved by the Engineer.

Forms for walls, columns and other thin sections of the significant height shall be provided with opening or other devices that will permit the concrete to be placed in a manner that will prevent segregation and accumulations of hardened concrete on the formwork or reinforcement above the level of the placed concrete.

d. Interruption to placing.

If concrete placing is interrupted for any reason and the duration of the interruption cannot be forecast or is likely to be prolonged, the contractor shall immediately take the necessary action to form a construction joint so as to eliminate as far as possible feather edges and sloping top surfaces and shall thoroughly compact the concrete already placed. All work on the concrete shall be completed while it is still plastic, and it shall not thereafter be disturbed until it is hard enough to resist damage. Plant and materials to comply with this requirement shall be readily available at all times during concrete placing.

Before concreting is resumed after such an interruption the Contractor shall cut out and remove all damaged or encompassed concrete, feather edges or any other undesirable features and shall leave a clean sound surface against which the fresh concrete may be placed.

If it becomes possible to resume concrete placing without contravening the Specification and the Engineer consents to resumption, the new concrete shall be thoroughly worked in and compacted against the existing concrete so as to eliminate any cold joints.

e. Dimensions of pours

Unless otherwise agreed by the Engineer, pours shall not be more than two meters high and shall as far as possibly have a uniform thickness over the plan area of the pour. Concrete shall be placed to the full planned height of all pours except in the circumstances described in 4.5 (d) The Contractor shall plan the dimension and sequence of pours in such a way that cracking of the concrete does not take place due to thermal or shrinkage stresses.

f. Placing sequence

The Contractor shall arrange that as far as possible the intervals between placing successive lifts of concrete in one section of the Works are of equal duration. This duration shall normally the not less than three or more than seven days under temperate weather conditions unless otherwise agreed by the Engineer.

Where required by the Engineer to limit the opening of construction joints due to shrinkage, concrete shall not be placed against adjacent concrete which is less than 21 days old.

When the drawing call for contraction gaps in concrete, these shall be of the widths and in the locations shown on the drawings and they shall not be filled until the full-time interval shown on the drawing’s bas elapsed.

4.6 COMPACTION OF CONCRETE

The concrete shall be fully compacted throughout the full extent of the placed layer. It shall be thoroughly worked against his formwork and around any reinforcement and other embedded items, without displacing them. Particular care shall be taken at arises and other confined spaces. Successive layers of the same pour shall be thoroughly worked together. Concrete shall be compacted with the assistance of mechanical immersion vibrators, unless the Engineer agrees another method.

Immersion vibrators shall operate at a frequency of between 7,000 and 10000 cycles per minute. The Contractor shall ensure that vibrators are operated at pressures and voltages not less than those recommended by the manufacture in order that the comp active effort is not reduced.

A sufficient number of vibrators shall be operated to enable the entire quantity of concrete being placed to be vibrated for the necessary period and, in addition, standby vibrators shall be available for instant use at each place where concrete is being placed.

Where the concrete contains aggregate with a nominal size of 75mm or more, vibrators with a diameter of 100mm or more shall be used.

Vibrators shall be continued at each point until the concrete ceases to contract, a thin layer of mortar has appeared on the surface and air bubbles have ceased to appear.

Vibrators shall not be used to move concrete laterally and shall be withdrawn slowly to prevent the formation of voids.

Vibrators shall not be applied by way of reinforcement nor shall vibrators be allowed to touch reinforcement or other embedded items. The vibrators shall be inserted vertically into the concrete to penetrate the layer underneath at regular spacing which shall not exceed the distance from the vibrator over which vibration is visibly effective.

4.7 CURING OF CONCRETE

a. General

Concrete shall be protected during the first stage of hardening from loss of moisture and from the development of temperature differentials within the concrete sufficient to cause cracking. The methods used for curing shall not cause damage of any kind to the concrete.

Curing shall be continued for as long as may be necessary to achieve the above objectives but in any case, for at least seven days or until the concrete it covered by later construction whichever is the shorter period.

The above objectives are dealt with in sub-clause 4.7 (b) and (c) but nothing shall prevent both objectives being achieved by a single method where circumstances permit.

The curing process shall commence as soon as the concrete is hard enough to resist damage from the process, and in the case of large areas or continuous pours, shall commence on the completed section of the pour before the rest of the pour is finished.

Details of the Contractor’s proposals for during concrete shall be submitted to the Engineer before the placing of concrete commences in the Works.

Formed surfaces may be cured by retaining the formwork in place for the required curing period. If the use of the foregoing methods is inappropriate surfaces which will not have further concrete bonded to them and which are not to receive an application of a finish may be cured by the application of a curing compound having an efficiency index of at least 90 per cent. Curing compounds shall contain a fugitive dye to enable the extent of the spread to be seen easily.

Curing compound used on surfaces exposed to the sky shall contain sufficient finely divided flake aluminum in suspension to produce a complete coverage of the surface with a metallic finish when applied at the rate recommended by the manufacturer.

Curing compounds shall become stable and impervious to the evaporation of water from the concrete surface within 60 minutes of application. The material shall not react chemically with the concrete surfaces for at least the

first four days of the curing period. If instructed by the Engineer, the Contractor shall, in addition to the curing provisions set out above provide a suitable form of shading to prevent the direct rays of the sun reaching the concrete surfaces for at least the first four days of the curing period.

b. Loss of Moisture

Exposed concrete surfaces shall be closely covered with impermeable sheeting, properly secured to prevent its removal by wind and the development of air spaces beneath it. Joints in the sheeting shall be lapped by at least 300mm.

If for some reason, it is not possible to use impermeable sheeting, the Contractor shall keep the exposed surfaces continuously wet by means of a water spray or by covering with a water absorbent material which is kept wet, unless this method conflicts with 4.7(c)

Water used for curing shall be of the same quality as that used for mixing

c. Limitation of Temperature Differential

The Contractor shall limit the development of temperature differentials in concrete after placing by any means appropriate to the circumstances including the following: -

(i) Limiting concrete temperatures at placing as set out in 4.9 (b)

(ii) Use of low heat cement, subject to the agreement of the Engineer

(iii) Insulation of exposed concrete surface by insulating blankets. Such blankets shall have an insulation value at least equivalent to 50mm of dry mineral wool.

(iv) Leaving formwork in place during the curing period. Steel forms shall be suitably insulated on the outside.

(v) Preventing rapid dissipation of heat from surfaces by shielding from wind.

(vi) Avoiding the use of water sprays when such use would cause rapid cooling of the surface.

4.8 PROTECTION OF FRESH CONCRETE

Freshly placed concrete shall be protected from rainfall and from water running over the surface until it is sufficiently hard to resist damage from these causes.

No traffic shall be allowed on any concrete surface until such time as it is hard enough to resist damage by such traffic.

Concrete in the Works shall not be subjected to any loading until it has attained at least its nominal strength as defined in table 4.2.

If the Contractor desires to impose loads on newly-placed concrete, he shall make at least three test cubes and cure them in the same conditions as the concrete they represent. These cubes shall be tested singly at suitable intervals in order to estimate the time at which the nominal strength is reached.

4.9 CONCRETING IN HOT WEATHER

a. General

The Contractor shall prevent damage to concrete arising from exposure to extreme temperatures, and shall maintain in good working order all plant and equipment required for this purpose.

In the event that conditions become such that even with the use of the equipment the requirements cannot be met, concrete placing shall immediately cease until such time as the requirements can again be met.

b. Concrete Placing in Hot Weather

During hot weather the Contractor shall take all measures necessary to ensure that the temperature of concrete at the time of placing in the woks does not exceed 30 degrees centigrade and that the concrete does not lose any moisture during transporting and placing.

Such measures may include but are not necessarily limited to the following: -

(i) Shielding aggregates from direct sunshine

(ii) Use of mist water spray on aggregate

(iii) Sun shields on mixing plants and transporting equipment

(iv) Cooling the mixing water if ice is used for this purpose, it should preferably be in flake form. Lump ice shall not be allowed to enter the tank supplying the mixer drum

(v) Covering skips closely with polythene sheet so that the latter is in contact with the concrete

Areas in which concrete is to be placed shall be shielded from direct sunshine and rock or concrete surfaces shall be thoroughly wetted to reduce absorption of water from the concrete placed on or against them.

After concrete in any part of an area has been placed, the selected curing process shall be commended as soon as possible. If any interval occurs between completion of placing and start of curing, the concrete shall be closely covered during the interval with polythene sheet to prevent loss of moisture.

4.10 FINISHES ON UNFORMED SURFACES

Horizontal or nearly horizontal surfaces which are not cast against formwork shall be finished to the class shown on the Drawings and defined hereunder.

UF 1 Finish

All surfaces on which no higher class of finish is called for on the Drawings or instructed by the Engineer shall be given a UF 1 finish

The concrete shall be leveled and screened to produce a uniform plain or ridged surface; surplus concrete being struck off by a straight edge immediately after compaction

UF 2 Finish

This is a floated finish to roof or floor slabs and other surfaces where a hard trowel led surface is not required.

The surfaces shall first be treated at a Class UF 1 finish and after the concrete has hardened sufficiently, it shall be floated by hand or machine sufficiently only to produce a uniform surface free from screed marks.

UF 3 Finish

This is a hard trowel led surface for use where weather resistance or appearance is important, or which is subject to high velocity water flow.

The surface shall be floated as for a UF 2 finish but to the tolerance stated below. When the moisture film has disappeared and the concrete has hardened sufficiently to prevent laitance from being worked to the surface, it shall be steel trowel led under firm pressure to produce a dense, smooth uniform surface free from trowel marks.

TABLE 4.3 SURFACE TOLERANCES

CLASS OF FINISH	TOLERANCES IN MM (see Notes)		
	A	B	C
UF1	Not Applicable	10	20 or -10
UF2	Nil	10	20 or -10
UF3	Nil	5	12.5 or -7.5

NOTES: -

1. Col A is the maximum allowable value of any sudden change of level in the surface.
2. Col. B is the maximum allowable value of any gradual irregularity of the surface, as indicated by the gap between the
   surface and a three-meter-long straight edge or correctly shaped template placed on the surface.
3. Col C is the maximum allowable value of the difference in level or position between a three-meter-long straight edge and correctly shaped template placed on the surface and the specified level or position or that surface.
   Where dimensional tolerance is given on the Drawings or in this Special Specification, they shall take precedence over those given in Table 4.3.

4.11. MORTAR

This Clause covers mortar for use ahead of concrete placing, and other uses not covered elsewhere in the Specification.

Mortar shall be composed of fine aggregate and ordinary Portland cement complying with BSS12. The mix elsewhere in this Specification or if not stated shall be one part of the cement to two parts of fine aggregate by weight.

Small quantities of mortar may be hand mixed but for amounts over 0.5 cubic meters a mechanical mixer shall be used.

The water content of the mortar shall be as low as possible consistent with the use for which it is required but, in any case, the water/cement ratio shall not be more than 0.5.

Mortar which is specified as “dry pack” shall be mixed with sufficient water for the mix to become cohesive but not plastic when squeezed in the hand. Dry pack mortar shall be rammed into the cavity it is required to fill, using a hand rammer with sufficient force to ensure full compaction.

4.12. CONCRETE FOR SECONDARY PURPOSES

a) Non-structural concrete (NS concrete) shall be used only for non-structural purposes, where, shown on the Drawings.

NS concrete shall be composed of ordinary Portland cement complying with BSS 12 and aggregates complying with BSS 882, DIN 1045 including all-in aggregate within the grading limits of BSS882 and DIN4226.

The weight of cement mixed with 0.3 cubic meters of combined or all-in aggregate shall not be less than 50kg. The mix shall be proportioned by weight or by volume. The maximum aggregate size shall be 40mm nominal.

The concrete shall be mixed by machine or by hand to a uniform colour and consistency.

Before placing. The quantity of water used shall not exceed that required to produce a concrete with sufficient workability to be placed and compacted where required.

The concrete shall be compacted by hand or by mechanical vibration.

b) No fines concrete (NF concrete) is intended for use where a porous concrete is required and shall only be used where shown on the Drawings or instructed by the Engineer.

The mix shall consist of ordinary Portland cement complying with BSS 5328. The aggregate size shall be 40mm. Quantity of water shall not exceed that which will coat evenly the whole of the aggregate.

4.13 RECORDS OF CONCRETE PLACING

Records, in a form agreed by the Engineer, shall be kept by the Contractor of the details of every pour of concrete placed in the Works. These records shall include class of concrete, location of pour, date of pour, ambient temperature and concrete temperature at time of placing, moisture contents of aggregates, details of mixes, batch numbers, cement batch number, results of all tests undertaken, location of test cube sample points and details of any cores taken.

The Contractor shall supply to the Engineer four copies of these records each week covering work carried out the preceding week. In addition, he shall supply to the Engineer monthly histograms of all 28-day cube strengths together with accumulative and monthly standard deviations and any other information which the Engineer may require concerning the concrete placed in the works.

4.14 CONSTRUCTION JOINTS

Whenever concrete is to be bonded other concrete which the hardened, the surface of contact between the sections shall be deemed a construction joint.

Where construction joints are shown on the Drawings, the Contractor shall form such joints in those positions. The location of joints which the Contractor requires to make for the purpose of the construction shall be subject to the agreement of the Engineer. Construction joints shall be in vertical or horizontal planes except in sloping slabs where they shall be normal to the exposed surface or elsewhere where the Drawings require a different arrangement.

Construction joints shall be so arranged as to reduce to a minimum the effects of shrinkage in the concrete after placing, and shall be placed in the most advantageous positions with regard to stresses in the structures and the desirability of staggering joints.

Feather edges of concrete at joints shall be avoided and any feather edges which may have formed where reinforcing bars project through a joint shall be cut back until sound concrete has been reached.

The intersections of horizontal or near horizontal joints and exposed faces of concrete shall appear as straight lines produced by use of a guide strip fixed to the formwork at the top of the concrete lift, or by other means acceptable to the Engineer.

Construction joints formed as free surfaces shall not exceed a slope of 20 per cent from the horizontal.

The surface of the fresh concrete in horizontal or near horizontal joints shall be thoroughly cleaned and roughened by means of high-pressure water and air jets when the concrete is hard enough to withstand the treatment without the leaching of cement. The surfaces vertical or near vertical joints shall be similarly treated if circumstances permit the removal of formwork at a suitable time.

Where concrete has become too hard for the above treatment to be successful, the surface whether formed or free is to be thoroughly scrabbled by mechanical means or wet sand blasted and then washed with clean water. The indentations produced by scrabbling shall be not less than 10mm deep and shall not extend closer than 40mm to a finished face.

If instructed by the Engineer the surface of the concrete shall be thoroughly brushed with a thin layer of mortar composed of one part of cement to two parts of sand by weight and complying with clause 4.11 all as set out in immediately prior to the deposition of fresh concrete. The mortar shall be kept just ahead of the fresh concrete shall be thoroughly and systematically vibrated to full depth to ensure complete bond with the adjacent layer.

No mortar or concrete may be placed in position on or against a construction joint until the joint has been inspected and passed by the Engineer.

4.15 EXPANSION AND CONTRACTION JOINTS

Expansion and contraction joints are discontinuities in concrete designed to allow for thermal or other movements in the concrete.

Expansion joints are formed with a gap between the concrete faces to permit subsequent expansion of the concrete. Contraction joints are formed to permit initial contraction of the concrete and may include provision for subsequent filling.

Expansion and contraction joints shall be formed in the positions and in accordance with the details shown on the Drawings of elsewhere in the Specifications.

4.16 WATERSTOPS

All references to water stop include grout stops. Water stops shall be of the material and form shown on the Drawings. No water stop material shall be brought onto site until the Contractor has submitted full details of the materials he proposes to use, including samples, and these have been approved by the Engineer. All samples shall be of adequate length for testing.

Water stops shall be made of material which are resistant to chlorides, sulphates, or other deleterious substances which may be present in the environment of the works.

Rubber water stops may be of natural rubber and shall have an elongation at breaking stress of at least 500 per cent at 24 degrees centigrade and shall allow a joint movement of at least 50mm.

Polyvinyl chloride (PVC) water stops shall be extruded from an unfilled plasticized PVC polymer or copolymer which does not contain any reclaimed or scraps PVC.

PVC water stops shall have an elongation at breaking stress or at least 225 per cent at 25 degrees centigrade and shall allow a joint movement of at least 10mm.

Low modulus water stops shall be of rubber or PVC as described above but shall have an elongation of at least 200 per cent at 25 degrees centigrade under a tensile stress of 6N/mm2 and shall allow a joint movement of at

least 50mm. Water stops shall be supplied in lengths as long as possible consistent with ease of handling and construction requirements.

In rubber or plastic materials, joints other than butt joints shall be supplied ready made by the manufacturer. Butt joints shall be made on site in accordance with the manufacturer's instructions and with equipment supplied for the purpose by the manufacturer. Water stops material shall be stored carefully on site to avoid damage and contamination with oil, grease, or other pollutants. Rubber and plastic water stops shall be stored in cool well-ventilated places away from direct sunlight.

Rubber and plastic water-stops which are embedded in one side of a joint more than one month before the scheduled date of placing concrete on the other side shall be protected from the sun.

Water stops shall be firmly fixed in the formwork so that they cannot be displaced during concrete placing and shall be completely free of all dirt, grease, oil, etc before placing concrete. Where eyelets are provided these shall be fully wire to the reinforcement and be the only means whereby the water stop is fixed. In no circumstances shall a water stop be punctured with nails etc as a means of fixing.

Concrete shall be placed carefully round water stops so as to avoid distortion or displacement and shall be fully compacted. Where water stops lie in a horizontal or nearly horizontal plane the Contractor shall ensure that no voids are left on the underside of the water stop.

Formwork round water stops shall be carefully removed to avoid damage. If water stops suffer any damage which cannot be properly repaired in-situ the Engineer may require a section of concrete to be removed and the water stop replaced.

4.17 GROUTING OF POCKETS AND HOLES AND UNDERPINNING OF BASEPLATES

Packets and holding-down bolt holes shall be thoroughly cleaned out using compressed air and water jet. Holes drilled by a diamond bit shall be roughened. The pockets and holes shall be filled with grout consisting of cement and clean fresh water mixed in proportion of two parts by weight cement to one part by weight of water. The pouring of liquid grout shall cease as soon as each hole is filled and any excess grout on the surface of the concrete foundation shall be completely removed and the surface dried off before the next operation proceeds.

The space between the top surface of foundation concrete and the underside of base plates shall be filled with a special mortar made up in the following proportions: -

Portland cement 50 kg

Fine aggregate	50 kg

An additive acceptable to the Engineer to counteract shrinkage in proportions recommended by the manufacturer.

The special mortar shall be mixed with the lowest water-cement ratio which will result in a consistency of mix of sufficient workability to enable maximum compaction to be achieved.

The special mortar shall be well rammed in horizontally below the base plate and from one edge only until it is extruded from the other three sides. The mortar which has extruded shall then be rammed back to ensure complete support without voids.

4.18 REMEDIAL WORK TO DEFECTIVE SURFACES

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

Defective surfaces shall not be made good by plastering.

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

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

Surface irregularities which are outside the limits of tolerance set out in Clause 4.17 shall be ground down in the manner and to the extent instructed by the Engineer.

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

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

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

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

4.19 BENDING REINFORCEMENT

Unless otherwise shown on the drawings, bending and cutting shall comply with BSS4466

The Contractor shall satisfy himself as to the accuracy of any bar bending schedules supplied and shall be responsible for cutting, bending and fixing the reinforcement in accordance with the Drawings.

Bars shall be bending cold by the application of slow steady pressure. At temperatures below 5 degrees Centigrade the rate of bending shall be reduced, if necessary, to prevent fracture of the steel.

After bending, bars shall be securely tied together in bundles or groups and legibly labelled as set out in BSS 4466.

Reinforcement shall be thoroughly cleaned, and all dirt, scale, loose rust, oil and other contaminants removed before it is placed in the works.

4.20 FIXING REINFORCEMENT

Reinforcement shall be securely fixed in position within a dimensional tolerance of 20mm in any direction parallel to a concrete face and within a tolerance of 5mm at right angles to a face, provided that the cover is not thereby decreased below the minimum shown on the drawings, or if not shown shall be not less than 25mm or the diameter of the bar, whichever is the greater. Cover on distribution steel shall not be less than 15mm or the diameter of the bar whichever is the greater.

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

Spacer blocks shall be used for ensuring that the correct cover is maintained on the reinforcement. Blocks shall be as small as practicable and of a shape agreed by the Engineer. They shall be made of mortar mixed in the proportions of one part of cement to two parts of sand. Wires cast into the block shall be 1.6mm diameter soft annealed iron.

Alternatively, another type of spacer block may be used subject to the Engineer's agreement.

Reinforcement shall be rigidly fixed so that no movement can occur during concrete placing. Any the space to be occupied by the concrete being correctly placed.

No splices shall be made in the reinforcement except were shown on the drawings or agreed by the Engineer. Splice lengths shall be as shown on the drawings. Reinforcement shall not be welded except where required by the Contractor or agreed by the Engineer.

If welding is employed, the procedures shall be as set out in BSS2640 for gas welding or DIN8558 for metal is welding. Full strength butt welds shall only be used for steel complying with BSS4449, and if used on high yield deformed bars complying with BSS4449 the permissible stresses in the vicinity of the weld shall be reduced to those applicable to plain bars complying with that specification.

Mechanical splices shall not be used unless the Engineer agrees otherwise.

The Contractor shall ensure that reinforcement left exposed in the works shall not suffer distortion, displacement or other damage. When it is necessary to bend protruding reinforcement aside temporarily, the radius of the bend shall not be less than four times the bar diameter for mild steel bars or six times the bar diameter for high yield bars. Such bends shall be carefully straightened before concrete placing continues, without leaving residual links or damaging the concrete around them. In no circumstances will heating and bending of high yield bars be permitted.

Bars complying with BSS4461 or other high tensile bars shall not be bent after placing in the works.

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

5. FORMWORK

5.1. FORMWORK FOR CONCRETE

Definitions:

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

False work means the structural elements supporting both the formwork and the Concrete until the concrete becomes self-supporting.

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

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

5.2 CONSTRUCTION OF FORMWORK AND FALSEWORK

Before construction begins, the contractor shall submit to the Engineer drawings showings details of the proposed formwork and false work. Formwork and False work shall be constructed that they support the loads imposed on them by the fresh concrete together with additional stresses imposed by vibrating equipment and by construction traffic, so that after the concrete has hardened the formed faces shall be in positions shown on Drawings within the tolerances set out in Clause 5.6.

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

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

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

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

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

Formwork shall be provided for concrete surfaces at slopes of 30 degrees to the horizontal or steeper.

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

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

The internal and external angles on concrete surfaces shall be formed with fillets and chamfers of the sizes on the Drawings unless otherwise instructed by the Engineer.

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

Supports for formwork for water retaining structures may be bolted to previously place concrete provided the type of bolts and positions of fixing are acceptable to the Engineer. After concreting the Contractor shall remove all support bolts and seal all holes with well rammed cement / sand mortar containing approved waterproofing cement additive. Metal ties which would be left in the concrete shall not be permitted.

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

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

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

Where precast concrete elements are specified for use as permanent formwork, or proposed by the Contractor and agreed by the Engineer, they shall comply with the requirements of the specification.

5.3 PREPARATION OF FORMWORK

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

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

In cases where it necessary to fix reinforcement before placing formwork, all surface preparation of formwork shall be carried out before it is placed into position.

The Contractor shall not allow reinforcement or prestressing tendons to be contaminated with formwork release agent.

Before placing concrete all dirt, construction debris and other foreign matter shall be removed completely from within the placing area.

Before concrete placing commences, all wedges and other adjusting devices shall be secured against movement during concrete placing and the contractor shall maintain a watch on the formwork during placing to ensure that no movement occurs.

5.4. REMOVAL OF FORMWORK

Formwork shall be carefully removed without shock or disturbance to the concrete. No formwork shall be removed until the concrete has gained sufficient strength to withstand safely any stresses to which it may thereby be subjected. The minimum periods which shall elapse between completing of placing concrete and removal of forms are given in table 5.1 and apply to ambient temperatures higher than 10 degrees centigrade. At lower temperatures or if cement other than Ordinary Portland are involved, the Engineer may instruct longer periods.

Alternatively, formwork may be removed when the concrete has attained the strength set out in Table 6.1 provided that the attained strength is determined by making test cubes and curing the under the same conditions as the concrete to which they refer.

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

TABLE 5.1 - MINIMUM PERIODS FOR FORMWORK REMOVAL		
Position of formwork	Min. Period for temperature over 10 degrees Centigrade	Strength to be attained
Vertical or near vertical faces of mass concrete	48 hours	0.2 C
Vertical or near vertical faces of reinforced walls, beams and columns	4 days	0.3 C
Underside or arches beams and slabs (formwork only)	7 days	0.5 C
Support to under of arches, beams and slabs	14 days	C
Arches lining in tunnels and underground works	4 days	4 N / mm2

Note:

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

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

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

5.5 SURFACE FINISHES ON FORMED SURFACES

Classes of finish

The surface finish to be achieved on formed concrete surfaces shall be as shown on the Drawings and defined hereunder:

a) Class F1 finish

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

b) Class F2 finish

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

c) Class F3 finish

This finish is for surfaces which will be in contact with water flowing at high velocity, and for surfaces prominently exposed to view good appearance is for special importance. To achieve this finish, which shall be free of board marks, the formwork shall be faced with plywood complying with BSS6566 or equivalent material in large sheets. The sheets shall be arranged in an approved pattern. Wherever possible, joints between sheets shall be arranged to coincide with architectural features or changes in direction of the surface.

All joints between panels shall be vertical and horizontal unless otherwise directed. Suitable joints shall be provided between sheets to maintain accurate alignment in the plane of the sheets. Unfaced wrought boarding or standard steel panel will not be permitted for Class F3 finish. The Contractor shall ensure that the surface is protected from rust marks, spillages and stains of all kinds.

d) Curved surfaces

For curved surfaces where F2 or F3 finishes are called for, the formwork face shall be built up of splices cut to make a tight surface which shall be dressed to produce the required finish.

Alternatively single curvature surfaces may be faced with plaster or plywood linings attached to the backing with the adhesive or with escutcheon pins driven flush. Linings shall not bulge, wrinkle or otherwise deform when the subject to temperature and moisture changes**.**

5.6 TOLERANCES.

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

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

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

TABLE 5.2

Class of Finish	Tolerance in mm (See Note below for explanations)		
	A	B	C
F1	10	10	+25 or -10
F2	5	10	+ or -15
F3	2	5	+ or -10

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

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

B Is a gradual deviation from a plane surface as indicated by a straight edge 3 m long.

In the case of curved surfaces, the straight edge shall be replaced by a correctly shaped template.

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

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6 . MASONRY

6.1 GENERAL

All masonry work shall be constructed from Concrete Blocks or building stone as specified on drawings.

For culvert headwalls and other small works, the stone shall, unless otherwise specified, be rough dressed.

For walls, facing and other exposed works the stone shall unless otherwise specified, be medium chisel-dressed.

6.2 WORKMANSHIP

The Contractor shall provide and use proper setting out rods for all work.

The Contractor shall provide and use proper setting out rods for all work. Stones shall be all soaked before use and the tops of walls shall be kept wet as the work proceeds. The stones shall be properly bonded so that no vertical joint in a course is within 115mm of a joint in the previous course. Alternate courses of walling at angles and intersections shall be carried through the full thickness of the adjoining walls. All perpendiculars reveals and other angles of the walling shall be built strictly true and square. The stones shall be bedded, jointed and pointed in mortar 1 to 3 with beds and joints 9mm thick flushed up and grouted solid as the work proceeds. All masonry work shall be cured in accordance with the relevant requirements of Clause 4.7.

6.3 CAST STONEWORK

Facing stones shall be brought up in courses to a height not exceeding 1 meter at a time, the concrete backing being brought up and well incorporated into and round the backs of the stones and the projecting metal ties to ensure a complete bond. The stones shall be bonded and jointed as shown on the Drawings.

All materials, moulds, mixing, casting and surface treatment, setting, jointing and pointing, and all centering, scaffolding and labour required to complete the cast stonework specified or as shown on the Drawings, shall be included in the rates for such work,

7. MATERIALS

7.1 GENERAL

The approval in writing or otherwise by the Engineer of any materials shall not in any way whatsoever relieve the Contractor from any liability or obligation under the contract and no claim by the Contractor on account of the failure, insufficient or unsuitability of any such materials will be
entertained.

a) All items shall be suitable for water works purposes and for use with cold water installation and operation being in a tropical climate.

b) All item hereinafter specified shall be to such other Standard or Specification which in the opinion of the Engineer provides for a quality of material and workmanship not inferior to the Standard quoted. The Standard or Specification must be submitted to the Engineer for approval before commencement of work.

c) All ferrous pipes and fittings shall be coated with a bituminous protective paint suitable for use in and transport through a tropical climate.

d) The Contractor shall supply to the Employer a certificate stating that each item supplied has been subjected to the tests hereinafter laid down and conforms in all respects to the said Specification.

e) The Contractor shall provide adequate protection to all piping. Flanged items and valves so as to guard effectively against damage in transit and storage and ingress of foreign matter inside the valves.

f) All pipe work and fittings shall be subjected to a work hydrated test pressure, which shall be not less than twice the maximum operating pressure.

g) The Contractor should exercise diligence to provide the best material.

h) Where applicable the manufacture's Specification should accompany all offers. The name of the manufacturer must in every case be stated.

i) Where necessary the Contractor shall provide rubber gaskets to comply with BS 4865 and all other bolts, nuts etc. to undertake jointing at fittings etc.

j) Any article required under this Contract. Which are found to be faulty due to a crack, flaw or any other reason or is not in accordance with the Specification stipulated will not be accepted nor will the Employer be liable for any charges in respect of such an article. Where any such rejected article can, in the opinion of the Engineer, be rendered usable, the Contractor may deal with it accordingly and include it in the Contract at a price to be mutually agreed.

Straight pipes which have been cut will be accepted provided the length is not less than 4 meters or two thirds of the standard length whichever is the lesser and will be pricedpro -rata.

k) Wherever possible, sample of pipes and fittings shall be submitting for approval of the Engineer prior to the contractor obtaining the total requirements.

7.2 GALVANISED PIPES AND SPECIALS

All Galvanized pipes shall conform to BS 1387 and BS 729 for medium piping. The pipes shall be screwed and socketed or flanged.

All specials shall be of such dimensions as will mate with the piping supplied. Screw down stop valves shall conform to BS 1010. Barrel nipples shall conform to BS 21 and all other special shall conform to BS 143.
All pipes supplied shall be certified by the manufacturer to have been tested in accordance with the relevant standard specification.

7.3 STEEL PIPES AND FITTINGS

7.3.1 Standard of Manufacture

Steel pipes will be manufactured to AWWA C200. Pipes from DN150mm and above will be manufactured with a spiral weld seam or with a spiral seam or longitudinal weld seam. Automatic submerged-arc fusion welding from both sides shall be used.

7.3.2 Design criteria, steel grade, minimum thicknesses and working pressures

7.3.2.1 Design Criteria

Steel grades and wall thicknesses shall meet the following criteria set out in AWWA M11 (Design manual for steel water pipe):
Internal Working Pressure of 16bars, utilization factor: 50% of min. yield stress 3% max. deflection under Trench and Vehicle Loads for 1-3 m soil cover
Resistance to Buckling (Factor of Safety 2.5) under above Loads
Pipe Stiffness of 2000N/m2 for Handling (CIRIA 78 Report)
The supplier shall provide calculations to this effect.
Steels used shall be ASTM A570 Grade 33 (228 Mpa yield stress) or equivalent/superior minimum yield stress.
The working pressures and test pressures for the minimum wall thickness shall be as follows:

Out Side Diameter (mm)	Min Wall Thickness (mm)	Max Working Pressure (Bar)	Works Test Pressure (Bars)
88.9	2.6	67	100
114.3	2.6	52	78
168.3	2.9	39	59
219.1	2.9	30	45
273.0	3.2	27	40
323.9	3.6	25	38
355.6	4.0	26	38
406.4	4.0	22	34
457.2	4.5	22	34
508.0	4.5	20	30
610.0	5.0	19	28

711.0	5.0	16	24
812.8	6.3	18	27
914.4	7.1	18	27
1016	8.0	18	27
1219.2	10.0	19	28
1422.4	12.5	20	30
1625.6	14.2	20	30
1829.0	14.2	18	27
2032.0	16.0	18	27

7.3.3 Pipe Ends

Pipes shall be joined by either bolted sleeve couplings to AWWA C219 or be manufactured with integrally formed push fit socket and spigot joints to AWWA C200 4.13.6.

Pipes to be joined with bolted sleeve type couplings shall be delivered with plain ends square to the axis with the external spiral weld bead ground back 203mm.

Pipe with socket and spigot push fit joints shall be have the socket hot or cold expanded to incorporate an internal groove for fitting of the rubber gasket either is the socket or the spigot. The rubber gasket shall conform to BS2494 Type W. The external weld on the spigot end shall be ground back 203mm from the pipe ends.

7.3.4 Lengths, Dimensional Tolerances and Visual Inspection.

7.3.4.1 Pipes shall be delivered with 12 m length from 323.9 mm and above and 6m lengths for below 323.9mm. Tolerance on length will be +/ -51mm (AWWA C200 4.12.4)

7.3.4.2 Tolerance on diameters over a distance L from pipe ends shall be as follows:

Tolerances (mm)	L(mm)	Pipe Outside Diameter (mm)
+1.6/-0.8	100	88.9 - 323.9
+1.6/-1.6	150	355.6 - 1219
+1.6/-3.0	150	1422
+3.0/-3.0	150	1626 - 1829

7.3.4.3 Circumferential Tolerances of Pipe Body shall not exceed +/-1.00% of the pipe outside circumference but not exceeding a maximum of 19mm (AWWA C200 4.12.2).

7.3.4.4 Wall thickness tolerances shall not exceed +/-7.5% of the specified wall thickness

7.3.4.5 Maximum deviation from straightness shall not exceed 3.2mm over a length of 3000mm (AWWA C200 4.12.3).

7.3.4.6 Weld bead height shall not exceed 3.2mm

7.3.4.7 Defects in the parent metal of the pipe such as dents, scabs, tears, laps, slivers not greater than 12.5 percent of wall thickness shall be removed by grinding and smoothly dressed to match the pipe contour provided the minimum wall thickness tolerance is not exceeded. Defects greater than 12.5 percent of wall thickness will not be accepted. Cracks, sweats and leaks in welds shall not be acceptable.

7.3.4.8 Radial Offset of weld seams shall be 1.6mm or 0.1875 wall thickness whichever larger for thicknesses 9.5mm or less and 3.2mm or 0.1875 wall thickness for thicknesses above 9.5mm (AWWA C200 Sec 4.10.1).

7.3.5 Testing

7.3.5.1 Hydrostatic Testing

All pipes shall be hydrostatically tested. Works Test Pressures shall be carried to induce a hoop stress of 75% of the minimum yield stress of the steel

The results of all hydrostatic tests shall be recorded on a pressure recording chart. All test pressures must be held for a minimum of 10 seconds.

7.3.5.2 Destructive Testing

One set of production weld tests consisting of reduce section tensile tests, bend tests and etching tests shall be carried out on each batch of pipes in accordance with AWWA C200 Section 4.11.5. One batch is defined as 915 meters of pipes having the same diameter, thickness and steel grade

7.3.6 Chemical Composition

The steel manufacturer shall furnish a ladle analysis of each heat of steel supplied and the analysis shall conform to the requirements of ASTM A 570

7.3.7 Pipe Repairs

7.3.7.1 Pipes with defects exceeding the 12.5 percent limitation of Clause 1.4.7 shall be disposed of in following way:

7.3.7.2 Defect removed and cavity cleaned.

7.3.7.3 Defect repaired by automatic or manual welding according qualified under 4.11.2.1 or 4.11.3.1 of AWWA C200

7.3.7.4 Hydrostatic testing of the repaired pipe

7.3.7.5 Cutting off of the section containing the defect provided length limits are met.

All weld repairs shall be carried out in accordance with AWWA C200 4.11.8.

7.3.8 Pipe Couplings

7.3.8.1 Plain ends of pipes and fittings will be joined using bolted, sleeve-type couplings and manufactured in accordance with AWWA C219 (Standard for

Bolted, Sleeve Type Couplings) and rated at PN 25. Deflections will be as per Table 3 of AWWA C219.

7.3.8.2 End rings and canter sleeves will be manufactured from specially shaped hot rolled steel tee sections and hot rolled steel coil respectively. After rolling into circular sections, ends will undergo automatic flash welding and welds will be tested by internal radial expansion.

7.3.8.3 All couplings will be coated internally and externally in fusion bonded epoxy to AWWA C213 to a thickness of 300-400 microns.

7.3.8.4 All coatings will be holiday tested and checked for thickness.

7.3.8.5 Rubber gaskets will be to BS2494 Type W (Nitrile) and suitable for portable water.

7.3.8.6 Bolts, nuts and washers will be hot dipped galvanized to BS729 with minimum coating weight of 305 gms/m2.

7.3.9 Fittings, flanges and flange gaskets.

7.3.9.1 All fittings shall be manufactured from pipes that have been previously successfully tested. All new welds made during the fabrication of the fittings shall be subjected to non-destructive testing using wither radiological, ultrasonic or dye penetrants or a combination of these depending on the geometry of the weld.

7.3.9.2 Fittings will have dimensions in accordance with BS534 or AWWA C208 depending on the client's preference. If required fittings can be manufactured with dimensions in accordance with Ductile Iron specifications BS4772 or ISO2531. If required fittings will be reinforced in accordance with AWWA M11 and AWWA C208.

7.3.9.3 Calculation of wall thickness of bends will be carried out in accordance with AWWA C208. Reinforcement of Tees and washout tees shall be carried out with AWWA M11 and AWWA C208 respectively.

7.3.9.4 Flanges shall be manufactured in accordance with the relevant table of BS4504 for steel flanges.

7.3.9.5 Flanges gaskets will be manufactured with dimensions to BS4865 Part 1 and shall be of the inside bolt circle diameter type with material to BS2494 Type W for potable water.

7.3.9.6 Flange Bolts, nuts and washers shall manufacture to BS4190 and BS4320 respectively and hot dipped galvanized to BS729 with a minimum coating weight of 305 gms/m2.

7.3.10 External Coatings of Pipes and Fittings

7.3.10.1 Prior to external and internal lining, all Pipes and Fittings will be grit blasted to ISO8501-1 SA2.5 quality with a surface profile of 38-102 microns. All grit blasting machines will be fitted with air-wash systems to remove dust and fines from the surfaces during grit blasting. All surfaces will be cleaned of dust by compressed air prior to coating or lining.

7.3.10.2 Pipes and fittings will be coated externally in fusion bonded epoxy powder to AWWA C213 to a thickness of 300-400 microns. Pipes will be electrostatically sprayed and fittings will be coated using a combination of electrostatic sprays and fluidized beds.

7.3.10.3 Prior to startup of coating, the following tests will be done on epoxy powder or on steel plate specimens coated with epoxy powder by the epoxy manufacturer or the coating contractor in accordance with AWWA C213 Clause 5.3.2.

7.3.10.4 During production external epoxy coatings will be tested by the pipe coating contractor according to AWWA C213 Clause 5.3.3

7.3.10.4.1 Electrical continuity, every pipe and fitting

7.3.10.4.2 Thickness, every pipe and fitting8.3.7.4.3 Adhesion, every 10 pipes and fittings

7.3.11 Cement Mortar Linings for Pipes and Fittings

7.3.11.1 All Pipes and fittings will be lined internally in cement mortar to AWWA C205.

7.3.11.2 Prior to cement mortar lining, all surfaces will clean to remove any loose or other foreign matter that could interfere with the adherence of the cement mortar.

(i) Portland cement shall conform to ASTM C150 Type 1 or 2

(ii) Sand shall consist of inert materials having hard, strong, durable, uncoated grains conforming to ASTM C33. Sand shall be graded according to the following envelope and a sieve analysis shall be done for each day of sifting and recorded:

Size	% Passing
1.18 mm	100
600 microns	60-90
425 microns	30-98
300 microns	10-95
212 microns	5-75
150 microns	2-30
75 microns	0-2

(iii) Water used shall be clean, odorless and free from quantities of organic matter, alkali, salt or other impurities that might reduce the strength, durability or other desirable qualities of the mortar.

(iv) Pipes will be lined using a retracting rotating spraying head that will deposit a circumferential layer of cement mortar on the internal surfaces of the pipe before the pipe is rotated at high speed for a short period of time to smoothen the lining. The pipe surface may be subjected to vibration to aid smoothening of the lining.

(v) The cement to sand ratio will be 1:1 by weight and shall be checked each day of lining application. The water to cement ratio shall not exceed 0.46:1 and shall also be checked each day of lining application.

(vi) Lining thicknesses shall be in accordance with AWWA C205 Table 1 as follows:

Pipe DN	Nom Thickness	Tolerance
80-250	6	-1.6/+3.2
280-580	8	-1.6/+3.2
600-900	10	-1.6/+3.2
>900	13	-1.6/+3.2

Lining Thicknesses shall be measured on each pipe using a graduated steel point for wet linings or with an electromagnetic or magnetic measuring instrument for dry linings. The average of thickness readings taken from 4 points spaced at 90 degrees along any cross-sectional plane at least 50mm from the pipe ends shall be calculated and this average shall fall within the tolerances above

(vii) Compression Tests on Mortar Lining Test Cylinders shall be done weekly in accordance with AWWA C205 Section 4.8. Compressive strength shall reach 18MPa in 7 days and 31MPa in 28 days

(viii) Curing shall be done in accordance with Section 4.7 of AWWA C205. Curing shall take place under an ambient temperature of more than 5 deg C and pipes shall be kept shaded for the first 24 hours after lining to prevent cracking.

Pipe ends shall be sealed with plastic end caps not later than 30 minutes after lining and the internals kept wet during the curing period. Linings have to be cured for a minimum of 4 days before shipment.

(ix) Cracks in Linings shall not exceed 1.6mm. Cracks wider than 1.6mm shall be repaired unless it can be demonstrated to the satisfaction of the purchaser that cracks will heal autogenously under constant soaking of water.

(x) Linings shall not contain defects such as sand pockets, voids, over sanded areas, blisters and cracks as a result of impacts.

Specials whose shape precludes lining by spinning shall be lined either using mechanical placement, pneumatic placement or hand application and finished to produce a smooth, dense surface. Specials larger than 610mm shall be reinforced with wire-fabric or ribbon-mesh in accordance with Section 4.5 of AWWA C205.

7.4 UNPLASTICISED UPVC PIPES

Unplasticized PVC piping shall be in accordance with BS 3505.

The maximum sustained working pressures to which the pipes and fittings will be subjected is based on water at a temperature of 20 degrees centigrade.

The Contractor shall submit full details of the pipes he intends to supply.

The pipes up to and including 40mm diameter can be of a solvent weld type. The pipe shall be supplied with interchangeable sockets preformed at the factory and of such internal diameter that it takes the plain end of the pipe with the same nominal diameter.

The joint shall sustain the end thrust to which the pipe shall be subjected. The Contractor shall supply sufficient quantity of the cleaner and adhesive, which shall be required to make the joints with the
pipes

The pipes of 50mm diameter and over shall consist of a grooved socket at one end of the pipe. The socket shall be designed to give a clearance fit on the outside diameter of the parent pipe. The sealing medium, which shall seat in the groove, shall be a rubber ring.

If the formation of the socket and groove results in the thinning of the original wall thickness of the pipe, it shall be compensated for by shrinking on the socket area a reinforcing sleeve of the same material as the pipe.

The socket and groove shall incorporate no sharp angles where the stress points are created. The joints shall take 10% deformation of the spigot at the point where it enters the socket without leakage from the pipe when subjected to the test pressure specified for the pipe. Thermal expansion of the pipe shall be capable of linear deflection up to 3 degrees.

The sealing ring shall be of first grade natural rubber and the physical properties of the mix shall meet the requirements of BS 2494.

The Contractor shall supply sufficient quantity of any lubricant or other material, which shall be needed to make the joint, which shall be assembled by hand.

The Contractor shall submit full details of the type of joint offered and a full description of the method of jointing.

The fitting shall have the same type of joint as for the pipes to be used. The Contractor shall submit full details of the materials dimensions and test pressures of the fittings offered.

Precautions shall be taken to avoid damage to the pipes and fittings.

In handling and storing the pipes and fittings, every care shall be taken to avoid distortion, flattening, scoring or other damage. The pipes and fitting shall not be allowed t drop or strike objects. Pipes lifting and lowering shall be carried out be approved equipment only.

Special care shall be taken in transit, handling and storage to avoid any damage to the ends.

Pipes and fittings shall be marked at not greater than one-meter intervals showing their class and diameter.

Pipes and fittings shall be marked at not greater than one-meter intervals showing their class and diameter.

7.5 GATE VALVES

Gate valves shall comply with requirement of BS 5163

The gate valves shall be suitable for use in pipelines and for operating pressure equipment to a head of 100 meters of water.

The gate valves shall double flanged. The dimensions and drilling of flanges shall be in accordance with BS 4504, flanges shall be machined flat. Flanges shall be NP 16 complying with BS 4504.

Spindles of the gate valves shall be provided with iron cast confirming to the requirements as specified under ‘valve caps’ in BS 5163 or handwheels if so specified.

The spindles of the gate valves shall be of non-rising type and screwed so as to close the valves when rotated in a clockwise direction. The direction of closing shall be clearly case on the valve cap or handwheel.

The gate valves shall be subject to ‘closed end test’ in accordance with the procedure head by manual operation.

7.6 FIRE HYDRANT

Fire hydrants shall be in accordance with BSS750. They shall be for installation underground and shall be in accordance with BSS750. The spindle shall be provided with a cast iron cap confirming to dimension under spindle cap in BSS 5163.

The spindle of the fire hydrant shall be on the non-arising type and screwed so as to close the hydrant when rotated in a clockwise direction viewed from above. The direction of closing shall be clearly cast on the valve cap.

The flanged outlet of the outlet bend shall have a gayonet joint cutlet for a 63mm standpipe. The outlet of the hydrant shall be of the hooked type with hocks 112mm apart.

The outlet shall have a gun metal standpipe seating and be covered by a loose case iron cap, which shall be attached to the hydrant by means of a chain.

Both flanges shall be 63mm drilled to requirements of BSS 2035.

The outlets bends shall be subject to a hydrostatic test in accordance with procedure set out in BSS 750 and shall be water tight against a rest pressure of 1.95 pa. head of water.

7.7 AIR VALVE

The contractor shall provide air valves to suit the site on which the main is located and the maximum water pressure specified. The body and cover of air valves shall comply with BSS 1452.

The body, cover, splash cowl and joint support ring of the air valve shall be of mechanite cast iron with flanges drilled to British Standards or other approved standards.

The internal screwed isolating valve shall have the valve and seating of gunmetal, operating screws of bronze, nuts of gunmetal, and glands and cap of machinate.

The small orifice valve shall have a rubber-covered ball and the air release nipple shall be of special alloy screwed into a bronze plug. The ball guiders may be lined with gunmetal.

The large orifice valve shall have a vulcanite covered ball closing on a moulded dexine seat ring. The bush may be in gunmetal.

The double orifice type of air valve shall comprise a small and large orifice unit with common connection to the main and screw down isolating valve to permit inspect of valve. The spindle of isolating valve shall be screwed so as to close the valve when rotated in a clockwise direction and be provided with a spindle cap to dimension as specified in a BSS 5163.

Design of the air valves shall be such that the balls do not blow shut under any working or test conditions when large volumes of air are being released.

7.8 WATER METERS

All water meters up to 50mm size be of the rotary piston positive action with all moving parts composed of non-corrosive material. 75mm diameter and over, meters shall be of the inferential helix full flow type.

The body of the 12mm to 25mm size of meter shall be of brass, the larger sizes in cast iron. The external surface of the brass bodies shall be coated with baked enamel and the cast iron bodies shall be painted to suit.

The working chamber of rotary type meter shall be made of bronze or similar on corrosive material and the piston shall be in ebonite or similar material.

The working parts of the helix type meter shall facilitate removal for repair or replacement without removing the meter body from the pipeline. The working parts shall be interchangeable and the working chamber so designed as to be full of water under all conditions of flow.

The dial of the meter shall be of the direct reading type registered in cubic meters with suitable lid locking device.

The capacities of the piston type meter shall not be less than the following amounts per month:

12mm	250 cubic meters
19mm	350 cubic meters
25mm	500 cubic meters
50mm	700 cubic meters

The helix type meter shall be capable of continuous working with a head loss not exceeding 300mm at the following rates of flow:

75mm	25 cubic meters/ hour
100mm	45 cubic meters/ hour
150mm	90 cubic meters/ hour
50mm	700 cubic meters

All meters shall be accurate to within +0 1/3 over the range of the meter upwards from the minimum flows given for each size

12mm	23 liters/hour
19mm	29 liters/hours
25mm	32 liters/hour
38mm	110 liters/hour
50mm	190 liters/hours
75mm	2.5 cubic meters/ hour
100mm	2.8 cubic meters/ hour
150mm	4.5 cubic meters/ hour

Meters above 150mm diameter should conform to specifications as set out by the Engineer. The 12mm and 18mm sizes shall be guaranteed to register commencing at 5 liters/hour. The meters shall be tested to a head of not less than 184 meters of water.

7.9 STOP VALVES

All stop valves shall be in accordance with BS 1010. Sample of valves be submitted for test and approval to the Engineer

7.10 CHECK VALVES (DIRECTIONAL VALVES)

Check valves of 65mm diameter and under shall comply with the requirements of BSS 6282 with cast iron body and cover, gunmetal doors with leather facing discs and fernal screwed ends in accordance with BSS 2591.

Check valves of 75mm diameter and over shall comply with the requirements of BSS 6282 with cast iron body and cover, gunmetal doors with bronze facing rings and flanges connections in accordance with BSS, NP 16.

7.11 PENSTOCKS

The penstocks shall be made of cast iron and shall be in accordance with BSS 1452. Seating faces shall be of gunmetal or bronze.

The spindles shall be threaded as necessary and non-rising unless otherwise specified. The spindles shall be of aluminum bronze or manganese bronze and extension spindles may be of mild steel.

Handwheels shall be of cast iron and word “OPEN” and “SHUT” marked on the upper side with appropriate direction arrows.

7.12 FLANGED JOINTS

All flange on fittings and pipework where flanged connection is required must comply with the requirements of BS 4504 and NP 16, unless otherwise specified. Inspection gaskets for flanged joints shall be rubber reinforced

with cotton 3m thick and shall be in accordance with BS 4865. Bolts and nuts for flanges joints shall be of thick mild steel complying with BS 4190.

7.13 FLEXIBLE JOINTS

All flexible coupling (Viking Johnson or other approved type) shall be supplied complete with rubber gaskets, bolts, nuts and washers. All couplings shall be coated with red oxide primer and bituminous composition suitable for us with portable water.

7.14 PRESSED STEEL TANKS

The pressed Steel tanks (or similar approved), towers and associated materials and fittings shall comply with BSS 1564. Detailed drawings of steel tank should be submitted to the Engineer for approval prior to acceptance.

The pressed steel tank to BSS 1564 Type A (2) or of similar approval shall be supplied completer with: -

a) All stays, bolts, nuts, washers, joining compound and associated materials and fittings
b) Connection for inlet, outlet, washout and overflow.
c) Galvanized access ladders 450mm wide.
d) Steel roof cover to fit the tank complete with access manhole and mosquito proof cowl ventilators.
e) Water level indicator.

Jointing material to the tank to be a non-toxic plastic compound, which does not impact taste, colour nor odour to the water. Connection to the tank shall be wheeled to the outside of the tank plate and drilled and tapped to suit flanges to BS 4504, NP 16 unless otherwise stated.

The cover to the tank shall be of mild steel cambered for external use and adequately supported by rolled steel or pressed steel bearers or trusses.

The tank tower shall be supplied complete with: -

i Anchor bolts
ii Bolts, nuts, washers and associated materials and fittings
iii Access ladder 450mm wide extending from ground level to the top of the tank. Safety rings shall be at 1.2m center.

The supports to the tank shall consist of steel joints designed to carry imposed load under each transverse joint and the two ends of the tank.

The columns of the tank shall consist of rolled steel joint sections or similar. For such columns shall be provided with adequate bracing.

Internal surfaces of the tank and tower shall be painted with approved non-toxic primer and not toxic bituminous paint.

External surfaces of the tank and tower shall be painted with approved primer and approved bituminous aluminum paint.

Jointing material to the tank to be a non-toxic plastic compound, which does not impact taste, colour nor odour to the water. Connection to the tank shall be wheeled to the outside of the tank plate and drilled and tapped to suit flanges to BS 4504, NP 16 unless otherwise stated.

7.15 PAINTING

General

a) Unless otherwise specified, the workmanship of, and quality of materials or painting shall comply with CP 231 or BS 5493 as appropriate.
b) All paints are to be obtained from a manufacturer or manufacturers approved by the Engineer in writing and it is to be of a quality that has proved successful in similar situations.
c) Samples of paint are to be submitted to the Engineer for his approval before the paint is ordered and no paid other than that approved shall be used.
d) No paint shall be used after the date of expiry of the 'shelf life' marked on its container, and on such expiry the paint shall be immediately removed from the site.
e) Paints shall be thoroughly mixed under the supervision of a competent foreman in a manner approved by the Engineer and shall not be passed to the painters until both it and the surfaces to be painted have been properly prepared.

Preparation of Surfaces

a) Mechanical cleaning of metal surfaces shall be carried out by power driven tools, such as carborundum grinding wheels, or by steel wire brushing and·· dusting to remove all loose material. The Engineer shall ensure that no rust, mill scale, weld scale, grease or loose dirt remains after this cleaning.
b) Rags, brushes and tools used in the preparation of surfaces for painting shall be clean. Surfaces contaminated with oil or grease shall be cleaned with white spirit. Immediately before paint is applied the whole of the surface to be painted shall be thoroughly cleaned of all dust, loose paint or dirty by washing down with fresh clean water and as necessary by brushing with a bristle brush and allowed to dry thoroughly.
c) Contact surfaces and surfaces to be painted shall be maintained clean of cement grout or concrete, and any such contamination shall be thoroughly washed away with fresh water before it has hardened.
d) Preparation of the surfaces should result I the production of sound, clean and dry surfaces which shall have no detrimental effect on the material to be treated and the subsequent treatment.

Protection & Painting of Softwood

Joinery which is to be painted shall be primed with one coat immediately after fabrication. The primer shall be lead-based complying with BS 2521. Spraying of paint will not be allowed in the application of first priming coat. Contact surfaces with brick, masonry or concrete shall be given a second coat of primer.

After fixing and before applying any subsequent coats of paint, the primer shall be examined for defects. Powdery, brittle or peeling primer shall be removed, holes, cracks and blemishes in exposed surfaces shall be stopped with putty, and knots shall be treated with an approved knotting, and such surfaces shall be made good with primer. Joinery shall then be painted with one undercoat and two gloss finishing coats of compatible alkyd resign paints from the same manufacturer, complying with BS 2525 to BS 2527, of approved colors. The first gloss finishing coat shall be rubbed down on interior surfaces before the top coat is applied.

Protection & Painting of Metal

a) Surfaces of the sheet-piling shall be given one coast of an approved bituminous paint within four hours of having been cleaned. Before being driven a second coat of the same paint shall be applied to the sheet-pilling and any areas of paint which are subsequently damaged shall be repainted at the Contractor's expenses. After driving at a time to be approved by the Engineer a third coat of the same paint shall be applied extending as far as the level of the ground permits.

b) Galvanized steel surfaces be treated in accordance with Clause 5.10.6 will not be painted.

c) Other steel or metalwork, unless otherwise specified, immediately after cleaning shall be primed with one coat of red lead paint to BS 2521, 2523 and painted as specified for joinery.

Painting of Concrete, Plaster and Block work

The surface of concrete, rendering, plaster and block work which are specified or ordered to be painted shall be allowed to dry after preparing them as specified in Clause 5.12.2 hereof and shall then be treated with a fungicidal wash. Subject to the approval of the Engineer the fungicidal wash may be omitted. Oil painted surface shall be primed with one coat of approved sealer and painted with one undercoat and one floss finishing coat of alkyd resin paint as specified in Clause 5.12.3 hereof.

Conditions for painting

a) Each coat of paint shall be allowed to dry and harden thoroughly before the application of the next coat. No painting shall be done in wet or foggy, weather or without the Engineer's prior approval when during the period of painting or hardening the temperature is or is likely to be less than 15°C or more than 320C or the relative humidity more than 90%. During hot weather and when, requested by the Engineer the surfaces shall be shaded from the direct rays of the sun during the application and hardening of paint.

b) Internal paintwork to buildings other than priming and sealing shall not be commenced until all other trades have finished and, on plastered or rendered surfaces, until the surfaces have fully hydrated and dried.

7.16 PRECAST CONCRETE UNITS

Precast concrete covers to be precast units for use in the works, whether instructed under the Contract or proposed by the Contractor.

a. Formwork For Precast Units

Moulds shall be so constructed that they do not suffer distortion or dimensional changes during use and are tight against loss of cement grout of fines from the concrete.

Moulds shall be set up on firm foundations so that no settlement occurs under the weight of the fresh concrete.

Moulds shall be constructed so that units may be removed from them without sustaining any damage.

Release agents used for demolding shall not stain the concrete or affect its properties.

b. Reinforcement For Precast Units

Reinforcement in precast units shall comply with the requirement of Clauses 7.30 and 4.19-4.20. When preformed cages are used the cages shall be made up on jigs to ensure dimensional accuracy and shall be carefully supported within the mould in such a way that they cannot move when concrete is placed.

Reinforcement complying with BSS4449 may be tack welded where bars cross to provide rigidity in the cage but reinforcement complying with BSS4461 shall not be welded.

Cover to main reinforcement shall be as shown on the drawings, or if not shown shall be not less than 25mm or the diameter of the bar, whichever is the greater. Cover on distribution steel shall not be less than 15mm or the diameter of the bar whichever is the greater. Bars shall be bend so that the minimum clear distance between them is the maximum nominal aggregate size plus five millimeters but in any cast not less that the diameter of the bars.

Bars may be placed in pairs provided that there are no laps in the paired lengths.

c. Casting of Units

Concrete for precast units shall comply with Clauses 7.18 and 4.1-4.10 using the class of concrete specified on the drawings. If lightweight aggregates are specified, they shall comply with BSS3797.

The area in which units are cast shall be adequately protected from the weather so that the process is not affected by rain, sun or drying winds.

d. Curing Precast Units

Requirements for curing shall be generally as set out in Clause 4.7.

Requirements for curing shall be generally as set out in Clause 4.7. The Contractor shall ensure that units do not suffer any loss of moisture or sudden changes of temperature for at least four days after casting. If a water spray is used for curing, the water shall be at a temperature within 5 degrees centigrade of the temperature of the unit being cured.

If Contractor proposed curing at elevated temperatures, the method shall be subject to the agreement of the Engineer and shall include means whereby units are heated and subsequently cooled evenly without sudden changes of temperature.

e. Dimensional Tolerances of Precast Units

Units shall be accurately formed to the dimensions shown on the drawings unless closer tolerances are called for by the Engineer

f. Surface Finish of Precast Units

The formed faces of precast units shall be finished to Class F3 as set out in Clause 5.5 (c) unless another class of finish is specified on the drawings. Free faces shall be finished to class UF2 unless another class of finish is specified on the drawings.

In cases where a special finish is required a trial panel shall be constructed by the Contractor which after approval by the Engineer shall be kept available for inspection at the place of casting and production units shall thereafter match the approved pattern.

Those parts of the unit which are to be joined to other units or to in situ concrete shall be brushed with a stiff brush before the concrete has fully hardened. Alternatively, if the concrete has been allowed to harden the surface shall be roughened by sand blasting or by the use of a needle gun.

g. Handling and storage of Precast Units

Precast units shall be handled in a manner which will not cause damage of any kind and shall be stored on a hard impermeable base. Prestressed units and large precast normally reinforced units shall be handled and

stored so that no stresses shall be induced in excess of those which they will incur in their final positions in the works unless they have been designed to resist such stresses.

Units shall be provided with adequate lifting holes or loops, placed in the locations shown on the drawings or agreed by the Engineer and they shall be lifted only by such holes or loops.

Where it is not possible to provide holes or loops, suitable sling positions shall be indicated in paint on the units.

Units shall be marked indelibly with the reference number and date of casting and shall be stacked on suitable packers, which will not damage the concrete or stain the surfaces. Not more than two packers shall be placed under each unit and these shall be located either at the positions of the permanent support points or in positions such that the induced stresses in the unit will be a minimum.

h. Testing Precast Units

Precast units shall be capable of safely sustaining the loads which they have been designed to carry. The Contractor shall subject units selected by the Engineer to load tests simulating the working conditions. Detail of such tests shall be agreed between the Engineer and the Contractor.

In the case of units subject to bending loads the test piece shall be supported at full span and a loading equivalent to 1.25 times the sum o the live and dead loads which were assumed in the design shall be maintained for one hour without the appearance of any signs of distress. The recovery one hour after the removal of load shall be not less than 75 percent of the full load deflection.

If the unit fails to meet the above requirement, further tests shall be carried out on two more units. If either of these fails the whole batch of unit will be rejected.

If the Engineer so requires, a test to destruction shall also be carried out which on units subject to bending shall be as follows: -

The unit shall be supported at full span and a load applied in increments instructed by the Engineer up to 95 per cent of the designed ultimate load. This load shall be held for 15

minutes without failure of the unit. The deflection at the end of this period shall be not more than 1/40th of the span. The load shall then be further increased until failure occurs.

If the unit fails to sustain the required load for the prescribed period or if the deflection exceeds the specified amount the Engineer may order two further tests, and if either of this fail, the batch of units which they represent may be rejected.

7.17 SUBMISSION OF SAMPLES

As soon as possible after the contract has been awarded, the Contractor shall submit to the Engineer a list of the suppliers from whom he proposes to purchase the materials necessary for the execution of the Works. Each supplier must be willing to admit the Engineer or his representatives, to his premises during ordinary working hours for the purpose of obtaining samples of the materials in question.

Alternatively, if desired by the Engineer, the Contractor shall deliver the samples of the materials to the Engineer’s office without charge.

The information regarding the names of the suppliers may be submitted at different times, as may be convenient, but no source of supply shall be changed without the Engineer’s prior approved once a supplier, source or material has been approved.

Samples of materials approved will be retained at the Engineer's office until the completion of the contract. Samples may be tested to destruction. All materials delivered to site must be at least equal in all respects to approved samples; otherwise, they shall be rejected. No special payment will be made for compliance with clauses specifying tests etc. to ensure quality control etc. unless specifically itemized in Bills of Quantities

7.18 MATERIALS FOR CONCRETE

a. General

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

b. Cement

Cement shall comply with the following standards: -BSS12 for Ordinary Portland cementBS12 for Rapid Hardening Portland cement plus all special conditions to its use stipulated by the manufacturer.

BSS12 for Sulphate Resisting or High Alumina cement.

Cement shall be free flowing and free of lumps. It shall be supplied in the Manufacturer's sealed unbroken bags or in bulk.

Bagged cement shall be transported in vehicles with effective means of ensuring that it is protected from the weather.

Bulk cement shall be transported in vehicles or in containers built and Equipped for the purpose.

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

Each delivery of cement in bags shall be stacked together in one place.

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

Cement from broken bags shall not be used in the works.

Cement in bags shall be used in order in which it is delivered.

Bulk cement shall be stored in weatherproof silos, which shall bear a clear indication of the type of cement contained in them. Different types of cement shall not be mixed in the same silo.

The Contractor shall provide sufficient storage capacity on site to ensure that his anticipated programme of work is not interrupted due to lack of cement.

Cement which has become hardened or lumpy or fails to comply with the Specifications in any way shall be removed from the site. All cement for any one structure shall be from the same source.

All cement used in the Works shall be tested by the manufacturer or the Contractor in a laboratory acceptable to the Engineer. The tests to be performed shall be those set out in BSS12 and the Contractor shall supply two copies of each certificate to the Engineer.

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

Cement which is stored on site for longer than one month shall be retested in a laboratory approved by the Ministry of Public Works Republic or at the Bureau of Standard at the rate of one set of tests as shown in BSS12 for every 200 tonnes, and at monthly intervals thereafter.

Cement which does not comply with the Specification shall not be used in Works and it shall be disposed of by the Contractor.

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

c. Fine Aggregate

Fine aggregate shall be clean hard and durable and shall be natural sand, crushed gravel sand or crushed rock sand complying with SRN 108. All the material shall pass through a 5mm standard sieve and the grading shall be in accordance with Zone 1, 2 or 3 of BSS882. In order to achieve an acceptable grading, it may be necessary to blend materials from more than one source. Fine aggregate for mortar only shall comply with BSS1200.

The fine aggregate shall not contain iron pyrites or iron oxides. It shall not contain mica, shale, coal or other laminar, soft or porous materials or organic matter unless the Contractor can show by comparative tests, on finished concrete as set out in BSS1881, that the presence of such materials does not adversely affect the properties of the concrete.

Other properties shall be as set out below: -

Content passing a 75-micron standard sieve shall not exceed 3 per cent for natural of crushed gravel sand of 15 per cent for crushed rock sand.

Chlorides soluble in a 10 per cent solution by weight of nitric acid shall not exceed 0.05 per cent by weight expressed as chloride ion when tested as set out in BSS812, subject also to the further restriction given in the note on total chloride content in sub-clause 7.18(d).

Sulphate soluble in a 10 per cent solution by weight of hydrochloric acid shall not exceed 0.4 per cent by weight expressed as SO3, when tested as set out in BSS1377, subject also to the further restriction given in the note on total sulphate content in sub-clause 7.18(d).

Soundness: after five cycles of the test in AASHTO or an approved equivalent the aggregate shall not show a weight loss of more than 10 per cent.

Organic impurities:

If the test for presence of organic impurities in aggregates described below shows that more than a trace of organic impurities is present, the fine aggregate shall not be used in the Works unless the Contractor can show by tests on finished concrete as set out in BSS1881 that the presence of organic impurities does not adversely affect the properties of the concrete.

Test for presence of organic impurities in aggregates:

This test is designed to indicate the presence of organic impurities in aggregates used for making concrete.

A 350-cc graduated bottle shall be filled to the 120-cc mark with a sample of the aggregate to be tested and a 3% solution if sodium hydroxide in water added until the volume of aggregate and liquid after shaking gives a total volume of 200 cc. The bottle shall be stopped, shaken thoroughly and allowed to stand for 24 hours. If, after 24 hours, the colour of the solution is no darker than a pale brown, the aggregate under test may be deemed satisfactory.

d. Coarse Aggregate

Coarse aggregate shall be clean, hard and durable crushed rock, crushed gravel or natural gravel complying with the requirements of BSS882. The material shall not contain any iron pyrites, iron oxides, flaky or laminated material, hollow shells coal or other soft or porous material, or organic matter unless the Contractor can show be comparative tests on finished concrete as set out in BSS1881 that the presence of such materials does not adversely affect the properties of the concrete. The pieces shall be angular rounded or irregular as defined in BSS12.

Coarse aggregate shall be supplied in the nominal sizes called for in the Contract and shall be graded in accordance with BSS882 for each nominal size. Other properties shall be as set out below: -

The proportion of clay, slit and other impurities passing a 75-micron standard sieve shall be not more than one per cent by weight.

The content of hollow and flat shells shall not be such as will adversely affect the concrete quality when tested as set out in BSS1881. The total content of aggregate shall not be more than the following: -

40mm nominal size and above	2% of dry weight
20mm nominal size	5% of dry weight
10mm nominal size	15% of dry weight

Chlorides soluble in a 10 per cent solution by weight of nitric acid shall not exceed 0.03 per cent by weight, expressed as chloride ion when tested as set out in BSS812 but subject also to the further restriction under the note on total chloride content hereunder. Sulphate solution in a 10 per cent solution by weight of hydrochloric acid shall not exceed 0.4 per cent by weight expressed as 50g when tested as set out in BSS1377 subject also to the further restriction given in the note on total sulphate content hereunder.

Soundness: After 5 cycles of the test in AASHO T104 or approved equivalent, the aggregate shall not show a weight loss of more than 12 per cent.

When tested in accordance with test C289 of the American Society for Testing of Materials or approved equivalent, the aggregate shall be non-reactive.

Flakiness Index when tested in accordance with BSS812 shall be as set out hereunder: -

For 40mm stone and above, not more than 40

For 20mm stone and below, not more than 35

If the Flakiness Index of the coarse aggregate varies by more than five units from the average value of the aggregate used in the approved trial mix, then a new set of trial mixes shall be carried out if the workability of the mixes has been adversely affected by such variation.

Impact value: Not more than 45 per cent when tested in accordance with BSS812. Ten per cent fines value: Not less than 50kN when tested in accordance with BSS812.

Shrinkage: When mixed with other ingredients in the approved proportions for concrete and tested as set out in BSS1881, the shrinkage factor shall not exceed 0.05 per cent.

Organic impurities: If the test for presence of organic impurities in aggregate shows that more than a trace of organic impurities is present, the aggregate shall not be used in the Works unless the Contractor can show by tests on finished concrete as set out in BSS1881 that the presence of organic impurities does not adversely affect the properties of the concrete.

Water absorption:

The aggregate shall not have water absorption of more than 2.5 per cent when tested as set out in BSS812.
Aggregate Crushing Value (ACV): not more than 35 per cent. Los Angeles Abrasion (LAA): Not more than 50 per cent.

NOTE: Total chloride and sulphate content:

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

i. For prestressed, concrete, steam cured concrete or concrete containing sulphate resisting or super sulphated cement: 0.05 per cent.
ii. For any other reinforced concrete: 0.3 per cent in 95 per cent of all test results provided no result is more than 0.5 per cent.

The total sulphate content expressed as 50g of all the ingredients in a mix including cement, water and admixtures shall not exceed 0.4 per cent by weight of the aggregate or 4.0 per cent of the weight of cement in the mix, whichever is the lesser.

e. Testing Aggregates

i . Acceptance testing

The Contractor shall deliver to the Engineer samples containing not less than 50 kg of any aggregate which he proposes to use in the Works and shall supply such further samples as the Engineer may require. Each sample shall be clearly labelled to shoe its origin and shall be accompanied by all the information called for in BSS812.

Tests to determine compliance of the aggregates with the requirements of sub clause 7.18(c) and (d) shall be carried out by the Contractor in laboratory acceptable to the Engineer. If the tested materials fall to comply with the specification, further tests shall be made in the presence of the Contractor and the Engineer and acceptance of the material shall be based on such tests.

A material shall be accepted if not less than three consecutive sets of test results show compliance with the Specification.

ii Compliance testing

The Contractor shall carry out routine testing of aggregate for compliance with the Specification during the period that concrete is being produced for the Works. The tests set out below shall be performed on aggregate from each separate source on the basis of one set of tests for each day on which aggregates are delivered to site provided that no set of tests shall represent more than 250 tons of fine aggregate nor more than 500 tons of course aggregate, and provided also that the aggregate are of uniform quality, if the aggregate from any source is variable, the frequency of testing shall be increased as instructed by the Engineer.

Grading BSS812 Silt and clay contents BSS812Moisture content BSS812 Check on organic impurities.

In addition to the above routine tests, the Contractor shall carry out the water content of the concrete as required by the Specification.

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

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

The Contractor shall take account of the fact that when the chloride content is variable it may be necessary to test every load in order to prevent excessive amounts of chloride contaminating the concrete. For this purpose,

the Contractor shall use the rapid field test. In the event of disagreement regarding the results of the field test, the chloride content of the aggregate shall be determined in the laboratory as described in BSS812 (the Volhard test).

f. Delivery and Storage of Aggregates

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

Each type or size of aggregate shall be stored in a separate bin or compartment having a base such that contamination of the aggregate is prevented. Dividing walls between bins shall be substantial and continuous so that no mixing of types or sizes occurs.

The storage of aggregates shall be arranged so that as far as possible rapid drying out in hot weather is prevented in orders to avoid sudden fluctuation in water content. Storage of fine aggregates shall be arranged so that they can drain sufficiently before use in order to prevent fluctuations in water content of the concrete.

g. Water for concrete and mortar

Seawater or brackish water containing more than 1000 ppm chloride ion or 2000 ppm sulphate ion shall not be used for mixing or curing concrete.

Water shall be clean and free from harmful matter and shall comply with the requirements of BSS3148.

The Contractor shall carry out tests in accordance with BSS3148 to establish compliance with the Specification.

h. Admixtures

i General

The use of the admixtures in concrete may be required under the contract to promote special properties in the finished concrete or may be proposed by the Contractor to assist him in compliance with the Specification.

In all cases the Contractor shall submit to the Engineer full details of the admixture he proposes to add it to the mix. The information provided shall include:

a) The typical dosage, the method of dosing and the detrimental effects of an excess or deficiency in the dosage.
b) The chemical names of the main active ingredients in the admixture.
c) Whether or not the admixture contains chloride, and if so the chloride ion content expressed as a percentage by eight of admixture.
d) Whether the admixture leads to the entertainment of air when used at manufacturer's recommended dosage and if so, the extent to which it does so.
e) Details of previous uses of the admixture.

The chloride ion content of any admixture shall not exceed 2 per cent by weight of the admixture nor 0.03 per cent by weight of the cement in the mix.

Admixture shall not be mixed together without the consent of the Engineer.

Calcium chloride or admixtures containing calcium chloride shall not be used in pre-stressed concrete.

ii Workability agents

Workability agents shall comply with BSS5075 and shall not have any adverse effect on the properties of concrete.

7.19 BUILDING STONE

All building stone shall be capable of withstanding when wet a crushing stress of 1.4kg. /sq.mm. The source of stone shall be approved by the Engineer and stone supplied there from shall be free from Magadi (bicarbonate compounds), overburden, mudstone, cracks, sand holes, veins, laminations or
other imperfections.

The stone shall be chisel dressed into true rectangular blocks, with each surface even and at right angles to all adjoining surface, to the size specified. For exposed stonework the maximum permissible variation of any of the specified dimensions shall be 6mm provided that cut stone, supplied as rock face stone may be hammer dressed on one face only, or on one face and one end, if in other respects it conforms to this specification. Stones shorter than 375mm will not be accepted.

Unless the Engineer allows otherwise the Contractor shall at his own expense provide and dress four 100mm cubes of stone for testing.

The stone shall be sound when tested in accordance with BSS1438 except that:-

a) The treatment shall be repeated for 10 cycles only 1 and
b) The second criterion of failure shall be amended to allow for a loss of weight of not more than 20k of its original weight.

7.20 STONE DUST

Stone dust for blinding shall be blackstrap screened to the following grading: -

Passing	Percentage
10mm Sieve	100%
No 4 Sieve	85%-100%
No 100 Sieve	5% - 25%

7.21 MURRAM

Murram shall be from an approved source quarried so as to exclude vegetable matter, loam, topsoil or clay. The California Bearing Ratio of the murram, as determined for a sample compacted t maximum density (as defined under BSS1377) and allowed to soak in water for four days, shall not be less than 30%. This C.B.R. is a guide to quality only and the compaction in the work will be judged by density.

7.22 WATER FOR CEMENT TREATED MATERIALS

If water for the works is not available from the Employer's supply, the Engineer's approval must be obtained regarding the source of supply and manner of its use. Water to be used with cement or lime shall be free from salt, oil, alkali, organic matter and other deleterious substances. If the water is required to be tested, this shall be done in accordance with BSS3148: Tests for water for making concrete, all to the cost of the Contractor.

7.23 CEMENT MORTAR

Cement mortar shall consist of proportions by volume as specified of Portland cement and natural sand or crushed natural stone or a combination of both as specified on BSS1200 and BSS1199: Building Sands from Natural Sources. The constituent materials shall be accurately gauged and mixed in an approved manner.

Cement mortar shall be made in small quantities only as and when required, and any mortar which has begun to set or which has been mixed for a period of more than one hour shall be rejected.

7.24 HYDRATED LIME

Hydrated lime shall comply with BSS890: Building Limes and shall be of the semi - hydrated type.

7.25 CALCIUM CHLORIDE

Calcium chloride shall be of good industrial grade and shall be obtained from an approved source.

7.26 LIME MORTAR

Lime mortar shall consist of proportions by volume as specified by hydrated lime and natural sand or crushed natural stone or a combination of both as specified for cement mortar in Clause 7.23. The constituent materials shall be accurately gauged and mixed in an approved manner.

7.27 CEMENT - LIME MORTAR

Cement- lime mortar shall consist of Portland cement, hydrated lime and natural sand or crushed natural stone or a combination of both, as specified for cement mortar in Clause 7.23. The constituent materials shall be accurately gauged and mixed by volume in an approved manner in proportion specified.

Cement - lime mortar shall be made only in small quantities as and when required and any mortar which has begun to set or which had been mixed for a period of more than two hours shall be rejected.

7.28 CEMENT GROUT

Cement grout shall consist of Portland cement and water mixed in the proportion of one part by volume of cement and one and a half parts by volume of water. The grout shall be used within one hour of mixing.

7.29 CAST STONE

Cast stone shall be manufactured by an approved manufactures to the shapes and dimensions shown on the drawings, and shall conform to the requirements of BSS1217: Cast Stone. It shall have dense and even surface of the texture and colour detailed on the drawings or required by the Engineer. Where indicated, exposed faces of the stone shall be formed of a specially graded mix. Metal bond ties of approved manufacture shall be cast in with the stone as shown on the drawings. Sample of the completed stone shall be submitted for the Engineer's prior approval.

All stones shall be protected from damage during transport and erection by means of cement slurry coating or by other approved methods.

7.30 REINFORCEMENT FOR CONCRETE

Reinforcement which shall comply with the following Standard, covers plain and deformed bar reinforcement and steel fabric to be cast into concrete in any part of the works but does not include prestressing tendons or any other embedded steel.

BSS4449 for hot rolled plain bar and high yield deformed bar BSS4461 for cold worked steel bar

BSS4483 for steel mesh fabric

All reinforcement shall be from an approved manufacturer and, if required by the Engineer, the Contractor shall submit a test certificate from the manufacturer.

All reinforcement for use in the works shall be tested for compliance with the appropriate Standard in a laboratory acceptable the Engineer and two copies of each test certificate shall be supplied to the Engineer. The frequency of testing shall be as set out in the relevant Standard

In addition to the testing requirement described above, the Contractor shall carry out additional tests as instructed by the Engineer.

Any reinforcement which does not comply with the Specification shall be removed from site.

All reinforcement shall be delivered to site either in straight lengths or cut and bent. No reinforcement shall be acceptable in long lengths which have been transported bent over double.

Any reinforcement which is likely to remain in storage for a long period shall be protected from the weather so as to avoid corrosion and pitting. All reinforcement which has become corroded or pitted to an extent which, in the opinion of the Engineer, will affect its properties shall either be removed from site or may be tested for compliance with the appropriate Standard at the Contractor's expense.

Dowel Bars

Dowel bars and tie bars shall consist of mild steel, or deformed bars of high yield steel all complying with BSS4461 and they shall be free from oil, paint other than bond - breaking compound, dirt, loose rust and scale.

Dowel bars and tie bars shall be of sizes as shown on the drawings and directed by the Engineer, and shall be straight, free from burred edges, or other irregularities and shall have their sliding ends sawn or, if approved, sheared.

Bond breaking compound for dowel bars shall consist of 66 per cent of 200 pen bitumen blended hot with 14 per cent light creosote oil and, when cold, brought to the consistency of paint by the addition of 20 per cent solvent naptha or other approved compound meeting the following requirements.

a) It shall not retard or in any other way affect the setting of concrete.

b) The average bond stress on bars coated with the compound with half their length cast into concrete specimens and subject to pull out tests at 7 days shall not exceed 0.14 Newton per square millimeter and the total movement of the dowel bar relative to the concrete shall not be less than 0.25 millimeters at that stress. The concrete specimens shall be 150 millimeters in section and 0.45 meter long and made with the same mix proportions as used in the Works.

7.31 STRUCTURAL STEEL FOR WELDED WORK

Structural steel for welded work shall comply with the requirements of BSS4360: Structural Steel, BSS4449: The use of Structural Steel in Building and for welded work, BSS4360: High Yield Stress and High Tensile Structural Steel, High Tensile (Fusion Welding Quality) Structural Steel for Bridges, etc, and General Building Construction.

7.32 WATERPROOF UNDERLAY

Waterproof underlay shall consist of either waterproof paper complying with BSS1521: Waterproof Building Paper, containing approved fibrous reinforcement, or 900 Gauge polythene sheeting as stated in the Bill of Quantities.

7.33 PREFORMED JOINT FILLER

Preformed joint filler be of the thickness shown on the drawing or as stated in the Bill of Quantities. The material comprising joint filler shall be as stated on the drawings or approved by the Engineer.

7.34 JOINT PRIMER

Joint priming compound shall be entirely in accordance with the manufacturer's recommendations for the joint sealant to be used.

7.35 JOINT SEALING COMPOUND

Poured joint sealing material shall consist of an approved rubber- bitumen compound, complying with the requirements of BSS5212 or a two component, cold applied compound complying with BSS5212 as stated in the Bill of Quantities. Test Certificates, prepare d by an approved testing laboratory, shall be supplied by the Contractor to show that the material does in fact comply in respect of cone penetration, flow and bond with the under-mentioned requirement.

Cone Penetration Flow

Test Cone	**Hot Poured Materials**	**Cold Poured Materials**
Penetration 0.15 Kg. For at 25 degrees centigrade using standard grease cone	Penetration not to exceed 9mm than 5mm and penetration to be not less	Penetration to be not less not more than 27.5mm
Test Cone	**Hot Poured Materials**	**Cold Poured Materials**
25mm wide joint extended at rate of 4mm per hour at 18 degrees centigrade. Not more than one specimen in three to develop a crack separation or other opening more than 4mm deep	12 mm Five cycles of extension and recompression	Three cycles of extension and recompression

Approved hot-poured materials shall also comply with a requirement whereby when heated for a period of 6 hours at a temperature of 80 degrees centigrade above recommended pouring temperature or 30 degrees centigrade below the safe heating temperature whichever is the greater shall still comply with the flow requirement of this Clause.

7.36 CONCRETE PIPES AND SPECIALS

Concrete pipe and special shall comply with the requirements of BSS5911. They shall carry the relevant Standards Institution registration certification trademark, or test certificates shall be furnished by the manufacturers.

7.37 CONCRETE POROUS PIPES

Concrete porous pipes shall comply with the requirements of BSS1194: porous pipes for under-drainage.

7.38 CONCRETE DRAIN INVERT BLOCKS

Precast concrete invert blocks shall be manufactured to the detail's drawings supplied from concrete Class 20/10 as specified in Table 4.2 using maximum 12mm size aggregates. The Invert Block Drains are to be manufactured in accordance with BSS 340. If required, cube test certificates shall be supplied by the manufacturer.

7.39 CONCRETE SLABS FOR OPEN DRAINS

Precast concrete slabs for lining open drains shall be manufactured to the detail drawing supplied from concrete Class 20/10 as specified in Table 4.2 using maximum 12mm size aggregate. The slabs are to be manufactured in accordance with the relevant provisions of BSS 368. If required cube test certificates shall be supplied by the manufacturer.

7.40 MANHOLE COVERS AND FRAMES

Manhole covers and frames shall be basically in accordance with the requirements of BSS497: Cast Manhole Covers, Road Gully Gratings and Frames for Drainage Purposes except that the manhole covers shall be constructed of mild steel, concrete filled, in accordance with the standard detail drawings.

Foul water sewer manhole shall have triangular Grade 'A' heavy duty covers and frames. Circular manhole covers and frames shall be used on surface water sewer manhole.

7.41GULLY GRATING AND FRAMES

Gully grating and frames shall be basically in accordance with the requirements of BSS497, nominal size 500mm x 350mm except that the gully grating shall be constructed of mild steel concrete filled in accordance with the standard detail drawings.

Where indicated as being kerb inlet type, the gullies shall conform to the shape and dimensions given on the detail drawings supplied, but in respect of materials and workmanship conforms to BSS497.

7.42 PRECAST CONCRETE MANHOLE AND INSPECTION CHAMBERS

Precast concrete manholes and inspection chambers shall comply with the requirements of BSS5911: Concrete Cylindrical Pipes and Fitting including Manholes, Inspection Chambers and Street Gullies and they shall carry the relevant Standard Institution registered certification trade mark, or test certificates shall be furnished by the manufacturer.

7.43 PRECAST CONCRETE GULLIES

Precast concrete gullies shall be unreinforced and shall comply with the requirements of BSS5911: Concrete Cylindrical Pipes and Fitting including Manholes, Inspection Chambers and Street Gullies.

7.44 MANHOLE STEP IRONS

Step irons of general-purpose type shall comply in all respects with BSS1247: Malleable Step Irons.

7.45 TIMBER

Timber shall be sound, well-seasoned and entirely free from worm, beetle, warps, shakes, splits and all forms of rot and deadwood. Where required, all timber shall be treated with creosote, as specified in BSS144: Coal Tar Creosote for the preservation of Timber or an alternative approved timber preservative.

7.46 WATER BARS

Water bars shall be 'Dumbbell' type and be of natural or synthetic rubber or extruded PVC. They shall be flexible, tough, elastic and durable and of dimensions detailed. They should be unaffected on contact with dilute acids or alkalis. Joints and junctions shall, when possible, be prefabricated by the manufacturer's instruction including recommended adhesive shall be followed and used. Samples shall be submitted for approval of the Engineer before use of any material.

7.47 CONCRETE BLOCKS

Solid and hollow concrete blocks for walling shall comply with BSS6398 in every respect. All solid and hollow concrete blocks used in the walling must be capable of withstanding a crushing pressure of not less than 0.35 per square millimeter after 29 days. The blocks shall be cast in metric sizes.

8. DRAINS, SEWERS AND MANHOLES

8.1 EXCAVATION FOR DRAINS, SEWERS AND MANHOLES

The ground shall be excavated to the lines and depths shown on the drawings or to such other lines as the Engineer may direct. Excavations taken out to a greater depth than is necessary shall be filled to the required level with approved material as specified for the pipe bed at the Contractor's own cost.

Trenches shall be of sufficient width to enable the pipes to be properly laid and jointed. In case of pipes of greater diameter than 300mm the width of trench shall be external diameter of pipe, plus 400mm.

When any excavation has been taken out and trimmed to the levels and dimensions shown on the drawings or as directed by the Engineer, the Engineer shall be informed accordingly so that he may inspect the completed trench and no excavation shall be filled in or covered with concrete until it has been so inspected and the Contractor has been authorized to proceed with the work. All surplus materials from such excavations not required for refilling shall be carted away to tips, or otherwise disposed of, as directed. All excavations shall be kept dry, and all balling and pumping, timbering, shoring and supporting of sides that may be required, and any materials necessary in carrying out the excavations and backfilling of trenches shall be taken to provide a solid and even bed is not specified, the floor of the trench shall be properly shaped to receive the sockets and the backfill must be thoroughly rammed along the sides of the pipe.

The rate of excavation in the bills of quantities shall include for keeping trenches dry and for all bailing, pumping, timbering, shoring and supporting of the sides that may be required.

8.2 SUPPORTS FOR PITS, TRENCHES AND OTHER EXCAVATIONS

The sides of pits, trenches and other excavations shall where necessary be adequately supported to the satisfaction of the Engineer and all such excavations shall be of sizes sufficient to enable the pipes and bedding to be laid accurately, and proper refilling and compacting to be carried out.

The Contractor shall take all precautions necessary for the safety of adjoining structures and building by sharing, opening in short lengths or otherwise, during the time the trenches are open.

8.3 ROCK CUTING IN TRENCHES FOR PIPES

Where solid rock is met within trenches, it shall be cut out to a depth of 100mm below the intended level of the bottom of the pipes and replaced with 100mm of approved material as specified. In measuring such rock excavation, the Contractor will be allowed a width of 400mm more than the external diameter of the pipes to a level of 100m below the bottom of the pipes. The price inserted in the bill of quantities shall be held to cover all expenses in connection with excavating the rock, backfilling after lying of pipes and disposing of surplus material as directed by the Engineer.

8.4 WATER IN TRENCHES FOR PIPELINES

Trenches shall be kept free from water at all times during construction of works until in the opinion of the Engineer, any concrete or other works therein are sufficiently set, and the Contractor shall construct any sumps or temporary drains that the Engineer may deem necessary.

The Contractor shall be responsible for the removal and disposal of all water entering the excavations from whatever source and shall deal with and dispose of such water in a manner approved by the Engineer so as to ensure the excavations are kept dry.

The Contractor shall provide all plant, labour and materials required for such work and all costs incurred shall be deemed to be included in his rates of excavation.

8.5 LAYING AND JOINTING, RIGID JOINTED CONCRETE PIPES

Concrete pipes as specified in Clause 7.36, shall be laid true to line and level, each pipe being separately bond between sight rails. For spigot and socket joints, the spigot of each pipe shall be placed home in the socket of the one previously laid, and the pipe then adjusted and fixed in its correct position with the spigot or the pipe accurately centered in the socket. A ring of tarred rope yarn shall next be inserted in the socket of each pipe previously laid and driven home with wooden caulking tool and wooden mallet, such socket shall then be completely filled with cement mortar 1 to 2 as specified in Clause 7.23 and a fillet of the same worked all round the side. The fillet shall be leveled off and extend for a length of not less than 30mm from the face of the socket.

For 'Ogee' jointed pipes, the joints shall be thoroughly cleaned before laying, and cement mortar, as specified in Clause 7.23 shall be applied evenly to the ends for jointing so as to completely fill the joint. The pipes shall then be neatly pointed with a band of cement mortar approximately 125mm wide and 20mm thick. The inside of each joint shall also be pointed up as the wok proceeds.

Special care shall be taken to see that any excess of cement mortar etc is neatly cleaned off while each joint is being made and any earth, cement or a tight-fitting mad through them as the work proceeds, or by other approved means. A properly fitting plug shall be well secured at the end of the last laid plug shall be well secured at the end of the last laid pipe and shall be removed only when joint laying is proceeding. The trenches, pipes and joint holes shall be kept free from water until the joints are thoroughly set.

Where shown on the drawings or directed by the Engineer concrete pipes shall be bedded and haunched or surrounded with concrete as specified in Clause 1019.

The price inserted in the Bill of Quantities shall include for providing laying and jointing of pipes.

8.6 PIPES LAID WITH OPEN JOINTS

Ogee porous concrete pipes as specified in clause 7.28 shall be laid unjointed with a space of 12mm between the spigot and the inner end of the socket. All pipes shall be packed and surround as directed by the Engineer with approved broken stone, sand or gravel aggregate, to the gradings as shown on the drawings or stated in the Bill of Quantities. The prices inserted in the Bill of Quantities shall include the trench excavation, providing and laying pipes, supply and placing graded packing materials, refilling trench and disposing of surplus all as specified.

8.7 CAST IRON PIPES

Cast iron pipes and special castings, shall be supplied, laid and jointed with lead wool properly caulked to form perfectly uniform and watertight joints, and when laid and jointed they shall be true to line and level.

Where cast iron drains are laid on unstable ground or which is likely to settle appreciably over a period of years, they shall be pointed by means of an approved self-adjusting or screwed gland joint as directed by the Engineer.

8.8 DRAINS TO BE LEFT CLEAN ON COMPLETION

On completion, all drains, manholes, etc. shall be flushed from end with water and left clean and free from obstructions.

8.9 REFILLING TRENCHES.

Trenches shall be refilled with suitable excavated material of 100mm surround but not before the work has been measured and approved by the Engineer. For pipes which are not surround with concrete, the first layer of filling material shall be free from stones and shall not be thrown directly on to the pipes but shall be placed and packed with care all round them. All fillings shall be deposited and compacted in layers, not exceeding 225mm loose depth, to a dry density not less than that of the adjoining soil. The last 450mm of filling must be returned in the order in which it has been removed. Timber and framing shall be withdrawn ahead of the layer to be compacted; care being taken to keep the sides of the trenches solid and to fill all the spaces left by the withdrawn timber.

8.10 CONNECTIONS OF EXISTING SEWER AND DRAINS

Where shown on the drawings existing sewers and drains shall be properly extended, connected and jointed to new sewers, culverts, drain or other work and a reference. Where pipe connections are made to a sewer, stone pitched or lined channel, the pipes shall be well and tightly built into the concrete, or masonry work and be so placed as to discharge in the direction of the main sewer, drain or channel and with the end of the pipe connections are between pipe sewers or drains, special connecting pipes as shown on the drawings shall be supplied and laid properly jointed.

8.11 MANHOLES AND INSPECTION CHAMBERS

Manholes and inspection chambers shall be constructed in accordance with the drawings and in the position shown on the drawings or directed by the Engineer. Foundation slabs shall consist of concrete of the appropriate classes as specified on drawings. The side walls shall consist of similar concrete or building stone as specified in clause 7.19 in accordance with the drawing.

The side walls shall be fair faced or rendered internally as specified on drawings. They shall be brought of vertically to receive a precast slab formed of concrete of the appropriate classes specified and reinforced all as shown on the drawing. Cast iron manhole covers and frames as specified in clause 7.41 shall be provided and frames shall be bedded in cement mortar 1 to 3 and so set that the tops of the covers shall be flush at all points with surrounding surface of the footway, verge or carriageway, as the cases may be. Any slight adjustment of the slab level which may be necessary to accomplish this shall be affected by topping the side walls with concrete integral with the slab.

If required half channel pipes, bends and junctions as specified in clause 7.36 and clause 7.28 shall be laid and bedded in cement mortar 1 to 3 to the required lines and levels, and both sides of the appropriate class and finished smooth to the slopes and levels as shown on the drawings or directed by the Engineer. The ends of all pipes shall be neatly built in and finished flush with cement mortar 1:3. Where the depth of the invert exceeds 1 metro below the finished surface of the carriageway or the adjacent ground, step irons as specified in clause 751 shall be built in with alternate steps in line vertically and with such additional hand irons as the Engineer may direct.

All manholes when completed shall be watertight and to the satisfaction of the Engineer. The prices inserted in the Bill of Quantities shall include for excavation, provision of all materials, construction, refilling and disposal of surplus.

8.12 GULLY CONNECTIONS

Gullies completed with gratings end with ridding eyes where necessary all as specified in clause 7.44 shall be supplied and laid in accordance with the drawings. Where directed by the Engineer precast concrete gullies shall be laid on and surrounded with 100mm of concrete of the appropriate grade specified in table 4.2. The concrete surround to be brought up to the underside of the frame or flush with the top surface as the case may be. Masonry gullies shall be constructed from 225mm building stone and rendered internally. The rates included in the Bill of Quantities shall include for excavation, provision of all materials, construction, making junctions with connections to main drains, accurate setting of frames to line and level, refilling and disposal of surplus materials. Gullies shall be trapped were leading into foul sewers or into combined foul surface water sewers.

8.13 SURFACE BOXES, COVERS ETC.

Surface boxes manhole and other covers lying within the site of the works, shall be raised, and lowered. Altered or removed as directed by the Engineer.

8.14 GULLIES

Gullies completed with gratings end with ridding eyes where necessary all as specified in clause 7.44 shall be supplied and laid in accordance with the drawings. Where directed by the Engineer precast concrete gullies shall be laid on and surrounded with 100mm of concrete of the appropriate grade specified in table 4.2. The concrete surround to be brought up to the underside of the frame or flush with the top surface as the case may be. Masonry gullies sha ll be constructed from 225mm building stone and rendered internally. The rates included in the Bill of Quantities shall include for excavation, provision of all materials, construction, making junctions with connections to main drains, accurate setting of frames to line and level, refilling and disposal of surplus materials. Gullies shall be trapped where leading into foul sewers or into combined foul surface water sewers.

8.15 COMPLETION OF DRAINAGE WORKS.

All sub-soil and surface water drains shall be completed in advance of the construction.

8.16 TEMPORARY STOPPERS

Junction pipes which are laid but not immediately connected to gullies shall be fitted with temporary stoppers or seals, and the position of all such junctions shall be clearly defined by means of such stakes or training wires properly marked and labeled.

8.17 PROVISION FOR FUTURE CONNECTION TO MANHOLES

Inlet pipes of the required diameters shall be built into the walls of manholes and elsewhere for future use and shall be of the diameters shown on the drawings. The external ends of all such connections shall be sealed off with temporary stoppers, approved by the Engineer. The pipes shall be laid and jointed as specified in clause 1005 and during the placing of the concrete they shall be adequately supported.

8.18 SURROUND OR HAUCHING OF PIPE WITH CONCRETE

Surrounding or haunching of pipes shall be carried out using concrete of the appropriate class specified in table 4.2. In carrying out this work the Contractor shall take care to pack the concrete under and around the pipes to ensure even bedding and solidity in the concrete and the concrete shall not be thrown directly on to the pipes. The upper surface of the concrete shall be struck off with a wooden trowel or template and neatly finished off. The rates shall include for any formwork that the Contractor requires to use under this item.

8.19 INVERT BLOCK AND STONE DRAINS.

Precast concrete invert and side slabs shall be formed of concrete of the appropriate class specified in table 4.2 to the dimensions shown on the drawings. Each course of side slabs rewired in the Bill of Quantities shall be interpreted as one completed row of side slab to one side of the channel concerned. Stone used for channels shall be 225mm x 100mm building stone. Drains should not normally be laid to a radius of curvature less than 10 times the actual width of the drained.

Invert block and stone- pitched drains shall be constructed in the positions and to the levels and dimensions shown on the drawings and laid to true line and even fall. Where under-filling is required, it shall be 100mm maximum thickness layers of compacted murram. The earth sides to such channels shall be neatly finished to a slope of I to I or such other slopes as the Engineer may direct.

Invert blocks and side slabs shall be laid on a 100mm minimum thickness of compacted murram and be neatly jointed with cement mortar 1 to 3 as the work proceeds. The excavation, murram bedding, providing, laying and jointing invert block or stone, backfilling and disposal of surplus all as specified and all in-situ connections in concrete of the appropriate class specified in table 4.2.

8.20 TESTING OF JOINTED PIPES AND MANHOLES.

Sealed jointed drains, up to end including 600mm diameters shall be tested in sections (e.g., between manholes) by filling with water under a head of not less than 1 meter. Drains found to be water -tight after a period of 30 minutes will be passed as satisfactory but the water must be retained in the pipes until a depth of at least 450mm of filling has been deposited and compacted on top thereof. Drains failing to stand the test shall be taken out and the pipes re-laid and re-joined until completely water -tight.

Drains exceeding 600mm in diameter shall be tested by means of a smoke test before they are covered up. Both ends of the lengths of drains to be tested shall be sealed to the satisfaction of the Engineer, and smoke shall then be pumped into the section from an approved machine. Should any joint in the section show an escape of smoke the section shall be taken out and the pipes re-laid and re-joined until there is no further escape of smoke.

Should the Engineer so direct, manholes shall be tested by completely filling with water and there shall be no appreciable loss over a period of 2 hours.

On completion of the works, or at suitable intervals during construction, infiltration tests will be carried out. The permissible amount of infiltration shall be 1 liter per hour per linear meter of nominal internal diameter.

The Contractor shall provide all labour and apparatus for above tests. All testing will be done in accordance with BSS2005.

8.21 PIPES LAID ON MURRAM BED.

The pipes will be laid on 75mm murram bed. The murram to be laid shall be approved by the Engineer. The murram shall be well rammed after watering it. Proper grooves shall be made in the murram bed so that the socket of the spigot and socket can be received. The backfill shall be properly rammed along the side of the pipes.

8.23 PIPES WITH RUBBER RING JOINTS

Rubber ring complying with BSS2494 will be provided by the Contractor. The jointing of pipes shall be carried out in accordance with manufacturer's instructions and in conformity with any modifications proposed by the Engineer

9. METALWORK

9.1 STANDARD OF MATERIALS &WORKMANSHIP

Steel and other metalwork shall comply with the following British Standards.

Structural Steel Sections Part 1,	
Hot rolled sections	BS 4
Steel Girder Bridges	BS 153
Covered Electrodes for the Manual Metal-Arch Welding of Mild Steel	BS 639
Methods of testing Welds	BS 709
Black Bolts, Screws and Nuts	BS 916
Precision Hexagonal Bolts, screws	BS 1083
Steel Tubes for structures	BS 1775
Weldable Structural Steels	BS 4360
Hot-rolled Structural Steel Sections Part 2: Hollow Sections Part 4	
Equal and Unequal Angles	BS 4848
Metal-arc Welding of Carbon and Carbon Manganese Steels	BS 5135

9.2 FABRICATION

Fabrication generally shall be in accordance with Part 1of B.S. 153. Materials shall be free from loose rusts, scale and be true to form. Straightening or flattening where required shall be done by a process not harmful to the material.

9.3 BOLTING

Unless specified otherwise, all bolts shall be black bolts. Holes shall be drilled. Bolts shall be fitted with washers and shall show one clear thread through the nut when fixed. Tapered washers shall be fitted where required.

9.4 WELDING

a) Welding will be permitted only, where directed or shown on the drawings. Welded joints other than those shown on the drawings will not be allowed without the permission of the Engineer.

b) Welding shall be in accordance with B. S. 153 and the relevant specifications referred to therein. The sequence of operations shall be arranged to eliminate distortion and accidental stresses, to the satisfaction of the Engineer. Surface to be welded shall be free from loose scale, grease or paint or other material harmful to the quality of the weld.

c) The Contractor shall supply samples to the Engineer when required by him for examination or test.

9.5 SMITHING AND BENDING

Small radius and forged parts shall be formed by methods which will not injure the material and shall be true to form, and finished in a workmanlike manner.

9.6 GALVANIZING

Where steel or wrought iron is specified to be galvanized the galvanizing shall be executed after all fabrication has been completed. The articles shall be cleaned and pickled in dilute sulphuric or hydrochloric acid followed by rinsing in water and pickling in phosphoric acid. They shall be thoroughly washed, stoved and dipped in molten zinc and brushed so that the whole of the metal shall be evenly' covered and the additional weight thereof after dipping shall be not less than O. 6 kg/m2 of surface galvanized.

Edges shall be clean and surface bright.

9.7 HANDRAILS

a) Handrails to be incorporated in the Permanent Works will be as shown on the drawings. All bends with a ' radius of 75 mm measured at the centre-line of the pipe.

b) The Contractor has to provide the hand railing with construction -joints of the bolted type at places to be approved by the Engineer.

9.8 GUARDRAILS

Guardrails to be incorporated in the Permanent Works, shall be "Armco Flex beam Guardrails" from Armco Ltd., P.O. 311410, MOMBASA or other equivalent approved by the Engineer.

9.9 FIXING & BUILDING-IN

a) The Contractor shall be responsible for the provision of all plant, tackle tools, ladders, etc. for the proper execution of the work.

b) The methods of transport, handling and erection shall be to be satisfaction of the Engineer.

c) The operations shall be carried out in such a manner as will not injure overstress or disfigure any part and shall include the provision of any temporary guys and bracing as necessary. Any member injured, overstressed or disfigured shall be replaced or rectified as directed to the satisfaction of the Engineer.

d) The periphery of openings and recesses left in concrete for the subsequent fitting and concreting-in of penstocks and other fixtures shall be treated in accordance with Sub-clause 7.05.10.

e) After placing the penstock or other fixture. The remaining void shall be carefully packed with concrete of the appropriate class or with a mortar to produce a watertight joint as directed by the Engineer. The concrete' or, mortar shall be retained by formwork. The Contractor shall ascertain from the supplies of prefabricated or manufactured goods any special fixing instructions and shall refer them to the Engineer.

f) Care must be taken to protect faces and other working parts from mortar and other droppings.

10. GENERAL WORKS, TESTING AND CLASSIFICATION OF MATERIALS

10.1 TESTING OF MATERIALS

Testing by the Contractor

The contractor shall, where instructed by the Engineer, facilitate the proper carrying out of all the tests required for the selection and control of the quality of material and for the control of workmanship in accordance with the Standard Specification and section 2 of this specification.

The contractor shall assume that the tests will be required on all materials used in the works and on all finished work."

Acceptance Standards of Materials.

All materials used in or upon the Works shall comply with this specification and the Standard specification and shall be acceptable to the Engineer. Where so specified, the material shall comply with the national specification named or with an alternative national specification acceptable to the Engineer.

Similarly, where a material has been specified by a manufacturer's trade name, the product of another manufacturer will be acceptable provided it is in all respects of equivalent or higher quality and provided that the Engineer's approval has been obtained.

Samples of all materials proposed to be used shall be submitted to the Engineer and shall, where required, be tested prior to the material being delivered in bulk upon the works."

Tests and Testing frequency for reinforcement for concrete

Where instructed by the Engineer the following basic tests shall be carried out on all deformed bar reinforcement and steel fabric.

Material	Test Type	Testing Frequency
Hot rolled plain bar and High yield deformed bar	Compliance with the requirement of BS 4449	Obtain manufacture's Certificate of compliance for each shipment and carryout complete set of tests whenever the Engineer considers it necessary.
Hard drawn mild steel wire	Compliance with the requirement of BS 4482	Obtain manufacture's Certificate of compliance for each shipment and carryout complete set of tests whenever the Engineer considers it necessary.
Cold worked steel	Compliance with the requirement of BS 4461	Obtain manufacture's Certificate of compliance for each shipment and carryout complete set of tests whenever the Engineer considers it necessary.
Steel mesh fabric	Compliance with the requirement of BS 4461	Obtain manufacture's Certificate of compliance for each shipment and carryout complete set of tests whenever the Engineer considers it necessary.

Tests and Testing frequency for Concrete Pipes and Fittings.

Where instructed by the Engineer the following basic tests shall be carried out on Concrete Pipes and Fittings

Material	Test Type	Testing Frequency
Concrete Pipes and Fittings	Compliance with the requirements of BS 5911 parts 1 and 3, and Section 17 of the Standard Specification	Obtain manufacturer's certificate of compliance for each shipment and carry out complete set of tests, whenever the Engineer considers that the material properties may have altered
Coarse and fine Aggregates	Grading, SSS, FI, AIV, 10% Fine, ACV, LAA, Silt and Clay Content, Moisture content, Organic Impurities and chloride content	For each new material source and whenever the Engineer considers that the material properties may have altered
Water for Concrete and Mortar	Chloride and Sulphate content and compliance with the BS 3148	Whenever the Engineer deems it necessary
Concrete Mix Design	Mix Design for each class of concrete specified Trial Mixes	Contractor to submit mix design at least 42 days before commencing placement of concrete in the permanent works. The design to include relevant tests on all materials to be used with mix design.
Concrete Mixes	Workability, Compaction and Strength tests	For each new batch and when the Engineer considers that the material properties may have altered at least once per day or every 50 tons whichever is more frequent

Frequency of Testing

(a) Test and Testing frequency for Soils and Gravel

When instructed by the Engineer the following basic tests shall be carried out on all soils and gravels

(b) Tests and testing frequency for Stone, Aggregate, Sand and Filler

When instructed by the Engineer the following basic tests shall be carried out on all stone, aggregate, sand and filler:

Material	Test Type	Testing Frequency
Surface Dressing stone aggregates	FI, LAA, ACV, SSS, PI, Sand Equivalent, Bitumen affinity and ALD FI, Grading, Angularity, Cleanliness, PI, Deleterious matter, Spread rate (Tray Test) and Sand Equivalent	For each new material source and when the Engineer considers that the material properties may have altered Where appropriate to the surface treatment specified these properties shall be determined twice daily when surface dressing or slurry seal work is in progress.

l) Tests and Testing frequency for Cement

When instructed by the Engineer and the following basic tests shall be carried out on all Portland Cement:

Material	Test Type	Testing Frequency
1. Ordinary Portland Cement	Compliance with the certificate of compliance for Standards KS02 - 21	Obtain manufacturer's each shipment and carry out complete set of tests whenever the Engineer considers that the material properties may have altered.

10.2 QUARRIES AND BORROW PITS, STOCKPILE AND SPOIL AREAS

Provision of Land

The Contractor shall be responsible for the leasing or renting of, and compensation for all land required for quarries, borrow pits, spoil and stockpile areas and access thereto.

Measurement and Payment

The Contractor shall be deemed to have allowed in his other rates and prices for the cost of renting, leasing or otherwise acquiring any land needed for borrow pits, quarries, stockpile areas or other purposes not forming part of the permanent works."

10.3 CULVERTS AND DRAINAGE WORKS

Excavation of Trenches

Foundation levels for all drainage works and structures which may be shown on the drawings are purely tentative and all drainage works and structures will be founded at a level and in a stratum to be determined on site by the Engineer. The Contractor's rates and working method must allow for placing of the foundations as directed by the Engineer in accordance with this provision.

All trenches shall be adequately shored and strutted to support the existing unexcavated road pavement and trench sides from damage by passing traffic or by other means.

Concrete Bed, Surrounds, Haunches

Precast concrete pipes under the carriageway, regardless of depth shall be bedded on concrete and surrounded with concrete for the entire length of the pipes as shown in the drawings.

Where access to private and public properties require crossing of the open side's ditches along the road, precast concrete pipes bedded on concrete and surrounded for the entire length of the pipes shall be constructed to the dimensions as shown in the drawings including headwalls and wingwalls.

Measurement and Payment

Item: Gulley Pots.

Unit: No.

Gulley pots shall be measured by number specified. The rates for gulley pots shall include for excavation to any depth, removal of surplus material, provision of gulley pot complete with grating and frame, making connections to main drain, concrete surround, accurately setting frames to line and level and complying with the requirements of the Standard Specifications.

Item: Gulley connections

Unit: m

Gulley connections shall be measured by the linear meter. The rate shall include for the cost of setting out, excavation to line, level, disposal of surplus excavated material, backfill, provision, laying and jointing of the pipes including pipe connections, Class 15(20) concrete haunch.

(u) Item: Invert Block Drains

Unit: m

Invert block drains shall be measured by the linear meter. The rate shall include for excavation and trimming to line and level, setting out, backfilling with 100mm thickness compacted approved gravel material, disposal of surplus spoil, providing, laying and jointing invert blocks including all the necessary in-situ connections in concrete of the class specified and as detailed on the drawings.

(v) Item: P.C.C Side Slabs.

Unit: m

Side slabs to invert block drains (I.B.D.) shall be measured by the linear meter. The rate shall include for excavation and trimming of the side slopes, disposal of surplus material, providing, backfilling with 100mm thickness compacted approved gravel material, providing, laying and jointing side slabs to the invert block drain including all the necessary in-situ connections in concrete of class 15(20) and as detailed on the drawings.

Gullies complete with gratings and frames shall be supplied and laid in accordance with the drawings, or as directed by the Engineer.

At locations directed by the Engineer the gullies shall be provided with a 150mm thick concrete bed, and surround instead of the normal 100mm bed and surround. The concrete surround shall be brought up to the underside of the frame or be flush with the top surface as appropriate for the placing of any concrete paving block pavement layer.

Gulley Connections

Connections from gullies to surface water drains or ditches shall consist of concrete pipes and fittings as shown on the drawings. All pipes, bends and junctions shall be laid to the lines and levels shown on the drawings or as directed by the Engineer.

Backfilling of over excavation for the pipe trench shall not be allowed. Any over excavation shall be made good by placing additional concrete of the quality specified for the pipe surround, at the Contractor’s cost.

Invert Block Drains, Side Slabs, Slotted Drains and Gulley Chambers

Where shown on the Drawings or directed by the Engineer, the Contractor shall excavate in any material, provide and place concrete for bedding, backfill, remove surplus material to spoil, provide, lay and joint precast concrete invert blocks, side slabs, slotted drains and gulley chambers.

Precast concrete invert block drains, side slabs, slotted drains and gulley chambers shall comply with the requirements of BS 340, and shall be laid in accordance with the Drawings.

Precast concrete invert block drains and side slabs shall be formed of concrete of the class specified and to the dimensions shown on the drawings. Drains shall not normally be laid to a radius of curvature less than 10 times the bed width or diameter of the drain.

Invert block drains shall be constructed in the positions and to the levels and dimension shown on the drawings or as directed by the Engineer. The earth sides to such channels shall be neatly finished to a slope of 1.1 or such other slope

as the Engineer may direct. Invert block drains and side slabs shall be laid on 100mm thick compacted approved gravel material, and neatly jointed with mortar consisting of 1:3 cement: sand by volume.

Manholes

Manholes shall be constructed in accordance with the drawings and in the positions shown on the drawings or as directed by the Engineer. Foundations slabs shall consist of concrete of the class specified. The side walls shall consist of concrete of the class specified all in accordance with the drawings.

Where required, half round pipes, bends and junctions as shown shall be laid in the invert and bedded in mortar to the required lines and levels, and both sides of the channel shall be benched up with concrete and rendered with mortar to the slopes and levels as shown on the drawings or as directed by the Engineer. The ends of all pipes shall be neatly built in and finished flush with mortar. The mortar shall be 1:3 cement: sand by volume.

10.4 NATURAL MATERIAL SUBBASE AND BASE

Definition

Gravel for sub base shall refer to natural gravel with the properties described below: -

Material Requirement

The gravel for sub base shall be laterite gravel or gravel from an approved source quarried so as to exclude vegetable matter and top soil. It shall contain a high proportion of hard pea gravel particles exceeding 707o of any sample. The material shall satisfy the following requirements: -

- CBR at 95% MDD (Modified AASHTO) after 4 days' soak -minimum 30
- Maximum size to be 2/3-layer thickness or 80 mm whichever is lesser.
- Uniformity Coefficient - Minimum 5
- Plasticity Index - Maximum 15 and Minimum
- Plasticity Modulus - Maximum 250

Grading for Natural Gravel for Sub base

The grading curve of the material, after processing and compaction shall be a smooth curve within the following envelope:

Sieve (mm)	% Passing (By Weight)
28	100
20	95 -100
14	80 -100
10	65-100
5	45-85
2	30-68
1	25-56
0.425	18-44
0.075	12-32

Laying and Compacting Lateritic Gravel Subbase

The sub base material shall be spread across the full width of the sub base layer broken down, so that the, maximum size of any particle is not greater than the maximum specified, brought to a suitable moisture of between 80%- 105% of the Optimum Moisture Content and compacted to at least 95% MDD (Modified AASHTO) Compact. The compacted thickness of any layer laid, processed and compacted at any one time shall not exceed 200 mm. large stones and boulders which cannot be broken down to the required size shall be removed and disposed of as directed by the Engineer. The surface shall be finished true to level, grade and cross fall.

Measurement and Payment for Lateritic Gravel Subbase

The Contractor shall be paid an 'all-in' amount for construction of gravel sub base. The unit of measurement shall be per cubic meter of gravel material placed and compacted in the subbase layer. The rate entered by the Contractor against the item in Bill of Quantities shall include for all necessary activities required to comply with the specifications including supplying suitable gravel and transportation to site, placing in the subbase layer, and adjustment of moisture content, compaction and trimming to shape, together with all labour, tools, plant, supervision, overheads and profit.

QUARRY CHIPS FOR BASE

Material Requirement

Quarry chips for the hand packed stone base shall be obtained from an approved quarry and shall satisfy the following requirements: L.A.A. Max 45, A.C.V. Max, S.S.S. Max 12, F.I. Max 30, C.R. Max 60.

The stones shall be free from an excess of flat or elongated; soft and less durable rock, clays, loam, top soil and other deleterious matter.

The smaller stones shall have a maximum dimension slightly greater than the thickness of the required compacted layer and be of a shape acceptable to the Engineer.

The larger stones shall have a reasonably uniform grading and be a nominal size suitable, in the opinion of the Engineer, for filling the surface voids of the as placed larger stones. The nominal size will be of the order of 50mm (2").

SCREENINGS:

The screenings shall consist of tough durable crushed rock, free from an excess of flat elongated, soft or disintegrated pieces and harmful material, such as loam, clay, organic matter, or other deleterious substances and shall be to the Engineer's approval. The grading of the screenings shall form a smooth curve and shall be within and approximately parallel to, the following grading limits; shall be stockpiled separately and not interungulate with each other or any other material.

B.S. Sieve	Percentage by Weight
Size	Passing B.S. Sieves
3/8"	100
3/16"	85-100
No.36	30-50
No.100	100 - 30
No.200	0-20

STOCKPILING OF MATERIAL

The site of the stockpile shall be levelled, graded and drained, all vegetation removed and if necessary, the area shall be surfaced with murrain or other material all as directed by the Engineer. Each category of material, as defined in these specifications, namely pitching stone, key stone, coarse aggregate and binding material.

LAYING OF THE STONE

On the prepared area, the pitching stone shall first be laid, each individual stone being positioned by hand, closely packed with the greatest dimension vertical, and the largest and flatest end downwards. The majority of the stones will be slightly higher than the final thickness of layer required. When an area has been covered in this way a second placing of stones of smaller size, keystone, shall be positioned in the spaces between those first placed and shall be wedged home by hammering. The points of pitching stone projecting beyond the required height shall then be knocked off, and a third placing of stone shall follow the second and so on until in the opinion of the Engineer the voids are sufficiently filled, to permit compaction. No hand packed stone layer of greater compacted thickness than 150mm shall be laid.

COMPACTION AND SLASHING:

After placement of the stone in the specified manner the material shall be initially compacted with a heavy pneumatic-tyred roller, weighing not less than 12Mg. and/or approved vibratory roller, and shall continue until the layer is thoroughly keyed, showing virtually no movement under or ahead of the roller.

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

The irregularities that may show up during compaction shall be corrected by loosening the surface and removing or adding material as may be required, and recompacting.

After the stone has been rolled and keyed, binder material, where necessary, shall be spread dry in thin layers and broomed into the interstices and dry rolling continued with approved vibratory -and smooth steel-wheeled rollers until no more binding material will go in.

The layer shall then be saturated with water, slushed and compacted with a smooth steel-wheeled roller weighing not less than 12 Mg. This rolling and slushing, with the addition of more binder material where necessary shall continue until all surface voids are filled and there is no visible movement under the roller.

All surplus fines shall be brushed off to expose a closely knit compact mosaic of stones as the finished surface of the layer.

MEASUREMENT AND PAYMENT

The hand packed material will be paid for per m3 of material measured in place. The volume of material shall be calculated as the product of the compacted thickness specified or ordered by the Engineer, and the net area required to be laid.

The rate shall be the full inclusive price for providing, spreading and compacting the material, and shall include for complying with this Section, site clearance of quarry and access road, opening up of the • quarry, removing over burden, constructing access road, complying with conditions of access, traffic control and signs, and safety and public health requirements, fencing, drainage of quarry, and access road, providing and installing machinery,

ancillary plant, stores, offices and removal of same, and making good on completion and leaving Site neat and tidy, drilling, blasting and crushing aggregate, providing and brooming in of binder material, rolling, slushing, setting out and checking lines and levels, making good detective areas, drainage of subgrade, maintenance of the surface and all tools, labour, plant, supervision, overheads and profit. No overhaul will be paid.

10.5 CONCRETE WORKS AND CONCRETE BLOCK PAVING

Concrete Interlocking block paving

(a) Definition

a. "Block paving" is the term applied to flexible surfacing consisting of precast concrete paving blocks laid on laying course
b. "Laying course" is the layer of material on which paving blocks are bedded.
c. "Surface course" is the layer of interlocked paving blocks.
d. Edge restraint" is that part of the construction, such as a raised or flush kerb or channel, which prevents sideways movement of the blocks and prevents loss of material from the laying course.

Materials

i. Precast Concrete Interlocking Blocks

Where shown in the drawings or instructed by the Engineer, the Contractor shall lay concrete interlocking block paving. Blocks shall be of the interlocking uni -block type. The paving blocks shall be laid on a sand course overlying the compacted base or subbase. Precast concrete blocks shall be heavy duty type complying with BS 6717: part 1. The block shall conform to the following size and strength specifications.

Length	225mm
Width	112.5mm
Thickness	60mm standard type
	80mm Heavy duty type
Characteristic Compressive strength	45N/mm^2

ii. Laying Course

Nominal Sieve size (mm)	Percentage by mass passing (%)
10	100
5.0	90-100
2.36	75-100
1.18	55-90
600µm	34-70
300µm	8-35
150µm	0-10

a. Laying Course

After completion of the specified base layer and approval by the Engineer, the contractor shall spread the laying course material in a loose uncompacted layer to approximately required final depth below the surface profile.

The loose thickness must be such that after compaction it forms a layer approximately 50mm thick below the paving blocks. In no case shall the material be less than 25mm thick at any point. The moisture content of the laying course material shall be between 80 and 105% of the optimum moisture content for that material. Any material which gets saturated following rain or for any reason shall be removed and dried out to bring the moisture content to acceptable limits.

After evenly spreading the material, the layer shall be compacted using a vibrating plate compactor until the surface achieves uniform density and compaction. Upon completion of the compaction and inspection and approval by the Engineer, the Contractor shall spread a further layer of material about 15mm thick and screed it to create a loose surface on which the paving blocks can be placed.

If any disturbance of the prepared laying course sand by pedestrian or wheeled traffic occurs, prior to placing the paving blocks, the Contractor shall re-screed affected areas of the laying course material.

The area of laying course prepared shall be such that the boundary is not less than 1 meter head of the laying face, except at the end of the working period when the boundary shall not exceed 1 meter ahead of the laying face.

b. Surface Course

Paving blocks shall be laid such that the surface layers are within the tolerances specified below.

Prior to commencing laying, the Contractor shall obtain the Engineer's written approval of the bond pattern adopted. The bond pattern shall be either "Herringbone" or "Stretcher" type as shown on the Drawings, or as directed by the Engineer.

The order of laying shall be such that an open working face is maintained. The first row of blocks shall be aligned against the edge restraint or by using a string line. Alignment of the blocks shall be checked by the Contractor as the work proceeds and adjustment made where necessary.

The bond pattern shall be maintained at all times. Joint width for sand filling shall be in the range of 2mm to 5mm. The area to be laid shall be completed as far as possible width whole blocks.

Formation of boundaries and changes in direction shall be carried out using blocks trimmed to shape and size for the purpose. In no case shall pieces less than one-third the size of a full block be inserted.

To work round any obstruction, the latter shall be surrounded with concrete using maximum aggregate size of 10mm and a compression strength of 40 N/mm2 to form a regular shape and paving blocks trimmed to abut the concrete surround. Infilling to boundaries and obstructions shall be completed as the laying proceeds and before compaction commences.

c. Compaction

After laying of the blocks is complete, the surface course shall be compacted using a vibrating plate compactor with a plate area of not less than 0.25m2 transmitting an effective force of not less than 75kN/m2 of plate at a frequency of vibration in the range of 75 Hz to 100 Hz. Alternative compaction equipment to achieve the same degree of compaction shall be to the approval of the Engineer.

Compaction shall be carried out as soon as possible after laying but not within 1 meter of any laying surface. No area of paving shall be left uncompacted at the completion of the day's work.

No paving shall be laid in inclement weather conditions as instructed by the Engineer.Joint Filling

After compaction of the surface course, dry sand or crushed rock fines complying with the grading specified above shall be spread over the surface and brushed into the joints. The surface shall be vibrated using the

vibratory plate compactor to ensure complete filling of the block-to-block joint by the sand or fines. Where necessary, further sand or fines shall be added and surface revibrated.

d. Measurements and Payments

Concrete block paving shall be measured in square meters as the net plan area instructed by the Engineer to be laid.

11. GENERAL SPECIFICATIONS FOR ELECTRICAL WORK.

11.1 Regulations and Standard Applicable.

The sub – contract works shall comply with the provisions of the following documents: -

1. The current edition of the 'Regulations for the Electrical Equipment of Building' issued by the Institution of Electrical Engineers of Great Britain (with respective host country amendment).
2. Respective Country's Power and Lighting Co. Ltd. By – laws

11.2 Scope

The sub-contractor shall supply all materials and install, fix, connect, test, label, commission and deliver the electrical work, clean, complete and working in every detail as described elsewhere in the specifications and any related specifications and the drawings listed in the schedule of drawings and to the satisfaction of the Engineer.

11.3 As Installed Drawings.

On completion of the works to be carried out under this contract the electrical sub – contractor shall submit to the engineer record or 'as installed' drawings. The size and scale of drawing shall generally be the same as the original contract drawing unless otherwise specified by the Engineer.

On completion of the drawing, they shall be endorsed as a true record of the installation where not specifically shown on the tender drawings or mentioned in this specification.

No deviations shall be made from the contract drawings unless with written approval from the engineer. Any such deviations will be rectified at the expense of the contractor.

11.4 Working Drawing.

The sub – contractor shall prepare working drawings as may be necessary for the proper execution of the works including conduits layouts, switchgear arrangement and cable routing. Three prints of working drawings must be submitted to the Engineer before commencement of work. One set will be signed by the Engineer and returned for use by the Sub-contractor. The other set will be returned to the sub – contractors to ensure that other services are not interfered with.

11.5 Materials

All materials required for completion of the sub – contract works must be supplied by the electrical sub – contractor unless stated otherwise these materials must conform to both the specifications and the contract drawings.

11.6 Labels.

All switchgears, distribution boards etc., shall be clearly and properly labeled. Fuse ways and circuit breakers feeding final sub – circuits shall be labeled to show whether light or power, the area served and the circuit number. This shall be done by writing neatly on the label normally provided with a ball – pen (not a pencil or felt tip). If no label is provided, the sub – contractor shall fix a specially made label of the 'TRAFFOLYTE' tape. (Dyno tape will not be accepted)

The outside cover of the switchgear, distribution board, consumer unit, shall be clearly labeled with a 'TRAFFOLYTE' tape label (not dyno tape) showing the service provided and any circuit reference number, which may be given on the drawings.

All label align shall be completed before testing commences and no test certificates will be accepted by the Engineer unless this has been done.

11.7 Galvanizing.

Galvanizing shall be applied by the process and shall consist of a smooth clear zinc coating free from defects and be in uniform thickness. The thickness shall not be less than 610gms of zinc per square meter of surface and tested in accordance with the requirements of B.S. 729 where applicable. Sherardize or other alternative processes shall not be used without approval in writing of the engineer. The preparation for galvanizing itself shall not adversely affect mechanical properties of the coated material.

Surfaces, which are normally in contact with oil, shall not be galvanized or cadmium plated. All out – door structures, access ladders, platforms equipment cubicles shall be galvanized.

11.8 Cleaning and Painting.

All equipment shall be cleared of all dust, oil, grease, dirt, scale and rust by power tool operated metal brush or preferred by shot or grit blasting and then smooth where necessary.

Unless otherwise approved, they shall then immediately have applied to them two coats of approved prime paints. After inspection, any rough surfaces shall be filled in and smoothed over and further painting done.

It shall be deemed that the sub – contractor has taken precautions against fire inclusive of insurance cover as per the sub – contract.

11.9 Fire Precautions.

It shall be deemed that the sub – contractor has taken into account protection against fire inclusive of insurance cover.

11.10. Padlock.

The sub – contractor is expected to use approved padlocks to ensure safety of his store and materials stored therein.

11.11 Expansion Joints.

Adequate allowance shall be made for longitudinal expansion and contraction of conduit under normal working temperature variations.

11.12 MV Switchboard and Switchgear.

The Medium Voltage (MV) Switchboard and Switchgear shall be a complete indoor, metal-clad, arc-resistant assembly designed, manufactured, tested, and supplied in accordance with IEC 62271 standards and suitable for operation under Somalia's environmental conditions, including ambient temperatures up to 50°C, relative humidity up to 95%, heavy dust, and coastal corrosive environments. The switchgear shall be rated for 11 kV (or 12/24/36 kV as specified), 50 Hz, with a minimum busbar current rating of 1250 A and a short-circuit withstand capacity of 25 kA for 3 seconds. It shall utilize withdrawable Vacuum Circuit Breakers (VCBs) with mechanical endurance of not less than 10,000 operations and include copper-insulated busbars, a full-length earth bar, and comprehensive mechanical and electrical interlocking systems. The assembly shall be classified as LSC2B, PM, and AFLR for service continuity, partitioning, and internal arc resistance, respectively. Each feeder shall be equipped with numerical protection relays providing overcurrent, earth fault, under/over-voltage, frequency,

thermal overload, and breaker failure protection, with communication capabilities via IEC 61850, Modbus RTU, and Modbus TCP/IP for SCADA integration. The switchgear shall include multifunction metering, current and voltage transformers, anti-condensation heaters, and a minimum enclosure protection rating of IP4X (IP54 for control compartments). Factory routine and type tests shall be conducted in accordance with IEC requirements, and the supplier shall provide complete documentation including shop drawings, single-line diagrams, protection and control schematics, test certificates, operation and maintenance manuals, and factory acceptance test reports.

11.13 PVC SWA PVC Cables.

These shall be 600/1000volt grade to BS6346 or BS6004 having copper conductors of plain copper wire PVC insulated PVC sheathed, single wire armored and PVC sheathed overall, the cores of four core cables shall be distinctively Coloured red yellow, blue and black. The sub – contractor shall provide suitable glands and accessories for all armored cable terminations and where cables are suspended shall provide the necessary cable trays, racks cleats or hanged supports and fixings.

Cable support and racks shall be made by recognized manufacturer and shall be to the approval of the architect. All supports and racks shall be arranged as far as is practicable for the easy removal of any single cable in a multicable run without threading cables through supports and racks. The number of types of support and racks shall be kept to a minimum commensurate with meeting the requirements of the contract work.

11.14 WIRING SYSTEMS.

11.14.1 Method of Wiring.

The system of wiring shall be as specified in particular specification contract drawings

11.14.2 System A – Cables Enclosed in Concealed Steel Screwed Conduit or Trunking.

The wiring shall be carried out in approval type of single core, plastic insulated cable, enclosed in steel screwed conduit or trunking mechanically and electrically continuous throughout.

Conduits shall be buried in the wall and floors of the buildings, and either run in roof space or buried in structural slabs.

11.14.3 System B – Cables Enclosed in Steel Screwed Conduit or Trunking Fixed to the Surface of Walls and Ceiling.

The wiring shall be carried out in an approved type of single core, plastic cables enclosed in steel screwed conduit or trunking mechanically electrically continuous, throughout. Conduit and trunking shall be secured in position by means of spacer bars saddles. Conduits shall be run horizontally on the walls or vertically to switches or outlets.

11.14.4 System C – PVC Insulated Cables with Insulated Earth Continuity Conductor Enclosed in Concealed Non – Metallic Conduit or Trunking.

Wiring shall be carried out in an approved type single core, plastic insulated cable with earth continuity conductor enclosed in high impact, heavy gauge, non – metallic conduit or trunking. Conduit shall be buried in the walls and floors of buildings and either run in roof space or buried in structural slabs.

11.14.5 System D – PVC Insulated Cable with Insulated Earth Continuity Conductor Enclosed in Non-Metallic Conduit or Trunking Fixed to the Surface of Wall and Ceiling.

Wiring will be carried out in approved type single core, plastic insulated cable with earth continuity conductor enclosed in high, impact, heavy gauge, non – metallic conduit or trunking. Conduit and trunking shall be run on the

surface of the surface of the walls and ceilings or in false ceiling spaces. Conduit shall be secured in position by means of space bar saddles. Conduit shall be run horizontally on the walls or vertically to switches or outlets.

11.14.6 Non – Metallic Conduit.

All non – metallic conduits shall be class 'A' heavy gauge, high impact. PVC complying with BS4606 part 2, type A11.The minimum size to be used is 20mm external diameter. All conduit installations shall be concealed in the walls and floors or in structural slabs.

11.14.7 Flexible Conduit.

These are to be used as final connections to motors and other fixed appliances where vibration is prevalent.

Flexible metallic conduit shall comply in all respects with BS731 part 1. Flexible non– metallic conduit shall comply with BS4607 part 3. Flexible metal conduits shall not be used as the sole means of providing earth continuity, and a separate earth continuity conductor complying with the appropriate requirements shall be provided for every part of a system formed by such conduit.

11.15 Cable Trays.

These are to be galvanized and constructed as per the relevant British Standard Specifications. They are to be supported to the wall at 1 M intervals.

11.16 Socket Outlets.

In all areas, general power outlets shall; be of the 13ampsd. Three pin plug type complying with BS1363. They shall be flush pattern with white or ivory cover plates unless otherwise specified on the drawings.

Conduit shall be kept at least 150mm clear of steam and hot water pipes and preferred run below the pipes. Where conduits run adjacent to cold water pipes, bell clock or telephone circuits they shall kept at 150mm or prevented by spacing or insulation, from coming into contact with these services.

Where there is a possibility of moisture collecting in the conduit a drain hole of 5mm diameter shall be drilled at the lowest point of the conduit run or box, or other points as directed by the Engineer and shall be fitted with a suitable drain plug.

Steel works shall not be drilled for the fixing of conduits or accessories except where authorized in writing by the Engineer. Such authorization shall be limited to the drilling of 3mm hole for hardened self – tapping screws and shall not normally be given when more than two conduits follow the same route. Conduits and accessories may be fixed to steelwork by means of purpose made bracket and grader fittings.

Details of such brackets and clamps shall be submitted to the Engineer for approval before being used. Where conduit runs enter specified areas requiring flameproof equipment barrier boxes should be inserted immediately before conduit enters the flameproof area. All conduits and accessories installed within this area shall be sold drawn galvanized. Equipment shall comply with BS229, BS889 and code of practice CP1003 conduit installed and buried in walls shall allow a minimum of 10mm cover. These conduits and those cast 'in situ' in concrete slabs shall be given one coat of rust prevention point before installation of conduits and before concrete is poured.

Where buried in the ground outside the building the whole of the buried conduit shall be painted with two coats of approved bitumastic composition before covering up. Where run on the surface, conduits and accessories shall be painted with two coats of oil bound enamel applied to rust and free metal work.

11.17. Fused connection units.

11.17.1 Fused Connection Units.

All fused connection units shall be 10 amps with fuse and neon indicator lamp. Boxes shall be flush type with white or ivory cover plates and shall be switch type unless otherwise specified on the drawings.

11.17.2 Fuses.

All fused connection units shall be fitted with 10 amps fuses, unless otherwise specified.

11.17.3 Labeling.

The front plate of each fuse connection unit shall, unless otherwise specified, be engraved with the name of the appliance to it.

11.18 LIGHTING SWITCHES.

11.18.1 Type.

Lighting switches shall be of the all – insulated rocker – operating plate switch type BS 3676 of ample rating. Switch inserts shall be white, set-in white ivory cover plates or as per Sample approved by Engineer.

Switch controlling points in bathroom shall be placed outside the bathroom. Switches mounted outdoors shall be of a weather tight pattern.

Switches shall be one - way, two - way or intermediate as specified and where a number of switches are mounted together, they shall be fitted in a common box.

11.19 LIGHTING FITTING.

11.19.1 General.

The sub – contractor shall supply and fit all lighting fittings of the type indicated on the drawings and in the schedules. All fittings shall be suitable for operation on respective country's' power rating supply. Lighting fittings rated other than above will not be accepted. All lighting fitting shall be supplied with lamps.

11.19.2 Fluorescent Fittings.

Fluorescent fittings shall generally be of the batten type, with control gear contained within the supporting channel. All fittings shall be supported from the conduit boxes, and shall be suspended by 20mm conduits to give clearance of 25mm between top of the fitting and the ceiling. In the ceiling, the conduits shall be joined, so that the lighting fitting hangs vertically below the conduit boxes. Fittings shall comply with BS3820 or class 1 indoor normal atmosphere. All fluorescent fittings shall be fitted with radio interference suppression capacitors and power factor correction capacitors and shall be earthed.

11.20 FLEXIBLE CORDS.

11.20.1 Type.

These shall be as power rating grade PVC insulated and shall comply with BS7. Flexible cords shall not be less than 24/.20 (23/.0076).

11.21 EARTHING.

11.21.1 Earthing.

Earthing electrode shall be minimum 1.4m long by 12mm diameter hard drawn copper rod, and shall be located not less than 3m apart at a convenient position 6m away from the building. The terminal head of each electrode shall be in a concrete inspection pit, with cover. If the resistance to earth is not satisfactory with one electrode, then additional electrode or an earth mat shall be provided, as directed by the engineer.

11.21.2 Distribution System Earthing.

All distribution boards shall be earthed in accordance either I.E.E. regulations. All metal work associated with the installations shall be earthed to comply with the regulations currently in force.

11.21.3 Testing of Earthing System.

The resistance of the earth continuity system, when measured between the main earthing point and may other point in the installation, including all conduit and other metalwork which may provide a path or earth, shall not exceed 0.5 ohms where steel conduit forms part of the whole system, or 1.0 ohm, if the earth continuity system is composed entirely of copper, copper alloy or aluminum.

When the installation is complete, the sub – contractor shall carry out tests for earth loop impedance, polarity, insulation, resistance, ring circuit continuity and earth electrode resistance, in the presence of, and to the satisfaction of the engineer and the power company. The contractor shall rectify all work not giving test results within the limits prescribed. A certificate of completion will not be issued until such tests have been completed and approved.

11.22 P.M.E. SYSTEM

Provision shall be made for the P.M.E. system at supply intake (where applicable)

'P.M.E.' means that the system whereby the neutral conductor of the supply network is earthed at a prescribed number of point a long its routes, together with the installation earth continuity conductor of the installation shall be the supply authority at the point of intake only. The connection at the isolators will be made by the sub – contractor in the presence of the Engineer after completion of all tests.

11.23 COMMISSIONING.

The whole installation shall be tested to the statutory requirements of the Electricity Authority, I.E.E. Regulations and commissioned in presence of and to the satisfaction of the engineer.

12. GENERAL SPECIFICATION FOR PLUMBING AND DRAINAGE

12.1 General

The materials shall be new and the best of their respective kinds.

Where proprietary materials are specified, the Contractor may propose alternatives for the consideration of the Engineer, but the written approval of the Engineer must be obtained prior to the use of such an alternative.

The Contractor shall be responsible for, and shall replace or make good at his own expense, any materials lost or damaged during the whole construction period until the official handing over of the works (and keys) to the Employer or the Employers representative.

12.2 Galvanized Pipes

Galvanized mild steel tubing shall be in accordance with BS 1387, Class B with screwed and socketed joints.

Fittings for same shall be galvanized malleable iron to BS 1740 joints shall be made with P.T.F.E. tape.

12.3 Copper Pipework

Capillary type connectors may be used for copper pipework where installed in continuous runs, and elsewhere approved compression fittings to BS 2871 shall be used.

Short right-angle bends are to be avoided and normal elbows and bends are to be used where practicable. Sets and bends in copper pipe shall be made by heating and sand filling where necessary. Kinked or flattened bends will be rejected.

12.4 Unplasticized PVC Pipework above Ground

Provide and install uPVC soil, waste and ventilating pipework complete with fittings, supports, brackets and accessories. Pipes and fittings shall comply with BS EN 1329-1 (formerly BS 4514) and shall be installed in accordance with the manufacturer's recommendations. Joints shall be push-fit elastomeric seal or solvent-welded type as specified. The completed system shall be watertight, adequately supported, and tested before acceptance.

12.5 Unplasticized PVC Pipework below Ground

Under Ground Unplasticized polyvinyl chloride (uPVC) pipework for drainage and sewer applications, including all fittings, bends, junctions, couplings, inspection chambers, bedding, haunching, and backfilling, should be in accordance with BS EN 1401-1 for structured-wall and solid-wall uPVC drainage and sewer pipes and fittings, and installation requirements of BS EN 1610. Pipes shall be of the diameters and stiffness classes indicated on the drawings and shall be laid true to line and level on a prepared granular bed with suitable surround material. Joints shall be watertight rubber-ring push-fit or solvent-welded type in accordance with the manufacturer's recommendations. Excavation, dewatering, testing, cleaning, protection of the works, and reinstatement of surfaces shall be included. Upon completion, the pipework shall be tested for watertightness and performance in accordance with BS EN 1610 and left clean, unobstructed, and ready for service.

12.6 Valves Generally

(a) All valves required to be stamped by the appropriate authority.

(b) Easy clean patterns are to be supplied. Where visible, and where easily accessible, a locking shield type is to be provided.

(c) Valves should be installed to control each section of the work and as indicated on the Drawings.

(d) The pattern of all valves to be used must be approved by the Engineer before any orders are placed.

(e) Stopcocks shall be fitted on all water supplies upto and including 50mm diameter unless otherwise specified. For pipe sizes over 50mm in diameter gate valves shall be installed.

(f) Drain cocks shall be fitted to all water mains entering the building after the isolating valve, where indicated on the drawings and where necessary for draining of services.

(g) All must fully conform to the relevant British Standard.

12.7 Stop Cocks

Provide and install stop cocks of approved manufacture, suitable for the working pressure and temperature of the system, complete with all necessary fittings and connections. Stop cocks shall be of dezincification-resistant (DZR) brass or bronze construction with screwed or compression ends as specified, and shall comply with the requirements of BS EN 1213 for copper alloy stop valves and the relevant provisions of the Water Supply (Water Fittings) Regulations. Valves shall be installed in accessible positions, arranged for ease of operation and maintenance, and tested as part of the completed pipework installation. All valves shall provide positive shut-off, be free from leakage, and be left fully operational upon completion of the works.

12.8 Gate Valves

Provide and install gate valves of the sizes indicated on the drawings, suitable for the specified working pressure and service conditions, complete with handwheel, gland packing, bolts, nuts, gaskets, flanges, supports, and all accessories required for a complete installation. Valves shall comply with BS 5154 for bronze/brass gate valves or BS 5163 as applicable, and shall be rated not less than PN16 unless otherwise specified. Valve bodies shall be of cast iron, ductile iron, bronze, or gunmetal as appropriate for the service, with non-rising or rising stems as indicated. Installation shall be carried out in accordance with the manufacturer's recommendations, ensuring correct alignment and adequate support of adjoining pipework. Upon completion, valves shall operate smoothly through their full range, provide tight shut-off without leakage, and be tested as part of the pipework system.

12.9 Drain Cocks

Provide and install drain cocks at all low points of the pipework and wherever indicated on the drawings to facilitate complete draining of the system. Drain cocks shall be of brass or dezincification-resistant (DZR) brass construction, screwed type, suitable for the working pressure and temperature of the installation, and shall comply with the requirements of BS 2879 or equivalent current British/European Standards and the relevant provisions of the BS EN 1213 where applicable. Drain cocks shall be installed complete with hose union outlet, blank cap, washers, and all necessary fittings, positioned for easy access and safe discharge. The completed installation shall be watertight, fully operational, and tested as part of the pipework system.

12.10 Ball Valves

Ball valves supplied for WC Cisterns shall be the plastic diaphragm type with sittings to suit the working pressure with plastic float to BS 2456, and suitable for internal overflow unless otherwise specified.

12.11 Foot Valves

Provide and install foot valves at the suction end of pump suction lines as indicated, of robust non-return type complete with strainer and removable screen. Valves shall be suitable for the working pressure and duty conditions,

and constructed of cast iron, ductile iron, bronze, or stainless steel as specified, with corrosion-resistant internal components. Foot valves shall comply with relevant requirements of BS EN 1074-3 and associated standards for water supply valve performance and testing. The valve shall be fitted with a stainless-steel or galvanized mesh strainer of adequate area to prevent debris entry, and shall be designed to ensure minimal head loss and reliable priming of the pump. Installation shall include proper alignment, secure support of pipework, and full testing to ensure watertight, non-return operation and free movement of all internal components.

12.12 Non-Return Valves (Check Valves)

Provide and install non-return (check) valves of the sizes and types indicated on the drawings, suitable for the specified working pressure and service conditions, complete with flanges, gaskets, bolts, and all necessary accessories. Valves shall be of cast iron, ductile iron, bronze, or stainless-steel construction as appropriate, with resilient-seated disc or swing-type mechanism to ensure positive non-return performance and minimal head loss. Non-return valves shall comply with BS EN 12334 or BS EN 1074-3 as applicable to water supply and general pipeline installations. The valve shall be installed in the correct flow direction, with adequate straight pipe lengths where required, properly supported, and accessible for maintenance. Upon completion, the system shall be tested to ensure tight shut-off, silent operation, and complete prevention of reverse flow under all operating condition.

12.13 External Pipe Works, Pipe Laying, Backfilling and Associated Items

(i) Where pipes are laid below ground, the main contractor shall carry out all excavation, back-filling, removal of spoil, and making good as specified and as necessary to complete the installation to the satisfaction of the Engineer.

(ii) The Contractor shall include for providing all information and marking out as necessary in good time, so that the main contractor can provide the necessary attendance.

(iii) All pipework shall be installed in a neat and workmanlike manner and properly aligned throughout.

(iv) Depth of crown of pipe shall not be less than 0.7m, and pipes shall be installed with due regard to clearances from other services installed in the area.

(v) Pipes shall be so arranged as to avoid air pockets, and shall be graded such that the system will vent normally through the installation, or by other approved means.

(vi) Trenches shall be of ample dimensions to permit laying and jointing, and pipes shall be bedded in not less than 75mm of sand or other approved material. Filling of the same material shall be hand packed around the pipe a further 75mm above the crown of the pipe, and the whole shall be wall rammed before completion of backfilling, consolidating and making good.

(vii) All drainage pipes shall be laid to continuous and even falls and in accordance with the manufacturer's recommendations.

(viii) The pipe trenches shall not be backfilled before the pipes have been tested and approved by the Engineer.

(ix) Following the final backfilling of all trenches, headings and manhole surrounds, the surface of the excavated areas shall be fully reinstated to the approval of the Engineer.

(x) All drains below buildings and small roads shall be encased in 150mm thick concrete (1:3:6). On completion, all drains, manholes, etc. shall be flushed from end to end with water and left clean and free from obstructions

12.14 Construction of Manholes

(i) Manholes shall be watertight and constructed of blockwork 200mm thick on a concrete foundation as shown on the Drawings.

(ii) Where manholes are likely to receive heavy loads such as roads and access areas, or where they are classed as deep manholes then the blockwork walls shall be reinforced and filled in accordance to the structural engineers Specification.

(iii) The top of the chamber shall be covered by a reinforced concrete slab with an opening to suit the cover and frame.

(iv) Branch connections to the main drain line shall be made with three quarter section bends which will be mounted on top of the half section channel of the main drain line and shall be swept in the direction of the flow.

(v) The manhole shall be benched up, sloping at 1 in 10 and rendered and trowelled smooth.

(vi) Manhole covers to BS 497 shall be of suitable size to allow complete access, or as indicated on the Drawings.

(vii) Manhole covers should be capable of supporting the traffic indicated by the area in which they are situated, or as shown on Drawings.

(viii) The underside of all foul drainage manhole covers and frames exposed to crude sewage vapours shall be suitably protected at the place of manufacture.

(ix) Keys for the purpose of lifting and locking these covers shall be provided, three sets under this contract.

(x) Before manhole covers are supplied to site, details of all covers are to be submitted to the Engineer for approval.

(xi) Step irons to BS 1247 shall be provided wherever the depth of the access pit requires, and as shown on Drawings.

(xii) In manholes that may in the future carry liquid containing acid, the trenches/channels shall be formed by U PVC pipe cut in half horizontally and embedded in the manhole benches.

(xiii) The neutralizing chamber shall be constructed as specified above and as shown on the Drawings full details being agreed.

12.15 Gullies

Gullies shall be 100mm PVC trapped type with a 150mm Belfast framed in concrete (1:3:6) of a 100mm minimum thickness, forming a box approximately 300 x 300mm x 100mm above ground. The gullies shall be provided with a light duty cover, to fit in the recess made for this purpose.

12.16 Installation of Internal Pipework

All pipework shall be installed in a neat and workmanlike manner, properly supported and aligned throughout.

Prior to erection, all piping, plant and equipment shall be cleaned throughout or blown through with compressed air. Where falls are not shown on the Drawings or stated otherwise in the Specification, pipework shall be installed parallel to the lines of the buildings and as close to the walls, ceilings, columns etc. as is practicable. All details shall be to approved and shall be clearly indicated on the contractor's detailed Working Drawings.

Before any joint is made, the pipes shall be hung in their supports and adjusted to ensure that the joining faces are parallel and any falls which shall be required achieved without springing the pipe.

All pipes shall be installed with due regard to other services within the ducts, ceiling spaces, or other spaces

provided. Branches shall be fitted so as to avoid stresses at the take off point, and to minimize as far as practicable sharp changes in the direction of flow. Pipe ends are to be cut square, be free from burrs and well reamed or filed inside to ensure full bore. The contractor shall ensure that access to all pipework, rodding eyes etc. is readily maintained particularly where such items are installed above false ceilings and similar areas. Full details shall be included in the Contractor's detailed Working Drawings.

Screwed piping shall be installed with a sufficient number of unions to facilitate easy removal of valves and fittings, and to enable alterations of pipework to be carried out without the need to cut the pipe. It is the Contractor's duty to suggest the positions and number of unions to be fitted, but the final decision rests with the Engineer.

Full allowance shall be made for the expansion and contraction of pipework, precautions being taken to ensure that any forces produced by pipe movements are not transmitted to valves, equipment or plant.

The Contractor shall pay particular care when supporting all pipework, particularly cast-iron pipes, in order to ensure that settlement and building movement do not break the pipe joints.

If nothing else is specified, all pipe supports shall be of robust metal construction galvanized or painted. They shall be so arranged as to permit longitudinal expansion and contraction of the pipework as necessary. Hangers, where used, shall be adjustable type, and anchor points shall be installed where necessary. All to be in accordance with manufacturers recommendations or where this is not specified then the following maximum spacings will be permitted.

	Horizontal Runs		
Pipe Nominal Bore mm	Iron (m)	Copper (m)	UPVC(m)
15	1.80	1.20	0.30
20	2.40	1.80	0.35
25	2.40	1.80	0.38
32	2.75	2.40	0.43
40	3.00	2.40	0.45
50	3.00	2.40	0.50
65	3.65	3.00	0.60
80	4.00	3.00	0.67
100	4.00	3.00	0.75
150	4.00	3.00	1.00

The support spacings for vertical runs shall not exceed one and a half times the distances given for the horizontal runs.

Where more than one size of pipe is carried on the same supports, spacing of supports shall be that required for the smallest pipe.

Use of explosive tools will be subject to Site approval by the Engineer in each case.

Unless otherwise directed, the pipework shall be generally concealed throughout, and no pipework may be exposed without prior approval unless so indicated on the Drawings.

The Contractor shall provide all necessary rodding and inspection facilities within the draining system. In positions where stacks pass through the roof, a weather apron shall be provided. The Contractor is to fix stacks before roofing is completed, to ensure that stacks do not allow ingress of water to building or duct. Full details shall be agreed with the Engineer prior to the commencement of the installation as the Engineer must agree details at roof level.

The open end of each stack shall be fitted with a plastic coated, or galvanised steel, wire guard.

Where pipes pass through walls and floors, sleeves shall be fitted to allow free axial movement of the pipes. Sleeves

shall be of a material compatible with the pipe they protect. Where fitted in visual position the sleeve should be fitted with an end plate, the details to be agreed upon by the Engineer. In all other cases they shall finish flush with the wall and the open space filled up with approved fire and sound proofed material. Sleeves passing through wetted floors, or walls, and floors below ground shall be of stainless steel and extend 6mm above floor and fitted with approved puddle flanges, or similar type arrangements, to prevent the ingress of moisture. Details shall be agreed.
Note that testing and sterilizing of pipework is required as referred to later herein.

12.17 Pipe Entry into Buildings

Service pipes shall enter the buildings in the positions shown on the Drawings. Entry shall be by means of sleeves built into the building structure, of ample dimension to permit the installation of the service pipes to move freely. On installation of the pipes, the sleeves shall be sealed both within the building and at the point of entry below ground level for distances of not less than 150mm, to prevent ingress of moisture or vermin. Sealing material shall be by use of bitumen, and the protruding sleeve, must be fitted as specified herein.

12.18 Sleeves

Where pipework passes through walls, floors or ceilings a sleeve shall be provided one diameter larger than the diameter of the pipe. The space between is to be packed with mineral wool, to the Engineer's approval.
Where sleeves pass through structural elements (beams, columns structural slabs etc) permission from the structural engineer must be obtained.
All sleeves associated with the same lengths of pipework must align and run true. Particular attention is required on this matter, and failure by the contractor to achieve this will render himself liable to the total costs involved in correcting the position of the sleeves.

12.19 Floor and Ceiling Plates

Where pipework passes through walls, floors or ceilings, plates shall be secured around the pipe. The plates shall be of stainless-steel construction and will serve no other purpose other than to present a neat finish to the exposed installation.

12.20 Connections

The Contractor shall connect the water supply to all outlets and equipment as scheduled in the Bill of Quantities or shown on the Drawings. Tee's and short radius bends will be permitted in 20mm and 15mm copper where associated with such final connections to equipment and outlets.
Unless otherwise directed, final connections to outlets and sanitary fixtures shall be carried out using copper pipework. Connections to W.C. pans shall be affected by the use of a W.C. connector, gasket and cover, sized to suit pan outlet.

12.21 Thermal Insulation

All hot water pipework, except exposed final connections, shall be lagged with an approved preformed section of foam rubber insulation. The final lagging thickness shall be commensurate with the pipework and installation details.
The required minimum thicknesses of insulation should be as follows:

Pipe I.D.	Min. Insulation Thickness
15 mm	45 mm
20 mm - 32 mm	57 mm
40 mm - 65 mm	64 mm
80 mm - 100 mm	77 mm

All hot water pipework, valves etc. is to be insulated with corresponding insulation thickness `Armaflex' insulation. The joints of the insulation are to be sealed with 75mm wide self-adhesive matching tape. The Pipework shall be clad with galvanized mild steel, or aluminum sheets of minimum 22's-gauge thickness.
The insulation shall be fixed to the pipes by means of metal clips at intervals not exceeding 400mm and at bends by continuous binding with copper wire to the extent necessary to provide a neatly formed finish.

12.22 Painting

The Contractor shall allow for priming, undercoating, and finishing of all exposed ferrous pipework and equipment to architectural requirements.
Exposed brass work shall be left polished and all supporting brackets, handles and similar items chromium plated or provided with a permanent bright finish to approval.

12.23 Pressure Tests

As the installation of pipework proceeds, the various sections shall be tested before they are built in, concealed, or finally connected. The Contractor shall advise the Engineer in writing at least three days in advance of the carrying out of such tests, and such tests shall, if considered necessary by the Engineer, be carried out in his presence.
All tests shall be at the expense of the Contractor and it shall be the responsibility of the Contractor to make all necessary records of the tests and results and submit these to the Engineer and Engineer in the final form agreed.

12.24 Pressure Pipes

All pipe systems shall be tested hydraulically for a period of one hour to not less than one and a half times the design working pressure.
If preferred, the Contractor may test the pipe lines in sections. Any such section found to be satisfactory need not be the subject of a further test when the system has been completed, unless specifically requested by the Engineer.
During the test, each branch and joint shall be examined carefully for leaks and any defects revealed shall be made good by the Contractor and the section re-tested.

12.26 Drainage Pipes

A site test shall be carried out on all drainage pipes before concrete haunching or surrounds are applied. These tests shall be carried out preferably from manhole to manhole.

12.27 Sanitary Appliances

The Contractor shall supply, deliver, install, fix, connect, test, and commission all sanitary appliances as specified in the drawings and schedules, complete with all necessary traps, wastes, fittings, supports, sealants, and accessories. All appliances shall be of approved manufacture, of vitreous china, stainless steel, acrylic, or other specified material, and shall comply with the relevant current British Standards including BS EN 997, BS EN 14688, and BS EN 13407 where applicable, together with associated BS EN standards for taps, valves, wastes, and connectors. Installation

shall be carried out strictly in accordance with manufacturers' instructions, ensuring secure fixing, proper alignment, effective sealing, and connection to drainage and water supply systems. All appliances shall be left clean, fully operational, watertight, and tested to the satisfaction of the Engineer upon completion. The appliances shall be fixed in the position shown on the drawings or as directed by the Engineer.

12.28 Cleaning

The inside of all pipes, valves, tanks and fittings shall be clean, smooth, and free from blisters, loose scale and dirt, when erected.

All lines shall be cleaned after installation and before placing in service.

When pipes are installed, all ends shall be suitable plugged until final fixing of fixtures can be carried out. No pieces of cloth or stones will be permitted.

12.29 Sterilization of Water Supply Systems

Upon completion of installation, repair, or modification of any potable water supply system, the Contractor shall thoroughly clean, flush, and sterilize the entire system, including all pipework, storage tanks, fittings, and associated appliances, in accordance with the relevant requirements of BS EN 806-4, BS EN 806-5, and the Water Supply (Water Fittings) Regulations 1999. Sterilization shall be carried out using an approved chlorine solution or other approved disinfectant at the specified concentration, ensuring full contact throughout the system for the required period. After disinfection, the system shall be flushed with clean potable water until all traces of disinfectant are removed and water quality is satisfactory. The Contractor shall carry out all necessary testing, including residual chlorine and bacteriological testing where required, and shall submit certificates of compliance.

12.30 Testing and Commissioning

Before handing over, the Contractor shall confirm that the installation has been examined, tested, accepted and approved by the relevant local authorities, is ready for use, that it will operate and can be maintained efficiently.

When handing over, the Contractor shall demonstrate to the Employer the methods of operation, limitations, the maintenance requirements and the safety precautions to be observed.

12.31 Water Storage Tanks

Water storage tanks, unless specified and made from plastic mouldings, shall be constructed in metric size. Tanks are to be complete with bracings, supports, box cleats, internal ladder, water level indicator and mosquito proof cover. The mosquito proof cover shall be complete with breather and shall be lockable. When there will be concrete casted water tank, Specification provided in BOQ and drawings will prevail.

12.32 Electrical Services

Suitably rated control panels shall be supplied and installed as part of this section of the Contract to meet the starting and operating characteristics of the fan, and motors.

The panels shall be either wall or floor mounted to suit the specific area and requirements. Power supplies to these panels shall be extended from adjacent isolating switches to be provided under the electrical services section of this Contract. Complete co-ordination shall be maintained with the electrical services to ensure supply and termination details are satisfactorily carried out to suit the plant and installation requirements.

12.33 Motor Control Panels

All starters, control equipment and the like shall be enclosed in purpose made sheet panels. The panels shall be installed within the plant rooms to suit the dimensions of the actual panels. All details of the panels and layouts within the plant shall be to the approval of the Engineer and shall include:

- Triple pole isolating switch removable neutral link and HRC fuses.
- Control circuit fuses of the HR cartridge type
- Under voltage release, adjustable and complete tower to allow for voltage associated with the electrical supply and motor starting.
- Over voltage protection, details to be agreed.
- Ammeter of the moving iron mounted on panel with selector switch.
- Pilot lamp, green.
- Rotary switch for HAND/OFF/AUTO operation, where required. Removable neutral link of heavy section copper.
- Motor winding over-temperature release. The Contractor shall provide this feature in conjunction with the specified thermistor protection
- Duty selection switches.
- Manual stop-start button units to operate in conjunction with rotary switch
- Hours run meter/counter.

The Contractor shall allow at present for the contactors to reclose automatically on the restoration of the mains voltage. This requirement shall be subject to further discussions with the Employer to suit the Diesel plant and the mode of operation of electrical supplies.

All starter panels shall include sufficient miniature circuit breakers, with neutral bar, to supply auxiliary or associated equipment. One 30TP and one spare 15TP MCBs shall be included as spares.

All starter panels, motor starters and controllers shall comply with BS 587. Enclosures shall be rigid, at least 1.6mm thick, with rolled corners stiffened as necessary, dust-proof, vermin-proof, damp and corrosion protected with a grey colour stone enamel or other approved finish, fully tropicalized, with washable air filters. Instruments, gauges, ammeters, indicator lamps, etc. shall be flush mounted. Panel doors shall include isolating switches to prevent them being opened unless the switches are in the off position. Each door shall be provided with a lock, and three sets of keys for all panel door locks shall be handed over to the Engineer.

Terminals for all outgoing main and control cables shall be marked and positioned so that the cables may be carried to the outlet from the panel without crossing or being carried round the panel. Terminal numbers and markings shall correspond to those used on connected equipment and wiring diagrams. All internal interconnecting wiring between individual units and the terminal chamber shall be carried out by the panel manufacturer.

Each panel shall be provided with a main isolator so that the whole panel may be completely isolated.

The Contractor shall determine all motor starter requirements and associated auxiliaries and controls prior to manufacture and shall submit the design and circuit diagrams to the Engineer for approval.

Contractors shall determine all motor starter requirements and associated auxiliaries and controls prior to manufacture and shall submit the design and circuit diagrams to the Engineer for approval.

Contractors shall be of air-break type BS 5424 Part 1 and/or BS 587, and shall be provided as follows:

- Magnetic blow-outs and air chutes on each pole.

- Renewable hard drawn copper contacts.
- Auxiliary contacts for remote control.
- Continuously rated operating coils, (Max 240V)
- Thermal overload protection device incorporating single phasing protection.

Starters shall be rated as follows:

Ordinary duty - For motors which will run continuously for periods in excess of two hours.

Intermediate duty - For motors under automatic control other than time controls. When the intervals of operation are greater than two hours.

Starters shall be of the following type:

- Up to and including 400W motor: Single phase on/off with overload protection.
- Over 4 kW and up to 15 kW: Star Delta starter.
- For starters incorporating reduced voltage starting the changeover of voltage shall be automatic.

Terminals shall be accessible and shall be provided with adequate clearance between phases and between phases and earth. Where starters are not enclosed in a composite panel, an integral isolating switch as specified for control panels shall be provided. Where electric motors are either not visible from the control panel or are located more than 10m distance they shall be provided with a local lock-off stop control circuit switch, or a main circuit isolator where there is no control circuit. A weatherproof lock-off stop control circuit switch shall be provided for motors located externally or otherwise exposed to the weather.

12.34 Motors

Motors shall comply with BS 816 Part 1 and shall be arranged for conduit entry.

Motors shall be fitted with locating type bearings and/or heavy thrust bearings at the non-driven and collar type at the drive end. Motors shall be of the totally enclosed fan cooled type, tropicalized to BS 5000 Part 99 suitably finished to resist corrosion by fluids or fumes. The rating of all motors shall be chosen to provide continuously the maximum power requirements of the plant. The motors shall be of the standard induction type. They may be of the squirrel cage, horizontal or vertical spindle type of all to the approval of the Engineer.

Vertical spindle type motors shall be provided with substantial canopies of the locked rotor current shall be stated on the name plate of each motor and shall be not more than six times the full load current

Thermistors shall be fitted to all motors above 5 kW. They shall be fitted during manufacture and their ends shall be brought out to additional terminals on the connector block of the motor All motors shall be rated 3 phases. 415 volt or single phase, 240 volt. high power factor continuous maximum rating complying with BS 5000 Part 99 and Class F insulation complying with BS 2757 unless otherwise specified. All motors larger than 400 kW shall be three phases. All three phase motors shall be supplied with six stud terminals with each end of the stator phase windings connected, terminals shall be of suitable size to accept the cable lugs of the feeding cables. Terminal blocks shall be mounted on the side of the motor case in an approved box complete with lid, gasket and tapped ET entry hole.

Rubber installation shall not be used on coil connections. Each motor shall be fitted with cable terminals and glands to accept the specified types of cable.

No motor shall run at a speed higher than 1500 rpm unless otherwise specified. Motors driving through Vee-belts

shall be fitted with slide rails. The power factor shall not be less than 0.9 lagging. All motors shall be from the same manufacturer as far as possible.

12.35 Cabling and Wiring

The Contractor shall carry out all power and control wiring including LV and ELV or any other voltage for the control equipment and alarm systems and interconnecting wiring between starter panels, remote control items, and motor units as required.

Cabling shall be carried out in PVC insulated, PVC sheathed, single wire armored and PVC sheathed overall cable, using compression type glands provided with means of securing armored wires within the body of the gland, under armor moisture seal and outer sheath seal.

Each core termination shall be fitted with a plastic ferrule engraved with an identification corresponding to the wiring diagrams.

Multicore control cables to the remote stop, start allow water cut-out/ alarms shall be 0.62mm2 PVCSWAPVC where external to the pump station and PVC/PVC or similar. All cables, whether internal or external being suitably protected.

All conductors shall be copper and the installations, both internal and external being carried out in accordance with the regulations and by-laws previously stated. Trenching and the fixing of cables shall be in accordance with locally specified standards details of which have been specified within the subcontract documents for the electrical services. These details can be made available upon request should the Contractor not be familiar with these requirements.

Details of the ratings, types and methods for all cables and wiring to be supplied under this sub-contract shall be submitted with the tenders, wiring, PVC single core shall be run in

either galvanized conduit or galvanized trunking of suitable sizes where surface in plant rooms and heavy gauge PVC were cast into walls, slabs etc.

13. GENERAL SPECIFICATION FOR MECHANICAL VENTILATION AND AIR CONDITIONING

13.1 General

The subcontract shall comprise the supply, delivery, installation, setting to work, testing and commissioning of all the materials and equipment called for in this specification or shown on the drawings.

The subcontract shall include for all appurtenances(accessories) and appliances, not necessarily called for in this specification or on the contract drawings but which are necessary for the completion and satisfactory functioning of the works. No claims for extra payments will be accepted from the subcontractor because of his noncompliance with the above requirements.

If in the opinion of the subcontractor, there is a difference between the requirements of the specification and the contract drawings, he shall clarify this difference with the Engineer before tendering.

All works shall be performed in a straight forward manner by competent workmen under skilled supervision to the entire satisfaction of the Engineer.

It is deemed that the tenderer has based his tender on equipment which is similar in design, performance and manufacture to that stated in this specification. If the tenderer wishes to offer suitable alternative equipment to that specified, he may do so under a separate covering letter and justification of such alternative.

Submission of the above will be under the tenderer's own initiative and in no case will any expenses incurred in preparation and documentation of such alternative be reimbursed. The employer reserves the right of accepting any alternative to the specification.

The alternative equipment shall not form part of the main tender which must be based on the equipment specified.

The works to be installed under the subcontract shall comprise but not restricted to the following installations: -

13.2 Sheet Metal Duct Work

The duct sizes shall be as shown on the contract drawings, fabricated from galvanized mild steel sheets of thickness as specified below.

The ductwork shall be made from mild steel strip mill cold rolled continuously and hot galvanized to BS 2989. The construction of ductwork shall comply with sheet ductwork as specified by the Association of Heating and Ventilating contractors' specification DW/142: 1982.

Ductwork material, gauge and stiffening shall be in compliance with the requirements set out in table A.

TABLE A

Duct Size (Largest Side, mm)	Sheet Thickness (mm)	Steel Gauge (SWG)	Stiffening / Reinforcement Requirement	Minimum Angle Section
Up to 400 mm	0.6	24 SWG	No stiffening required	Not required
401 – 750 mm	0.6	24 SWG	Cross-breaking or beading	25 × 25 × 3 mm
751 – 1,000 mm	0.8	22 SWG	Cross-breaking or beading	25 × 25 × 3 mm
1,001 – 1,500 mm	0.9	20 SWG	Angle frame with cross-breaking	25 × 25 × 3 mm
1,501 – 2,000 mm	1.2	18 SWG	Angle frame + intermediate stiffeners	40 × 40 × 3 mm
Over 2,000 mm	1.6	16 SWG	Heavy angle frame + internal bracing	50 × 50 × 5 mm

Cross joints for ducts up to 500 mm narrow side shall be 'C' cleat type and sealed with liquid mastic sealant.
Cross joints for ducts with narrow side in excess of 500 mm shall be reinforced standing seam. Longitudinal seams shall be of the lock form type riveted spot/plug welded as seams. The subcontractor shall ensure that the joints are completely airtight.
All bends shall have a centerline radius of one and half times the width of the duct. Transformation and Taper pieces shall where the cross-sectional area is unchanged have a minimum slope of 22.5 degrees and where the cross-sectional area is reduced up to 20 %, the maximum slope shall be 15 degrees.

13.3 Air Conditioners

The air conditioning units shall be completely factory assembled and tested, piped and internally wired fully charged with R-32 and DC inverter type. All units shall be suitable for ground installation inside plant rooms with ducts fitted to run to the supply areas.
The equipment shall be fully tropicalized. The external casing of the equipment shall be phosphatized Zinc coated steel with epoxy resin primer and baked enamel finish. The screws shall be coated with Zinc plus Zinc chromate and with neoprene washers where sealing is required.
Hinged access doors shall provide access to control components, filters, outside and return air dampers, evaporator coil and supply the exhaust fan sections. All access doors shall be lined with gaskets and mat faced fiberglass insulation.
The condenser section shall be provided with drain points. Each unit shall have lifting lugs to accept chains or cables for rigging.

13.4 Electrical Controls:

The units shall be suitable for use on 3 phase, 415 volts, and 50HZ power supply. It shall be the responsibility of others to provide all electrical wiring up to the isolator. The subcontractor shall be responsible for all electrical wiring between the isolator and all items of equipment. The subcontractor shall also provide all electrical control panels and shall be responsible for their fixing and satisfactory operation.
The control and power cables shall be run in firmly fixed steel conduits where concrete encased conduits are not provided. The control shall include for oil safety, supply and exhaust fan overload protectors, fuses for supply, exhaust air and condenser fans, compressor fuses and dead front panels. Each control item shall have an identifiable tag.

13.5 Insulation

Any external ductwork shall be wrapped with roofing felt properly lapped to ensure a waterproof covering. All cooled air ducts shall be insulated with either expanded polystyrene sheet or sprayed polyurethane foam without gaps using suitable adhesive and plastic impingement pines attached to ductwork.

14. GENERAL SPECIFICATION FIRE FIGHTING

Refer to BOQ Item description

15. GENERAL SPECIFICATION CCTV MONITORING

Refer to BOQ Item description

Technical Specifications

Purchase, Supply and Installation of Solar streetlights

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A. Objectives

The primary objectives are as follows:

A.1 Technical Objectives

- Supply and install high-quality, durable, and reliable solar streetlight systems
- Ensure automatic dusk-to-dawn operation with consistent lighting performance
- Provide systems capable of continuous night-time operation with sufficient battery autonomy
- Ensure compliance with international technical, safety, and performance standards

A.2. Operational Objectives

- Achieve minimum 98% system availability during the O&M period
- Minimize system downtime through preventive and corrective maintenance
- Enable easy maintenance and component replacement using standardized designs

A.3. Social and Economic Objectives

- Improve pedestrian safety and security in Corniche area
- Enhance night-time economic and social activities
- Increase community confidence and public space usability
- Promote local employment through engagement of local labor where feasible

A.4. Environmental Objectives

- Reduce dependence on fossil-Utility-based lighting
- Lower carbon emissions associated with public lighting
- Promote clean and renewable energy solutions in municipal infrastructure

B. Key Performance Indicators/Expected Outcomes and Targets

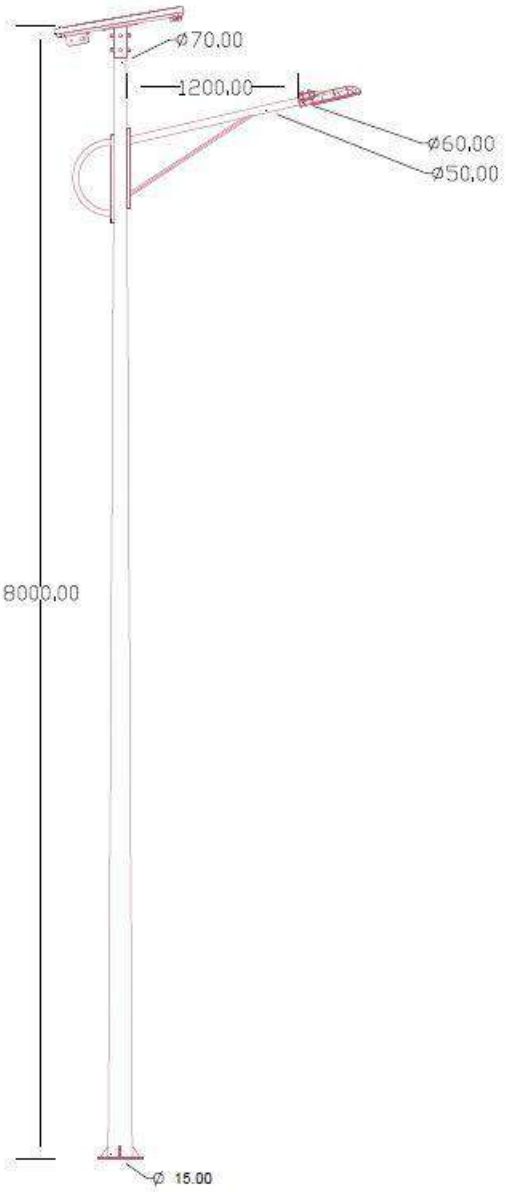
Upon successful completion, the following outcomes are expected:

- Fully operational solar streetlight network covering the specified corniche sections
- 100% operational availability of installed streetlights
- Minimum 10–12 hours of illumination per night
- Battery autonomy of 2–3 consecutive nights without solar input
- Improved public safety, visibility, and security
- Reduced municipal expenditure on conventional lighting systems

C. Activities (**Summary**)

The Contractor shall carry out, but not be limited to, the following activities:

- Site clearance and setting-out
- Civil works including excavation and foundation construction
- Supply and installation of poles, PV modules, batteries, controllers, and luminaires
- Electrical wiring & Conduits, protection, and system integration as per the below design
- Testing and commissioning of each streetlight unit
- Training of designated personnel
- Operation and Maintenance during the DNP



Proposed Solar Street Light Pole details

D. Specifications and Scope of Supply

The works to be carried out involve but are not limited to:

Solar Photovoltaic Street Lighting, as per design, The Contractor shall supply, install, test, and commission standalone solar-powered LED street lighting systems, complete with all electrical, mechanical, and civil works required for fully operational units. Each system shall be designed for reliable outdoor operation under local environmental conditions and shall operate independently of the utility grid. Standard solar Photo Voltaic Street Lighting system comprises a LED lighting lamp, photovoltaic module, rechargeable battery, solar charger controller, light pole, operation, instruction, and maintenance manual.

D.1.1. Solar Photovoltaic (PV) Module

Each solar street light shall be equipped with a monocrystalline solar PV module with a minimum rated capacity of 150 Wp per unit. The module shall have a minimum efficiency of 20% and a nominal voltage of 18 V. The PV module shall be manufactured using tempered glass and an anodized aluminum frame, suitable for outdoor

and corrosive environments. The module shall be securely mounted on the pole using an adjustable, corrosion-resistant mounting structure capable of withstanding the specified wind loads.

Fig 1: N-Types monocrystalline solar PV module

D.1.2. Battery Energy Storage System (BESS)

Each system shall include a Lithium Iron Phosphate ($LiFePO_4$) battery rated at 12 V, 150 Ah. The battery shall allow a minimum depth of discharge (DoD) of 80% and shall have a minimum cycle life of 2,000 cycles at rated operating conditions. The battery shall be designed for pole-mounted installation and enclosed in a weatherproof, lockable, and vandal-resistant housing. The battery system shall include an integrated Battery Management System (BMS) providing protection against over-charge, over-discharge, short circuit, and over-temperature.

Fig 2: Lithium Iron Phosphate ($LiFePO_4$) battery

D.1.3. LED Luminaire

The LED luminaire shall have a minimum rated power of 150 W with a luminous efficacy not less than 150 lumens per watt. The luminaire shall provide cool white illumination with a correlated color temperature (CCT) in the range of 5000K to 6500K. The housing shall be made of die-cast aluminum alloy with a minimum IP66 ingress protection rating. The luminaire shall be suitable for road and area lighting applications and designed for continuous outdoor operation.

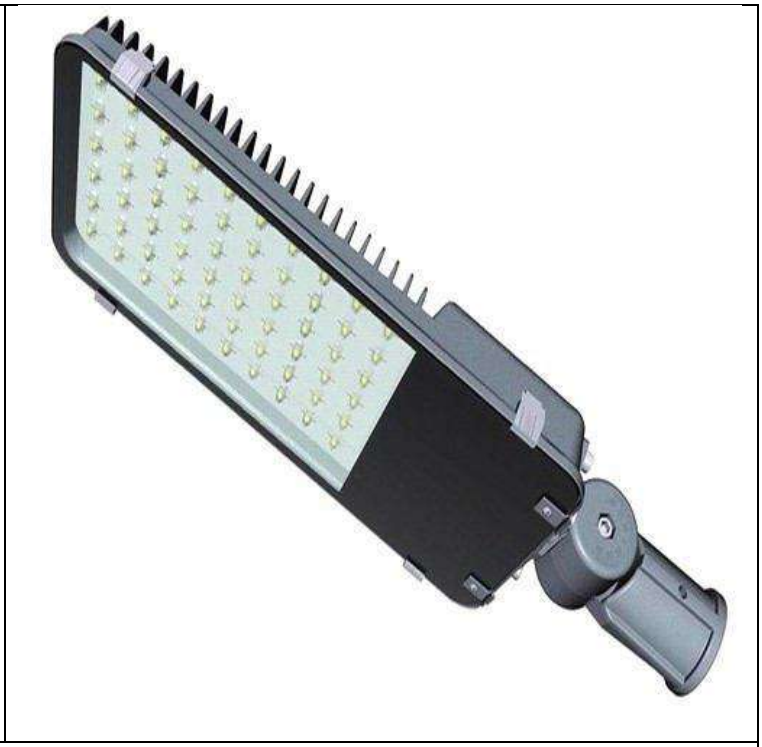


FIG 3: EXAMPLES LED SOLAR LAMPS

D.1.4. Solar Charge Controller

Each system shall be provided with a 10 A MPPT solar charge controller compatible with $LiFePO_4$ battery technology. The controller shall optimize energy harvesting from the PV module and provide automatic dusk-to-dawn operation. The controller shall include comprehensive protections against over-voltage, over-current, reverse polarity, short circuit, over-charge, and over-discharge. All settings shall be factory programmed and protected against unauthorized access.

Charge controllers are basically DC-DC converters, where PWM or MPPT technique is used to regulate the switches of the controller. There are three general types of charge controller, mainly:

- Simple ON/OFF Controller
- Pulse Width Modulated (PWM) Controller
- Maximum Power Point Tracking (MPPT) Controller

Most charge controllers operate at three stages to complete the charging cycle of the batteries. These stages vary according to different times and battery voltages. PWM can be employed to control the charging at the stages:

- BULK stage
- ABSORPTION stage
- FLOAT stage

FIG 4: EXAMPLES OF CHARGER CONTROLLERS

D.1.5. Mechanical Hardware and Pole

The lighting pole shall be 8 meters high, manufactured from hot-dip galvanized (HDG) steel suitable for outdoor installation. The pole shall be supplied with a base plate of minimum size 300 × 300 × 20 mm and installed using four (4) 15mm dia 1.5m long anchor bolts fixed into a reinforced concrete foundation. The pole shall be designed to comply with applicable wind load requirements and shall include integrated brackets for mounting the PV module, LED luminaire, battery enclosure, and charge controller. All bolts, nuts, brackets, and fasteners shall be corrosion-resistant.

The pole should be made of mild steel pipe with a height of at least 8 meters above the ground level, after grouting and final installation. The pole should have the provision to hold the weatherproof lamp housing. It should be painted with a corrosion resistant paint.

A vented, acid proof and corrosion resistant painted metallic box for outdoor use should be provided for housing the battery.

FIG 5: EXAMPLES OF INTEGRATED SOLAR STREETLIGHT

E. Applicable Codes and Standards

E.1. Solar Photovoltaic (PV) Modules

- **IEC 61215** – Terrestrial photovoltaic (PV) modules – Design qualification and type approval
- **IEC 61730-1 & IEC 61730-2** – PV module safety qualification (construction and testing)
- **IEC 61701** – Salt mist corrosion testing of photovoltaic modules (where applicable)
- **IEC 62804** – PV modules – Potential induced degradation (PID) resistance
- **ISO 9001** – Quality management systems (manufacturer certification)

E.2. Batteries ($LiFePO_4$ / Lithium-Ion)

- **IEC 62619** – Safety requirements for secondary lithium cells and batteries for industrial applications
- **IEC 62133-2** – Safety requirements for portable sealed secondary lithium cells and batteries

- **UN 38.3** – Transport of lithium batteries (testing and certification)
- **IEC 62933 (Series)** – Electrical energy storage (EES) systems – Safety and performance
- **ISO 9001 / ISO 14001** – Manufacturer quality and environmental management systems

E.3. LED Luminaires (Outdoor Street Lighting)

- **IEC 60598-1** – Luminaires – General requirements and tests
- **IEC 60598-2-3** – Luminaires for road and street lighting
- **IEC 62722-2-1** – Luminaire performance for LED luminaires
- **IEC 62471** – Photo biological safety of lamps and lamp systems
- **IEC 62031** – LED modules for general lighting – Safety specifications
- **IEC 60529** – Degrees of protection (IP Code)

E.4. Solar Charge Controller

- **IEC 62509** – Performance of battery charge controllers for photovoltaic systems
- **IEC 62109-1 & IEC 62109-2** – Safety of power converters for use in photovoltaic systems
- **IEC 61000 (Series)** – Electromagnetic compatibility (EMC) requirements

E.5. Poles, Mechanical Structures, and Foundations

- **EN 40 (Series)** – Lighting columns (design, manufacturing, and testing)
- **ISO 1461** – Hot-dip galvanized coatings on fabricated iron and steel articles
- **ISO 12944** – Corrosion protection of steel structures by protective paint systems
- **IEC 61936-1** – Power installations exceeding 1 kV AC (general safety principles – where applicable)
- **ASCE 7** or equivalent – Minimum design loads for buildings and structures (wind load design)

E.6. Electrical Installation and Cabling

- **IEC 60364 (Series)** – Low-voltage electrical installations
- **IEC 60228** – Conductors of insulated cables
- **IEC 60502** – Power cables with extruded insulation
- **IEC 60947** – Low-voltage switchgear and control gear
- **IEC 61643** – Surge protective devices (SPDs)

E.7. Environmental and Ingress Protection

- **IEC 60529** – IP ratings (minimum IP66 for luminaires and outdoor enclosures)
- **IEC 60068 (Series)** – Environmental testing (heat, humidity, vibration, dust)

E.8. Occupational Health, Safety, and Installation Practices

- **ISO 45001** – Occupational health and safety management systems
- **IEC 50110-1** – Operation of electrical installations
- **ILO Safety Standards** – Electrical and construction site safety

E.9. Testing, Inspection, and Acceptance

- **IEC 62446** – Grid-connected PV systems – Documentation, commissioning, and inspection (applicable principles for PV installations)
- **ISO/IEC 17025** – General requirements for competence of testing and calibration laboratories

E.10. Equivalency Clause

Equipment and materials complying with equivalent international, regional, or nationally recognized standards shall be acceptable, subject to approval by the Engineer.

F. PERFORMANCE REQUIREMENTS, O&M DURING DEFECT AND LIABILTY PERIOD

F.1. General O&M Obligations

The Contractor shall be responsible for full Operation and Maintenance (O&M) of the Solar Streetlight System during the period of **06 Month**; ensuring continuous, safe, and reliable operation in accordance with Good Industry Practice, manufacturer recommendations, and applicable standards.
O&M activities shall include routine inspection, preventive maintenance, corrective maintenance, fault rectification, component replacement, and system performance monitoring.

F.2. System Availability and Service Levels

- Minimum **system availability: ≥ 98%** of installed streetlights operational at any time.
- A streetlight shall be deemed unavailable if it fails to operate automatically from dusk to dawn.
- Availability shall be assessed monthly.

F.3. Lighting Performance Requirements

- Each streetlight shall provide illumination for a minimum of 10–12 hours per night, depending on system design.
- Luminaires shall operate automatically via dusk-to-dawn control.
- Light output degradation shall not exceed manufacturer limits during the O&M period.
- Uniform lighting distribution shall be maintained and flickering or intermittent operation shall not be permitted.

F.4. Battery Performance and Energy Storage

Batteries (Li-ion / LFP / Gel, as applicable) shall:

- Maintain adequate State of Charge (SOC) to support nightly operation;
- Operate within manufacturer-specified voltage and temperature limits;
- Provide a minimum autonomy of 2–3 consecutive nights without solar input.
- Battery depth of discharge shall be controlled to prevent premature degradation.
- Any battery failing to meet performance requirements shall be replaced at the Contractor's cost.

F.5. Solar Module Performance

- PV modules shall be kept clean and free from shading, dust, and debris.
- Performance losses due to soiling shall be mitigated through scheduled cleaning.
- Broken, cracked, or non-functional modules shall be replaced within the specified response time.

F.6. Controller, LED Luminaire, and Pole Integrity

- Charge controllers and drivers shall ensure stable power supply and protection against over-charging, over-discharging, and short circuits.
- LED luminaires shall operate within rated current and temperature limits.
- Poles, brackets, foundations, and fasteners shall be inspected for corrosion, mechanical damage, and alignment.

F.7. Maintenance Response Times

Fault Category	Maximum Response Time
Critical (complete outage)	48 hours
Major (reduced lighting)	72 hours

Minor (non-critical issue)	7 days

Note: All faults shall be logged, tracked, and closed within the agreed timeframes.

F.8. Performance Monitoring and Reporting

- The Contractor shall maintain maintenance logs and fault records.
- O&M reports shall include:
- Number of operational streetlights;
- Faults and corrective actions taken;
- Replaced components;
- Preventive maintenance activities.

F.9. Penalties and Corrective Measures

- Failure to meet availability or performance requirements may result in:
- Withholding of retention payments;
- Requirement to replace defective components;
- Application of contractual performance deductions, where applicable.

F.10. Handover at End of Defect and Liability Period and Releasing Retention Money

At the end of the Defect and Liability period, the Contractor shall hand over the system in good working condition, with:

- 100**%** of streetlights fully operational**;**
- Updated maintenance records;
- Confirmation of remaining component warranties.
- The Retention Money released upon issuance of the Taking-Over Certificate (TOC)
- Expiry of the Defects and Liability of Six (06) months;

F.11. Short Tender Summary

- **Availability:** 100%
- **Lighting Duration:** 10–12 hours/night
- **Autonomy:** 2–3 nights
- **Response Time:** 48–72 hours
- **Retention Period:** 06 months from TOC
- **Retention Amount:** 10% of Contract Price
- **O&M Coverage:** Full O&M by Contractor during Defect and Liability
- **Release:** After Performance Certificate

ANNEX 2 - DESIGNS AND DRAWINGS

Drawings - Coastal Development in the Bossaso Waterfront Project

MASTER PLAN LAYOUT SCALE 1:1700

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
2.DEPTH AT FOUNDATION TO BE DETERMINED ON SITE ALL FOUNDATIONS R.C. COLUMNS AND R.C. WORKS TO STRUCTURAL ENGINEERS' DETAIL.
3.HEAVY DUTY POLYTHENE SHEETING AND TERMITE TREATMENT TO BE PROVIDED UNDER GROUND FLOORSLAB. DPC TO BE THREE PLY BITUMINOUS FELT LAID UNDER ALL WALLS.
4. P.V DENOTES PERMANENT VENTILATION, F.L DENOTES FANLIGHT ABOVE.
5. ALL WALLS TO BE REINFORCED WITH HOOP IRON AT EVERY ALTERNATIVE COURSE.
6. ALL SANITARY WORKS TO BE EXECUTED IN ACCORDANCE WITH M.O.H. RULES AND REGULATIONS.
7. ALL DRAINS UNDER BUILDING, DRIVEWAY, AND PARKING TO BE 150mm CAST IRON PIPE ENCASED
IN 150mm CONCRETE INSPECTION CHAMBERS WITHIN BUILDING TOBE FITTED WITH HEAVY DUTY DOUBLE SEAL AIR TIGHT COVERS

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2.HEAT/SMOKE DETECTORS TO BE INSTALLED.
3.BREAK-GLASS FIRE ALARM SYSTEM TO BE INSTALLED.
4.4500LTR WATER TANK WITH A BOOSTER PUMP TO BE PROVIDED.
5.1x9LTR WATER/CO2 AT EACH FIRE POINT TO BE PROVIDED.
6.1x10KG DRY POWDER AT EACH FIRE POINT TO BE PROVIDED.
7.FIRE NOTICE AND FIRE EXIT SIGNS AT STRATEGIC POSITIONS TO BE PROVIDED.
8.1000 GALLON WATER FOR FIRE FIGHTING TO BE PROVIDED.
9.1 NO. 4.5KG FIRE EXTINGUISHER AND 1 NO. BLANKET TO BE PROVIDED.
10.SPRINKLER SYSTEM TO BE INSTALLED IN THE PARKING.
11.6 NO. HYDRAULIC HOSE REELS 30 METRES LONG WITH OPEN SHUT OFF JET NOZZLE TO BE PROVIDED.

CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **MASTER PLAN LAYOUT** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/01** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **16/08/2026**

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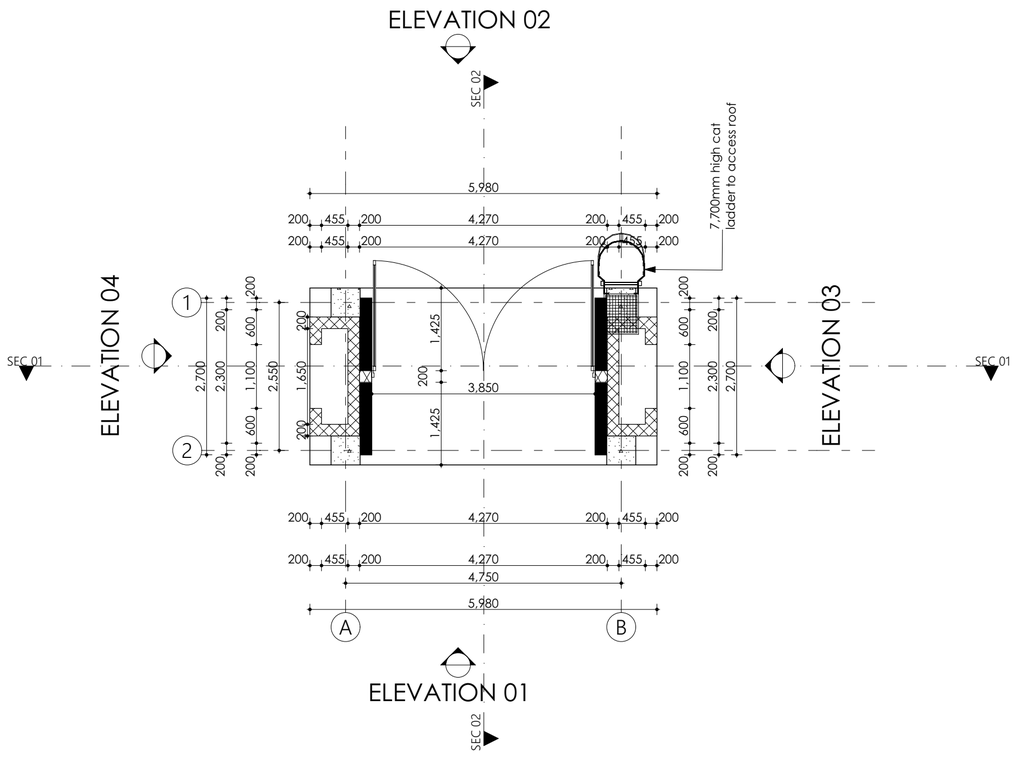
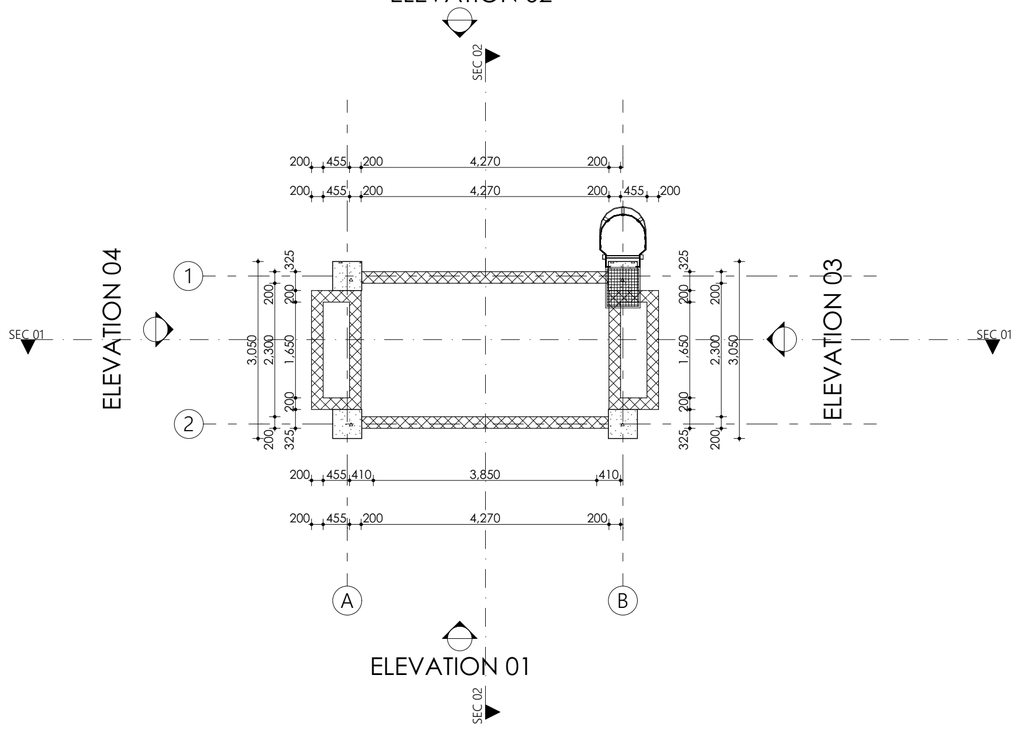
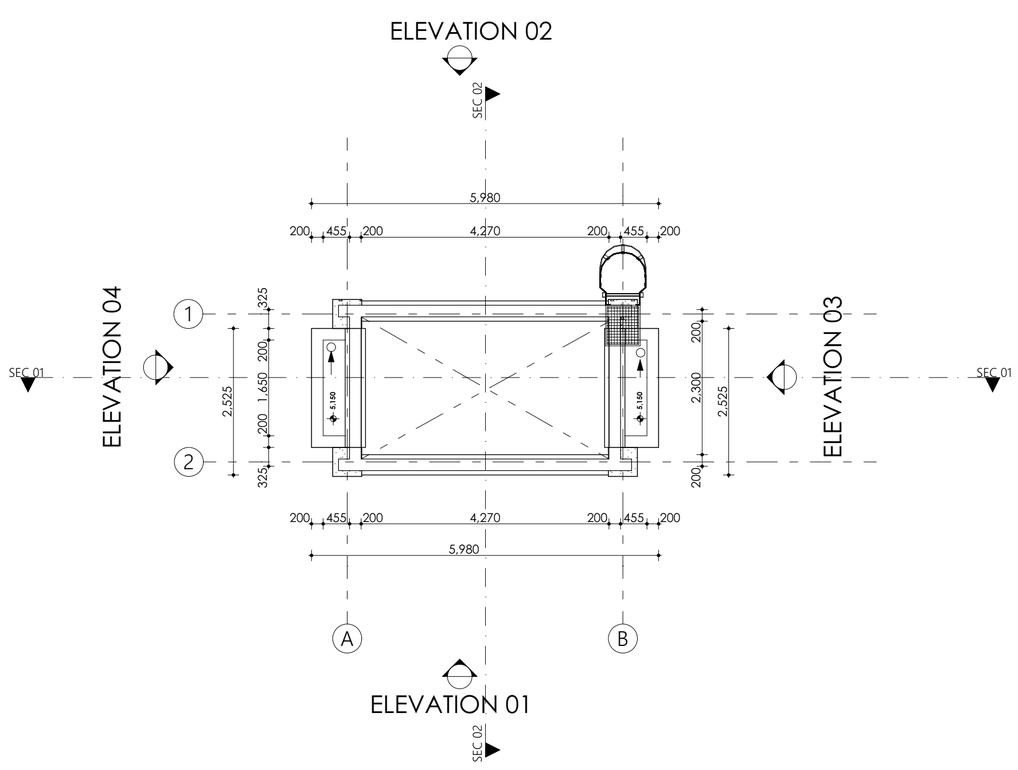
ARCHITECTURAL DRAWINGS
COASTAL RESILIENCE IN BOSSASO WATER FRONT PROJECT



GATE WAY GROUND FLOOR PLAN SCALE 1:100



GATE WAY ARCHES AREA FLOOR PLAN SCALE 1:100



GATE WAY ROOF LEVEL ONE PLAN SCALE 1:100

GATEWAY ROOF FLOOR PLAN SCALE 1:100

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CLIENT :
SINAN PROJECTS

PROJECT :
BOSASO BEACH CORNICHE

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT:
IRFAN HOBAYA

DRAWING TITLE : **GATE PLAN LAYOUT** | SCALE: **AS SHOWN**

DRAWING NO:	PROJECT NO:	REV NO:
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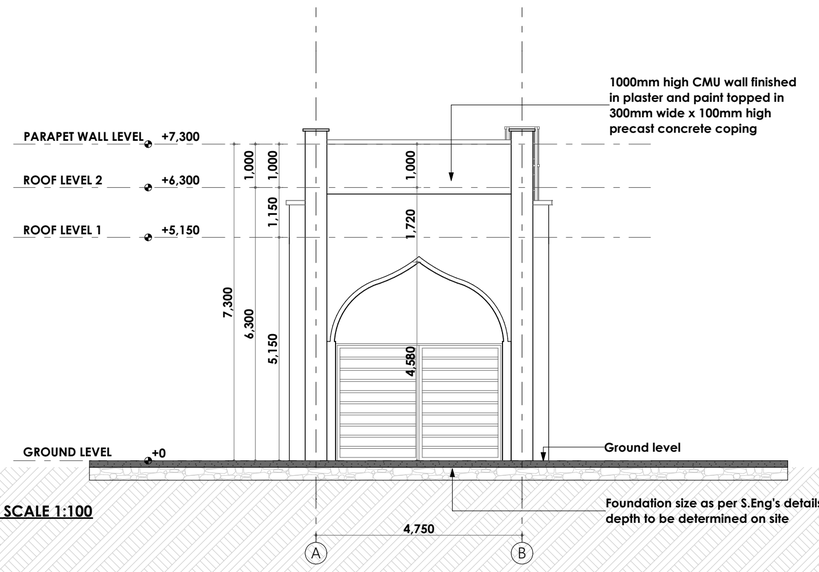

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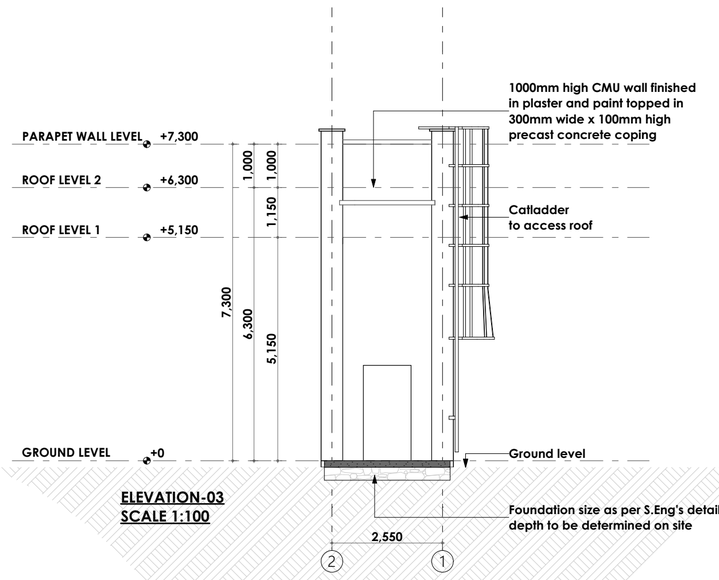

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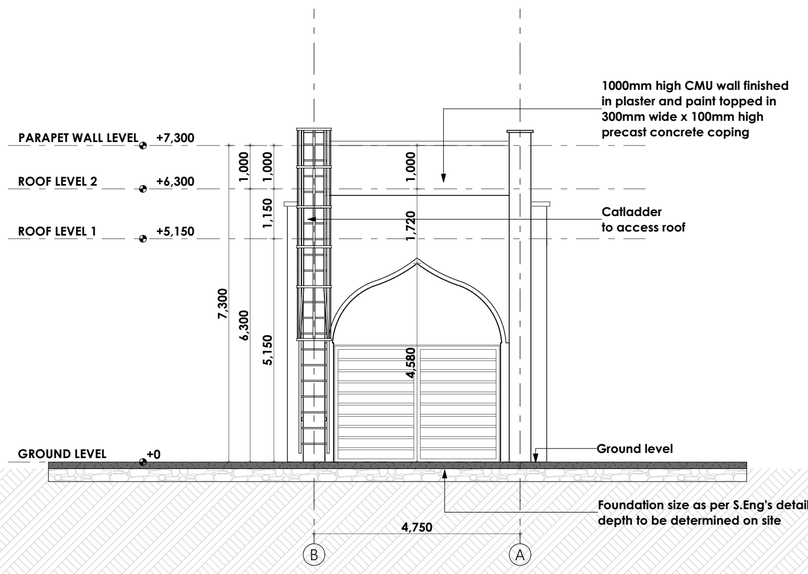

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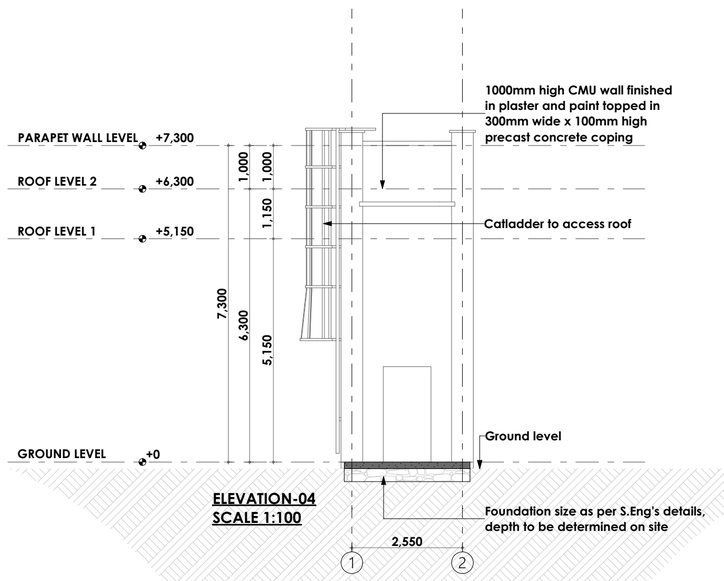

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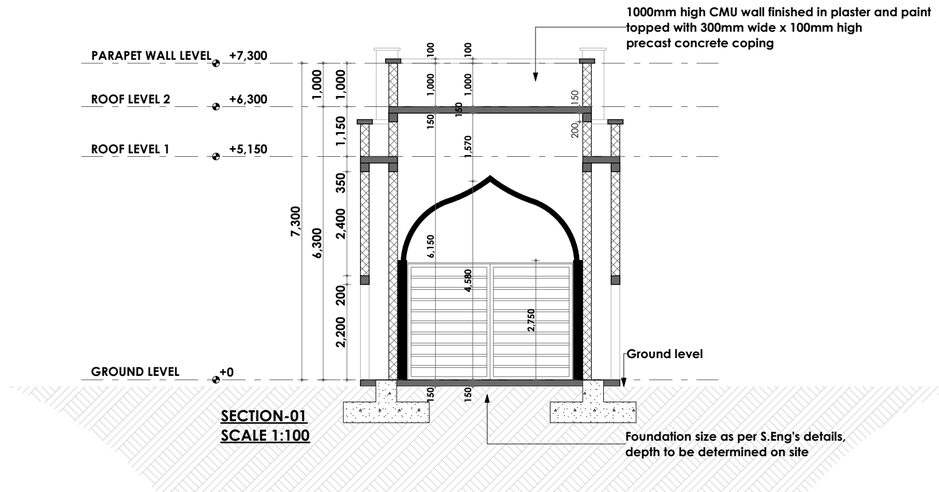

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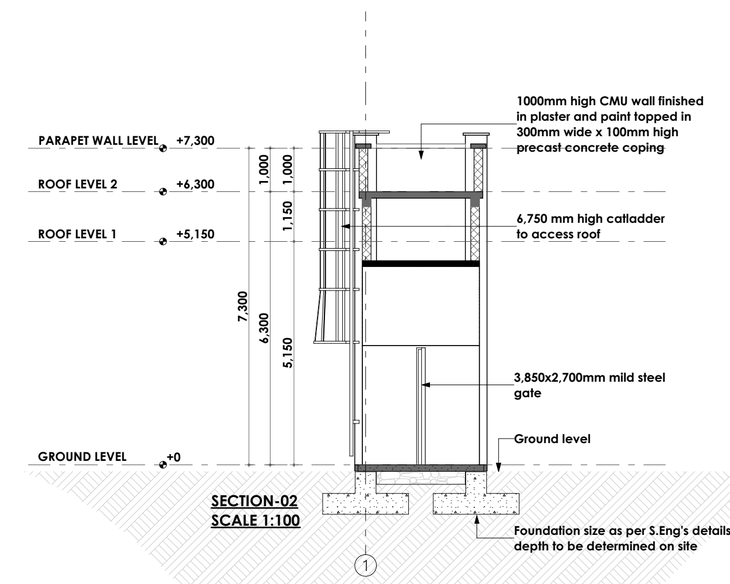

SECTION-02 SCALE 1:100

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PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **GATE ELEVATIONS AND SECTIONS** | SCALE: **AS SHOWN**

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DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **13/08/2026**

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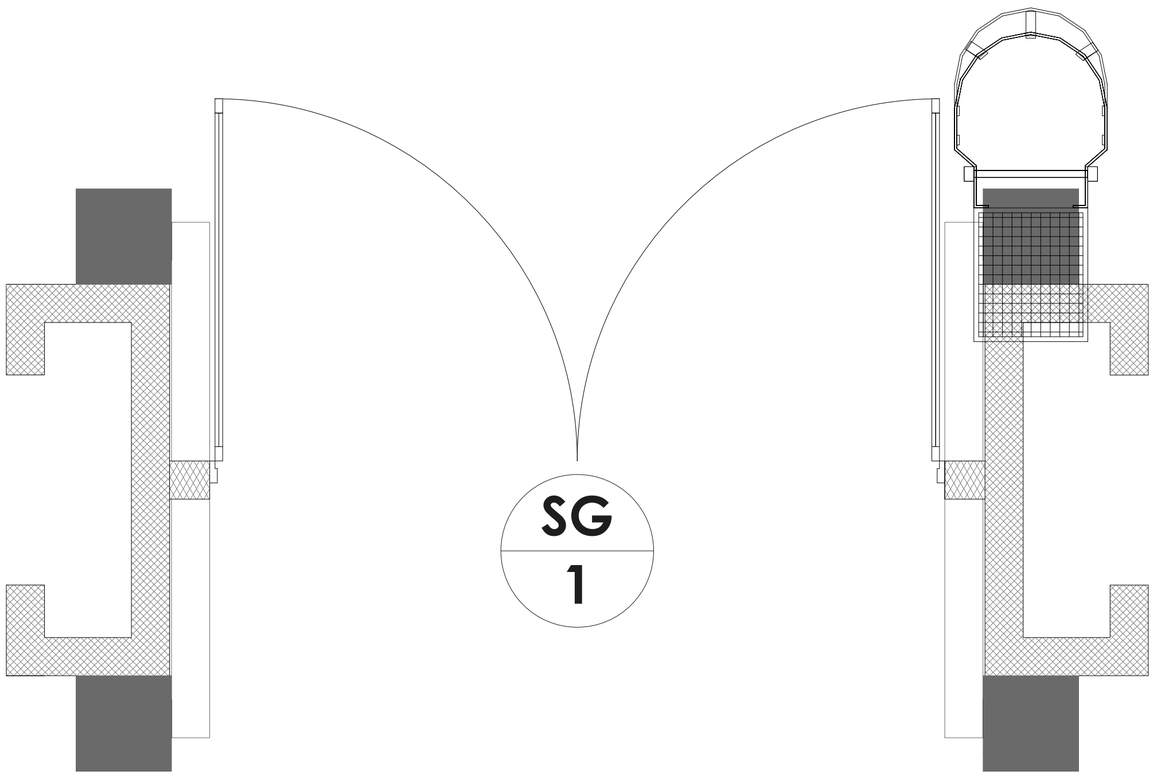
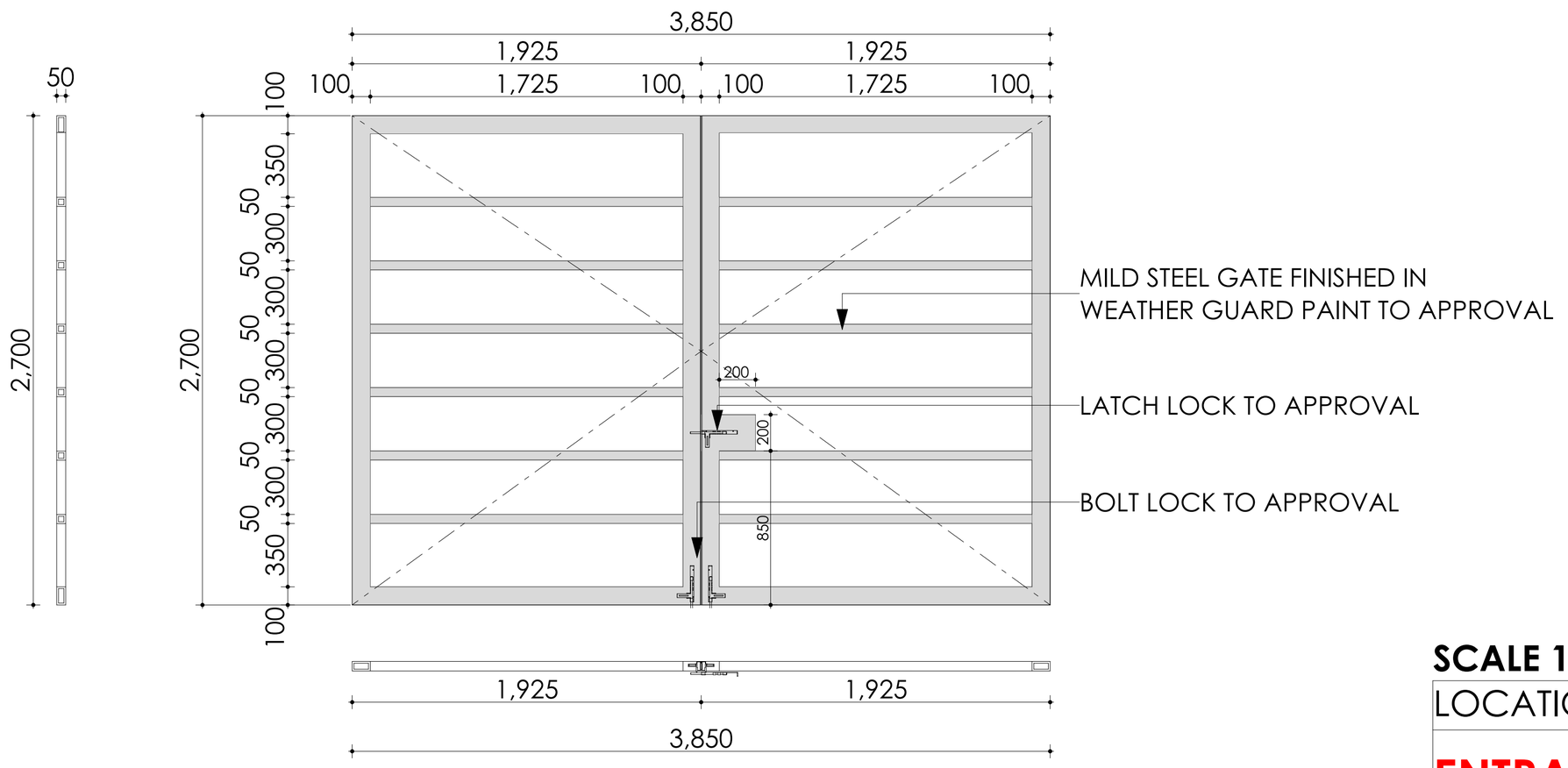


DOOR SCHEDULES

TOTAL NO
4 GATES

SG
1



SCALE 1:20

LOCATION

ENTRANCES

DESCRIPTION	**SIDE HUNG GATE**
FRAME	**STEEL**
IRON MONGERY	**DROP BOLT AND LATCH LOCK TO APPROVAL**

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
2.DEPTH AT FOUNDATION TO BE DETERMINED ON SITE ALL FOUNDATIONS R.C. COLUMNS AND R.C. WORKS TO STRUCTURAL ENGINEERS' DETAIL.
3.HEAVY DUTY POLYTHENE SHEETING AND TERMITE TREATMENT TO BE PROVIDED UNDER GROUND FLOORSLAB. DPC TO BE THREE PLY BITUMINOUS FELT LAID UNDER ALL WALLS.
4. P.V DENOTES PERMANENT VENTILATION. F.L DENOTES FANLIGHT ABOVE.
5. ALL WALLS TO BE REINFORCED WITH HOOP IRON AT EVERY ALTERNATIVE COURSE.
6. ALL SANITARY WORKS TO BE EXECUTED IN ACCORDANCE WITH M.O.H. RULES AND REGULATIONS.
7. ALL DRAINS UNDER BUILDING, DRIVEWAY, AND PARKING TO BE 150mm CAST IRON PIPE ENCASED
IN 150mm CONCRETE INSPECTION CHAMBERS WITHIN BUILDING TOBE FITTED WITH HEAVY DUTY DOUBLE SEAL AIR TIGHT COVERS

FIRE FIGHTING NOTES

1.ALTERNATIVE MEANS OF LIGHTING USING SECONDARY MEANS TO BE INSTALLED.
2.HEAT/SMOKE DETECTORS TO BE INSTALLED.
3.BREAK-GLASS FIRE ALARM SYSTEM TO BE INSTALLED.
4.4500LTR WATER TANK WITH A BOOSTER PUMP TO BE PROVIDED.
5.1x9LTR WATER/CO2 AT EACH FIRE POINT TO BE PROVIDED.
6.1x10KG DRY POWDER AT EACH FIRE POINT TO BE PROVIDED.
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9.1 NO. 4.5KG FIRE EXTINGUISHER AND 1 NO. BLANKET TO BE PROVIDED.
10.SPRINKLER SYSTEM TO BE INSTALLED IN THE PARKING.
11.6 NO. HYDRAULIC HOSE REELS 30 METRES LONG WITH OPEN SHUT OFF JET NOZZLE TO BE PROVIDED.

CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **MAIN GATE** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/011** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

PC | MAC | CAD FILE:

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sikastaba | in every way

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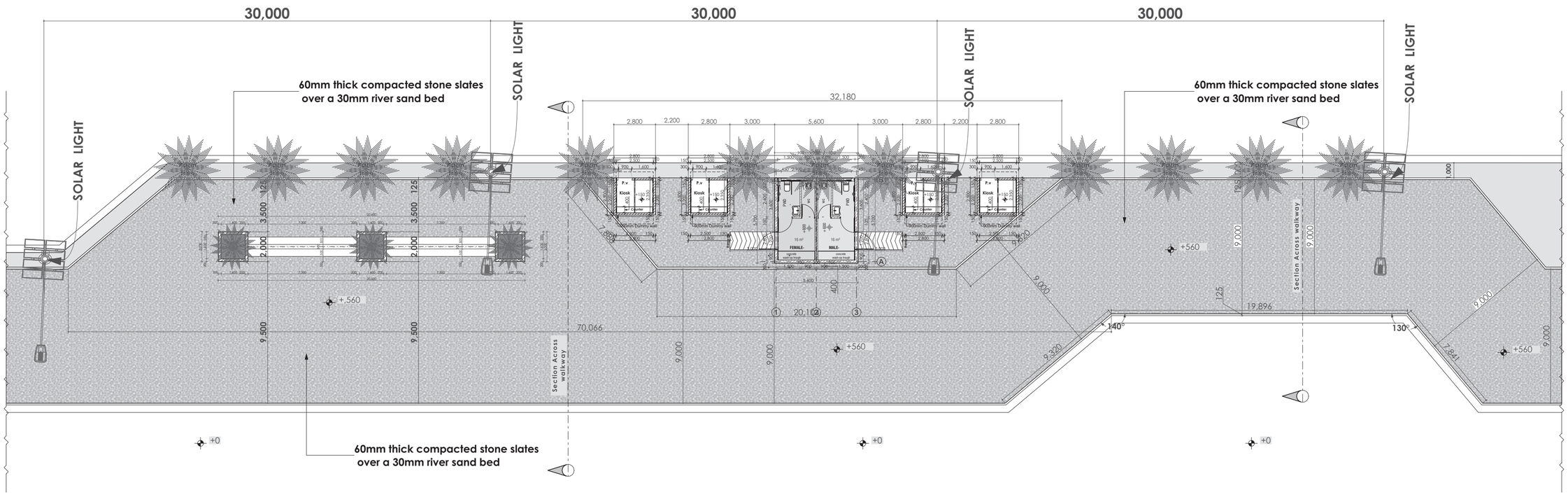
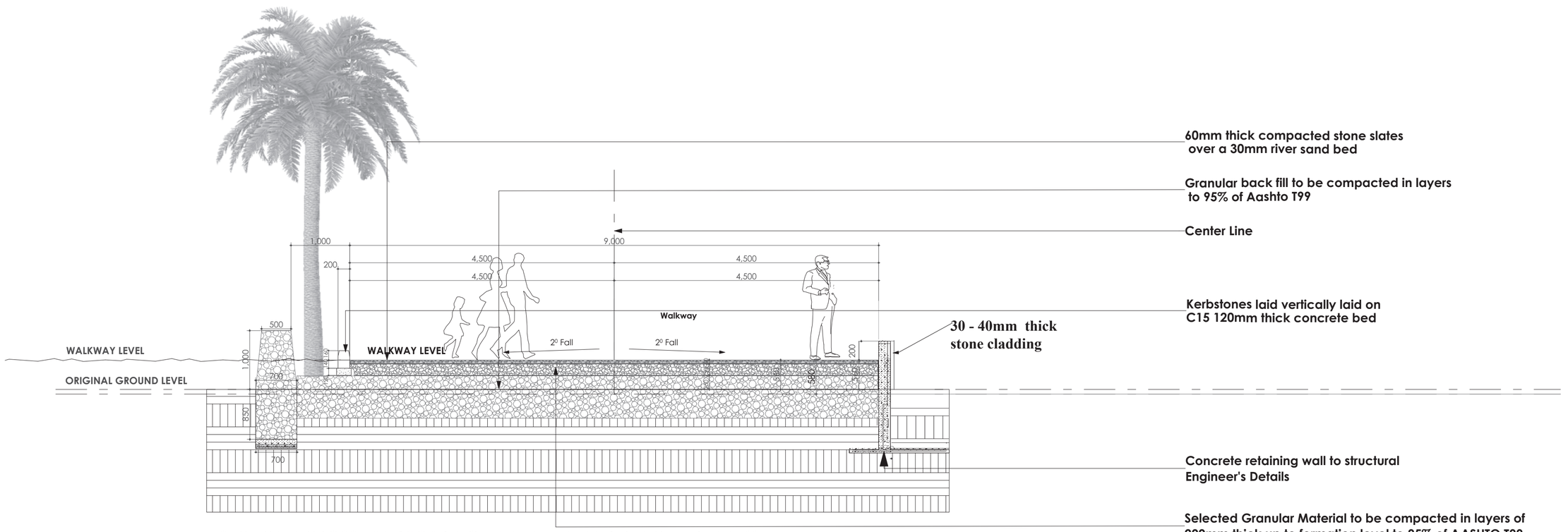
A1:011



PATHWAYS AND SEATING AREAS EXPLODED VIEWS



SECTION ACROSS LANDSCAPING , WALKWAY AND BEACH AREA 1:40

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
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CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **EXPLODED WALKWAY AREA** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/04** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **16/08/2026**

PC | MAC | CAD FILE:

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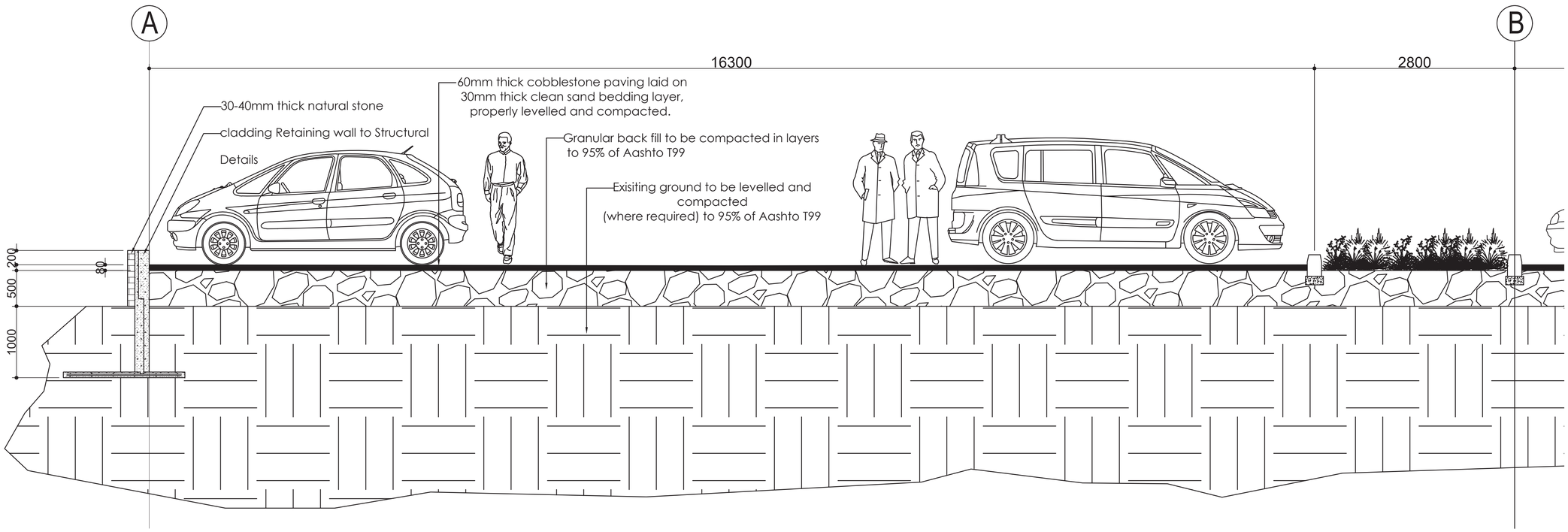
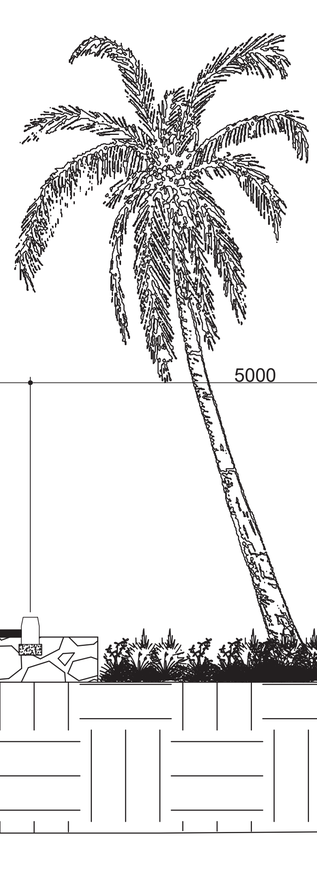
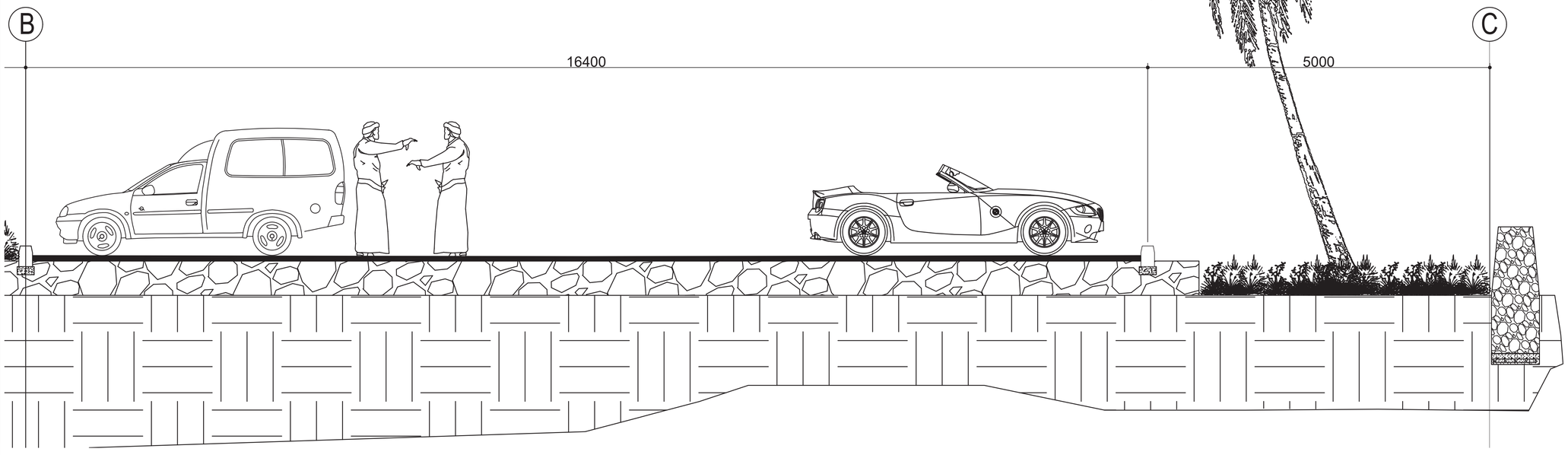
A1:04







PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

OFFICE:

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE:

BOSSASO

TITLE:

CAR PARKING DETAILS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	05/08/2026	AA	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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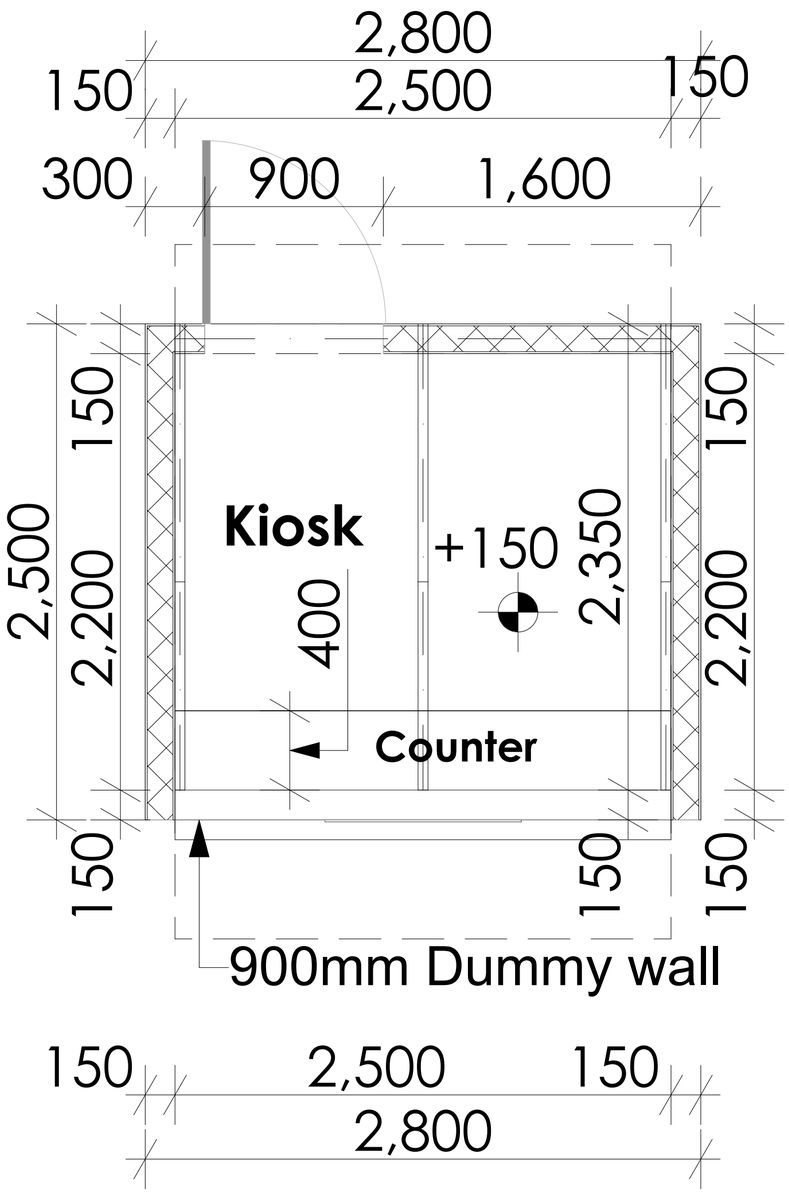
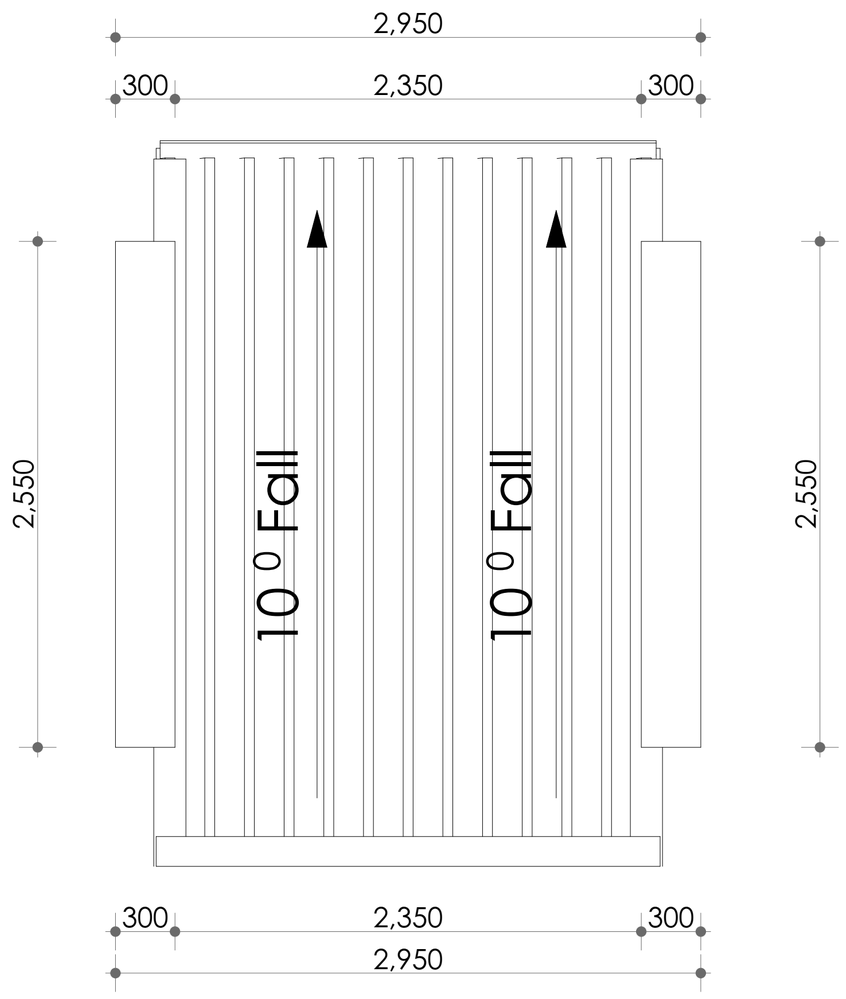


KIOSK GROUND FLOOR PLAN LAYOUT



KIOSK ROOF FLOOR PLAN LAYOUT

GENERAL NOTES

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CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **FLOOR PLAN KIOSKS** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/01** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

PC | MAC | CAD FILE:

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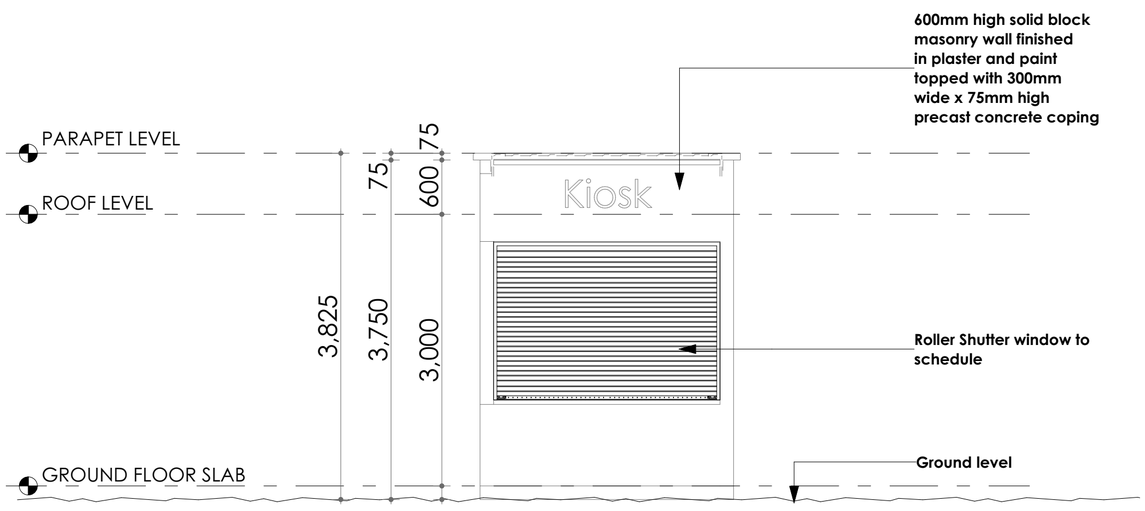
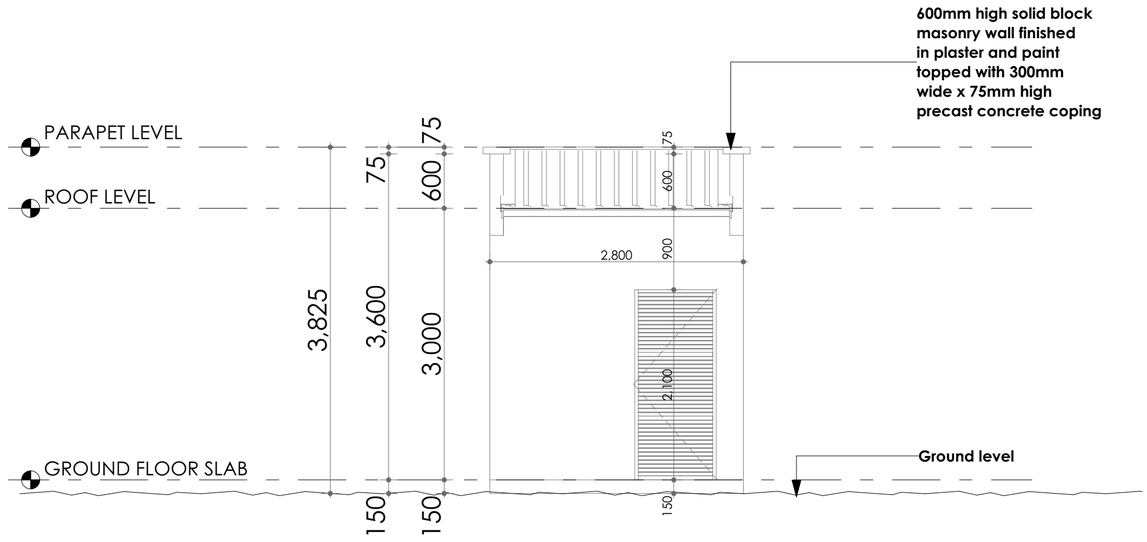
A1:01



ELEVATION 01
KIOSK SCALE 1:50



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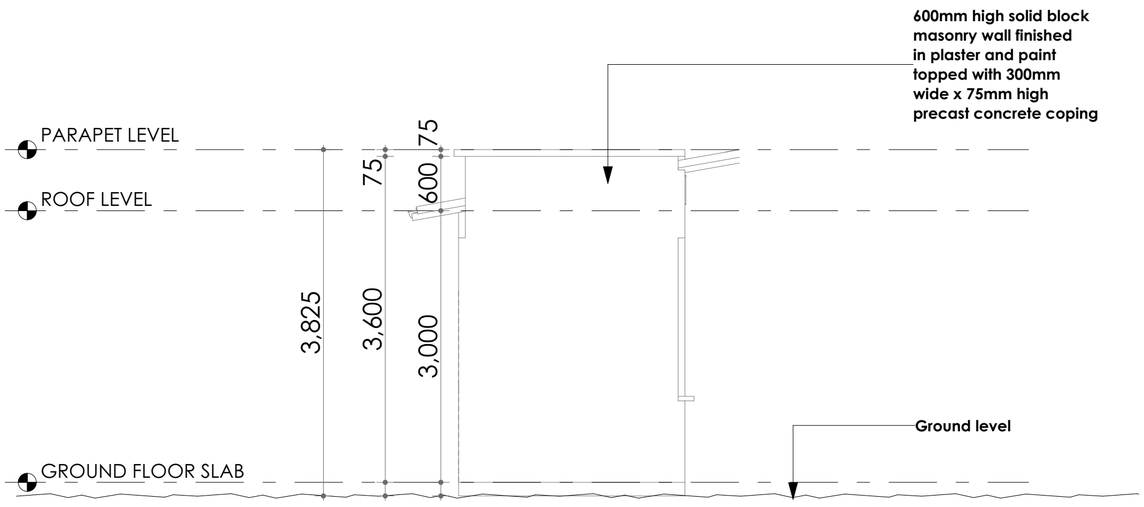
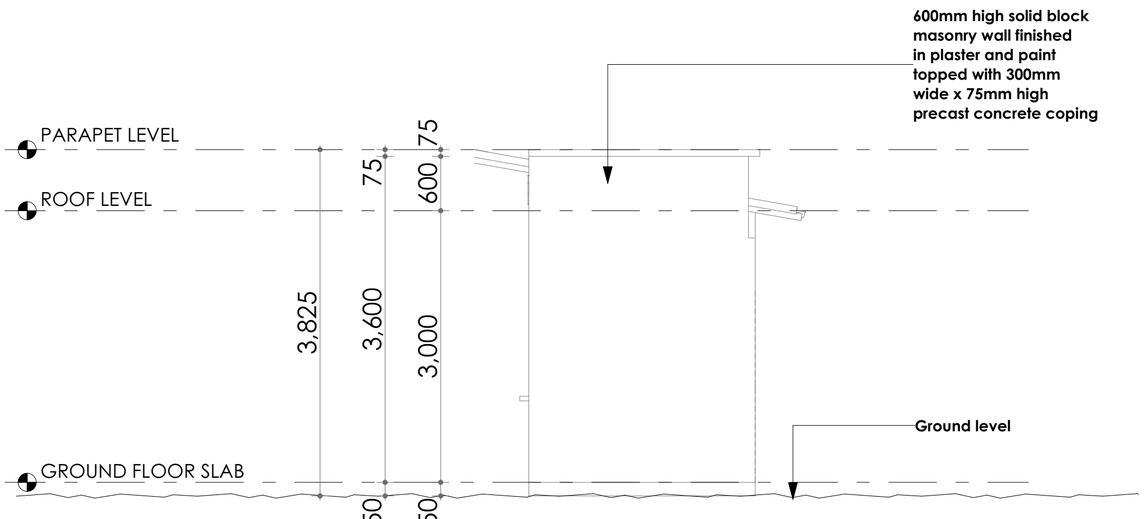
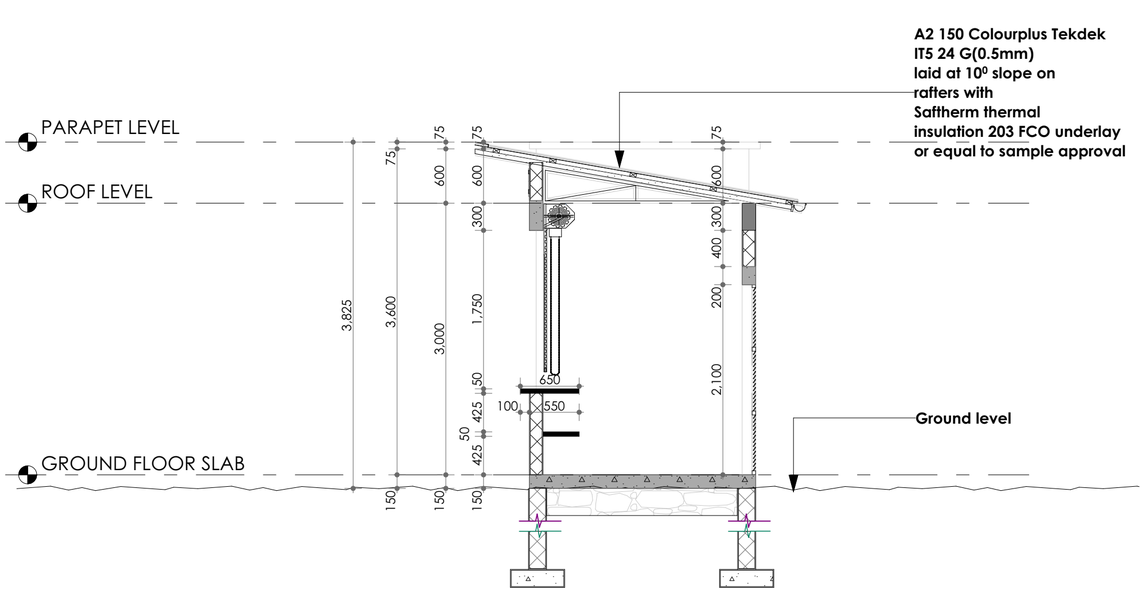
KIOSK SCALE 1:50



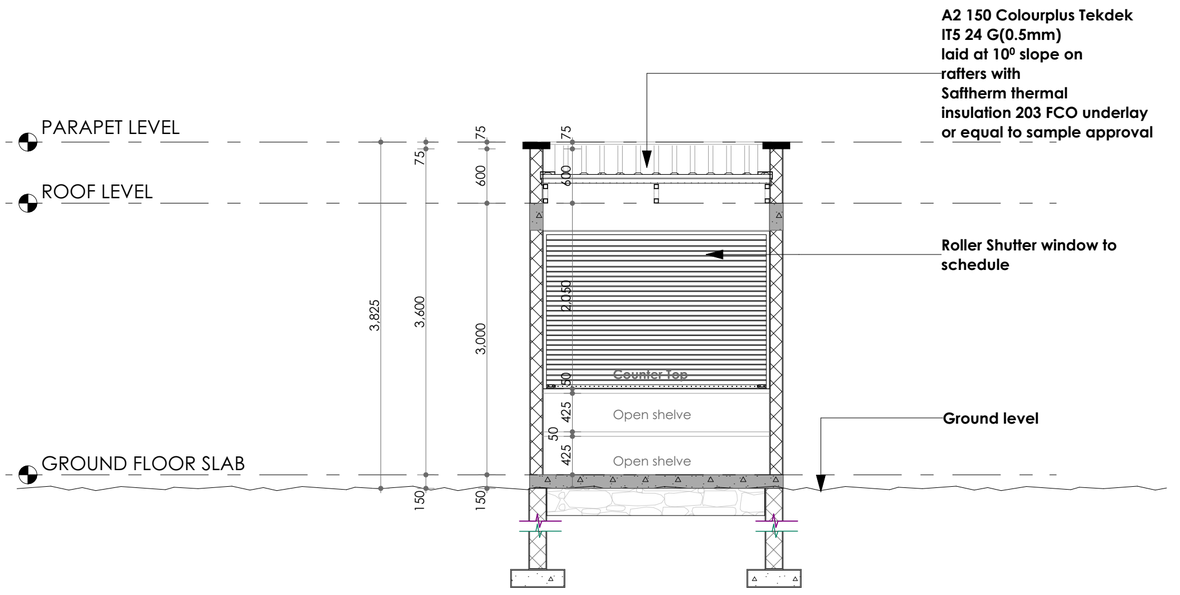
ELEVATION 03
KIOSK SCALE 1:50



ELEVATION 04
KIOSK SCALE 1:50



SECTION 01 KIOSK
SCALE 1:50



SECTION 02 KIOSK
SCALE 1:50

GENERAL NOTES

1.ALL DIMENSIONS TO BE CHECKED ON SITE. WRITTEN DIMENSIONS RULES OVER SCALED DRAWINGS.
ANY DISCREPANCY IN DIMENSIONS TO BE REPORTED TOTHE ARCHITECT BEFORE PROCEEDING.
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FIRE FIGHTING NOTES

1.ALTERNATIVE MEANS OF LIGHTING USING SECONDARY MEANS TO BE INSTALLED.
2.HEAT/SMOKE DETECTORS TO BE INSTALLED.
3.BREAK-GLASS FIRE ALARM SYSTEM TO BE INSTALLED.
4.450LTR WATER TANK WITH A BOOSTER PUMP TO BE PROVIDED.
5.1x9LTR WATER/CO2 AT EACH FIRE POINT TO BE PROVIDED.
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CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **ELEVATIONS AND SECTIONS KIOSKS** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/02** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

PC | MAC | CAD FILE:

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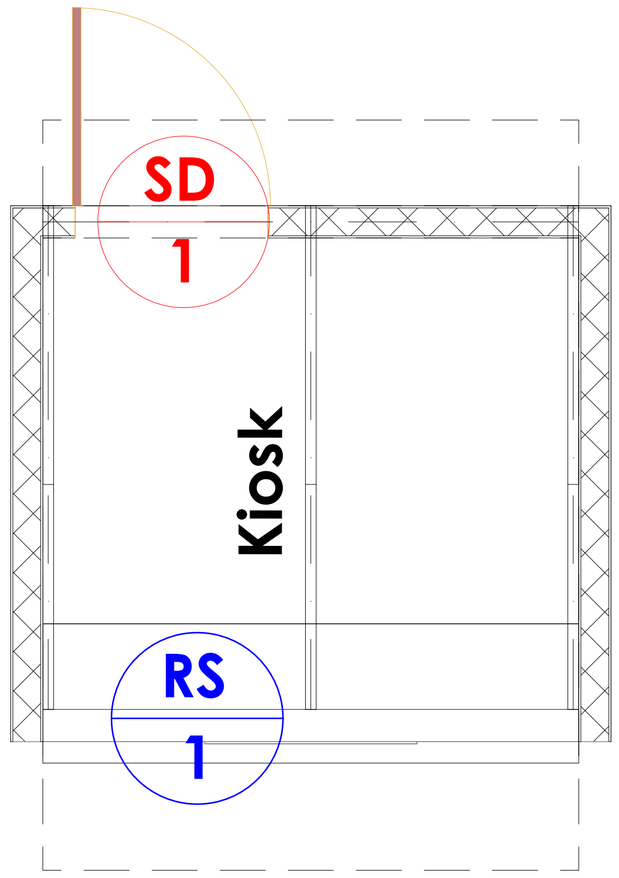
A1:02

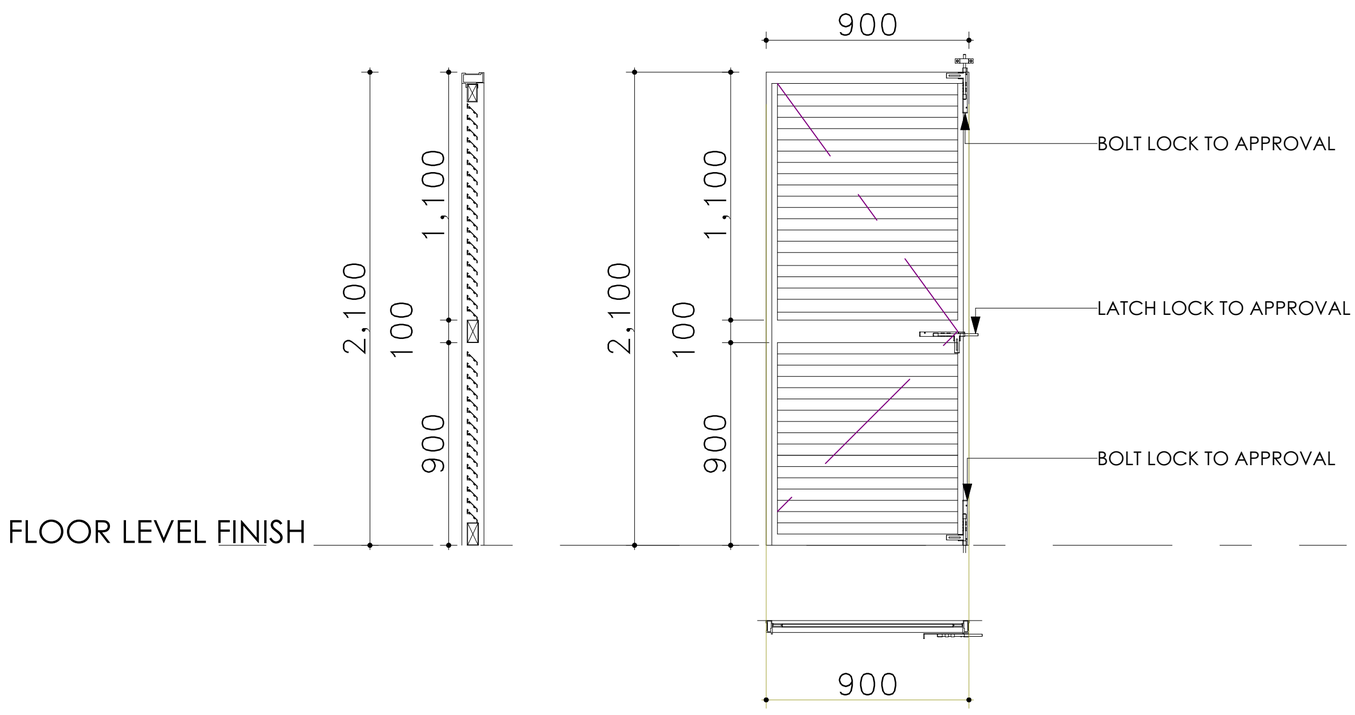


DOOR SCHEDULES

TOTAL NO

12 DOORS

SD 1



SCALE 1:20

LOCATION

KIOSK DOORS

DESCRIPTION	**SIDE HUNG DOOR**
FRAME	**STEEL**
IRON MONGERY	**DROP BOLT,TONER BOLT AND LATCH LOCK TO APPROVAL**

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CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **DOOR SCHEDULE 1** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/03** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

PC | MAC | CAD FILE:

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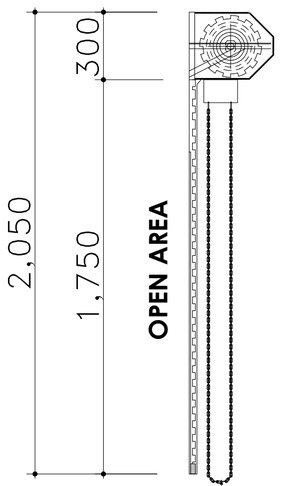
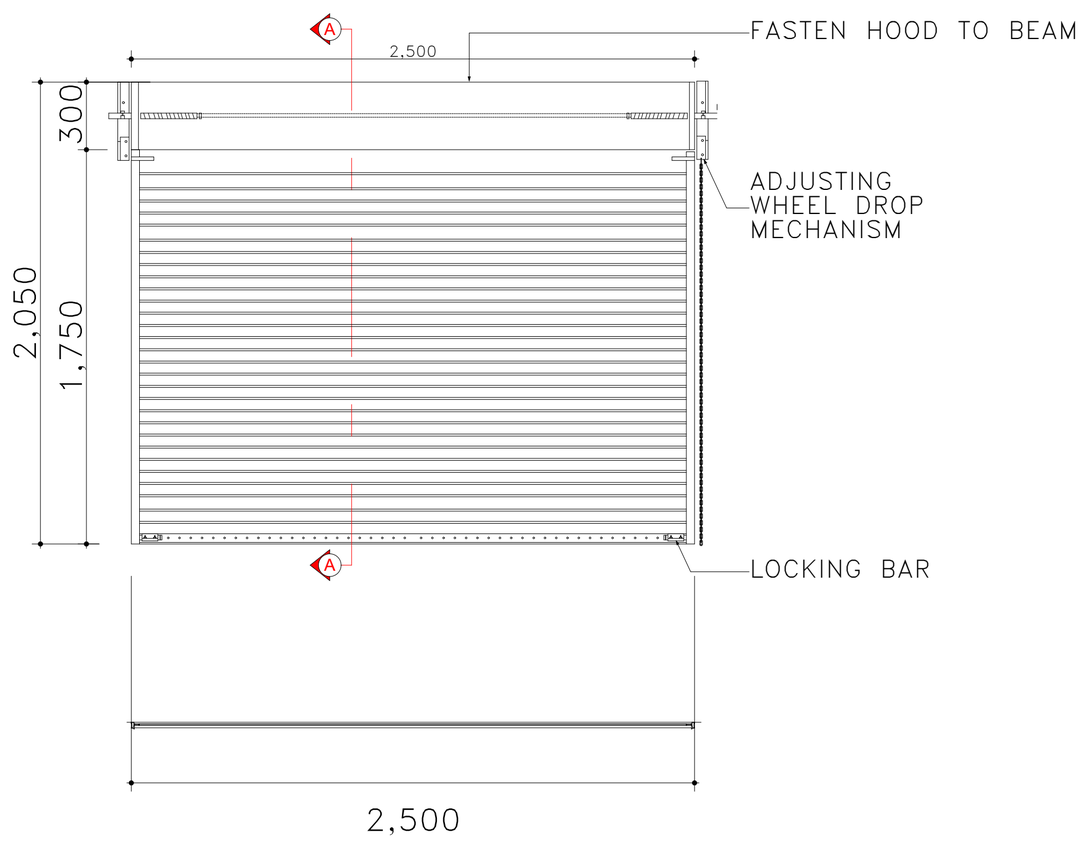
WINDOW SCHEDULES

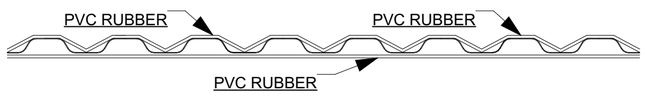
TOTAL NO

12 SHUTTERS

RS
1







SCALE 1:20

LOCATION
KIOSKS

DESCRIPTION	**MANUAL ROLLING SHUTTER**
FRAME	**ALUMINIUM**
MECHANISM	**DROP DOWN MECHANISM**
IRON MONGERY	**LOCKING BARS TO SAMPLE APPROVAL**

GENERAL NOTES

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6.1x10KG DRY POWDER AT EACH FIRE POINT TO BE PROVIDED.
7.FIRE NOTICE AND FIRE EXIT SIGNS AT STRATEGIC POSITIONS TO BE PROVIDED.
8.1000 GALLON WATER FOR FIRE FIGHTING TO BE PROVIDED.
9.1 NO. 4.5KG FIRE EXTINGUISHER AND 1 NO. BLANKET TO BE PROVIDED.
10.SPRINKLER SYSTEM TO BE INSTALLED IN THE PARKING.
11.6 NO. HYDRAULIC HOSE REELS 30 METRES LONG WITH OPEN SHUT OFF JET NOZZLE TO BE PROVIDED.

CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **WINDOW SCHEDULE 1** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/04** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

PC | MAC | CAD FILE:

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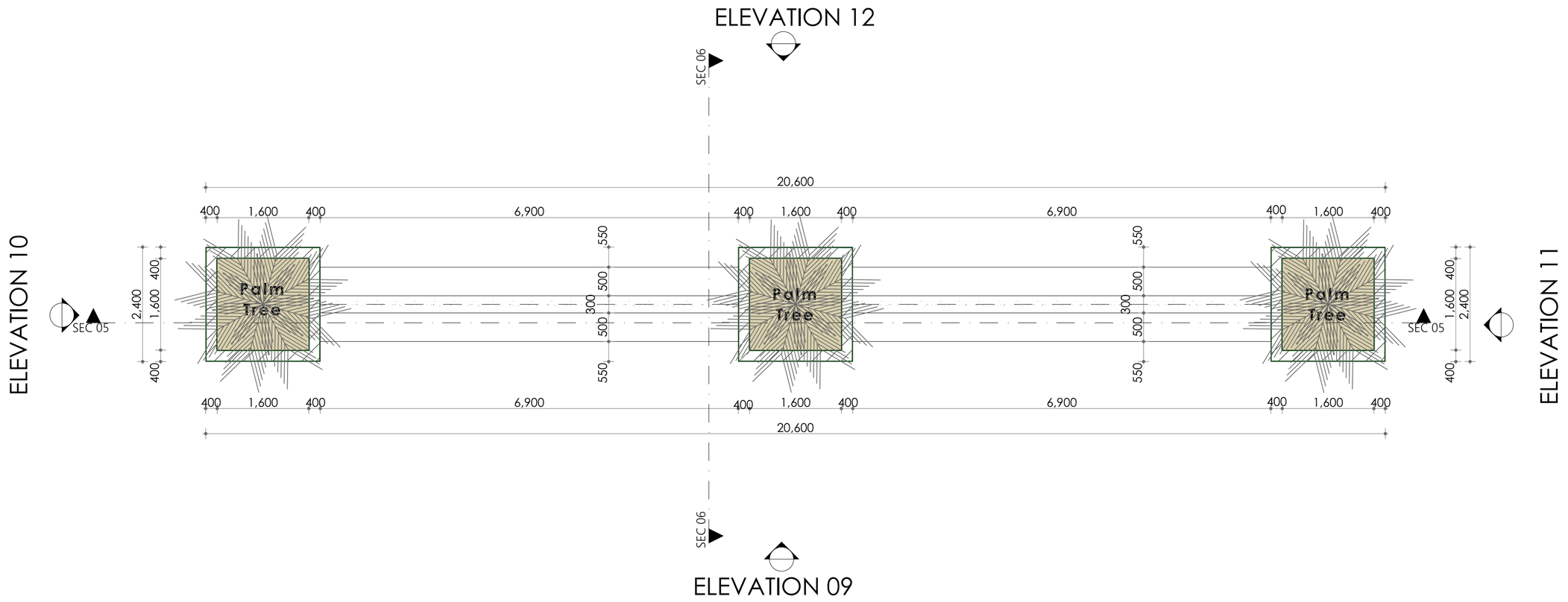
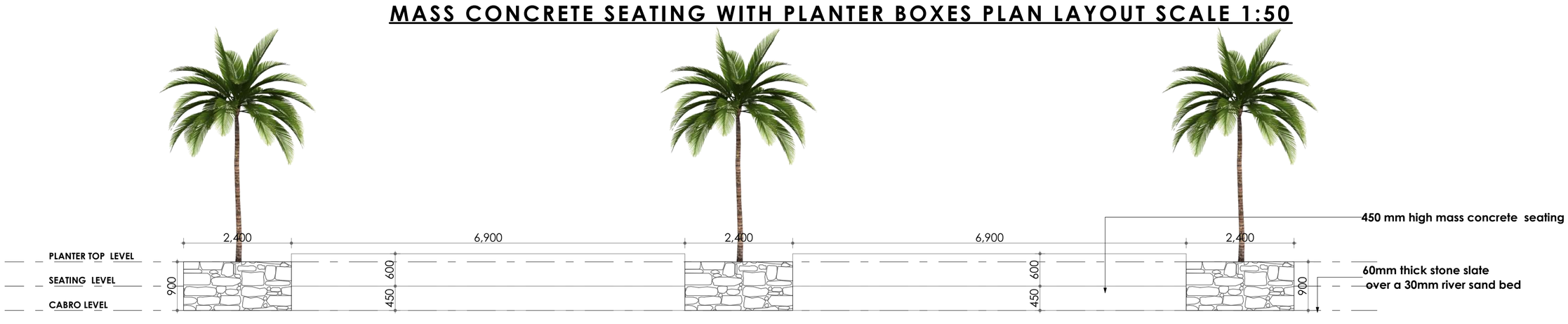
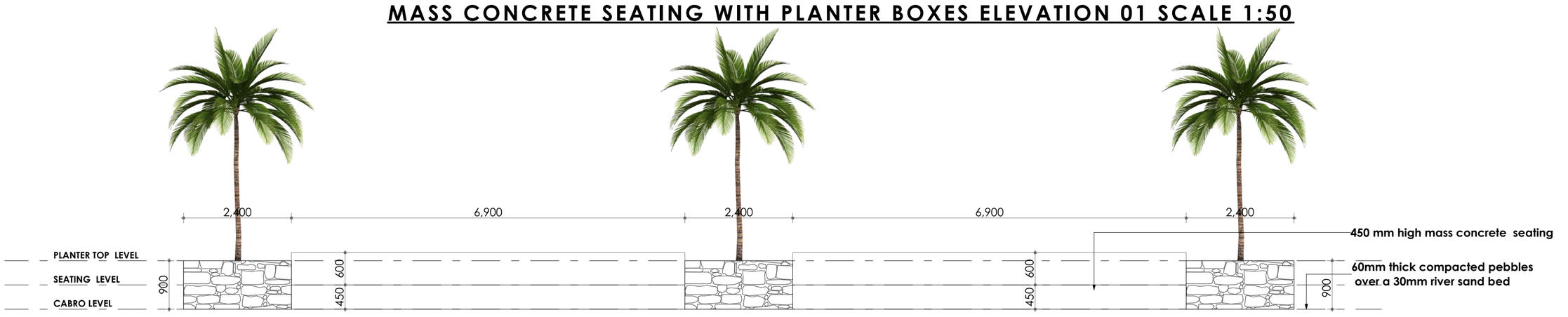
A1:04



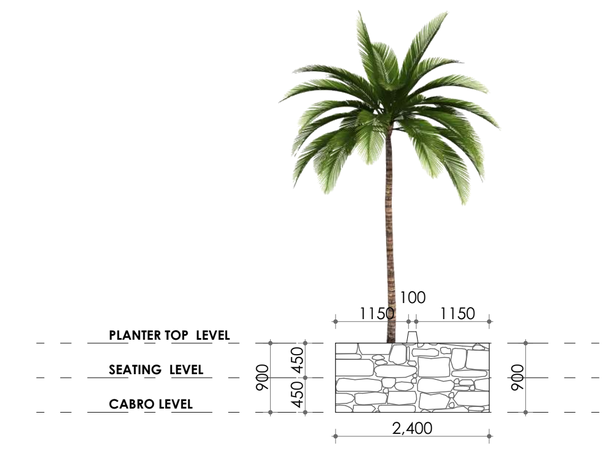
MASS CONCRETE SEATING WITH PLANTER BOXES PLAN LAYOUT SCALE 1:50



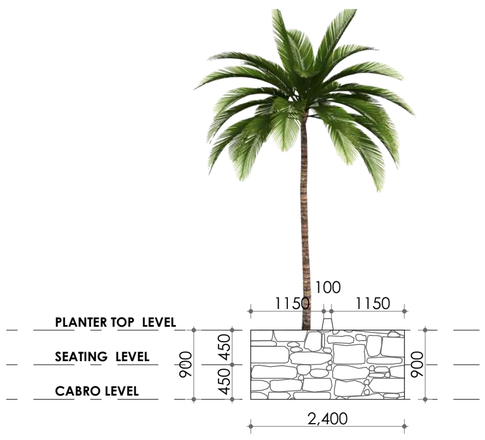
MASS CONCRETE SEATING WITH PLANTER BOXES ELEVATION 01 SCALE 1:50



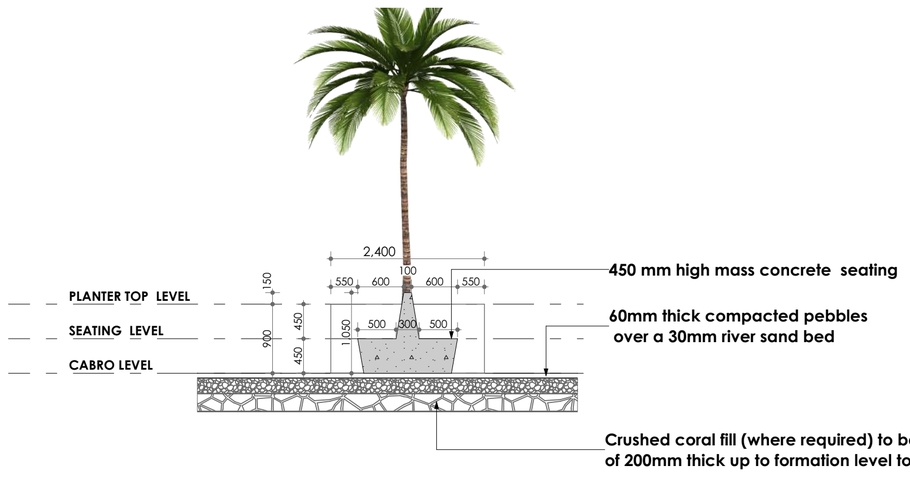
MASS CONCRETE SEATING WITH PLANTER BOXES ELEVATION 02 SCALE 1:50

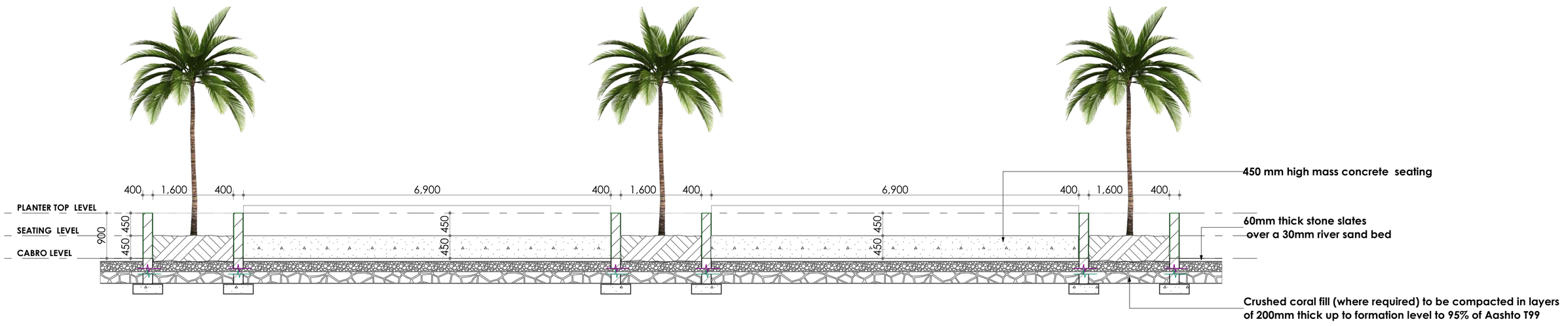


MASS CONCRETE SEATING WITH PLANTER BOXES ELEVATION 03 SCALE 1:50



MASS CONCRETE SEATING WITH PLANTER BOXES SECTION 01 SCALE 1:50





MASS CONCRETE SEATING WITH PLANTER BOXES SECTION 02 SCALE 1:50

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
2.DEPTH AT FOUNDATION TO BE DETERMINED ON SITE ALL FOUNDATIONS R.C. COLUMNS AND R.C. WORKS TO STRUCTURAL ENGINEERS' DETAIL.
3.HEAVY DUTY POLYTHENE SHEETING AND TERMITE TREATMENT TO BE PROVIDED UNDER GROUND FLOORSLAB. DPC TO BE THREE PLY BITUMINOUS FELT LAID UNDER ALL WALLS.
4. P.V DENOTES PERMANENT VENTILATION. F.L DENOTES FANLIGHT ABOVE.
5. ALL WALLS TO BE REINFORCED WITH HOOP IRON AT EVERY ALTERNATIVE COURSE.
6. ALL SANITARY WORKS TO BE EXECUTED IN ACCORDANCE WITH M.O.H. RULES AND REGULATIONS.
7. ALL DRAINS UNDER BUILDING, DRIVEWAY, AND PARKING TO BE 150mm CAST IRON PIPE ENCASED
IN 150mm CONCRETE INSPECTION CHAMBERS WITHIN BUILDING TOBE FITTED WITH HEAVY DUTY DOUBLE SEAL AIR TIGHT COVERS

FIRE FIGHTING NOTES

1.ALTERNATIVE MEANS OF LIGHTING USING SECONDARY MEANS TO BE INSTALLED.
2.HEAT/SMOKE DETECTORS TO BE INSTALLED.
3.BREAK-GLASS FIRE ALARM SYSTEM TO BE INSTALLED.
4.4500LTR WATER TANK WITH A BOOSTER PUMP TO BE PROVIDED.
5.1x9LTR WATER/CO2 AT EACH FIRE POINT TO BE PROVIDED.
6.1x10KG DRY POWDER AT EACH FIRE POINT TO BE PROVIDED.
7.FIRE NOTICE AND FIRE EXIT SIGNS AT STRATEGIC POSITIONS TO BE PROVIDED.
8.1000 GALLON WATER FOR FIRE FIGHTING TO BE PROVIDED.
9.1 NO. 4.5KG FIRE EXTINGUISHER AND 1 NO. BLANKET TO BE PROVIDED.
10.SPRINKLER SYSTEM TO BE INSTALLED IN THE PARKING.
11.6 NO. HYDRAULIC HOSE REELS 30 METRES LONG WITH OPEN SHUT OFF JET NOZZLE TO BE PROVIDED.

CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **OUTDOOR SITTING AREA & PLANTER BOXES** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/03** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **03/08/2026**

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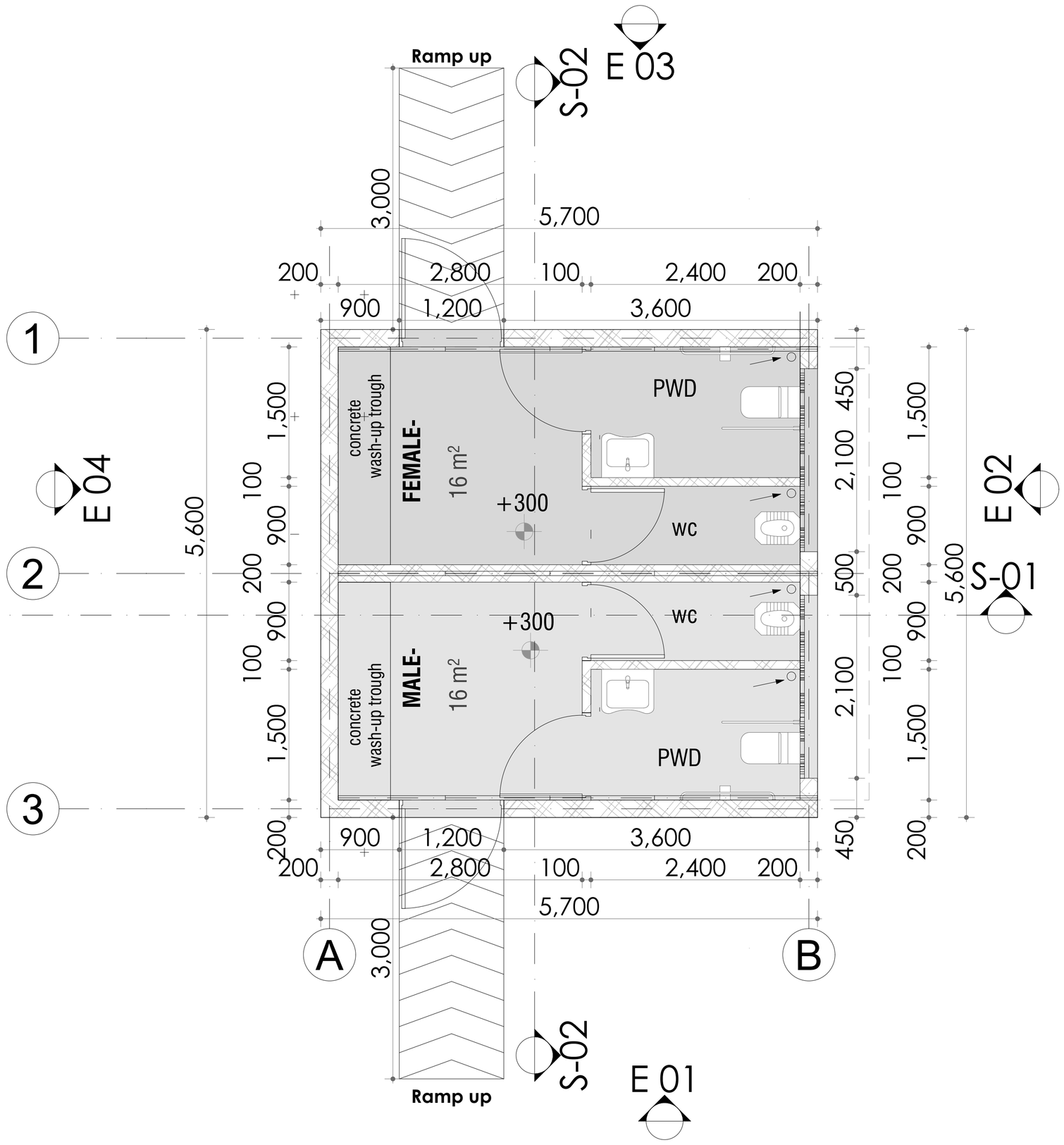
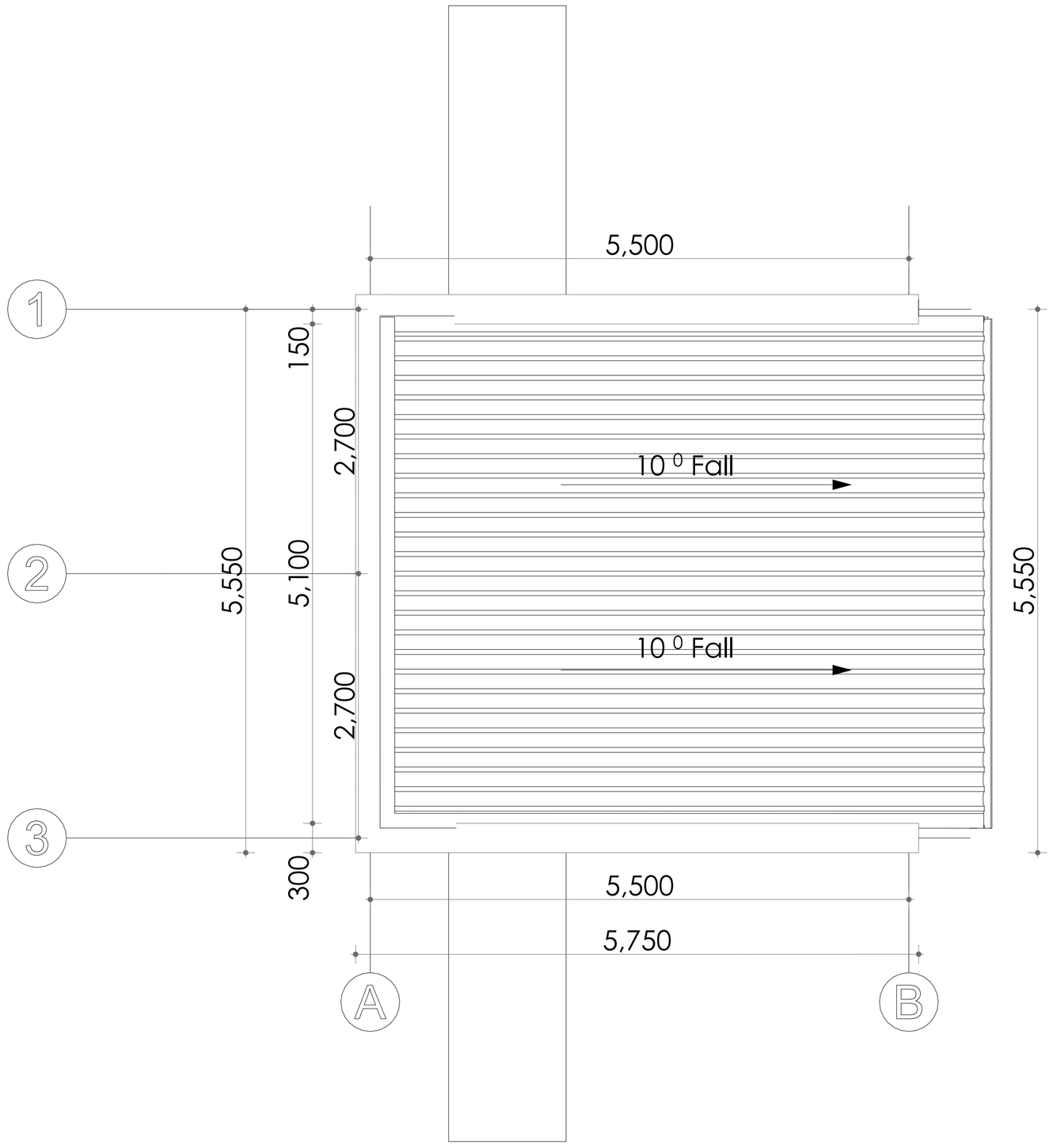
A1:03



ABLUTIONS AT KIOSKS GROUND FLOOR PLAN LAYOUT



ABLUTIONS AT KIOSKS ROOF FLOOR PLAN LAYOUT

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
2.DEPTH AT FOUNDATION TO BE DETERMINED ON SITE ALL FOUNDATIONS R.C. COLUMNS AND R.C. WORKS TO STRUCTURAL ENGINEERS' DETAIL.
3.HEAVY DUTY POLYTHENE SHEETING AND TERMITE TREATMENT TO BE PROVIDED UNDER GROUND FLOORSLAB. DPC TO BE THREE PLY BITUMINOUS FELT LAID UNDER ALL WALLS.
4. P.V DENOTES PERMANENT VENTILATION, F.L DENOTES FANLIGHT ABOVE.
5. ALL WALLS TO BE REINFORCED WITH HOOP IRON AT EVERY ALTERNATIVE COURSE.
6. ALL SANITARY WORKS TO BE EXECUTED IN ACCORDANCE WITH M.O.H. RULES AND REGULATIONS.
7. ALL DRAINS UNDER BUILDING, DRIVEWAY, AND PARKING TO BE 150mm CAST IRON PIPE ENCASED
IN 150mm CONCRETE INSPECTION CHAMBERS WITHIN BUILDING TOBE FITTED WITH HEAVY DUTY DOUBLE SEAL AIR TIGHT COVERS

FIRE FIGHTING NOTES

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8.1000 GALLON WATER FOR FIRE FIGHTING TO BE PROVIDED.
9.1 NO. 4.5KG FIRE EXTINGUISHER AND 1 NO. BLANKET TO BE PROVIDED.
10.SPRINKLER SYSTEM TO BE INSTALLED IN THE PARKING.
11.6 NO. HYDRAULIC HOSE REELS 30 METRES LONG WITH OPEN SHUT OFF JET NOZZLE TO BE PROVIDED.

CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **PLANS ABLUTION** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/01** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

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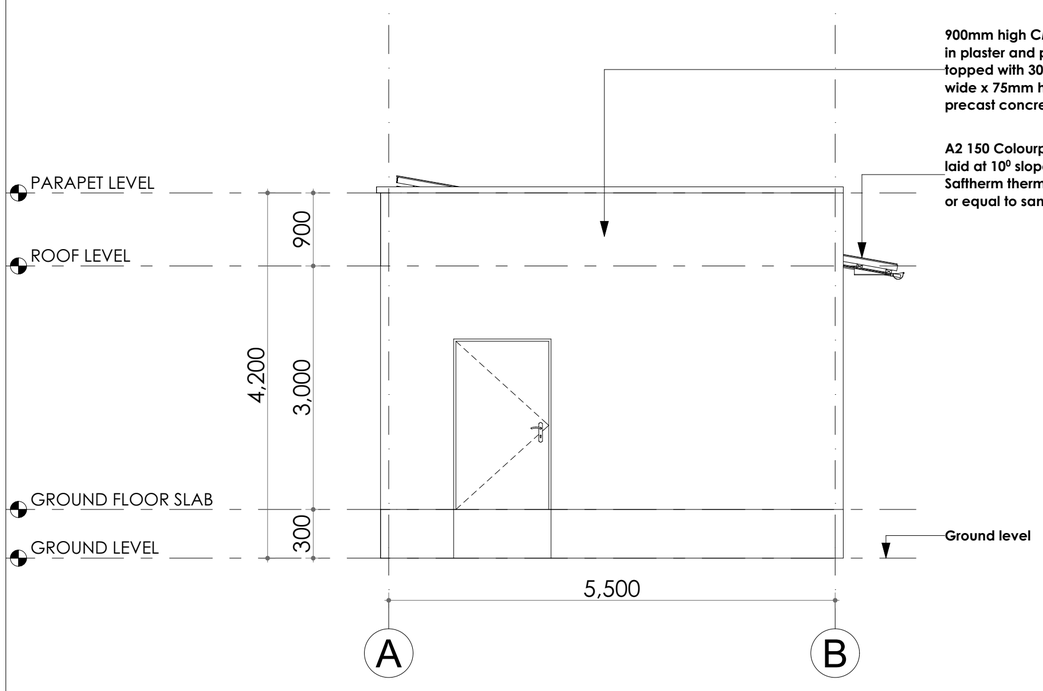
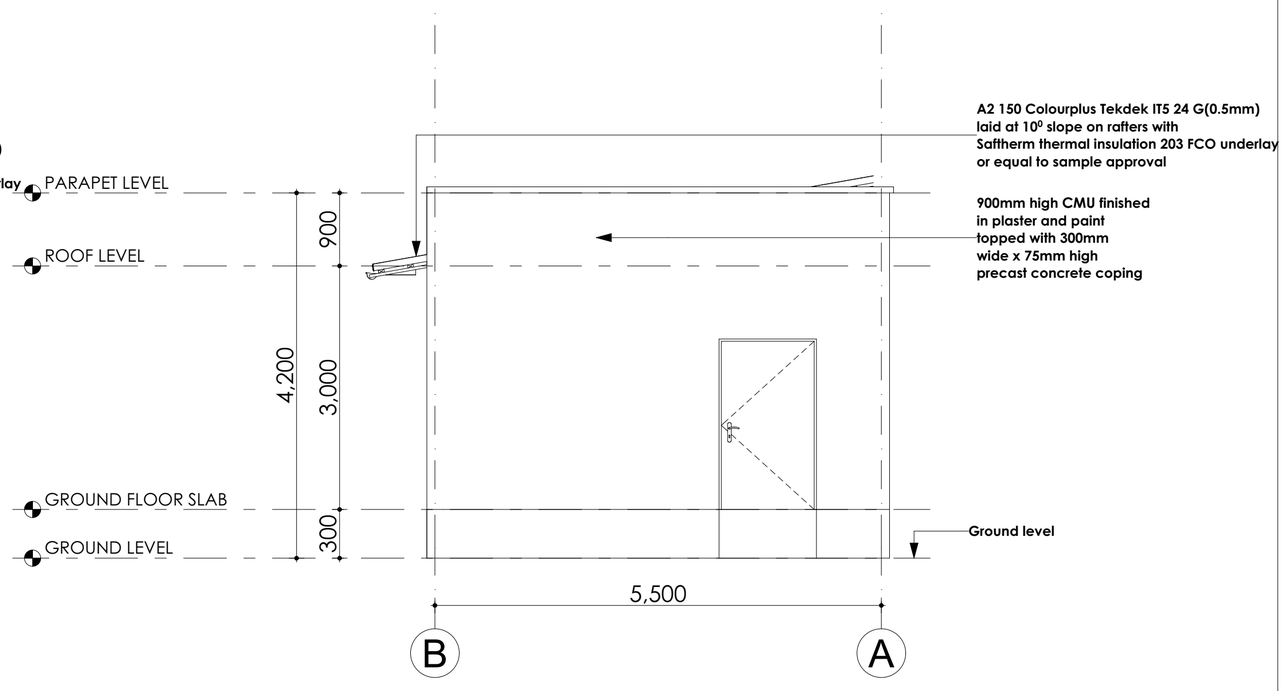
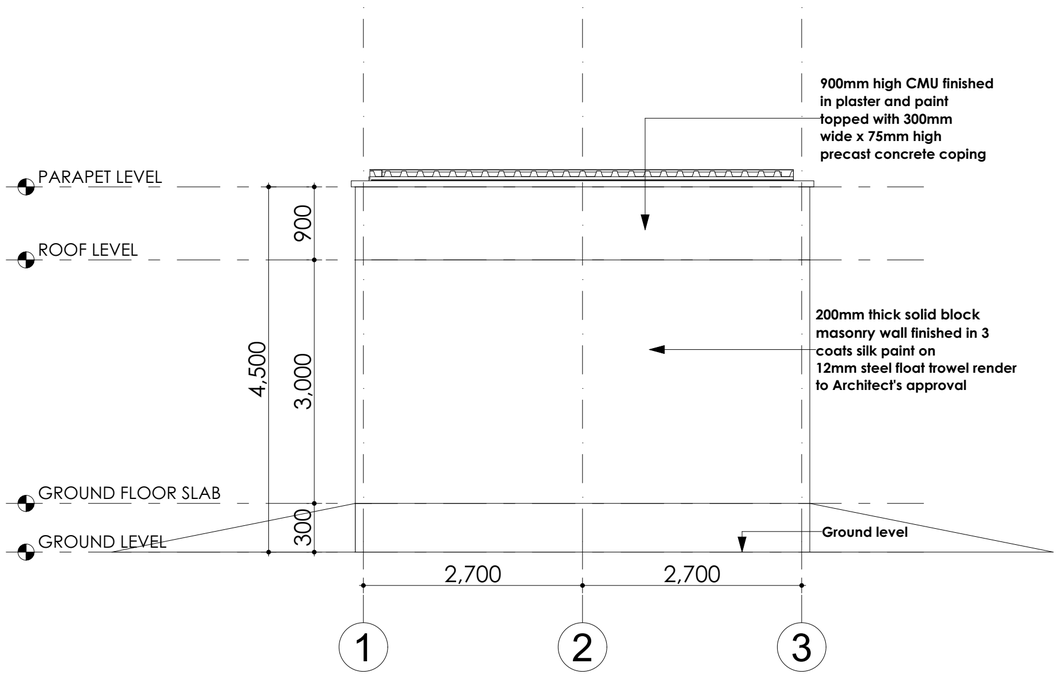
A1:01



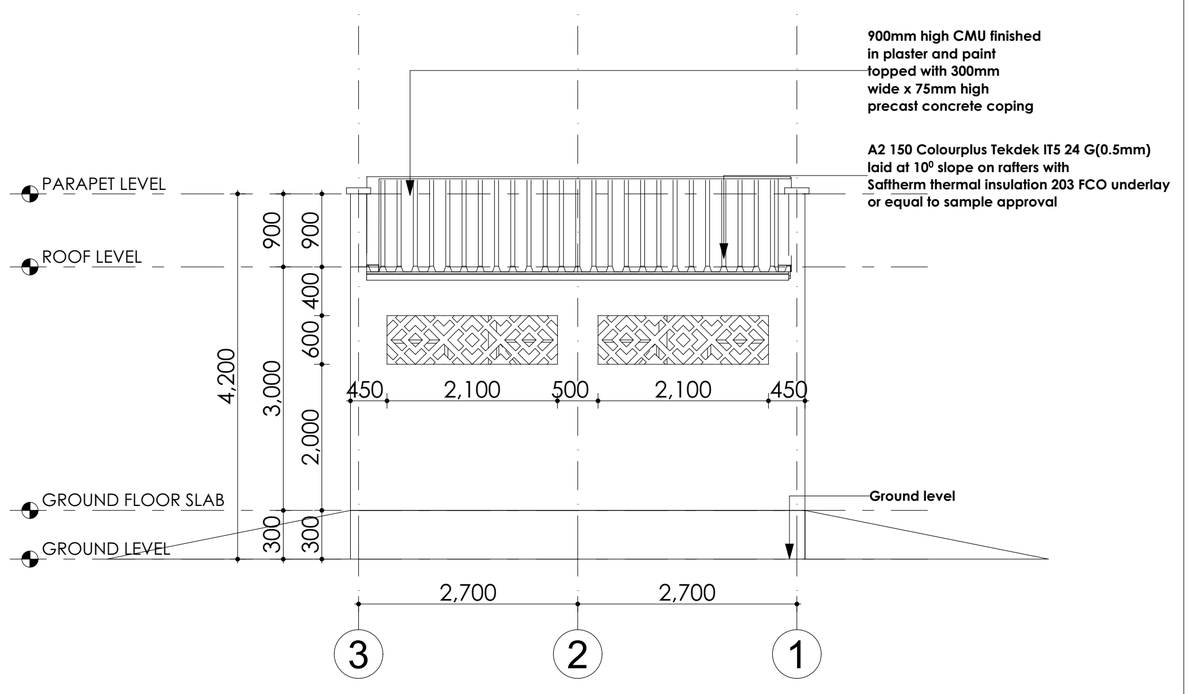
ELEVATION 01 SCALE 1:50



ELEVATION 02 SCALE 1:50



ELEVATION 03 SCALE 1:50



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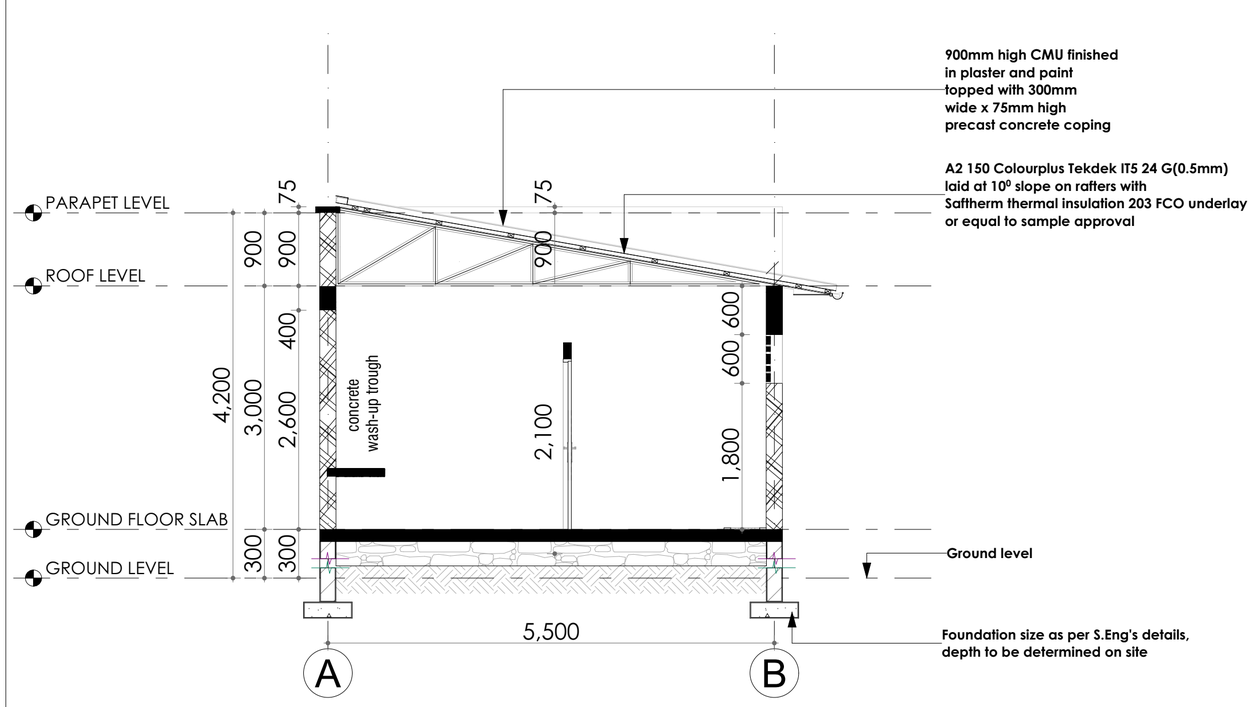
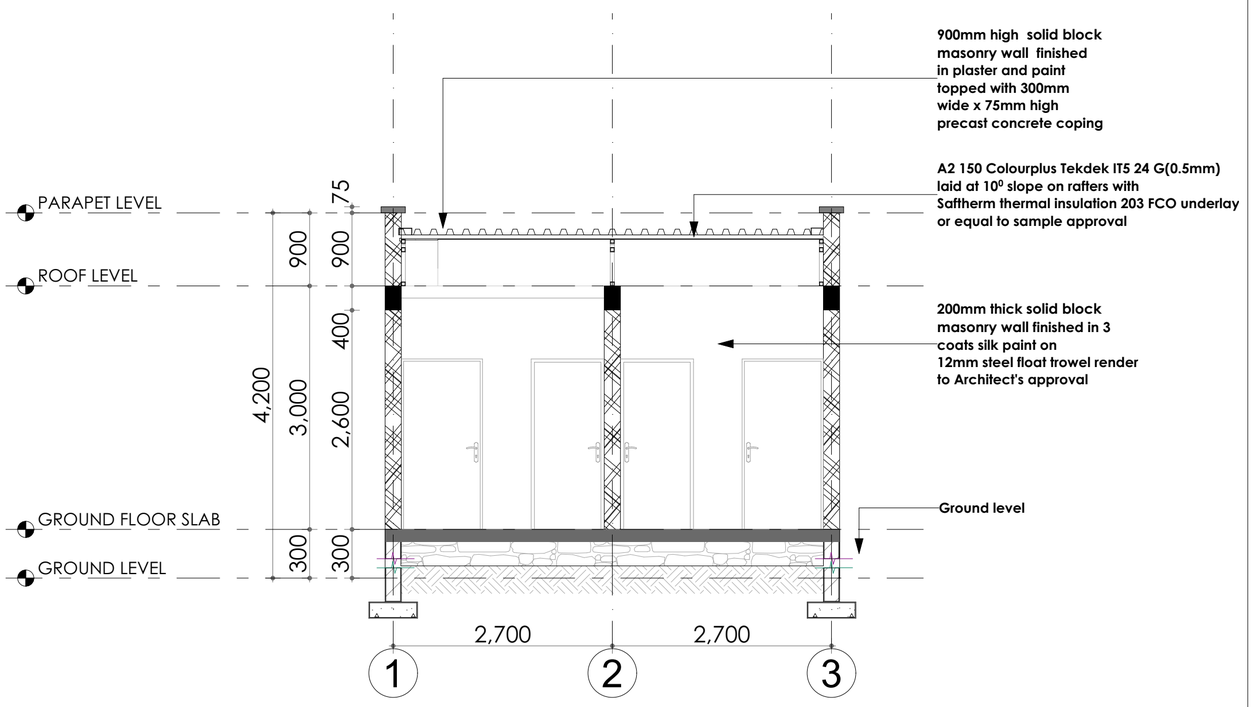


SECTION 01 SCALE 1:50



SECTION 02 SCALE 1:50

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
2.DEPTH AT FOUNDATION TO BE DETERMINED ON SITE ALL FOUNDATIONS R.C. COLUMNS AND R.C. WORKS TO STRUCTURAL ENGINEERS' DETAIL.
3.HEAVY DUTY POLYTHENE SHEETING AND TERMITE TREATMENT TO BE PROVIDED UNDER GROUND FLOORSLAB. DPC TO BE THREE PLY BITUMINOUS FELT LAID UNDER ALL WALLS.
4. P.V DENOTES PERMANENT VENTILATION. F.L DENOTES FANLIGHT ABOVE.
5. ALL WALLS TO BE REINFORCED WITH HOOP IRON AT EVERY ALTERNATIVE COURSE.
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7. ALL DRAINS UNDER BUILDING, DRIVEWAY, AND PARKING TO BE 150mm CAST IRON PIPE ENCASED
IN 150mm CONCRETE INSPECTION CHAMBERS WITHIN BUILDING TOBE FITTED WITH HEAVY DUTY DOUBLE SEAL AIR TIGHT COVERS

FIRE FIGHTING NOTES

1.ALTERNATIVE MEANS OF LIGHTING USING SECONDARY MEANS TO BE INSTALLED.
2.HEAT/SMOKE DETECTORS TO BE INSTALLED.
3.BREAK-GLASS FIRE ALARM SYSTEM TO BE INSTALLED.
4.4500LTR WATER TANK WITH A BOOSTER PUMP TO BE PROVIDED.
5.1x9LTR WATER/CO2 AT EACH FIRE POINT TO BE PROVIDED.
6.1x10KG DRY POWDER AT EACH FIRE POINT TO BE PROVIDED.
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8.1000 GALLON WATER FOR FIRE FIGHTING TO BE PROVIDED.
9.1 NO. 4.5KG FIRE EXTINGUISHER AND 1 NO. BLANKET TO BE PROVIDED.
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11.6 NO. HYDRAULIC HOSE REELS 30 METRES LONG WITH OPEN SHUT OFF JET NOZZLE TO BE PROVIDED.

CLIENT :
SINAN PROJECTS

PROJECT :
BOSASO BEACH CORNICHE

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT:
IRFAN HOBAYA

DRAWING TITLE : **ELEVATIONS &SECTIONS ABLUTION** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/02** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

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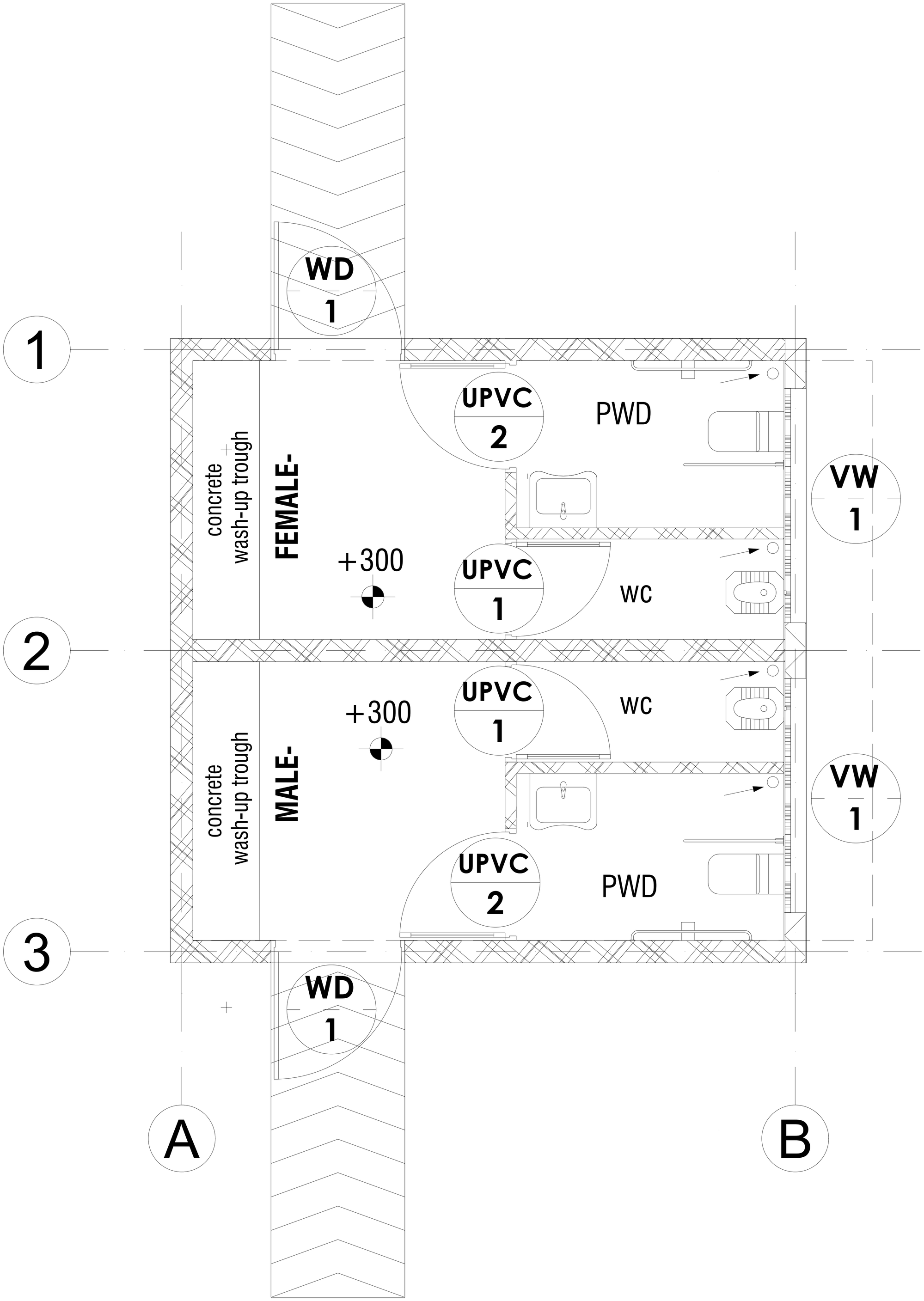
A1:02



GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
2.DEPTH AT FOUNDATION TO BE DETERMINED ON SITE ALL FOUNDATIONS R.C. COLUMNS AND R.C. WORKS TO STRUCTURAL ENGINEERS' DETAIL.
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IN 150mm CONCRETE INSPECTION CHAMBERS WITHIN BUILDING TOBE FITTED WITH HEAVY DUTY DOUBLE SEAL AIR TIGHT COVERS

FIRE FIGHTING NOTES

1.ALTERNATIVE MEANS OF LIGHTING USING SECONDARY MEANS TO BE INSTALLED.
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3.BREAK-GLASS FIRE ALARM SYSTEM TO BE INSTALLED.
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5.1x9LTR WATER/CO2 AT EACH FIRE POINT TO BE PROVIDED.
6.1x10KG DRY POWDER AT EACH FIRE POINT TO BE PROVIDED.
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8.1000 GALLON WATER FOR FIRE FIGHTING TO BE PROVIDED.
9.1 NO. 4.5KG FIRE EXTINGUISHER AND 1 NO. BLANKET TO BE PROVIDED.
10.SPRINKLER SYSTEM TO BE INSTALLED IN THE PARKING.
11.6 NO. HYDRAULIC HOSE REELS 30 METRES LONG WITH OPEN SHUT OFF JET NOZZLE TO BE PROVIDED.

CLIENT :
SINAN PROJECTS

PROJECT :
BOSASO BEACH CORNICHE

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT:
IRFAN HOBAYA

DRAWING TITLE : **DOOR & WINDOW SCHEDULE** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/03** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

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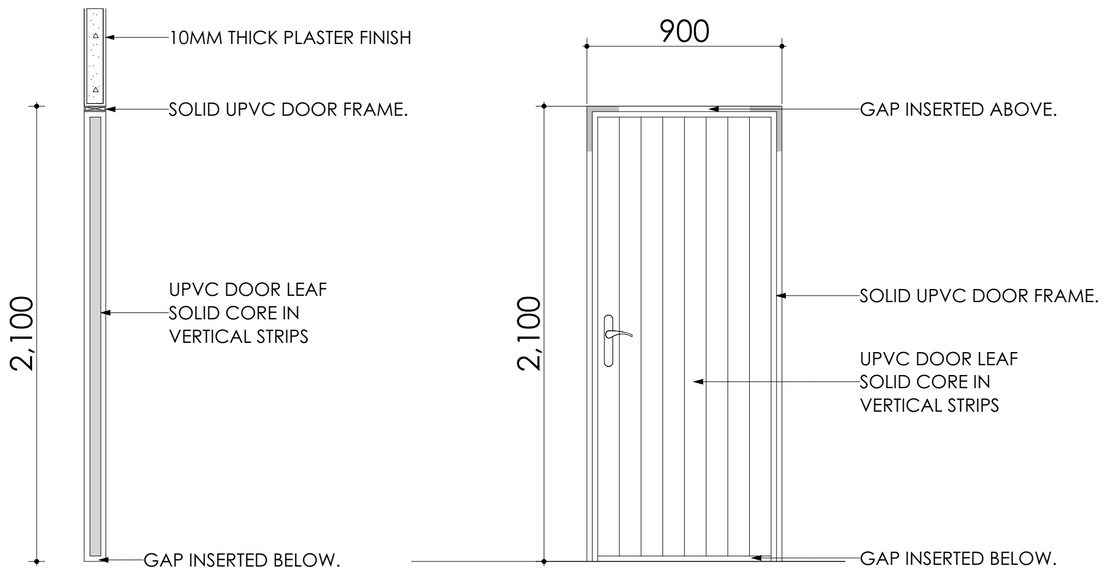
A1:03

DOOR SCHEDULES

TOTAL NO

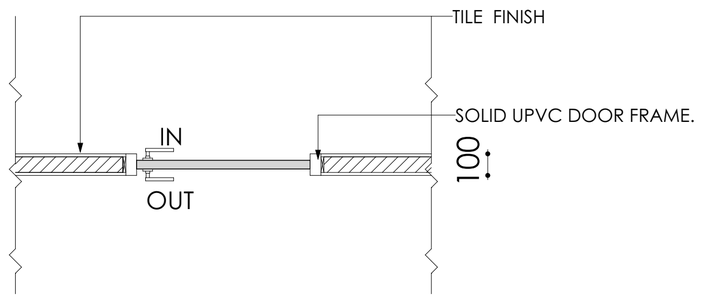
UPVC
1

6 DOORS



SECTION

PLAN



SCALE 1:20

LOCATION

ABLUTION BLOCK

DESCRIPTION	SIDE HUNG DOOR
FRAME	SOLID UPVC DOOR FRAME
MECHANISM	BUTT HINGE BALL BEARING
IRON MONGERY	MORTISE LOCK TO APPROVED SAMPLE

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
2.DEPTH AT FOUNDATION TO BE DETERMINED ON SITE ALL FOUNDATIONS R.C. COLUMNS AND R.C. WORKS TO STRUCTURAL ENGINEERS' DETAIL.
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7. ALL DRAINS UNDER BUILDING, DRIVEWAY, AND PARKING TO BE 150mm CAST IRON PIPE ENCASED
IN 150mm CONCRETE INSPECTION CHAMBERS WITHIN BUILDING TOBE FITTED WITH HEAVY DUTY DOUBLE SEAL AIR TIGHT COVERS

FIRE FIGHTING NOTES

1.ALTERNATIVE MEANS OF LIGHTING USING SECONDARY MEANS TO BE INSTALLED.
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CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **DOOR SCHEDULE 01** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/04** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

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A1:04

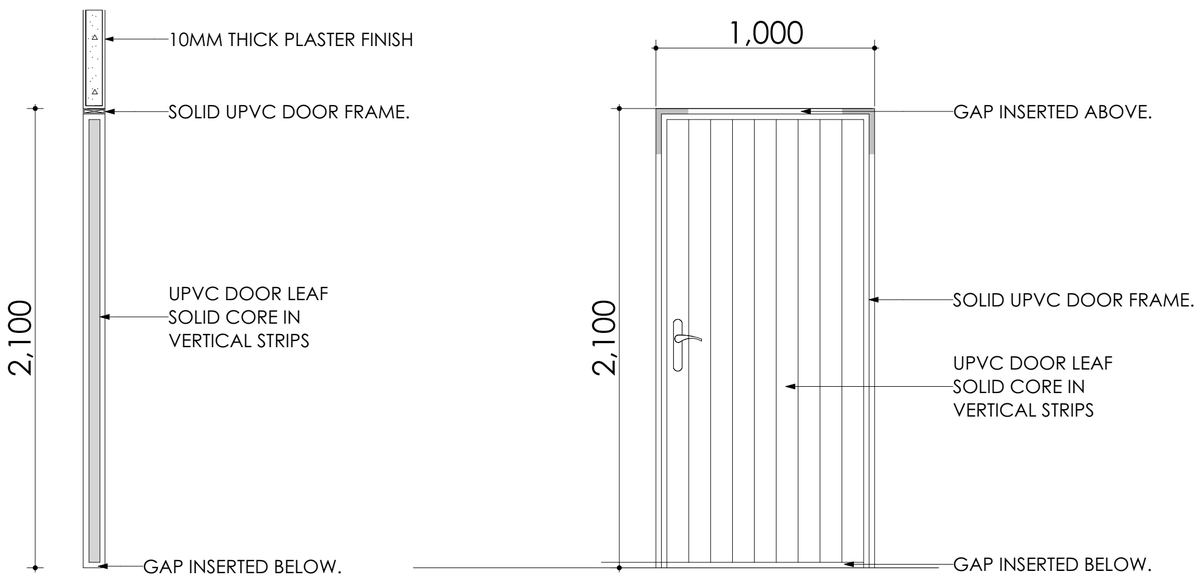
DOOR SCHEDULES

TOTAL NO

UPVC

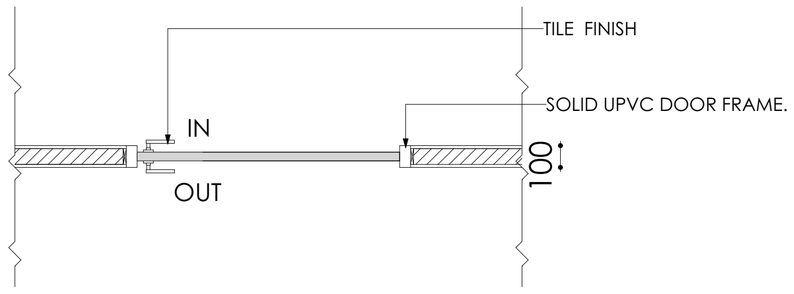
2

6 DOORS



SECTION

PLAN



SCALE 1:20

LOCATION

DISABLED WC

DESCRIPTION	SIDE HUNG DOOR
FRAME	SOLID UPVC DOOR FRAME
MECHANISM	BUTT HINGE BALL BEARING
IRON MONGERY	MORTISE LOCK TO APPROVED SAMPLE

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
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1.ALTERNATIVE MEANS OF LIGHTING USING SECONDARY MEANS TO BE INSTALLED.
2.HEAT/SMOKE DETECTORS TO BE INSTALLED.
3.BREAK-GLASS FIRE ALARM SYSTEM TO BE INSTALLED.
4.4500LTR WATER TANK WITH A BOOSTER PUMP TO BE PROVIDED.
5.1x9LTR WATER/CO2 AT EACH FIRE POINT TO BE PROVIDED.
6.1x10KG DRY POWDER AT EACH FIRE POINT TO BE PROVIDED.
7.FIRE NOTICE AND FIRE EXIT SIGNS AT STRATEGIC POSITIONS TO BE PROVIDED.
8.1000 GALLON WATER FOR FIRE FIGHTING TO BE PROVIDED.
9.1 NO. 4.5KG FIRE EXTINGUISHER AND 1 NO. BLANKET TO BE PROVIDED.
10.SPRINKLER SYSTEM TO BE INSTALLED IN THE PARKING.
11.6 NO. HYDRAULIC HOSE REELS 30 METRES LONG WITH OPEN SHUT OFF JET NOZZLE TO BE PROVIDED.

CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **DOOR SCHEDULE 02** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/05** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

PC | MAC | CAD FILE:

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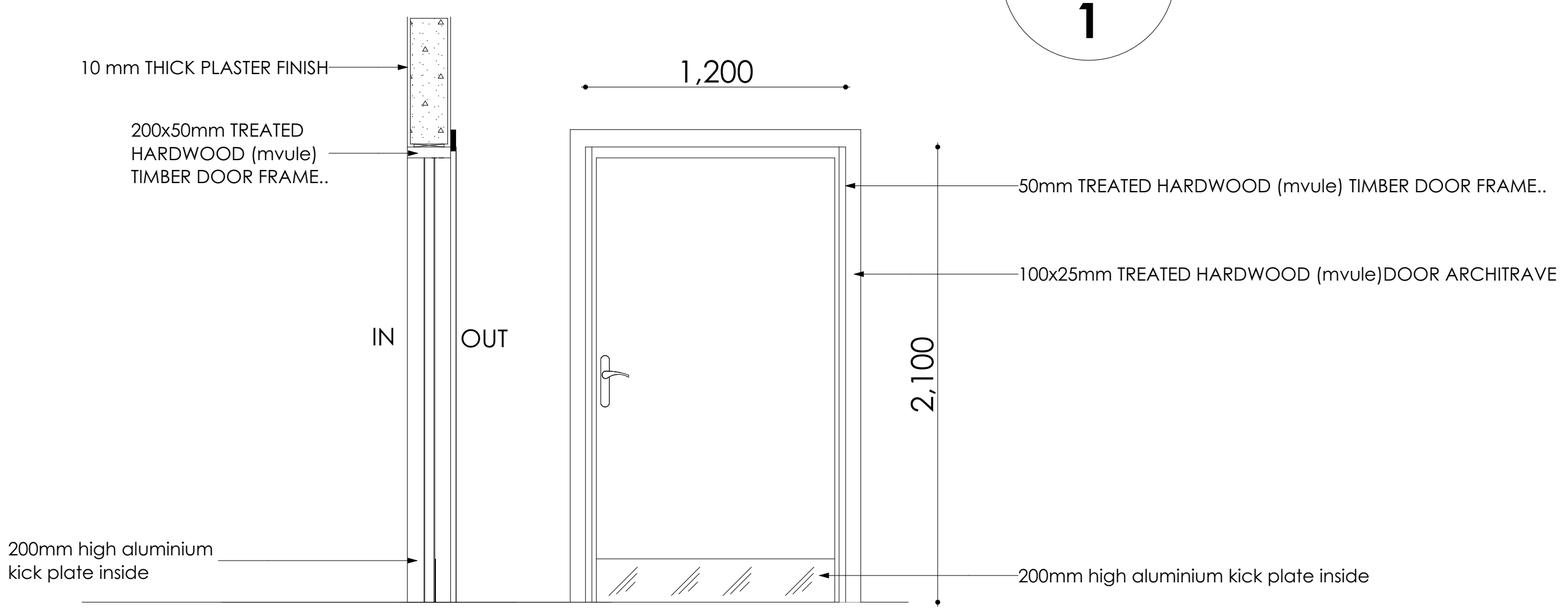
A1:05

DOOR SCHEDULES

TOTAL NO

6 DOORS

WD
1



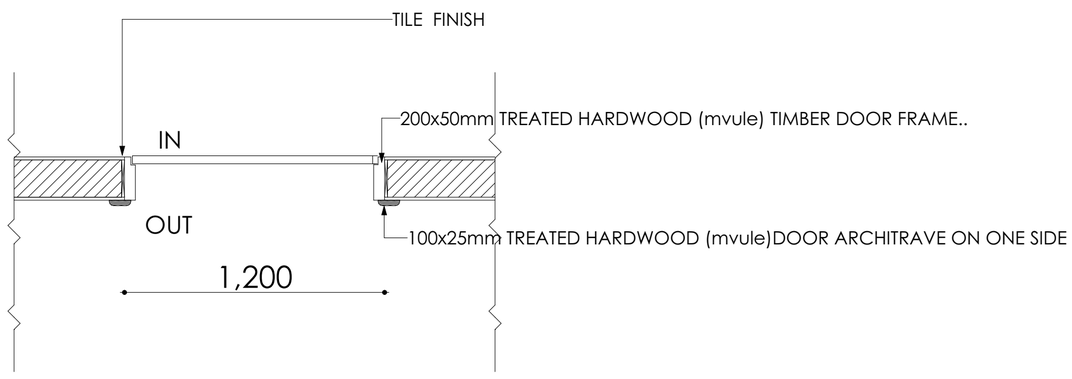
SECTION

3 No 100, stainless steel bearing hinges

2 lever Lock mortise lock complete with approved handles.
Rubber door stop,

Confrim swing from drawing

PLAN



SCALE 1:20

LOCATION
ENTRY AREA WC

DESCRIPTION	**SIDE HUNG DOOR**
FRAME	**VENEERED SOLID CORE DOOR**
KICK PLATE	**900MM HIGH INSIDE 200MM HIGH OUTSIDE**
MECHANISM	**STAINLESS STEEL BUTT HINGE BALL BEARING**
IRON MONGERY	**MORTISE LOCK COMPLETE WITH APPROVED HANDLES**

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
2.DEPTH AT FOUNDATION TO BE DETERMINED ON SITE ALL FOUNDATIONS R.C. COLUMNS AND R.C. WORKS TO STRUCTURAL ENGINEERS' DETAIL.
3.HEAVY DUTY POLYTHENE SHEETING AND TERMITE TREATMENT TO BE PROVIDED UNDER GROUND FLOORSLAB. DPC TO BE THREE PLY BITUMINOUS FELT LAID UNDER ALL WALLS.
4. P.V DENOTES PERMANENT VENTILATION. F.L DENOTES FANLIGHT ABOVE.
5. ALL WALLS TO BE REINFORCED WITH HOOP IRON AT EVERY ALTERNATIVE COURSE.
6. ALL SANITARY WORKS TO BE EXECUTED IN ACCORDANCE WITH M.O.H. RULES AND REGULATIONS.
7. ALL DRAINS UNDER BUILDING, DRIVEWAY, AND PARKING TO BE 150mm CAST IRON PIPE ENCASED
IN 150mm CONCRETE INSPECTION CHAMBERS WITHIN BUILDING TOBE FITTED WITH HEAVY DUTY DOUBLE SEAL AIR TIGHT COVERS

FIRE FIGHTING NOTES

1.ALTERNATIVE MEANS OF LIGHTING USING SECONDARY MEANS TO BE INSTALLED.
2.HEAT/SMOKE DETECTORS TO BE INSTALLED.
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CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **DOOR SCHEDULE 03** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/06** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

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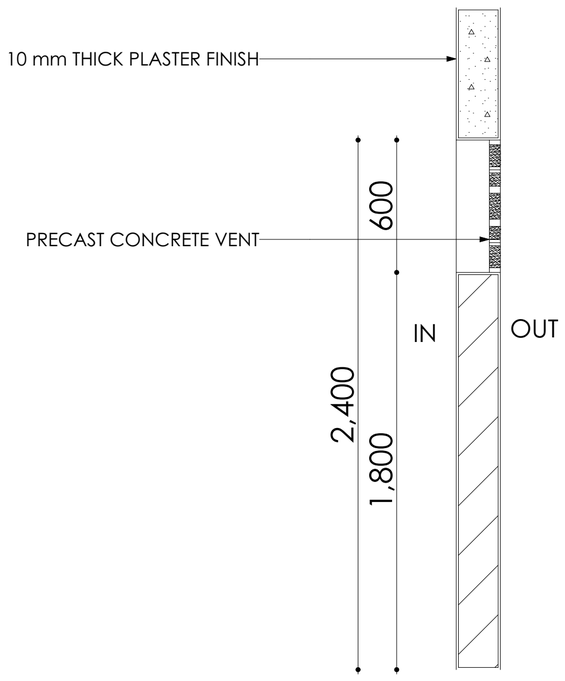
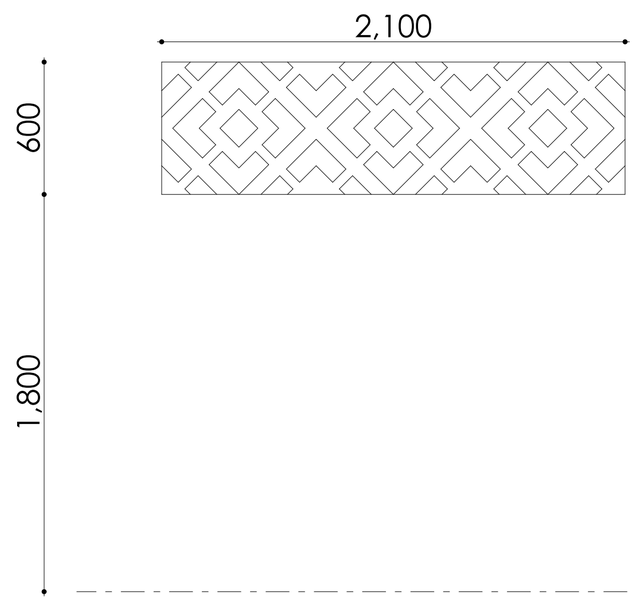
A1:06

VENT SCHEDULES

TOTAL NO

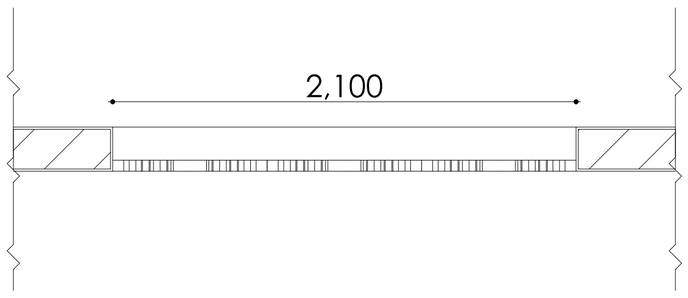
6 WINDOWS





VW

1



SCALE 1:20

LOCATION

ABLUTION BLOCK

DESCRIPTION | **PRECAST CONCRETE VENT**

GENERAL NOTES

1.ALL UNITS ARE IN MM OTHERWISE SPECIFIED
2.DEPTH AT FOUNDATION TO BE DETERMINED ON SITE ALL FOUNDATIONS R.C. COLUMNS AND R.C. WORKS TO STRUCTURAL ENGINEERS' DETAIL.
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CLIENT : **SINAN PROJECTS**

PROJECT : **BOSASO BEACH CORNICHE**

PLOT NO: | ROAD:

LOCATION: **SOMALIA** | TOWN: **GAROWE**

PROJECT MANAGER/ARCHITECT: **IRFAN HOBAYA**

DRAWING TITLE : **WINDOW SCHEDULE 01** | SCALE: **AS SHOWN**

DRAWING NO: **AA/310/07** | PROJECT NO: **AA/310/S/S** | REV NO: **-------**

DRAWN BY: **M.M** | CHECKED BY : **I.H** | DATE : **14/08/2026**

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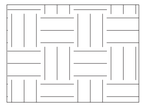
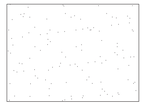
A1:07

STRUCTURAL DRAWINGS
COASTAL RESILIENCE IN BOSSASO WATER FRONT PROJECT

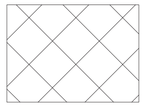


EARTH

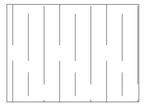
CAST–IN–PLACE CONCRETE



GROUT



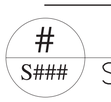
CONCRETE MASONRY UNIT



WOOD

ABBREVIATIONS:

A/C – AIR CONDITIONING
A/E – ARCHITECT AND/OR ENGINEER
AB – ANCHOR BOLT
ACI – AMERICAN CONCRETE INSTITUTE
AFF – ABOVE FINISHED FLOOR
AHU – AIR HANDLING UNIT
AISC – AMERICAN INSTITUTE OF STEEL CONSTRUCTION
AISI – AMERICAN IRON AND STEEL INSTITUTE
AITC – AMERICAN INSTITUTE FOR TIMBER CONSTRUCTION
ALT – ALTERNATE
ALUM – ALUMINUM
AMT – AMOUNT
ANCH – ANCHOR, ANCHORAGE
ANSI – AMERICAN NATIONAL STANDARDS INSTITUTE
APPROX – APPROXIMATE
AR – ANCHOR ROD
ARCH – ARCHITECT, ARCHITECTURAL
ASCE – AMERICAN SOCIETY OF CIVIL ENGINEERS
ASD – ALLOWABLE STRESS DESIGN
ASTM – AMERICAN SOCIETY OF TESTING & MATERIALS
AVG – AVERAGE
AWS – AMERICAN WELDING SOCIETY
BB – BOND BEAM
BLDG – BUILDING
BOF – BOTTOM OF FOOTINGS
BLK – BLOCK
BLKG – BLOCKING
BM – BEAM
BOS – BOTTOM OF STEEL
BOTT – BOTTOM
BRDG – BRIDGE, BRIDGING
BRG – BEARING
BS – BOTH SIDES
BTWN – BETWEEN
BUR – BUILT–UP ROOF
C – STEEL CHANNEL SHAPE
CAD – CADMIUM
CANT – CANTILEVER
CAP – CAPACITY
CB – CORNER BAR
CC – CENTER TO CENTER
CF – CUBIC FEET, COLUMN FOOTING
CFMF – COLD FORMED METAL FRAMING
CHKD – CHECKERED
CI – CAST IRON
CIP – CAST–IN–PLACE
CJ – CONSTRUCTION JOINT
CL – CENTERLINE
CLG – CEILING
CLR – CLEARANCE, CLEAR
CM – CONSTRUCTION MANAGER
CMU – CONCRETE MASONRY UNIT
CO – CUT OFF
COL – COLUMN
COMP – COMPOSITE, COMPRESSOR, COMPRESSIVE
CONC – CONCRETE
CONN – CONNECTION, CONNECT
CONSTR – CONSTRUCTION
CONT – CONTINUOUS
CONTR – CONTRACTOR
CRSI – CONCRETE REINFORCING STEEL INSTITUTE
CSK – COUNTERSINK
CTR – CENTER
CTRD – CENTERED
CW – CURTAIN WALL, CURTAINWALL
CY – CUBIC YARD
DBA – DEFORMED BAR ANCHOR
DBL – DOUBLE
DEG – DEGREES
DEMO – DEMOLITION
DEPT – DEPARTMENT
DET – DETAIL
DIA – DIAMETER
DIAG – DIAGONAL
DIAPH – DIAPHRAGM
DIM – DIMENSION
DL – DEAD LOAD
DN – DOWN
DO – DITTO
DT – DOUBLE TEES
DWG – DRAWING
DWL – DOWEL
E – EAST
EA – EACH
EE – EACH END
EF – EACH FACE
EJ – EXPANSION JOINT
EL – ELEVATION
ELEC – ELECTRICAL
ELEV – ELEVATOR
ENCL – ENCLOSURE
ENGR – ENGINEER
EOD – EDGE OF DECK
EOS – EDGE OF SLAB
EQ – EQUAL
EQPT – EQUIPMENT
ES – EACH SIDE
EST – ESTIMATED
ETC – AND OTHERS
EW – EACH WAY
EXIST – EXISTING
EXP – EXPANSION
EXP JT – EXPANSION JOINT
EXT – EXTERIOR
F – FAHRENHEIT
f'c – MINIMUM 28–DAY CONCRETE STRENGTH
f'm – SPECIFIED MASONRY STRENGTH
FB – FLAT BAR
FBC – FLORIDA BUILDING CODE
FD – FLOOR DRAIN
FDN – FOUNDATION
FF – FINISHED FLOOR
FIN – FINISH, FINISHED
FLR – FLOOR
FOS – FACE OF STUD
FRPF – FIREPROOF
FRT – FIRE RETARDANT
FS – FAR SIDE
FT – FOOT, FEET
FTG – FOOTING
Fy – YIELD STRENGTH OF STEEL
GA – GAUGE
GALV – GALVANIZED
GC – GENERAL CONTRACTOR
GCL – GRANULAR CAPILLARY LAYER
GEN – GENERAL
GLB – GULAM BEAM
GR – GRADE
GRND – GROUND
GWB – GYPSUM WALLBOARD
GYP – GYPSUM
HC – HOLLOW CORE
HCA – HEADED CONCRETE ANCHOR
HD – HEAVY DUTY, HEAD
HDG – HOT DIPPED GALVANIZED
HDR – HEADER
HEX – HEXAGONAL
HGR – HANGER
HGT – HEIGHT
HJR – HORIZONTAL JOINT REINFORCING
HK – HOOK
HORIZ – HORIZONTAL
HP – STEEL BEARING PILE
HS – HIGH STRENGTH
HSS – SQUARE, RECTANGULAR OR ROUND HOLLOW STRUCTURAL SECTION
HWH – HEX WASHER HEAD
IBC – INTERNATIONAL BUILDING CODE
ICF – INSULATED CONCRETE FORM
ID – INSIDE DIAMETER
IF – INSIDE FACE
IN – INCHES
INFO – INFORMATION
INSUL – INSULATION
INT – INTERIOR
JST – JOIST
JT – JOINT
kN – KILONEWTON
KB – KNEE BRACE
KD – KILN DRIED
KO – KNOCK OUT
KSF – KIPS PER SQUARE FOOT
KSI – KIPS PER SQUARE INCH
L – STEEL ANGLE, LENGTH
LAM – LAMINATED
LBS – POUNDS
LF – LINEAL FEET
LL – LIVE LOAD
LLBB – LONG LEG BACK TO BACK
LLH – LONG LEG HORIZONTAL
LLO – LONG LEG OUTSTANDING
LLV – LONG LEG VERTICAL
LRFD – LOAD AND RESISTANCE FACTOR DESIGN
LSH – LONG SIDE HORIZONTAL
LSL – LONG SLOTTED
LSV – LONG SIDE VERTICAL
LT – LIGHT
LW – LIGHTWEIGHT, LONG WAY
M – STEEL SHAPE
MACH – MACHINE
MAS – MASONRY
MATL – MATERIAL
MAX – MAXIMUM
MB – MACHINE BOLT, MASONRY BEAM
MBM – METAL BUILDING MANUFACTURER
MBR – MEMBER
MC – MISCELLANEOUS STEEL CHANNEL, MOMENT CONNECTION
MECH – MECHANICAL
MED – MEDIUM
MEMB – MEMBRANE
MEZZ – MEZZANINE
MFR – MANUFACTURER
MID – MIDDLE
MIN – MINIMUM
MISC – MISCELLANEOUS
MO – MASONRY OPENING
MTL – METAL, MATERIAL
MULL – MULLION
N – NORTH
NGVD – NATIONAL GEODETIC VERTICAL DATUM
NIC – NOT IN CONTRACT
No. – NUMBER
NOM – NOMINAL
NS – NEAR SIDE
NTS – NOT TO SCALE
OA – OVERALL
OC – ON CENTER
OD – OUTSIDE DIAMETER
OF – OUTSIDE FACE
OPNG – OPENING
OPP – OPPOSITE
OPPH – OPPH
OSHA – OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION
OVS – OVERSIZED
OZ – OUNCE
P – STEEL PIPE
PAF – POWDER ACTUATED FASTENER
PC – PRECAST, PILE CAP, PIECE
PCF – POUNDS PER CUBIC FOOT
PCI – PRESTRESSED CONCRETE INSTITUTE
PE – PROFESSIONAL ENGINEER
PED – PEDESTAL
PEMB – PRE–ENGINEERED METAL BUILDING
PERP – PERPENDICULAR
PL – PLATE
PLF – POUNDS PER LINEAL FOOT
PNL – PANEL
PP – PANEL POINT
PREFAB – PREFABRICATED
PRELIM – PRELIMINARY
PREP – PREPARATION
PSC – PRESTRESSED CONCRETE
PSF – POUNDS PER SQUARE FOOT
PSI – POUNDS PER SQUARE INCH
PT – PRESSURE TREATED
PTC – POST TENSIONED CONCRETE
PTD – PAINTED
PVMT – PAVEMENT
QA – QUALITY ASSURANCE
QC – QUALITY CONTROL
QTR – QUARTER
QTY – QUANTITY
R – RISER, REACTION, RADIUS
R/W – RIGHT OF WAY
RD – ROOF DRAIN
REF – REFERENCE
REINF – REINFORCED, REINFORCING, REINFORCEMENT
REM – REMAINDER
REQD – REQURIED
REV – REVISION
RFG – ROOFING
RM – ROOM
RO – ROUGH OPENING
RTN – RETURN
RTU – ROOF TOP UNIT
S – SOUTH, STANDARD BEAM
SBC – STANDARD BUILDING CODE
SC – SLIP CRITICAL
SCHED – SCHEDULE
SDI – STEEL DECK INSTITUTE
SE – STRUCTURAL ENGINEER
SECT – SECTION
SF – SQUARE FEET
SGL – SINGLE
SHT – SHEET
SIM – SIMILAR
SCJ – SAWED CONTROL JOINT
SJI – STEEL JOIST INSTITUTE
SLBB – SHORT LEG BACK TO BACK
SLO – SHORT LEG OUTSTANDING
SLOT – SLOTTED
SLP – SLOPE
SLV – SHORT LEG VERTICAL
SOG – SLAB ON GRADE
SPA – SPACED, SPACING, SPACES
SPEC – SPECIFICATION
SQ – SQUARE
SS – STAINLESS STEEL
SSL – SHORT SLOTTED
SSPC – STEEL STRUCTURES PAINTING COUNCIL
ST – STANDARD FLANGE, STRUCTURAL TEE
STD – STANDARD
STIFF – STIFFENER
STIR – STIRRUP
STL – STEEL
STRUCT – STRUCTURAL
SUSP – SUSPENDED
SW – SHORT WAY, SHEAR WALL
SY – SQUARE YARD
SYM – SYMMETRICAL
SYP – SOUTHERN YELLOW PINE
SYS – SYSTEM
T – TREAD
B – TOP & BOTTOM
T&G – TONGUE & GROOVE
TB – TIE BEAM
TEMP – TEMPORARY, TEMPERATURE
THK – THICK
THRD – THREADED
TOC – TOP OF CONCRETE
TOF – TOP OF FOOTING
TOGB – TOP OF GRADE BEAM
TOJ – TOP OF JOIST
TOM – TOP OF MASONRY
TOPC – TOP OF PILE CAP
TOPG – TOPPING
TOPL – TO OF PLATE
TOS – TOP OF STEEL
TOSL – TOP OF SLAB
TOW – TOP OF WALL
TPL – TRIPLE
TYP – TYPICAL
UNO – UNLESS NOTED OTHERWISE
VERT – VERTICAL
VOL – VOLUME
W – STEEL WIDE FLANGE SHAPE, WEST
W/ – WITH
W/O – WITHOUT
WCJ – WALL CONTROL JOINT
WD – WOOD
WEJ – WALL EXPANSION JOINT
WF – WALL FOOTING
WGT – WEIGHT
WL – WIND LOAD
WP – WORKING POINT, WATERPROOF
WPFG – WATERPROOFING
WS – WATERSTOP
WT – WIDE FLANGE STRUCTURAL TEE, WATER TAE
WALL TYPE
WWF – WELDED WIRE FABRIC
XS – EXTRA STRONG
XXS – DOUBLE EXTRA STRONG
YD – YARD



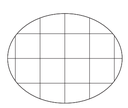
DETAIL NUMBER
SHEET CONTAINING DETAIL

ELEMENT ELEVATION

ELEVATION VIEW

SECTION NUMBER
SHEET CONTAINING SECTION

COLUMN GRIDLINE



SLAB REINFORCEMENT LAYOUT

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

sinaan
silkaatabo | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: COVER PAGE

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
----------	G-01	00

GENERAL STRUCTURAL NOTES:

GENERAL REQUIREMENTS:

1. STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE SPECIFICATIONS AND OTHER PROJECT DRAWINGS BY OTHER DISCIPLINES. ALL WORK SHALL CONFORM TO THE REQUIREMENTS OF THE CODES LISTED BELOW.
2. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND ELEVATIONS RELATING TO EXISTING CONDITIONS BY MAKING FIELD SURVEYS AND MEASUREMENTS PRIOR TO COMMENCING FABRICATION OR CONSTRUCTION.
3. THE GENERAL CONTRACTOR SHALL ENSURE THAT ALL CONSTRUCTION METHODS USED WILL NOT CAUSE DAMAGE TO ADJACENT BUILDINGS, UTILITIES, OR OTHER PROPERTY. THIS REQUIREMENT IS PARTICULARLY IMPORTANT DURING FOUNDATION INSTALLATION.
4. THE GENERAL CONTRACTOR IS ADVISED TO CONSIDER PERFORMING PHOTOGRAPHIC SURVEYS AND OTHER DOCUMENTATION OF THE CONDITION OF ADJACENT BUILDINGS AND OTHER STRUCTURES BEFORE THE START OF CONSTRUCTION.
5. THE GENERAL CONTRACTOR SHALL OBTAIN COPIES OF THE LATEST CONTRACT DOCUMENTS, INCLUDING ALL ADDENDA, AND PROVIDE THE RELEVANT PORTIONS TO ALL SUB-CONTRACTORS AND SUPPLIERS PRIOR TO SUBMITTAL OF SHOP DRAWINGS AND FABRICATION AND ERECTION OF STRUCTURAL MEMBERS.
6. THE GENERAL CONTRACTOR SHALL COMPARE AND COORDINATE THE DRAWINGS OF ALL DISCIPLINES AND REPORT ANY DISCREPANCIES BETWEEN THE DRAWINGS TO THE ARCHITECT AND ENGINEER.
7. DETAILS LABELED "TYPICAL" SHALL APPLY TO ALL SITUATIONS THAT ARE THE SAME OR SIMILAR TO THOSE SPECIFICALLY DETAILED. SEE DETAIL TITLES FOR APPLICABILITY OF A PARTICULAR DETAIL. TYPICAL DETAILS SHALL APPLY WHETHER OR NOT THEY ARE SPECIFICALLY KEYED AT EACH LOCATION. THE ENGINEER SHALL HAVE FINAL AUTHORITY TO DETERMINE APPLICABILITY OF TYPICAL DETAILS.
8. WHERE CONFLICTS EXIST BETWEEN STRUCTURAL DOCUMENTS THE STRICTEST REQUIREMENTS, AS INDICATED BY THE STRUCTURAL ENGINEER SHALL GOVERN.
9. DELEGATED ENGINEER REQUIREMENTS: THE FLORIDA BOARD OF PROFESSIONAL ENGINEERS HAS ISSUED STATEMENTS ON RESPONSIBILITIES OF PROFESSIONAL ENGINEERS, PURSUANT TO CHAPTERS 61G15-30 AND 61G15-31 OF THE FLORIDA ADMINISTRATIVE CODE. CERTAIN COMPONENTS OF THE STRUCTURE REQUIRE THE WORK OF DELEGATED ENGINEERS FOR THE DESIGN OF THOSE COMPONENTS. ALL RELEVANT PROCEDURES PRESENTED IN THE FLORIDA ADMINISTRATIVE CODE SHALL APPLY TO THIS PROJECT.
10. THE GENERAL CONTRACTOR SHALL REVIEW AND DETERMINE THAT DIMENSIONS ARE COORDINATED BETWEEN ARCHITECTURAL AND STRUCTURAL DRAWINGS PRIOR TO FABRICATION OR START OF CONSTRUCTION.
11. NO STRUCTURAL MEMBER SHALL BE CUT OR NOTCHED OR OTHERWISE REDUCED IN STRENGTH UNLESS APPROVED BY THE STRUCTURAL ENGINEER.
12. THE GENERAL CONTRACTOR SHALL COORDINATE ARCHITECTURAL, MECHANICAL, ELECTRICAL AND PLUMBING DRAWINGS FOR ANCHORED, EMBEDDED OR SUPPORTED ITEMS. NOTIFY THE ARCHITECT / ENGINEER OF ANY DISCREPANCIES.

CONSTRUCTION RESPONSIBILITY:

1. THE CONTRACT STRUCTURAL DRAWINGS AND SPECIFICATIONS REPRESENT THE COMPLETED STRUCTURE, AND ARE NOT INTENDED TO INDICATE THE METHOD OR MEANS OF CONSTRUCTION. THE CONTRACTOR SHALL SUPERVISE AND DIRECT THE WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, PROCEDURES, TECHNIQUES, SEQUENCES, AND FOR JOB SAFETY.
2. THE ENGINEER DOES NOT HAVE CONTROL OR CHARGE OF, AND SHALL NOT BE RESPONSIBLE FOR, CONSTRUCTION MEANS, METHODS, TECHNIQUES, SEQUENCES, OR PROCEDURES, FOR SAFETY PRECAUTIONS AND PROGRAMS IN CONNECTION WITH THE WORK, FOR THE ACTS OR OMISSIONS OF THE CONTRACTOR, SUBCONTRACTOR, OR ANY OTHER PERSONS PERFORMING ANY OF THE WORK, OR FOR THE FAILURE OF ANY OF THEM TO CARRY OUT THE WORK IN ACCORDANCE WITH THE CONTRACT DOCUMENTS.
3. PERIODIC SITE OBSERVATION VISITS MAY BE PROVIDED BY THE STRUCTURAL ENGINEER. THE SOLE PURPOSE OF THESE OBSERVATIONS IS TO REVIEW THE GENERAL CONFORMANCE OF THE CONSTRUCTION WITH THE STRUCTURAL CONTRACT DOCUMENTS. THESE LIMITED OBSERVATIONS SHOULD NOT BE CONSTRUED AS CONTINUOUS OR EXHAUSTIVE TO VERIFY THAT ALL CONSTRUCTION IS IN COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS. THE GENERAL CONTRACTOR SHALL BE RESPONSIBLE FOR PERFORMING ALL WORK IN COMPLIANCE WITH THE CONSTRUCTION DOCUMENTS.

PRIMARY CODES AND SPECIFICATIONS:

1. GENERAL BUILDING CODE:
   A. INTERNATIONAL BUILDING CODE (IBC 2009 EDITION) WITH SUPPLEMENT.
2. CONCRETE CODES:
   A. BUILDING CODE REQUIREMENTS FOR STRUCTURAL CONCRETE (ACI 318-05).
   B. SPECIFICATIONS FOR STRUCTURAL CONCRETE FOR BUILDINGS (ACI 301).
   C. LATEST EDITION OF THE CRSI MANUAL OF STANDARD PRACTICE WITH ALL SUPPLEMENTS.
3. MASONRY CONSTRUCTION:
   A. BUILDING CODE REQUIREMENTS FOR MASONRY STRUCTURES
   B. (ACI 530-05/ASCE 5-05/TMS 402-05).
   C. SPECIFICATIONS FOR MASONRY STRUCTURES (ACI 530.1-05/ASCE 6-05/TMS 602-05).
4. STEEL DECK:
   A. NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS, INCLUDING 2004 SUPPLEMENT (NAS-01).
   B. SDI DESIGN MANUAL FOR COMPOSITE DECKS, FORM DECKS AND ROOF DECKS.
5. COLD FORMED METAL FRAMING:
   A. NORTH AMERICAN SPECIFICATION FOR THE DESIGN OF COLD FORMED STEEL STRUCTURAL MEMBERS, INCLUDING 2004 SUPPLEMENT (NAS-01).

DESIGN LOADS:

1. ROOF LIVE LOADS:
   A. UNIFORMLY DISTRIBUTED LIVE LOAD ON HORIZONTAL PROJECTION..... 1.0 kPa
   B. SEE ROOF FRAMING PLAN FOR OTHER CONCENTRATED EQUIPMENT LOADS.
2. FLOOR LIVE LOADS:
   A. UNIFORMLY DISTRIBUTED LIVE LOADS:
      LABORATORY ROOM FLOOR..... 7.20 kPa
      MEZZANINE ROOM FLOOR..... 4.80 kPa
3. WIND LOADS:
   A. LOADS BASED ON ASCE 7-05 WIND LOAD CRITERIA.
      BASIC WIND SPEED, 3 SECOND GUST..... 120 MPH
      HURRICANE PRONE REGION..... NO
      WINDBORNE DEBRIS REGION..... NO
      BUILDING CLASSIFICATION CATEGORY..... II
      IMPORTANCE FACTOR..... 1.0
      INTERNAL PRESSURE COEFFICIENT..... +/- 0.18
      WIND EXPOSURE CATEGORY..... C
      WIND TOPOGRAPHIC FACTOR, Kzt..... 1.0
   B. SEE LOADING NOTES, TABLES AND DIAGRAMS FOR DESIGN FORCES FOR COMPONENTS

      SEISMIC: NOT CONTROLLING.

FOUNDATIONS:

3. FOUNDATION DESIGN IS BASED ON ASSUMPTION AND EXPERIENCE OF ADJACENT BUILDINGS IN THE AREA..
4. ALL VEGETATION, TOPSOIL, ROOTS AND ORGANIC ZONES SHALL BE STRIPPED AND REMOVED FROM THE CONSTRUCTION AREA FOR A DISTANCE OF AT LEAST 150CM BEYOND THE EXTERIOR OF BUILDING FOUNDATION LIMITS. THE DEPTH OF STRIPPING SHALL BE THAT REQUIRED TO REMOVE SIGNIFICANT ROOT ZONES, SMALL TREE STUMPS AND OTHER UNACCEPTABLE MATERIALS, BUT IN NO CASE LESS THAN 15CENTIMETERS.
5. EXCAVATIONS FOR LARGE STUMPS, ABANDONED UTILITIES, UNDERGROUND TANKS, ETC. SHALL BE BACKFILLED IN LAYERS OF MAXIMUM 15 CENTIMETERS WITH COMPACTION AND TESTING OF EACH LAYER BY DYNAMIC CONE PENETROMETER (DCP) FOR PLACEMENT AND COMPACTION OF FILL MATERIAL. USE LOOSE BACKFILL LAYER THICKNESS APPROPRIATE FOR THE SIZE OF COMPACTOR BEING USED. AFTER THE SITE HAS BEEN CLEARED AND PROOF-ROLLED, THE EXPOSED SOILS AT THE STRIPPED SURFACE WITHIN AND TO A POINT 150CM OUTSIDE THE BUILDING CONSTRUCTION AREA SHALL BE COMPACTED WITH OVERLAPPING PASSES WITH A LIGHT WEIGHT VIBRATORY DRUM ROLLER. DENSITIES OF AT LEAST 95 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D-1557) SHALL BE UNIFORMLY OBTAINED TO A DEPTH OF AT LEAST 60CM BELOW THE COMPACTED SURFACE. REGARDLESS OF THE DEGREE OF COMPACTION ACHIEVED, A MINIMUM OF EIGHT COMPLETE COVERAGES SHALL BE MADE WITHIN THE BUILDING AREA. THE ROLLER COVERAGES SHALL BE DIVIDED EVENLY INTO TWO PERPENDICULAR DIRECTIONS. THE CONTRACTOR IS ADVISED NOT TO USE THE VIBRATORY MODE OF COMPACTORS IN CLOSE PROXIMITY TO EXISTING STRUCTURES. THE CONTRACTOR SHALL COORDINATE COMPACTION EFFORTS AND FOUNDATION INSTALLATIONS TO INSURE THAT NO DAMAGE OCCURS TO ADJACENT STRUCTURES.
6. ALL EXISTING STRUCTURAL MEMBER FOUND IN THE CONSTRUCTION AREA MUST REMOVED, THE EXPOSED SOILS AT THE STRIPPED SURFACE WITHIN THE NEW BUILDING CONSTRUCTION AREA SHALL BE COMPACTED WITH OVERLAPPING PASSES WITH A WALK-BEHIND VIBRATORY COMPACTOR. DENSITIES OF AT LEAST 95 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D - 1557) SHALL BE UNIFORMLY OBTAINED TO A DEPTH OF AT LEAST 30CM BELOW THE COMPACTED SURFACE. REGARDLESS OF THE DEGREE OF COMPACTION ACHIEVED, A MINIMUM OF EIGHT COMPLETE COVERAGES SHALL BE MADE WITHIN THE PIT AREA. THE COMPACTOR COVERAGES SHALL BE DIVIDED EVENLY INTO TWO PERPENDICULAR DIRECTIONS. THE CONTRACTOR SHALL COORDINATE COMPACTION EFFORTS AND FOUNDATION INSTALLATIONS TO INSURE THAT NO DAMAGE OCCURS TO ADJACENT STRUCTURES.
7. AFTER COMPLETION OF DENSIFICATION OF EXISTING SOILS, STRUCTURAL FILL SHALL THEN BE PLACED IN LIFTS NOT EXCEEDING 15 CENTIMETERS IN LOOSE THICKNESS WHEN USING THE ROLLER PREVIOUSLY DESCRIBED. EACH LIFT SHALL BE THOROUGHLY COMPACTED WITH THE VIBRATORY ROLLER UNTIL DENSITIES EQUIVALENT TO AT LEAST 95 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY ARE UNIFORMLY OBTAINED. STRUCTURAL FILL SHALL CONSIST OF AN INORGANIC, NON-PLASTIC, GRANULAR SOIL CONTAINING LESS THAN 10 PERCENT MATERIAL PASSING THE NO. 200 MESH SIEVE, A RELATIVELY CLEAN SAND WITH A UNIFIED SOIL CLASSIFICATION OF SP OR SP-SM.
8. FOOTINGS AND MAT HAVE BEEN DESIGNED FOR AN ALLOWABLE BEARING PRESSURE OF 100kPa. THE UPPER 30 CENTIMETERS OF SANDY BEARING SOILS IN THE FOOTING EXCAVATION BOTTOMS SHALL BE COMPACTED TO DENSITIES EQUIVALENT TO 95 PERCENT OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY. COMPACTION, OR RECOMPACTION OF THE FOOTING EXCAVATION BEARING LEVEL SOILS LOOSENED BY THE EXCAVATION PROCESS, SHALL BE ACHIEVED BY MAKING SEVERAL PASSES WITH A RELATIVELY LIGHTWEIGHT, WALK BEHIND VIBRATORY SLED OR ROLLER COMPACTOR.
8. UNLESS OTHERWISE NOTED, ALL FOOTINGS SHALL BE CENTERED UNDER COLUMNS, PIERS AND WALLS.
9. SLAB-ON-GRADE CONSTRUCTION SHALL BE SUPPORTED ON SUBGRADE COMPACTED TO A DENSITY OF NO LESS THAN 95% OF THE MODIFIED PROCTOR MAXIMUM DRY DENSITY (ASTM D-1557) TO A DEPTH OF AT LEAST 30 CENTIMETERS. INTERIOR SLABS-ON-GRADE SHALL BE CAST OVER A VAPOR RETARDER. SEE SPECIFICATIONS.

CAST-IN-PLACE CONCRETE:

1. THE LATEST EDITION OF THE FOLLOWING ACI STANDARDS APPLY:
   ACI 318 (CODE) — ACI 304 (PLACING)
   ACI 306 (WINTER CONCRETING) — ACI 315 (DETAILING)
   ACI 305 (HOT WEATHER CONCRETING) — ACI 347 (FORMWORK)
   ACI 211.1 (MIX PROPORTIONING) — ACI 301 (SPECIFICATIONS)
2. ALL CONCRETE SHALL BE NORMAL WEIGHT (2345 KG/M^3 DRY DENSITY, MIN), WITH MIXES DESIGNED TO MEET THE FOLLOWING CRITERIA FOR USE IN VARIOUS ELEMENTS OF THE STRUCTURE AS FOLLOWS:

STRUCTURAL ELEMENT	28-DAY COMPRESSIVE STRENGTH (MPa)	MAX. SIZE AGGREGATE	MAX. W/C RATIO	SLUMP RANGE (CM)
A. FOOTINGS (WALL & MAT)	20	2	0.45	3-5
B. FOUNDATION WALLS	25	2	0.45	3-5
C. SLAB-ON-GRADE	20	2	0.50	3-5
D. ELEVATED FLOORS & BEAMS	25	2	0.45	3-5
E. COLUMN	25	2	0.45	3-5
F. LEAN CONCRETE	15	2	0.50	3-5

3. CONCRETE SLUMP IS TAKEN AT POINT OF PLACEMENT INTO STRUCTURE.
4. WATER REDUCING AND AIR ENTRAINING AGENTS SHALL BE INCLUDED IN DESIGN MIXES. SUPERPLASTICIZERS MAY BE USED AT THE CONTRACTOR'S OPTION.
5. A CONCRETE MIX DESIGN FOR EACH UNIQUE COMBINATION OF STRENGTH, COARSE AGGREGATE GRADATION AND WATER CEMENT RATIO SPECIFIED SHALL BE PREPARED BY THE SUPPLIER OR AN INDEPENDENT TESTING LABORATORY AND BE SUBMITTED FOR REVIEW PRIOR TO CASTING ANY CONCRETE. MIXES THAT WILL BE TRANSPORTED AT THE PROJECT SITE BY PUMPING SHALL BE SPECIFICALLY DESIGNED FOR PUMPING.
6. SLABS ON GRADE: UNLESS NOTED OTHERWISE, CONCRETE SLABS ON GRADE SHALL BE A MINIMUM OF 40CM THICK, REINFORCED WITH 16ø BARS SPACED AT 20CM C/C AS INDICATED ON THE PLAN. SLABS SHALL BE PLACED OVER PROPERLY COMPACTED EARTH.
7. CONCRETE TIE BEAMS: UNLESS NOTED OTHERWISE, CONCRETE TIE BEAMS SHALL BE A MINIMUM OF 45CM DEEP, REINFORCED AS SHOWN IN THE BEAM SCHEDULE.

REINFORCING STEEL:

1. REINFORCING STEEL: ASTM A 615, GRADE 60 (413 MPa).
2. MINIMUM REINFORCING STEEL CLEAR COVER (U.N.O.):
   A. CONCRETE CAST DIRECTLY AGAINST EARTH 8CM
   B. INTERIOR SLABS 2.5CM
   C. INTERIOR BEAMS ..... 5CM TO STIRRUPS
   D. SLABS ON GRADE ..... MID-DEPTH FROM TOP& BOTTOM
   E. COLUMNS ..... 5CM TO TIES
4. WHERE REINFORCING BARS ARE NOTED AS CONTINUOUS, THE FOLLOWING SHALL BE COMPLIED WITH:
   A. THE TERMINATION OF ALL CONTINUOUS REINFORCING BAR RUNS SHALL BE A STANDARD HOOK UNLESS NOTED OTHERWISE.
   B. SPLICES IN CONTINUOUS TOP BARS, IF REQUIRED, SHALL OCCUR OVER PARALLEL CMU WALLS OR AT THE CENTER OF THE OPENING SPAN.
   C. SPLICES IN CONTINUOUS BOTTOM BARS, IF REQUIRED, SHALL OCCUR OVER CMU WALLS OR CENTERED OVER COLUMNS.
5. WHERE SPLICE LENGTHS ARE NOT SPECIFIED, USE 48 BAR DIAMETERS IN MASONRY AND 50 BAR DIAMETERS IN CAST CONCRETE.
6. REINFORCING STEEL SHALL NOT BE TACK WELDED FOR ANY REASON. WELDED REINFORCING STEEL SPLICES ARE NOT PERMITTED.
7. ALL REINFORCING STEEL SHALL BE SUPPORTED ON STANDARD ACCESSORIES, HELD RIGIDLY AND ACCURATELY IN PLACE, AND PROTECTED AGAINST DISPLACEMENT BEFORE AND DURING PLACEMENT OF CONCRETE. SUPPORTING ACCESSORY LEGS THAT REST ON CONCRETE SURFACES THAT WILL BE EXPOSED IN THE FINISHED STRUCTURE SHALL BE FABRICATED OF STAINLESS STEEL.
8. DOWELS AND OTHER MISCELLANEOUS STEEL EMBEDDED ITEMS SHALL BE LOCATED AND HELD IN SPECIFIED POSITION PRIOR TO PLACEMENT OF CONCRETE AND SHALL NOT BE PUSHED INTO CONCRETE FOLLOWING CONCRETE POUR.
9. FOUNDATION AND GRADE BEAM REINFORCING SHALL BE SUPPORTED ON SPECIALLY CAST 9CM HIGH CONCRETE BLOCKS CAST IN ACCORDANCE WITH DETAILS FURNISHED ON DRAWINGS. SLAB-ON-GRADE REINFORCING, INCLUDING WIRE FABRIC, SHALL BE SUPPORTED ON PRECAST BLOCKS OR 3000 PSI CONCRETE BRICK OF THE PROPER THICKNESS.
10. SOFT METRIC BAR SIZES VS. INCH POUND BAR SIZES:

METRIC	INCH-POUND
6ø	N.A.
8ø	N.A.
10ø	#3
12ø	#4
14ø	N.A.
16ø	#5
18ø	N.A.
20ø	N.A
22ø	#7

CONCRETE FORMWORK:

1. SEE NOTES ON PRIMARY CODES AND SPECIFICATIONS.
2. ALL FORMWORK SHALL BE DESIGNED, ERECTED, SUPPORTED, BRACED, AND MAINTAINED ACCORDING TO ACI 347, RECOMMENDED STANDARD PRACTICE FOR CONCRETE FORMWORK.
3. RESPONSIBILITY: THE DESIGN, CONSTRUCTION, AND SAFETY OF ALL FORMWORK SHALL BE THE RESPONSIBILITY OF THE GENERAL CONTRACTOR. ALL FORMS, SHORES, BACKSHORES, FALSEWORK, BRACING, AND OTHER TEMPORARY SUPPORTS SHALL BE ENGINEERED TO SUPPORT ALL LOADS IMPOSED INCLUDING THE WET WEIGHT OF CONCRETE, CONSTRUCTION EQUIPMENT, LIVE LOADS, LATERAL LOADS DUE TO WIND AND WET CONCRETE IMBALANCE. SEE SPECIFICATIONS FOR DETAILED REQUIREMENTS.
4. TOLERANCES: UNLESS SPECIFIED OTHERWISE, ALL TOLERANCES FOR CONCRETE FORMWORK SHALL CONFORM TO ACI STANDARD 117, STANDARD TOLERANCES FOR CONCRETE CONSTRUCTION AND MATERIALS. THE CONTRACTOR SHALL ENGAGE A LICENSED SURVEYOR TO VERIFY THAT WORK IS WITHIN SPECIFIED TOLERANCES UNLESS WRITTEN AUTHORIZATION IS OBTAINED FROM THE ARCHITECT TO PROVIDE TOLERANCE CONTROL USING THE CONTRACTOR'S OWN FORCES PRIOR TO BEGINNING WORK.
5. ALL EXPOSED EDGES OF CONCRETE SHALL BE CHAMFERED WHERE SHOWN ON THE ARCHITECTURAL OR STRUCTURAL DRAWINGS.
6. PLUMBING SLEEVE SPACING SHALL BE THE LARGER OF THREE (3) DIAMETERS CENTER TO CENTER OF THE LARGER SLEEVE, OR 15CM CLEAR BETWEEN SLEEVES. SUBMIT SLEEVE LOCATIONS AND SIZES TO ENGINEER FOR REVIEW PRIOR TO CONSTRUCTION.
7. PENETRATIONS SHALL NOT BE PERMITTED IN ANY STRUCTURAL MEMBERS OTHER THAN THOSE SPECIFICALLY INDICATED ON THE STRUCTURAL DRAWINGS WITHOUT THE WRITTEN REVIEW OF THE STRUCTURAL ENGINEER OF RECORD. THE CONTRACTOR SHALL SUBMIT DRAWINGS TO THE STRUCTURAL ENGINEER OF RECORD FOR REVIEW INDICATING ANY CONCENTRATION OF PIPES, OPENINGS OR PENETRATIONS NOT SHOWN ON THE STRUCTURAL DRAWINGS PRIOR TO CONCRETE POURS.

CONCRETE MASONRY:

1. SEE NOTES ON PRIMARY CODES AND SPECIFICATIONS.
2. CONCRETE MASONRY UNITS SHALL BE LOAD BEARING TYPE CONFORMING TO ASTM C-90 HAVING A MINIMUM COMPRESSIVE STRENGTH OF 1900 PSI (NET AREA).
3. MORTAR SHALL CONFORM TO ASTM C-270 TYPE S.
4. PLAIN END TWO CELLED UNITS SHALL BE USED FOR BLOCKS THAT ARE TO HAVE CELLS REINFORCED AND FILLED. WEB SHELLS ADJACENT TO CELLS THAT ARE TO BE FILLED ARE TO BE BEDDED IN MORTAR.
5. FILL CELLS AS NOTED ON DRAWINGS WITH 20 kPa GROUT, OR GROUT CONFORMING TO ASTM C-476,SPECIFICALLY DESIGNED FOR FILLING OF CELLS.
6. IN SPLICING VERTICAL BARS, LAP ENDS, PLACE IN CONTACT AND WIRE-TIE TOGETHER OR USE BAR POSITIONERS. LAP BARS SIDE BY SIDE IN THE PLANE OF THE WALL TO MAINTAIN PROPER COVER.
7. SEE PRIMARY CODES, SPECIFICATIONS AND DRAWINGS FOR GROUTING PROCEDURES.
8. INSTALLATION OF CONCRETE MASONRY SHALL BE COMPATIBLE WITH ALL APPLIED FINISHES SUCH AS STUCCO OR PAINT. DO NOT SPONGE WALLS WITHOUT PROPER CLEANING COMPATIBLE WITH FINISHES.
9. PROVIDE GALVANIZED WIRE TYPE HORIZONTAL JOINT REINFORCING AT 40CM O.C. (MAX) AND AS INDICATED ON ARCHITECTURAL DRAWINGS. PROVIDE HOT DIP GALVANIZED HJR ON ALL EXTERIOR WALLS. IN ADDITION TO SCHEDULED OR DETAILED LINTEL AND SILL REINFORCING, PROVIDE TWO LAYERS OF HJR AT 20CM ON CENTER ABOVE AND BELOW ALL LINTELS AND SILLS WHICH SPAN MORE THAN 30CM. EXTEND ADDED HJR 60CM BEYOND THE OPENING JAMBS EXCEPT AT WCJ.
10. MASONRY BOND BEAMS AND CONCRETE TIE BEAMS CAST ON MASONRY WALLS SHALL BE CONSTRUCTED SO AS TO KEY AND BOND INTO BLOCK CELLS. THE USE OF BUILDING PAPER OR SHEET PLASTIC TO CLOSE VOIDS BELOW BEAMS IS NOT ALLOWED DUE TO BREAKAGE OF MORTAR BOND.
11. SEE ARCHITECT'S DRAWINGS FOR THE EXTENT AND EXACT LOCATION OF MASONRY WALLS.
12. WALL CONTROL JOINTS (WCJ):
    A. WALL CONTROL JOINTS SHALL BE PROVIDED IN ALL CONCRETE MASONRY CONSTRUCTION AT LOCATIONS INDICATED ON THE STRUCTURAL OR ARCHITECTURAL DRAWINGS BUT UNLESS NOTED OTHERWISE AT A SPACING NOT GREATER THAN 730CM O.C.
    B. HORIZONTAL JOINT REINFORCING SHALL BE INTERRUPTED EACH SIDE OF WALL CONTROL JOINTS.
    C. WALL CONTROL JOINTS SHALL NOT BE PLACED OVER OPENINGS OR WITHIN AN OPENING JAMB WIDTH. SEE PLANS AND/OR JAMB REINFORCING SCHEDULE FOR MINIMUM JAMB WIDTHS.
    D. SEE ARCHITECTURAL DRAWINGS FOR SEALANT REQUIREMENTS AT WALL CONTROL JOINTS.
    E. SEE THESE DRAWINGS FOR ADDITIONAL REQUIREMENTS.
13. MASONRY WALLS SHALL BE BRACED EITHER BY OTHER INTERSECTING WALLS OR BY ANCHORAGE OR BRACING TO THE STRUCTURE ABOVE, OR TO ADJACENT WALLS, AS DETAILED ON THE STRUCTURAL DRAWINGS.
14. BLOCK LINTELS SHALL BE SPECIALLY FORMED U-SHAPED LINTEL OR LOW WEB LINTEL UNITS WITH REINFORCING BARS, OR PRECAST UNITS DESIGNED FOR THE WEIGHT OF MASONRY ABOVE AND OTHER APPLIED LOADS.
15. ALL MASONRY WALLS SHOWN ON THE STRUCTURAL DRAWINGS HAVE BEEN DESIGNED TO RESIST THE REQUIRED CODE VERTICAL AND LATERAL FORCES IN THE FINAL CONSTRUCTED CONFIGURATION ONLY. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ADEQUATELY BRACE THE WALLS FOR VERTICAL AND LATERAL LOADS THAT COULD POSSIBLY BE APPLIED PRIOR TO COMPLETION OF LATERAL SUPPORT BY CONNECTIONS AT FLOORS OR ROOF FRAMING LEVELS.
16. QUALITY ASSURANCE: ALL REINFORCED MASONRY SHALL BE TESTED/INSPECTED IN CONFORMANCE WITH THE REFERENCED ACI 530/ASCE 5/TMS 402 CODES AND THE PROJECT SPECIFICATIONS. QUALITY ASSURANCES SHALL MEET THE REQUIREMENTS OF SECTION 1.6, TABLE 4 LEVEL B, UNLESS MORE RESTRICTIVE REQUIREMENTS ARE SPECIFIED ELSEWHERE IN THESE DOCUMENTS
17. TYPICAL SCHEDULED VERTICAL WALL REINFORCING SIZE AND SPACING SHALL ALSO BE CONTINUED ABOVE AND BELOW ALL OPENINGS.

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL FOR MUNICIPALITY OF BOSSASO PUNTLAND STATE SOMALIA:

SINAAN - DT GLOBAL

DT Global

sinaan
silkastaba | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: GENERAL NOTES I

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM
ACTIVITY NO:	DRAWING NO:		REVISION:
----------	G-02		00

STEEL ROOF DECK:

1. ROOF DECK SHALL BE 4CM DEEP. SEE ROOF PLAN FOR GAGE AND PROFILE DESIGNATION.
2. ROOF DECK SHALL BE PLACED SO AS TO COVER AT LEAST TWO SPANS. NO SINGLE SPAN CONDITIONS SHALL BE USED.
3. DECK SHALL BE FABRICATED SO THAT DECK RUNS CONTINUOUSLY OVER OPENINGS. THE OPENINGS IN THE DECK SHALL NOT BE CUT UNTIL THE OPENING IS NEEDED (PER OSHA).
4. STEEL DECK SHALL CONFORM TO ASTM A653 SQ GRADE 33 (Fy = 227 MPa).
5. STEEL DECK SHALL BE GALVANIZED WITH A PROTECTIVE ZINC COATING CONFORMING TO ASTM A924, WITH COATING DESIGNATION G90.
6. SEE ROOF PLAN AND DETAILS FOR ROOF DECK ATTACHMENT AND FORCES IMPOSED DUE TO UPLIFT AND DIAPHRAGM SHEAR UNDER WIND LOADING. SEE SPECIFICATIONS FOR INSPECTION AND REPORTING REQUIRED ON ROOF DECK ATTACHMENT.
7. PROVIDE A MINIMUM END BEARING OF 5CM OVER SUPPORTS. END LAPS OF SHEETS SHALL BE A MINIMUM OF 5CM AND SHALL OCCUR OVER SUPPORTS.
8. THE CONTRACTOR SHALL COORDINATE ALL TRADE REQUIREMENTS AND CONFIRM THE SIZE AND LOCATION OF ALL OPENINGS. OPENINGS LARGER THAN 12", AND AS DETAILED, SHALL HAVE STEEL FRAMING SUPPORTING ALL EDGES. SEE TYPICAL ANGLE FRAMING DETAILS.
9. WOOD MEMBERS SUPPORTING STEEL DECK AT THE PERIMETER OF THE BUILDING SHALL BE CONTINUOUS, DOUBLE NAIL PIECES WHERE SPLICES OCCUR.

SUBMITTALS:

1. ALL SHOP DRAWINGS MUST BE REVIEWED AND STAMPED BY THE GENERAL CONTRACTOR PRIOR TO SUBMITTAL. SUBMITTAL WITHOUT CONTRACTOR REVIEW WILL RESULT IN DELAYS. THE CONTRACTOR SHALL CONFIRM THAT SHOP DRAWINGS HAVE BEEN COMPLETED AND CHECKED BY THE SUPPLIER PRIOR TO SUBMISSION.
2. CONTRACTOR IS TO PROVIDE 1 REPRODUCIBLE AND 2 COPIES OF SHOP DRAWINGS. THE 2 COPIES WILL BE RETAINED BY THE ARCHITECT AND ENGINEER AND THE REPRODUCIBLE WILL BE RETURNED TO THE CONTRACTOR. ADDITIONAL COPIES WILL BE RETURNED UNMARKED. CONTRACTOR SHALL MAKE ANY OTHER ADDITIONAL REQUIRED COPIES FROM THE MARKED-UP REPRODUCIBLES. PREFERRED ALTERNATE: PROVIDE ELECTRONIC COPIES (PDF) OF CONTRACTOR REVIEWED AND STAMPED SHOP DRAWINGS FOR A/E REVIEW AND PROCESSING.
3. SHOP DRAWING SUBMITTAL REQUIREMENTS SHALL BE IN ACCORDANCE WITH THE STRUCTURAL SPECIFICATIONS. CHANGES OR ADDITIONS MADE ON RESUBMITTED SHOP DRAWINGS SHALL BE CLEARLY INDICATED, AND THE PURPOSE OF THE RE-SUBMITTAL SHALL BE NOTED ON THE TRANSMITTAL. REVIEW OF RESUBMITTED SHOP DRAWINGS SHALL BE LIMITED SPECIFICALLY TO THE ITEMS NOTED FOR CORRECTION ON THE PREVIOUS SUBMITTAL.
4. THE GENERAL CONTRACTOR SHALL SUBMIT FOR STRUCTURAL ENGINEER REVIEW SHOP DRAWINGS FOR THE FOLLOWING ITEMS:
   - CONCRETE MIX DESIGNS
   - REINFORCING STEEL
   - STEEL ROOF DECK

   THE NOTATIONS FOLLOWING SUBMITTAL ITEMS INDICATE THE FOLLOWING:
   - H. CALCULATION AND SHOP DRAWINGS SHALL BE SIGNED AND SEALED BY A PROFESSIONAL ENGINEER REGISTERED IN BANADIR REGIONAL ADMINISTRATION.
   - I. INCLUDE A CERTIFICATE OF COMPLIANCE WITH CONTRACT DOCUMENTS SIGNED AND SEALED BY THE PROFESSIONAL ENGINEER REGISTERED IN BANADIR REGIONAL ADMINISTRATION RESPONSIBLE FOR THE DESIGN.
   - J. SUBMIT ONE COPY FOR INFORMATION AND RECORD ONLY.
5. MANUFACTURER'S LITERATURE: SUBMIT TWO COPIES OF MANUFACTURER'S LITERATURE FOR ALL MATERIALS AND PRODUCTS USED IN CONSTRUCTION ON THE PROJECT.
6. THE ENGINEER'S REVIEW OF SHOP DRAWINGS IS FOR GENERAL CONFORMANCE OF THE DESIGN CONCEPT. CONTRACTOR SHALL SUBMIT A SCHEDULE OF SHOP DRAWING SUBMITTALS THAT IS ACCEPTABLE TO BOTH CONTRACTOR AND ENGINEER. AFTER THE CONTRACTOR HAS REVIEWEDTHE SHOP DRAWINGS, PROMPT REVIEW BY THE ENGINEER WILL BE MADE OF ALL SUBMITTALS. FOR LARGE SUBMITTALS, REASONABLE REVIEW TIME SHALL BE ALLOWED AND MAY EXCEED TWO WEEKS. THE CONCURRENT SUBMITTAL OF MULTIPLE SHOP DRAWINGS ("DUMPING") WILL FURTHER EXTEND THE REVIEW PROCESS AND TIME FRAME NECESSARY TO PROPERLY REVIEW EACH SUBMITTAL.
7. REPRODUCTION OF THESE CONTRACT DOCUMENTS BY ANYONE FOR USE IN SHOP DRAWINGS SHALL SIGNIFY THEIR ACCEPTANCE OF ALL INFORMATION SHOWN AS BEING CORRECT. TIS+/AECOM SHALL BE INDEMNIFIED AND HELD HARMLESS FROM ALL CLAIMS, DAMAGES, LOSSES, EXPENSES OR LIABILITIES OF ANY KIND, INCLUDING ATTORNEYS FEES. THE CONTRACTOR IS RESPONSIBLE FOR PROPER CHECKING AND COORDINATING OF DETAILS, DIMENSIONS, SIZES AND QUANTITIES AS REQUIRED TO FACILITATE COMPLETE AND ACCURATE FABRICATION AND ERECTION.

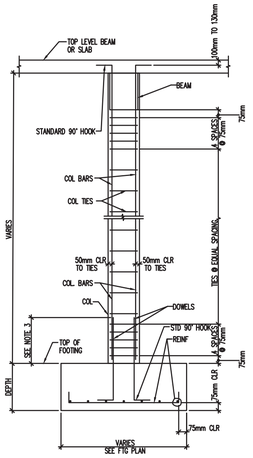
POST-INSTALLED ANCHORS:

1. POST-INSTALLED ANCHORS SHALL ONLY BE USED WHERE SPECIFIED ON THE DRAWINGS. CONTRACTOR SHALL OBTAIN APPROVAL FROM ENGINEER OF RECORD (EOR) PRIOR TO USING POST-INSTALLED ANCHORS FOR MISSING OR MISPLACED ANCHORS.
2. CARE SHALL BE GIVEN TO AVOID CONFLICTS WITH EXISTING REINFORCING WHEN DRILLING HOLES. HOLES SHALL BE DRILLED AND CLEANED PER THE MANUFACTURER'S INSTRUCTIONS. ANCHORS SHALL BE INSTALLED PER THE MANUFACTURER'S INSTALLATION INSTRUCTIONS AT NOT LESS THAN MINIMUM EDGE DISTANCES AND/OR SPACINGS INDICATED IN THE MANUFACTURER'S LITERATURE.
3. SPECIAL INSPECTION SHALL BE PROVIDED FOR ALL ADHESIVE AND MECHANICAL ANCHOR INSTALLATIONS AS REQUIRED BY THE EOR. INDEPENDENT ON-SITE PROOF LOAD TESTING SHALL BE PERFORMED AS REQUIRED BY THE ENGINEER OF RECORD (EOR). CONTACT EOR FOR NUMBER OF ANCHORS REQUIRED TO BE TESTED AND REQUIRED PROOF LOAD MAGNITUDE.
4. UNLESS NOTED OTHERWISE ON DOCUMENTS, ACCEPTABLE PRODUCTS SHALL BE AS LISTED BELOW:
   - A. MECHANICAL ANCHORS INTO CONCRETE:
     - i. USE THE FOLLOWING (UNO):
       - a) HILTI KWIK BOLT TZ CARBON AND STAINLESS STEEL ANCHORS (ICC-ES ESR1917).
       - b) RED HEAD TRUBOLT + WEDGE ANCHORS (ICC-ES ESR2427)
       - c) SIMPSON STRONG-TIE STRONG-BOLT (STB) (ICC-ES ESR1771)(FL8668)
     - ii. USE THE FOLLOWING ONLY WHERE SPECIFICALLY CALLED OUT ON THE DOCUMENTS:
       - a) HILTI HDA (ICC-ES ESR1546)
       - b) HILTI HSL-3 ANCHOR (ICC-ES ESR1545)
       - c) SIMPSON STRONG-TIE TITEN HD (THD) (ICC-ES ESR2713)(FL2304)
   - B. MECHANICAL ANCHORS INTO MASONRY LINTELS OR GROUT FILLED CELLS:
     - i. USE THE FOLLOWING (UNO):
       - a) HILTI KWIK BOLT 3 MASONRY ANCHORS (ICC-ES ESR1385)
       - b) SIMPSON STRONG-TIE WEDGE-ALL ANCHOR(WA) (ICBO-ES ER-3631) (FL5415).
     - ii. USE THE FOLLOWING ONLY WHERE SPECIFICALLY CALLED OUT ON THE DOCUMENTS:
       - a) HILTI HUS-H SCREW ANCHOR (ICC-ES ESR2369)
       - b) SIMPSON STRONG-TIE TITEN HD (THD) (ICC-ES ESR1056)(FL2304)
   - C. ADHESIVE ANCHORS INTO CONCRETE:
     - i. USE THE FOLLOWING (UNO):
       - a) HILTI HIT-RE 500-SD ADHESIVE (ICC-ES ESR2 (ICC-ES ESR2322)
       - b) RED HEAD EPCON G5 ADHESIVE (ICC-ES ESR1137)(FL6582)
       - c) SIMPSON STRONG-TIE SET-XP EPOXY-TIE ADHESIVE (SETXP) (ICC-ES ESR2508)
     - ii. USE THE FOLLOWING ONLY WHERE SPECIFICALLY CALLED OUT ON THE DOCUMENTS:
       - a) HILTI HIT HY 150 MAX ADHESIVE (ICC-ES ESR
   - D. ADHESIVE ANCHORS INTO MASONRY LINTELS OR GROUT FILLED
     - i. USE THE FOLLOWING (UNO):
       - a) HILTI HIT HY-150 MAX ADHESIVE (ICC-ES ESR
       - b) SIMPSON STRONG-TIE SET EPOXY-TIE ADHESIVE (ICC-ES ESR1772)(FL5550)

GRADE 60 BARS		CONCRETE STRENGTH, PSI									
		3000		4000		5000		6000			
BAR SIZE	CENTER TO CENTER BAR SPACING	LESS THAN 4db (mm)	4db OR MORE (NOTE 3)	LESS THAN 4db (mm)	4db OR MORE (NOTE 3)	LESS THAN 4db (mm)	4db OR MORE (NOTE 3)	LESS THAN 4db (mm)	4db OR MORE (NOTE 3)	2db	4db
ø8	TOP BARS	400	400	320	320	290	290	290	290	16	32
	OTHER BARS	290	290	290	290	290	290	290	290		
ø10	TOP BARS	540	540	460	460	410	410	410	410	20	40
	OTHER BARS	410	410	410	410	410	410	410	410		
ø12	TOP BARS	770	720	660	610	590	560	540	540	25	50
	OTHER BARS	590	560	510	490	460	440	440	440		
ø16	TOP BARS	1170	890	1020	770	920	690	840	640	35	60
	OTHER BARS	920	690	790	590	720	540	660	510		

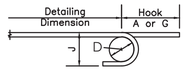
NOTES:
1) THIS DETAIL DOES NOT APPLY TO COLUMN VERTICAL BARS.
2) TOP BARS ARE HORIZONTAL BARS WITH MORE THAN 310mm OF CONCRETE CAST BELOW THE BARS.
3) THE USE OF TABULATED VALUES IN THIS COLUMN IS DEPENDENT UPON A MINIMUM CONCRETE COVER AS FOLLOWS: OUTER LAYER BARS IN WALLS AND SLABS REQUIRE 2db MINIMUM COVER, ALL OTHER BARS REQUIRE 4b MINIMUM COVER. IF MINIMUM COVER REQUIREMENTS ARE NOT MET, VALUES IN THE "LESS THAN 4db" COLUMN SHALL BE USED.
4) FOR LIGHTWEIGHT AGGREGATE, MULTIPLY ABOVE VALUES BY 1.3.
5) FOR EPOXY-COATED BARS MULTIPLY TOP BARS BY 1.3, OTHER BARS BY 1.50.

TENSION LAP SPLICE LENGTH FOR BEAM, SLAB, WALL AND CONCRETE JOIST REINFORCING BARS



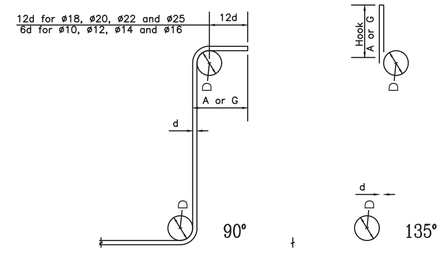
COLUMN AND FOOTING DETAIL

NOTES:
1) SEE COLUMN SCHEDULE FOR DIMENSIONS AND REINFORCING.
2) CLEARANCE SHOWN IS THE MINIMUM CONCRETE COVER FOR PRIMARY REINFORCEMENT AND TIES.
3) FOR SPLICE LENGTHS OF VERTICAL BARS, SEE /S-
4) SEE PLAN AND SCHEDULES FOR FOOTING DIMENSIONS AND REINFORCING.
5) SEE /S- FOR TYPICAL DETAILS.



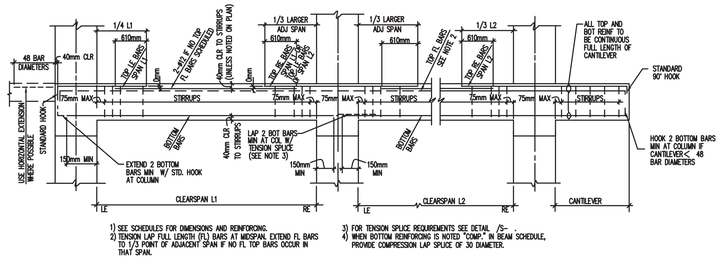
RECOMMENDED END HOOKS
All steel grades
D = Finished bend diameters

Bar size, ø in mm	D*, in mm	180 degree hook		90 degree hook
		A or G, (mm)	J, (mm)	A or G, (mm)
10	60	125	80	155
12	75	145	95	185
14	85	170	115	215
16	95	180	130	180
18	110	220	145	220
20	120	245	165	245
22	135	270	180	270
25	155	275	205	275



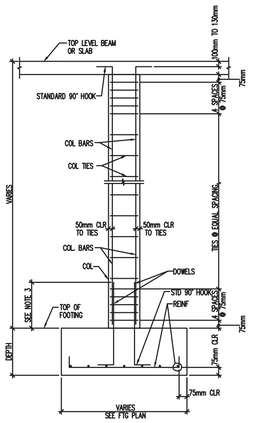
STIRRUP
(TIES SIMILAR)
STIRRUP AND TIE HOOK DIMENSIONS
ALL GRADES

Bar size, ø in mm	D*, in mm	135 degree hook		90 degree hook
		A or G, (mm)	H, (mm)	A or G, (mm)
10	40	105	65	105
12	45	115	75	110
14	55	125	90	125
16	65	140	95	155
18	110	195	110	175
20	120	215	125	290
22	135	230	135	355
25	155	270	155	410



1) SEE SCHEDULES FOR DIMENSIONS AND REINFORCING.
2) TENSION LAP FULL LENGTH (FL) BARS AT MIDSPAN. EXTEND FL BARS TO 1/3 POINT OF ADJACENT SPAN IF NO FL TOP BARS OCCUR IN THAT SPAN.
3) FOR TENSION SPLICE REQUIREMENTS SEE DETAIL /S-
4) WHEN BOTTOM REINFORCING IS NOTED "COMP." IN BEAM SCHEDULE, PROVIDE COMPRESSION LAP SPLICE OF 30 DIAMETER.

BEAM BAR BENDING AND PLACING DETAIL



COLUMN AND FOOTING DETAIL

NOTES:
1) SEE COLUMN SCHEDULE FOR DIMENSIONS AND REINFORCING.
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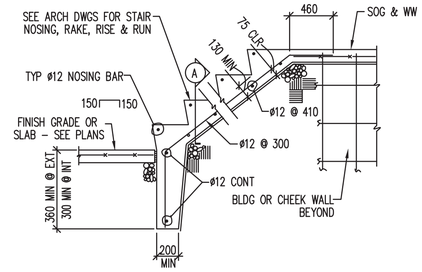
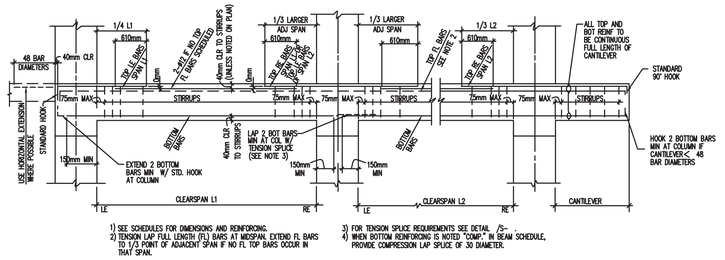
4) SEE PLAN AND SCHEDULES FOR FOOTING DIMENSIONS AND REINFORCING.
5) SEE /S- FOR TYPICAL DETAILS.



STAIR ON GRADE

1) SEE SCHEDULES FOR DIMENSIONS AND REINFORCING.
2) TENSION LAP FULL LENGTH (FL) BARS AT MIDSPAN. EXTEND FL BARS TO 1/3 POINT OF ADJACENT SPAN IF NO FL TOP BARS OCCUR IN THAT SPAN.
3) FOR TENSION SPLICE REQUIREMENTS SEE DETAIL /S-
4) WHEN BOTTOM REINFORCING IS NOTED "COMP." IN BEAM SCHEDULE, PROVIDE COMPRESSION LAP SPLICE OF 30 DIAMETER.

BEAM BAR BENDING AND PLACING DETAIL



1) SEE SCHEDULES FOR DIMENSIONS AND REINFORCING.
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3) FOR TENSION SPLICE REQUIREMENTS SEE DETAIL /S-
4) WHEN BOTTOM REINFORCING IS NOTED "COMP." IN BEAM SCHEDULE, PROVIDE COMPRESSION LAP SPLICE OF 30 DIAMETER.

BEAM BAR BENDING AND PLACING DETAIL

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL FOR MUNICIPALITY OF BOSSASO PUNTLAND STATE SOMALIA:

SINAAN - DT GLOBAL

DT Global

sinaan
silaastaba | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

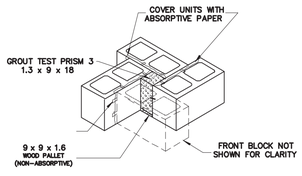
ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: GENERAL NOTES II

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

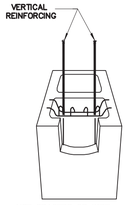
ACTIVITY NO:	DRAWING NO:	REVISION:
----------	G-03	00



NOTES:
1. TEST PER ASTM C1019.
2. SEE SPECIFICATIONS FOR FREQUENCY REQUIREMENTS.

METHOD OF CASTING GROUT TESTING PRISMS

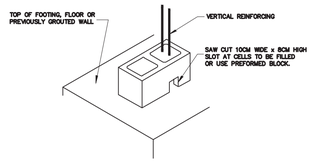
1 S10X DETAIL N.T.S



NOTES:
1. SEE PLAN & SCHEDULE FOR FILLED CELL LOCATIONS, REINFORCING SIZE, AND SPACING.
2. BED WEBS AS WELL AS FACE SHELLS ADJACENT TO CELLS TO BE FILLED TO PREVENT GROUT LEAKAGE TO ADJACENT CELLS UNLESS ADJACENT CELLS ARE ALSO TO BE FILLED.
3. SEE SPECIFICATIONS AND GENERAL NOTES FOR GROUT REQUIREMENTS.
4. ALL REINFORCING SHALL BE TIED OR SUPPORTED SECURELY IN POSITION. INSPECT REINFORCING AND CELL CONTINUITY PRIOR TO CLOSING CLEAN-OUTS.
5. GROUTING SHALL NOT COMMENCE UNTIL 48 HOURS HAS ELAPSED SINCE THE SECTION OF THE WALL TO BE GROUTED HAS BEEN COMPLETED TO ITS FULL HEIGHT.
6. A GROUT PUMP SHALL BE USED TO PLACE GROUT FOR THE HIGH LIFT METHOD.
7. PLACE THE FIRST LIFT OF GROUT FOR A SECTION OF WALL TO MAXIMUM HEIGHT OF 5 FEET, VIBRATING THE GROUT IN EACH FILLED CELL WITHIN 10 MINUTES OF PLACEMENT.
8. PLACE THE NEXT SUCCESSIVE LIFT NOT LESS THAN 30 MINUTES NOR MORE THAN 60 MINUTES LATER AND VIBRATE 12 INCHES INTO THE PREVIOUSLY PLACED LIFT.
9. CONTINUE PLACING SUCCESSIVE LIFTS UNTIL GROUTING OF SECTION OF WALL IS COMPLETED TO THE TOP.
10. SEE CMU WALL REINFORCING SCHEDULE FOR REQUIRED SPLICE LENGTHS.

METHOD OF HIGH LIFT GROUTING

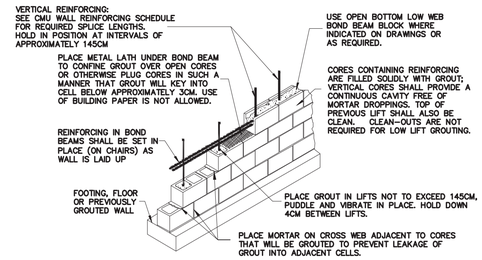
2 S10X DETAIL N.T.S



NOTES:
1. CLEAN OUT MORTAR DROPPINGS AT MIDDAY AND AT THE END OF EACH WORKING DAY. PLACE AND POSITION CELL REINFORCING AFTER FINAL CLEANOUT.
2. PLACE REINFORCING IN CELLS AFTER LAYING MASONRY.
3. SEE GENERAL NOTES AND SPECIFICATIONS FOR INSPECTION & ADDITIONAL REQUIREMENTS

CLEAN-OUT OPENINGS AT FILLED CELLS REQUIRED WHERE HIGH LIFT GROUTING IS USED

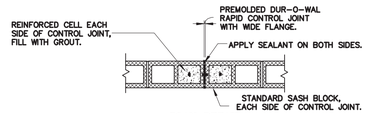
3 S10X DETAIL N.T.S



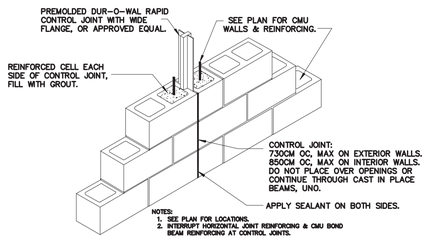
NOTES:
1. CONSTRUCT WALL IN LIFTS, GROUTING CELLS AND HORIZONTAL BOND BEAMS PRIOR TO LAYING BLOCK ABOVE.
2. BOND BEAMS MAY NOT OCCUR IN ALL LIFTS. REFER TO PLANS AND WALL SECTIONS FOR BOND BEAM LOCATIONS.

METHOD OF LOW LIFT GROUTING (145 MAXIMUM LIFT)

4 S10X DETAIL N.T.S



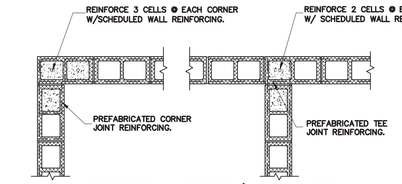
PLAN DETAIL



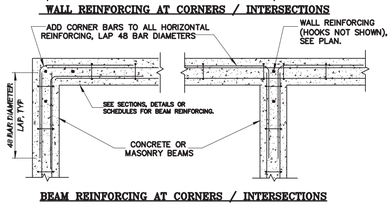
NOTES:
1. SEE PLAN FOR LOCATIONS.
2. INTERRUPT HORIZONTAL JOINT REINFORCING & CMU BOND BEAM REINFORCING AT CONTROL JOINTS.

METHOD OF WALL CONTROL JOINT (WCJ) CONSTRUCTION

5 S10X DETAIL N.T.S

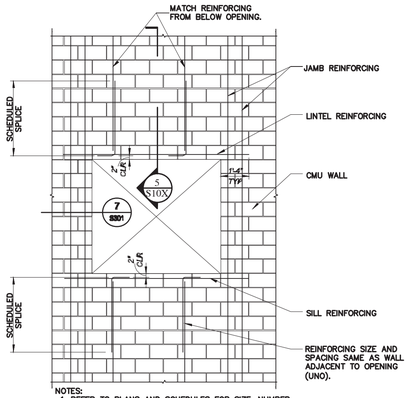


WALL REINFORCING AT CORNERS / INTERSECTIONS



BEAM REINFORCING AT CORNERS / INTERSECTIONS

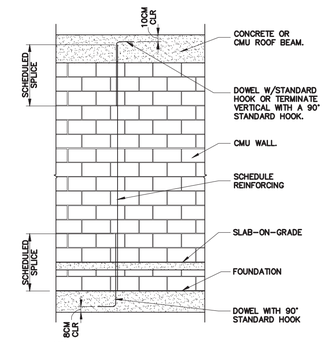
6 S10X DETAIL N.T.S



NOTES:
1. REFER TO PLANS AND SCHEDULES FOR SIZE, NUMBER AND LOCATION OF VERTICAL REINFORCING.
2. CLEAN-OUTS AND HJR NOT SHOWN BUT ARE REQUIRED, SEE SPECIFICATIONS.
3. SPLICE LOCATIONS ARE DIAGRAMMATIC. SPLICE AS REQUIRED.

DIAGRAMMATIC ELEVATION
WINDOW OPENING IN CMU (DOOR SIMILAR)

9 S10X DETAIL N.T.S



NOTES:
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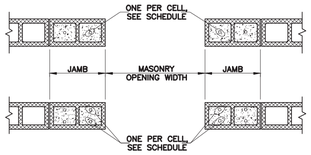
2. CLEAN-OUTS AND HJR NOT SHOWN BUT ARE REQUIRED, SEE SPECIFICATIONS.
3. SPLICE LOCATIONS ARE DIAGRAMMATIC. SPLICE AS REQUIRED.

AT SINGLE STORREY WALL

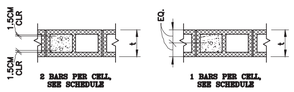
DIAGRAMMATIC ELEVATION
TYPICAL CMU WALL VERTICAL REINFORCING

10 S10X DETAIL N.T.S



MASONRY WALL JAMB REINFORCING SCHEDULE				
WALL TYPE	MASONRY OPENING WIDTH	NUMBER OF REINFORCEMENT PER CELL		SPLICE LENGTH
		OPENING IN EXTERIOR WALL	OPENING IN INTERIOR WALL	
WT1	UPTO 100CM	1-16@ PER CELL IN 2 CELL	1-16@ PER CELL IN 1 CELL	110CM
	UPTO 200CM	2-16@ PER CELL IN 2 CELL	1-16@ PER CELL IN 2 CELL	110CM

7 S10X DETAIL & SCHEDULE N.T.S



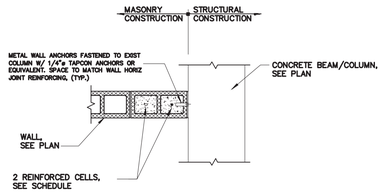
MASONRY WALL REINFORCEMENT SCHEDULE*						
WALL TYPE	WALL THICKNESS "t"	VERTICAL REINF.	MAXIMUM SPACING	SPLICE LENGTH	HJR REINF.	REMARKS
WT1	19CM	1-16@ BAR	40CM	110CM	40CM	

*SEE SEPARATE DETAIL/SCHEDULE FOR JAMB REINFORCEMENT

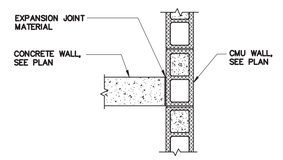
NOTES:
1. VERTICAL REINFORCING SHALL RUN FROM FOOTING TO 4" CLEAR FROM TOP OF UPPERMOST SUPPORTED BEAM (ROOF BEAM OR OPENING LINTEL). VERTICALS MAY BE LAP SPLICED AS REQUIRED FOR EASE OF BLOCK INSTALLATION. PROVIDE HOOKED DOWEL FROM FOOTING OR SUPPORT BEAM AT EACH FILLED BLOCK CELL. PROVIDE HOOK AT TOP OF VERTICAL. EACH POUR OF GROUT SHALL BE STOPPED AT LEAST 1 1/2" BELOW THE TOP OF THE LAST COURSE OF BLOCK LAID (EXCEPT AT PRECAST LINTELS).
2. SEE TYPICAL DETAILS AND CODE REQUIREMENTS FOR CLEAN-OUTS

TYPICAL FILLED CELLS WITH 1 BAR OR 2 BARS PER CELL

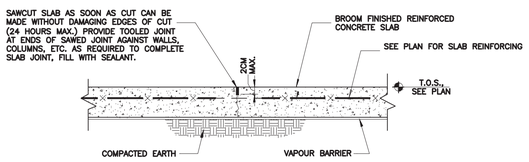
8 S10X DETAIL & SCHEDULE N.T.S



11 S10X DETAIL N.T.S



12 S10X DETAIL N.T.S



TYPICAL SAWED CONTROL JOINT (SCJ) AT SLABS EXCEEDING 20METERS IN LENGTH

13 S10X SLAB-ON-GRADE N.T.S

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL FOR MUNICIPALITY OF BOSSASO PUNTLAND STATE SOMALIA:

SINAAN - DT GLOBAL

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Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: WALL DETAILS & SECTIONS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM
ACTIVITY NO:	DRAWING NO:		REVISION:
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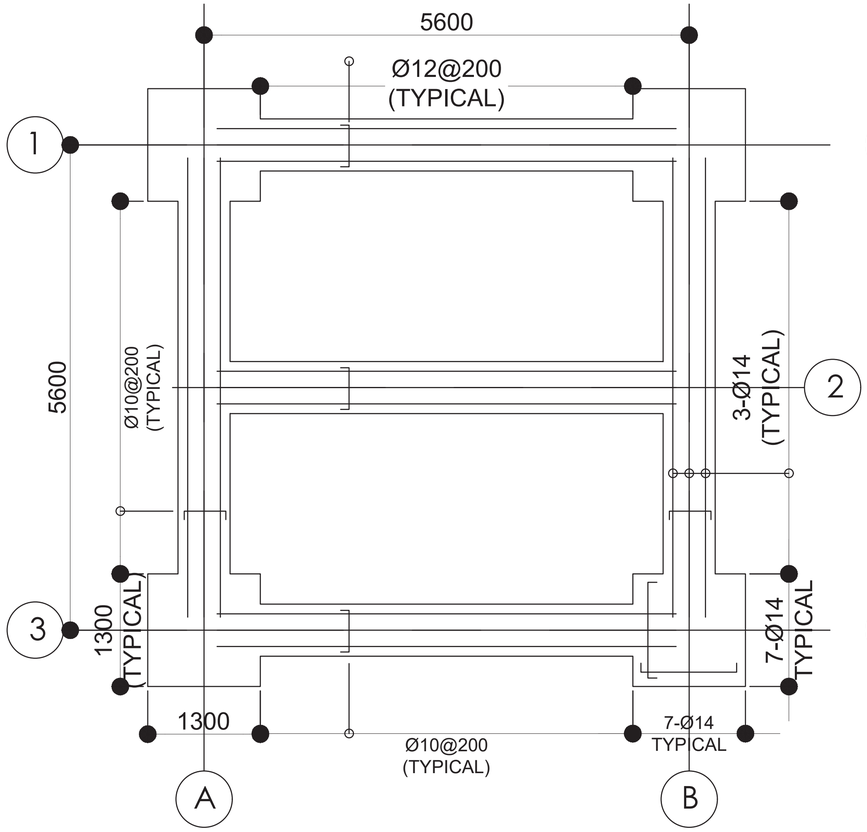
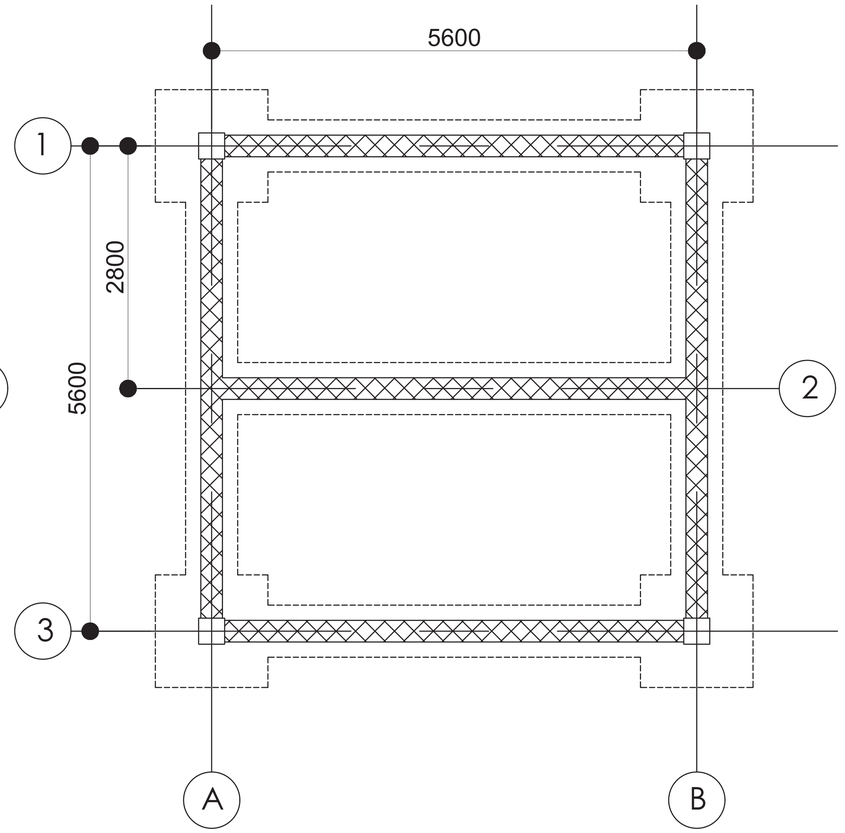
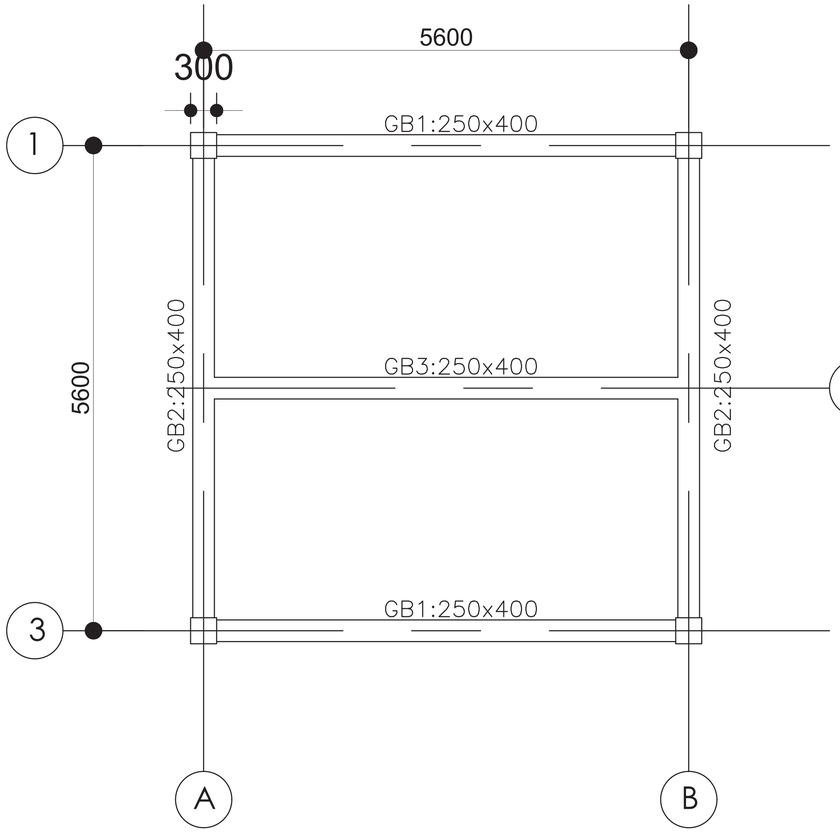
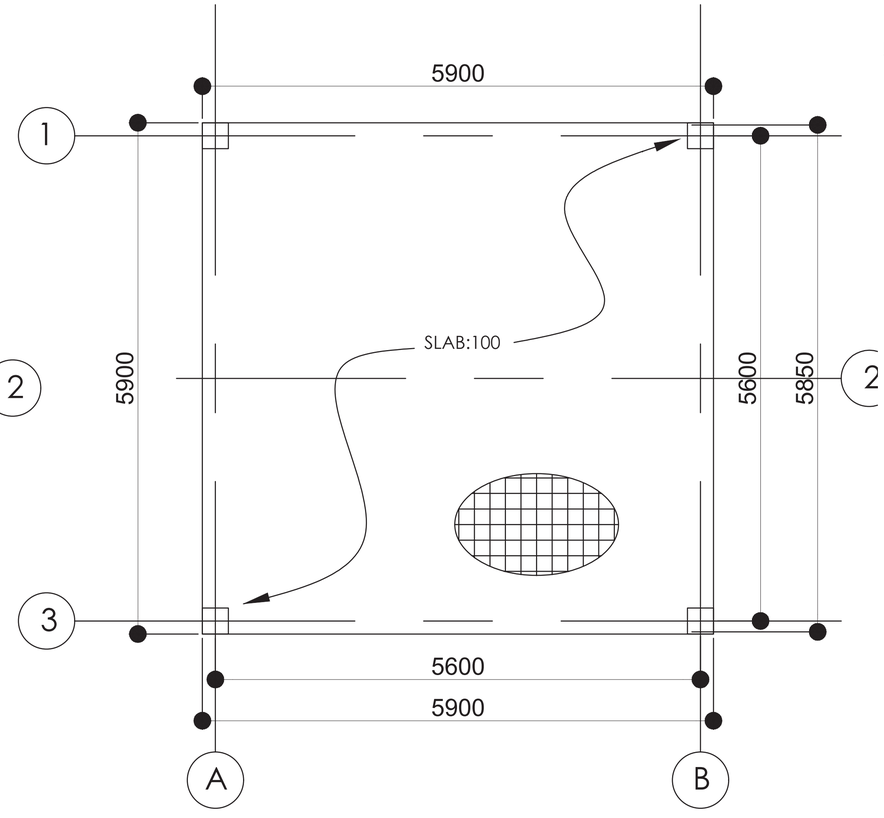
ABLUTION BLOCK





NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 8–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.





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ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

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www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: ABLUTION I

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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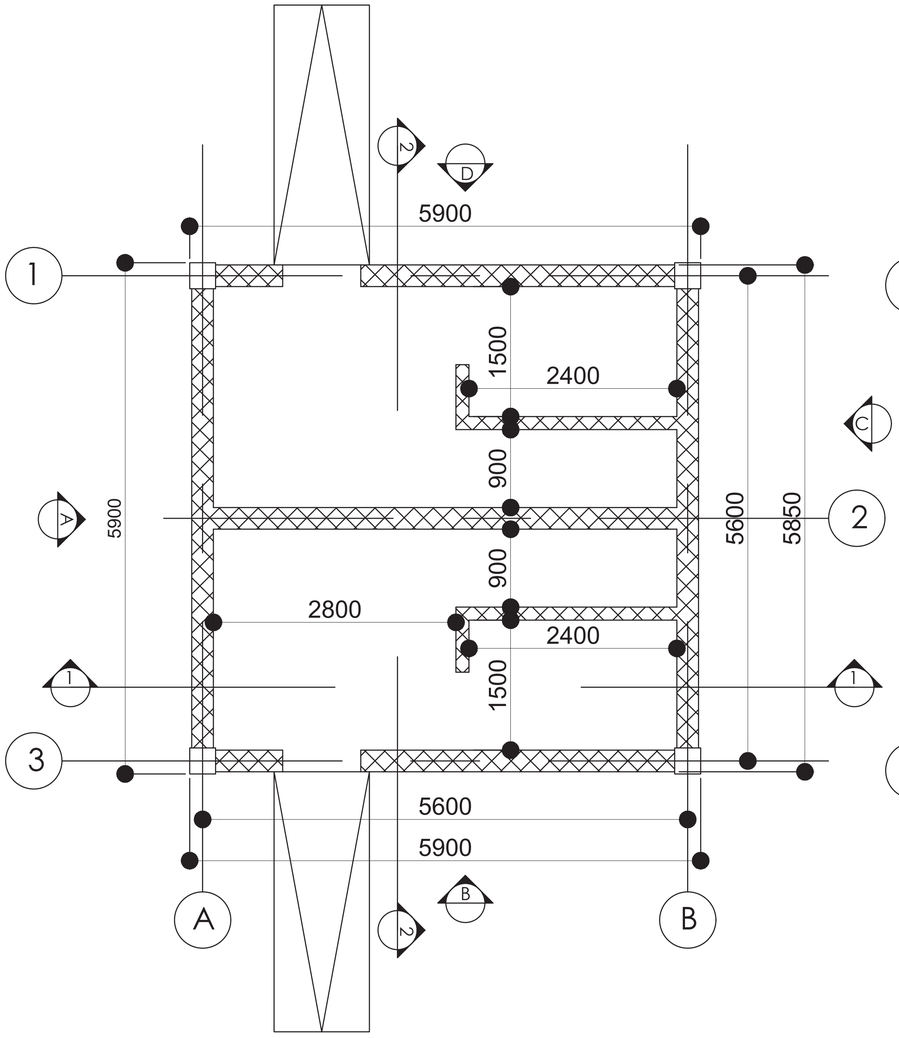

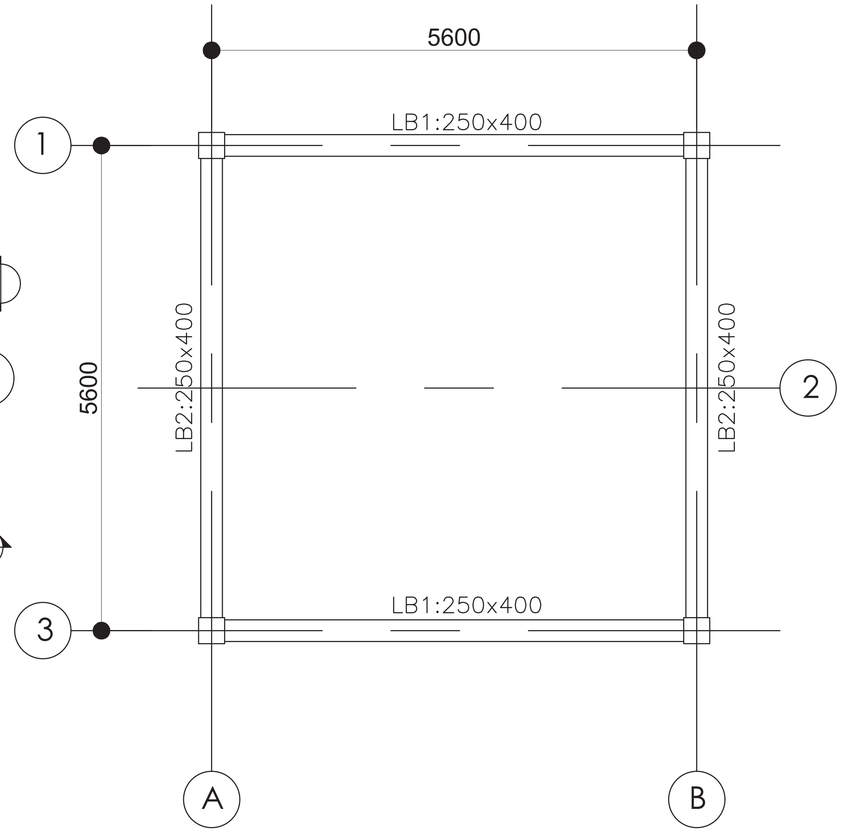

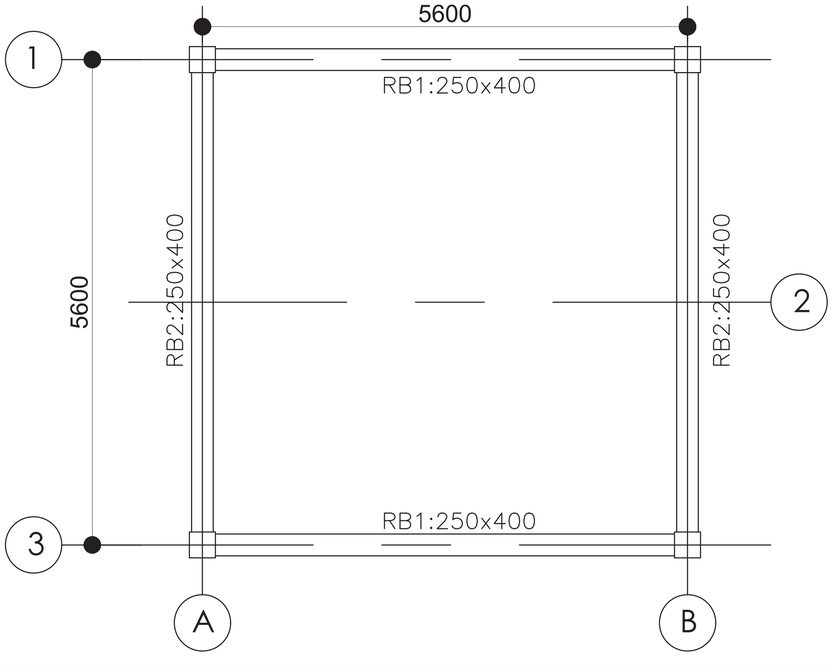

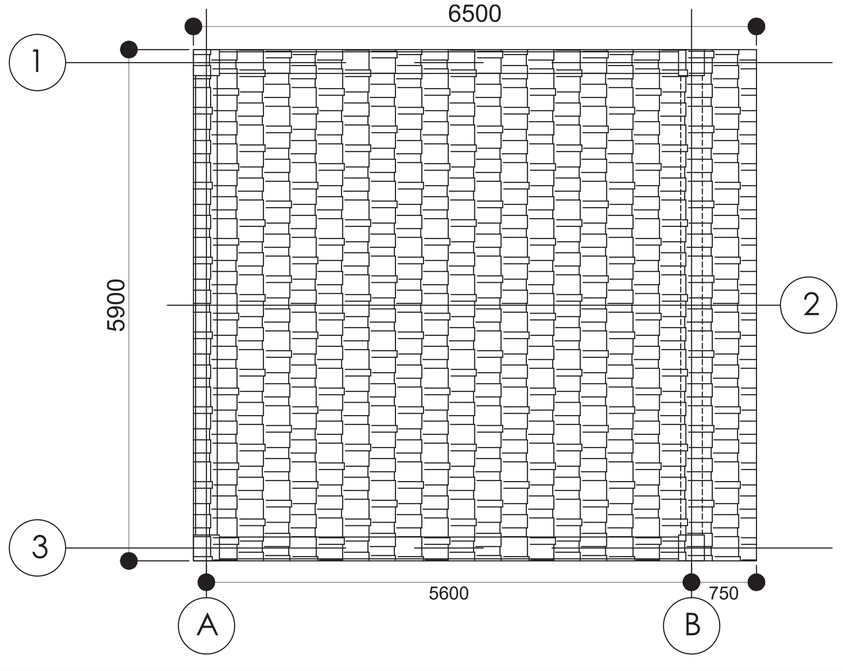

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8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.
9. PROVIDE ø10@150 EACHWAY & EACH DIRECTION AT MDI–DEPT OF SLAB–ON–GRADE

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PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL FOR MUNICIPALITY OF BOSSASO PUNTLAND STATE SOMALIA:

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REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: ABLUTION II

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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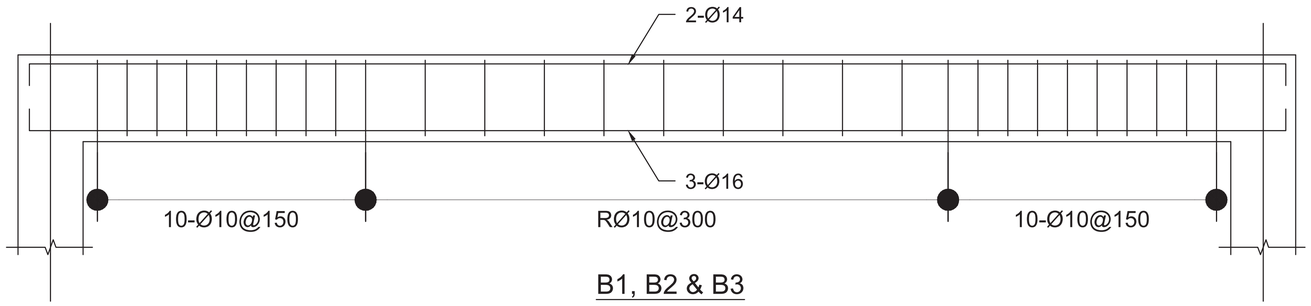
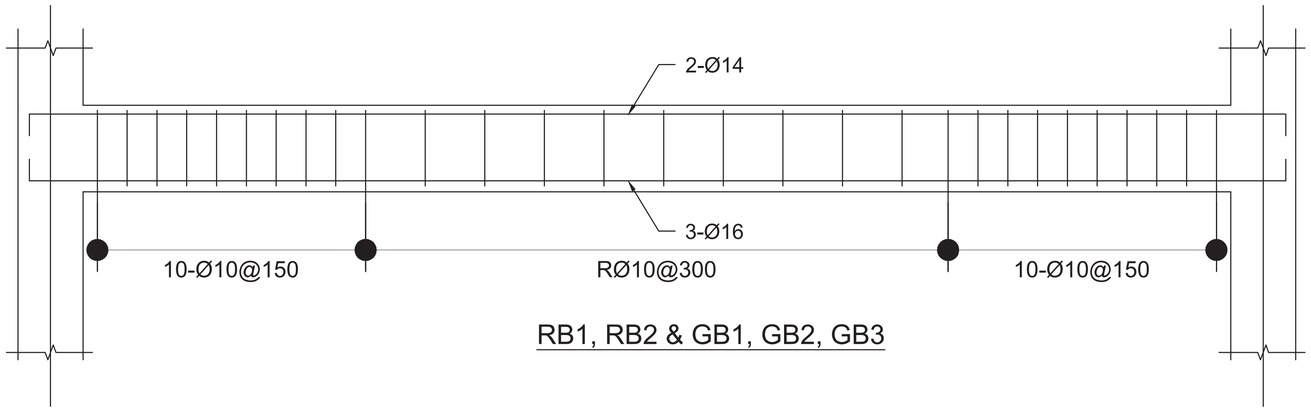


B1, B2 & B3



RB1, RB2 & GB1, GB2, GB3

NOTES:
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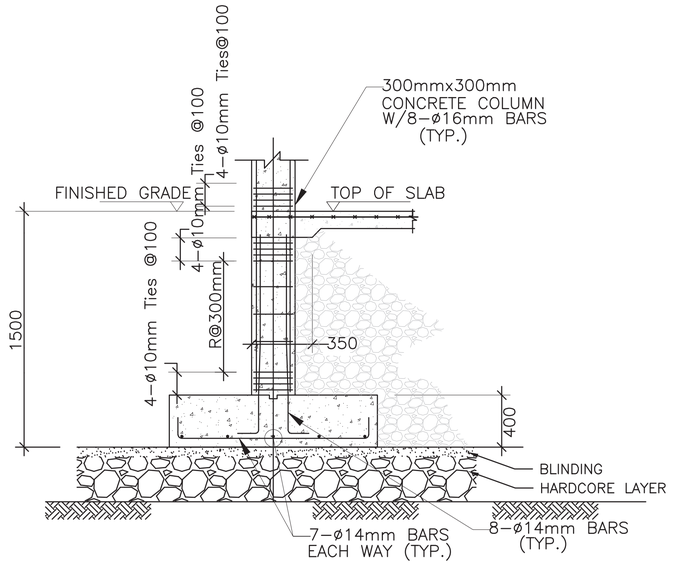
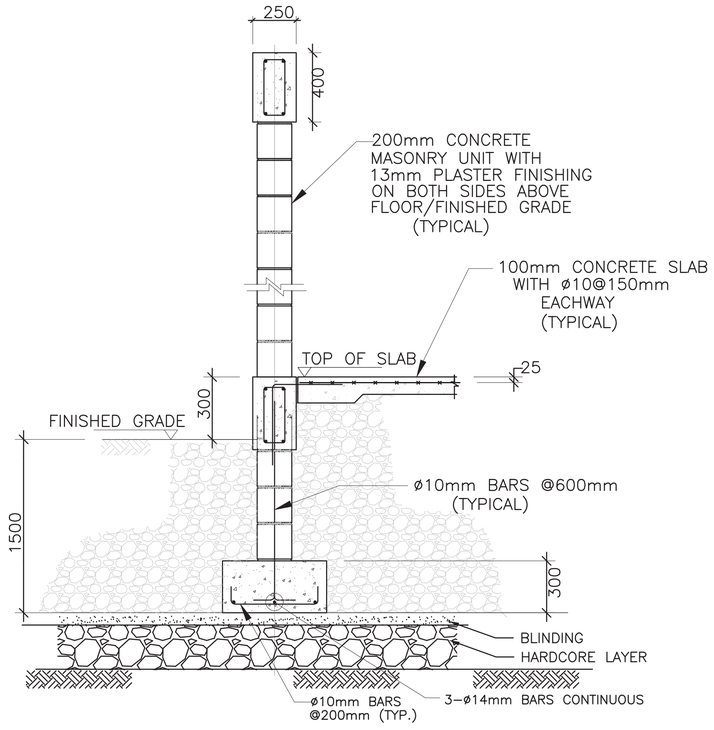


EXTERIOR COLUMN DETAIL
N.T.S.



BUILDING EXTERIOR WALL SECTION DETAIL
N.T.S.

NOTES:
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PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

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Mogadishu, Somalia
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REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: ABLUTION III

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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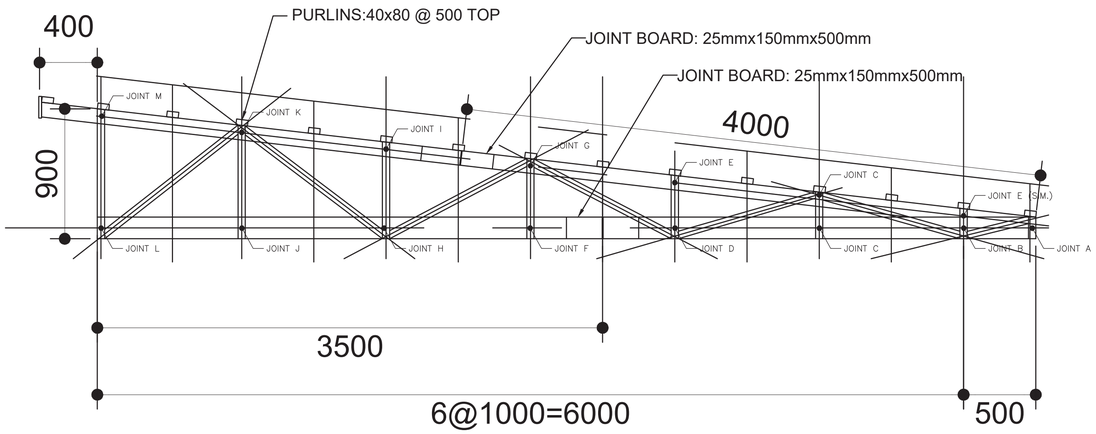
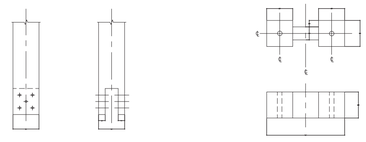


ROOF TRUSS DETAIL

NOTES:

1. DO NOT ALIGN ANY JOINT CONNECTIONS OF THE TOP & BOTTOM CHORD BOARDS.
2. ALL JOINT CONNECTIONS SHALL BE MADE WITH 150x25x500 JOINT BOARD FOR ALL BOTTOM CHORDS AND 100x25x500 JOINT BOARD FOR ALL TOP CHORDS AND ALL JOINTS WITH #6 NAILS SPACED AT 80mm MAXIMUM IN EACH DIRECTION AND STAGGERED ON EVERY OTHER LINE OF NAILS.
3. ALL TOP CHORDS SHALL BE MADE OF 2x100x25 BOARDS AND BOTTOM CHORDS SHALL BE MADE OF 2x150x25 AT NECESSARY LENGTH TO AVOID ALIGNMENT OF JOINTS.
4. ALL VERTICAL & DIAGONAL STUDS SHALL BE 80x80 AND DETAILED AS SHOWN IN THE TRUSS AND JOINT DETAILS.
5. ALL NAILING IN THE TRUSS JOINTS SHALL BE SPACED MAXIMUM AT 80mm CENTER-TO-CENTER AND ALL CENTRALLY ALIGNED IN EACH HORIZONTAL ROW AND STAGGERED ON EACH VERTICAL COLUMN.
6. ALL PURLINS ON TOP & BOTTOM CHORDS SHALL BE 40X80 SPACED AT 500 TIMBER.

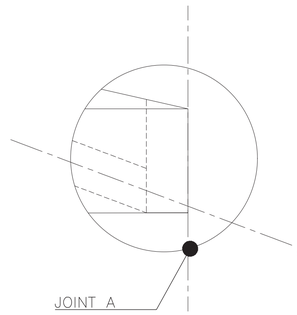


WOODEN ANCHOR BLOCK VERTICAL STUD WITH 5-#6 NAILS ON EACH FACE

WOODEN ANCHOR BLOCK 8x8x24, WITH 2x14mmø J-BOLTSx40CM LONG AT EXTERIOR ROOF BEAMS

ANCHOR BLOCK DETAIL AT JOINT "B" AND "L SIM."

N.T.S



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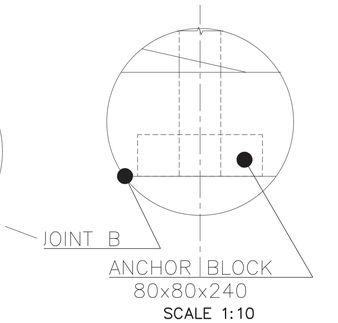
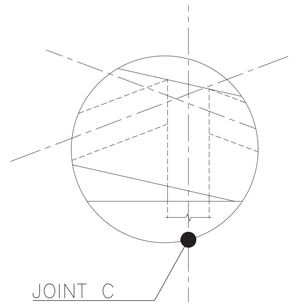


SCALE 1:10

*SEE WOODEN ANCHOR BLOCK DETAIL ON THIS SHEET



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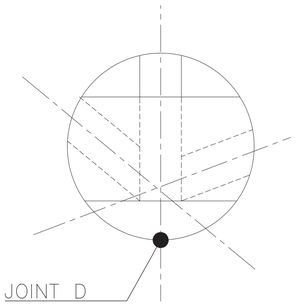

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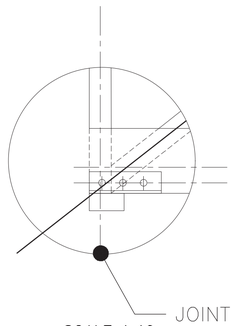

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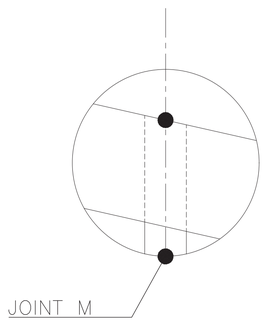

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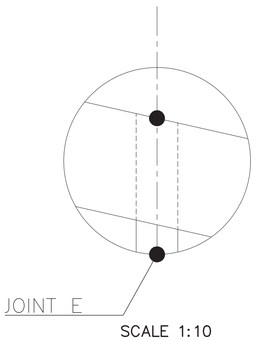

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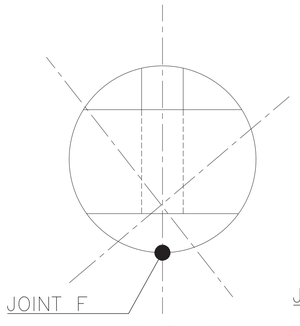

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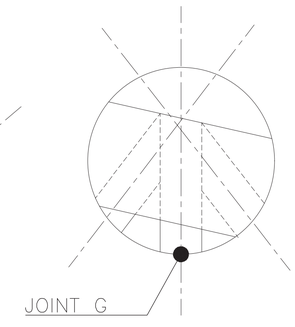

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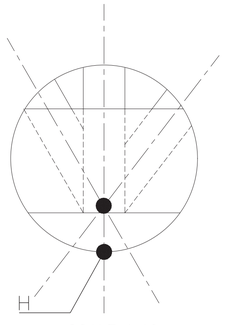

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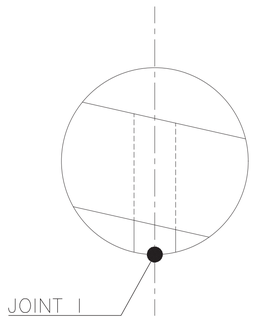

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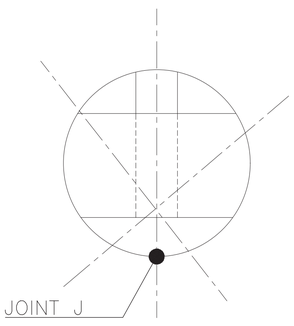

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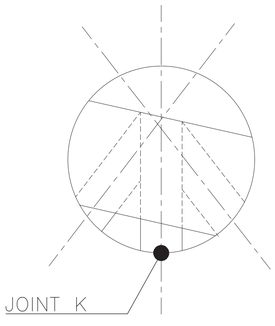

SCALE 1:10

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SINAAN PROGRAMME

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PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: ABLUTION IV

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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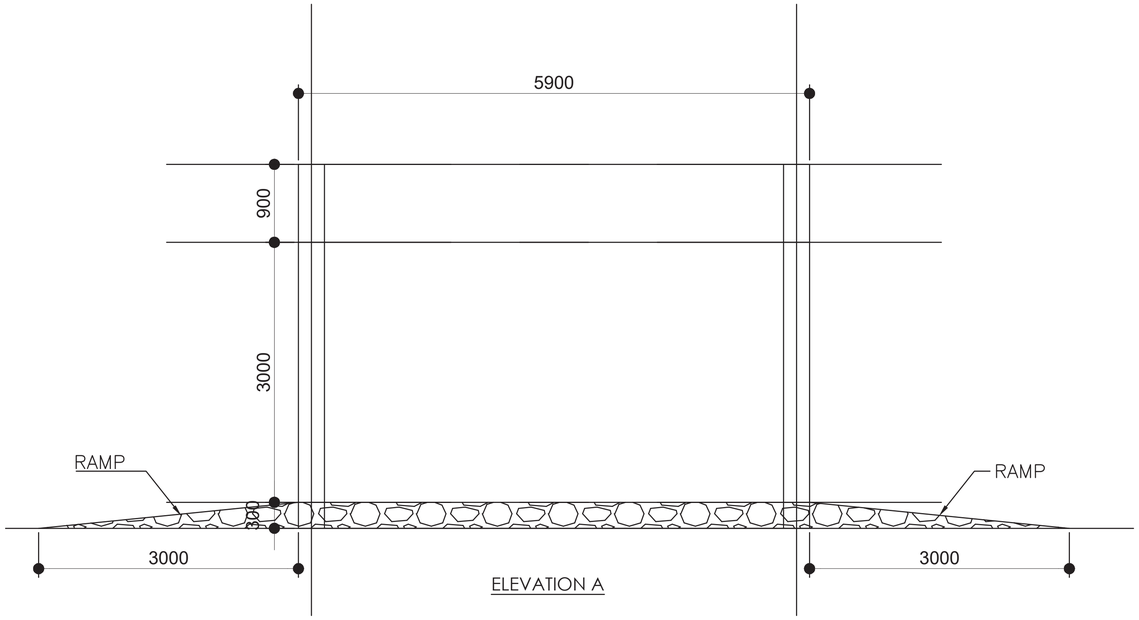
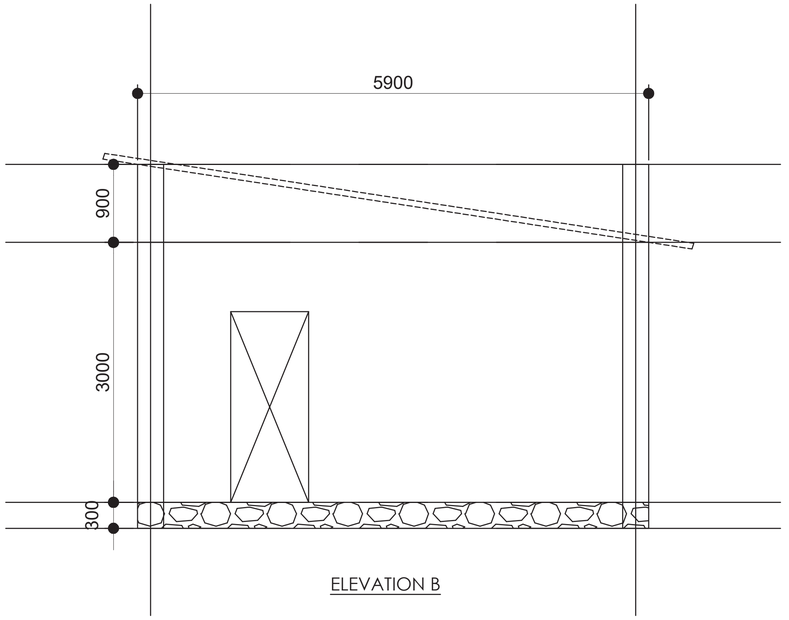
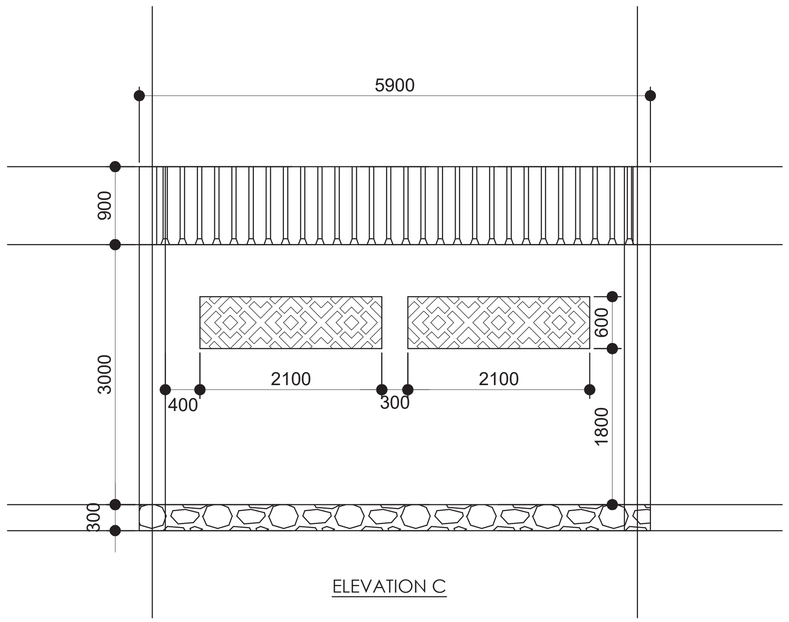


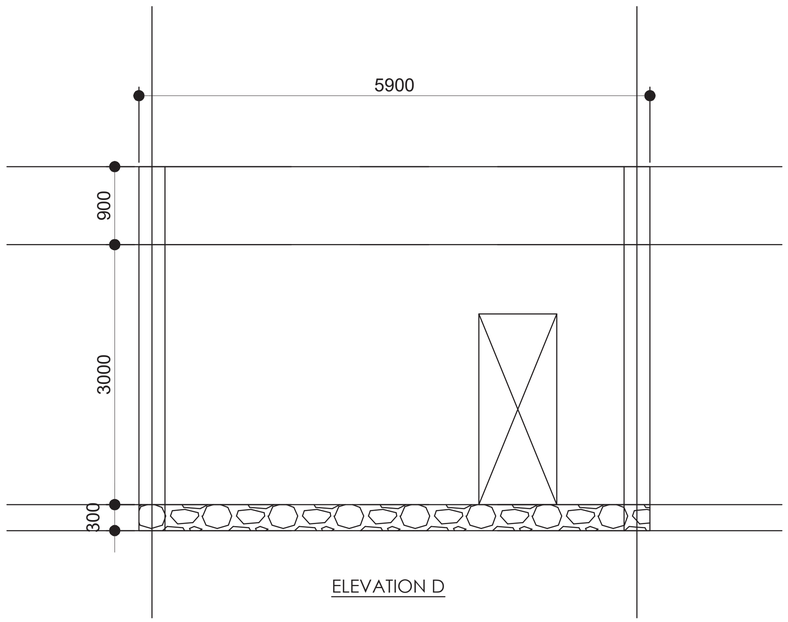
ELEVATION A



ELEVATION B



ELEVATION C



ELEVATION D

ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

sinaan
sikaastaba | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: ABLUTION V- ELEVATIONS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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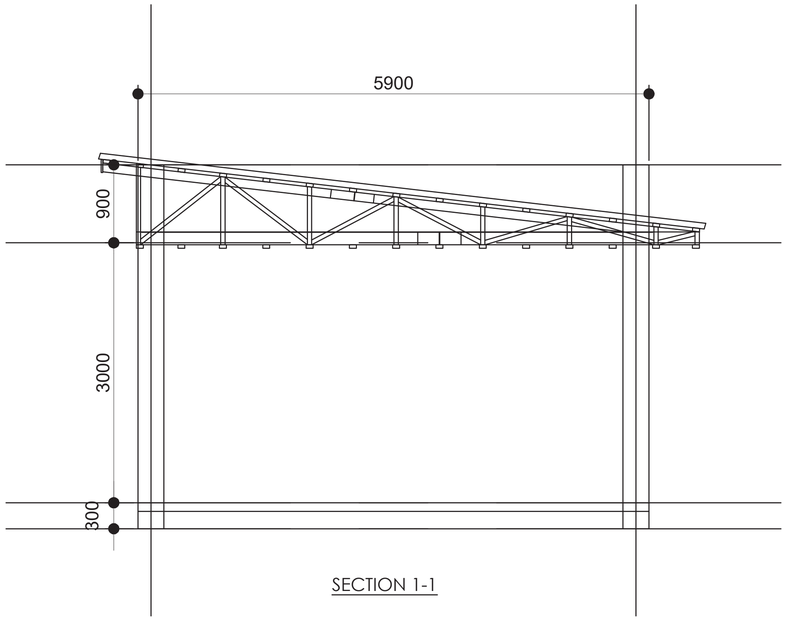
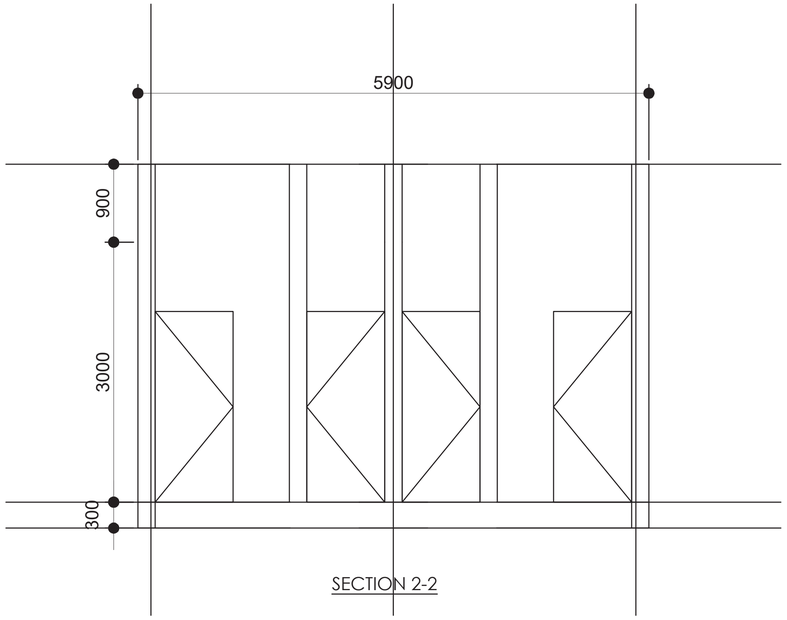
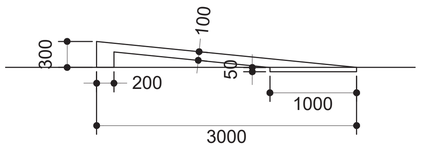


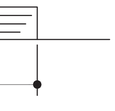
SECTION 1-1



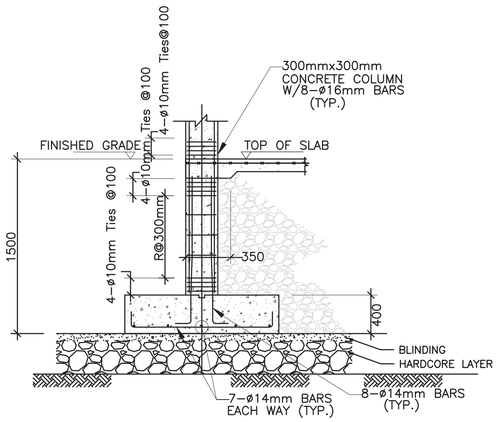
SECTION 2-2



RAMP CROSS-SECTION



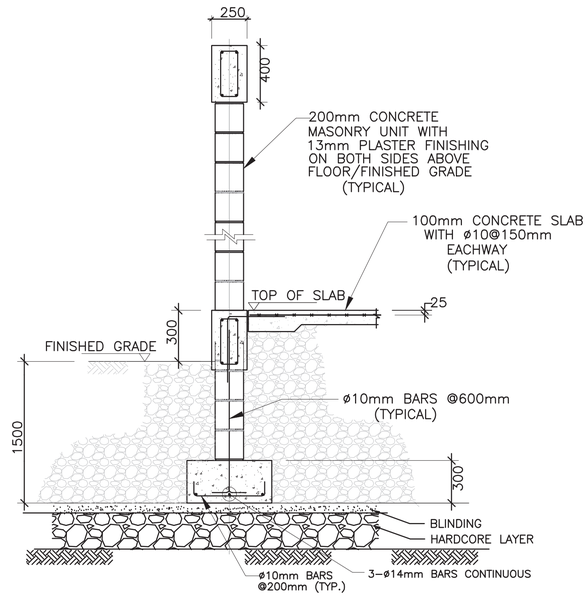
RAMP ELEVATION



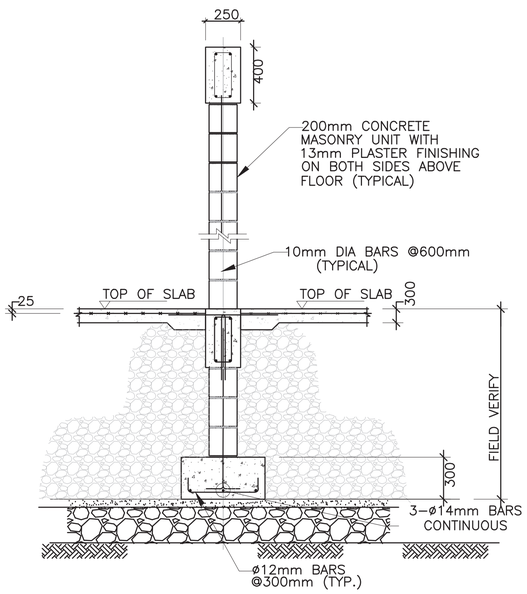
EXTERIOR COLUMN DETAIL
N.T.S.

NOTES:

1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT-ON-RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER-ON-RECORD FOR ANY STRUCTURAL ELEMENT CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. RAMP CONCRETE SHALL BE f'_c=21MPa.
5. PROVIDE ø10@150 EACHWAY & EACH DIRECTION AT MDI-DEPT OF RAMP SLAB



BUILDING EXTERIOR WALL SECTION DETAIL
N.T.S.



BUILDING INTERIOR WALL SECTION DETAIL
N.T.S.

ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

sinaan
sikastaba | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

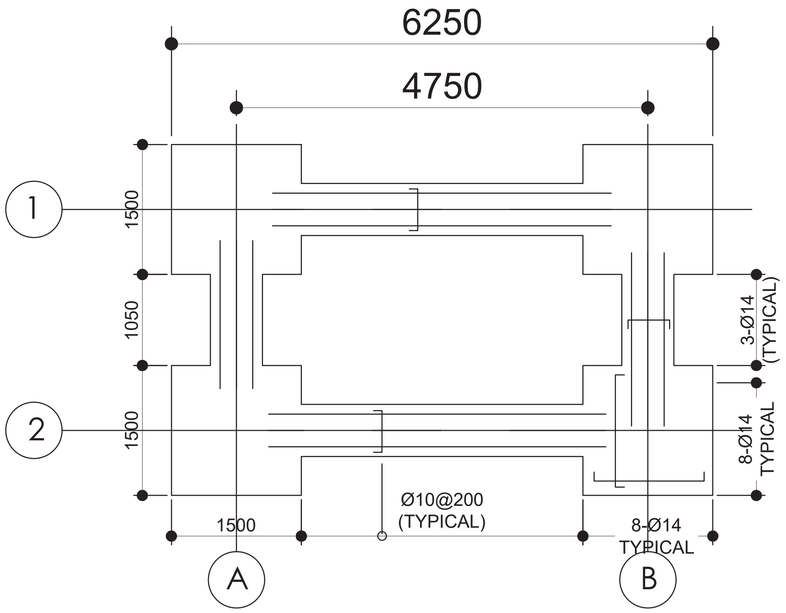
SITE: BOSSASSO

TITLE: ABLUTION VI - SECTIONS

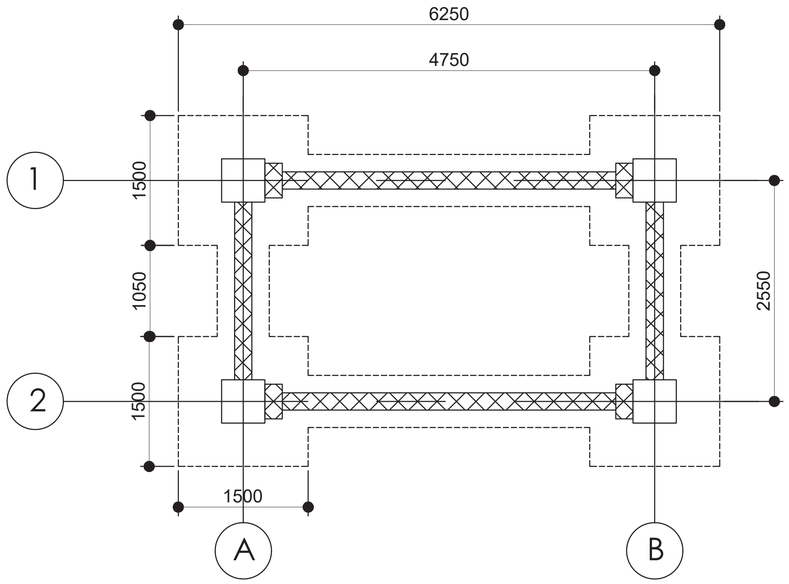
SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
----------	S-06	00

GATE WAY

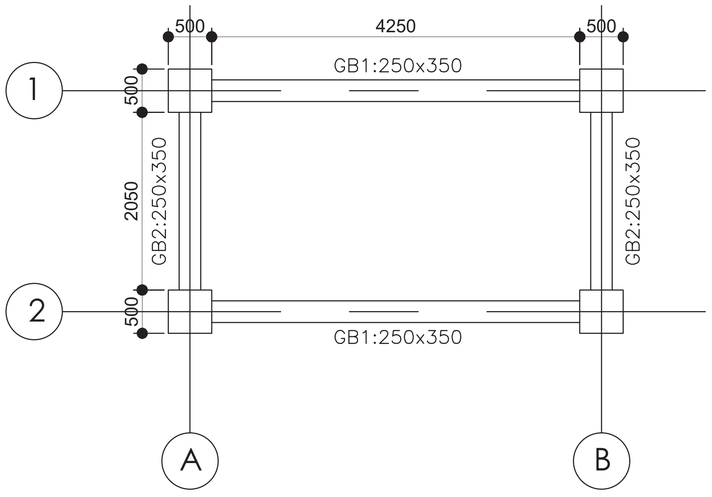


FOUNDATIONS

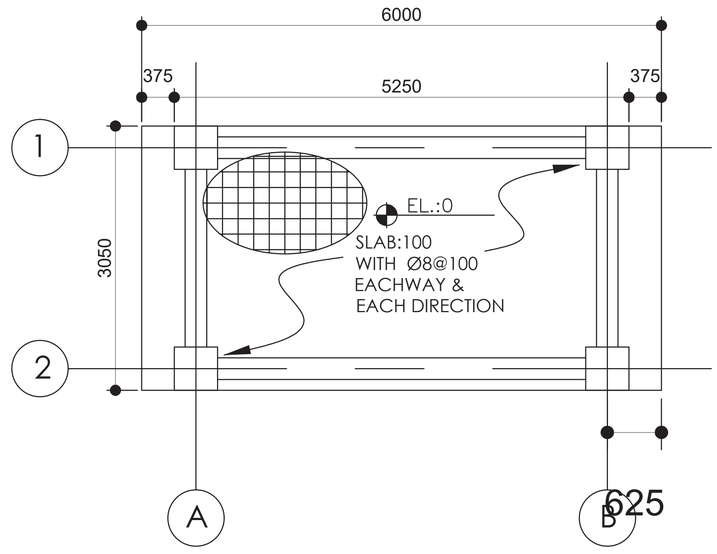


COLUMN LOCATIONS

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 16–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.



GRADEBEAMS



SLAB-on-GRADE

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL ELEMENT CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 8–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.
9. PROVIDE ø10@150 EACHWAY & EACH DIRECTION AT MDI–DEPT OF SLAB–ON–GRADE

ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

sinaan
sikaastaba | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: GATEWAY I

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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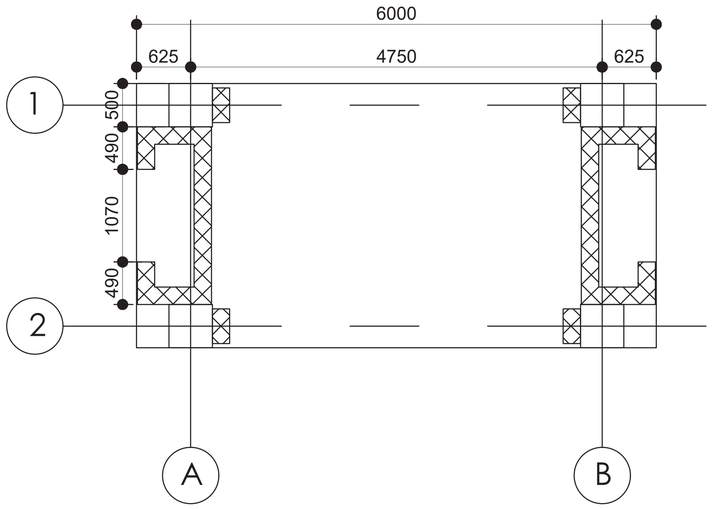
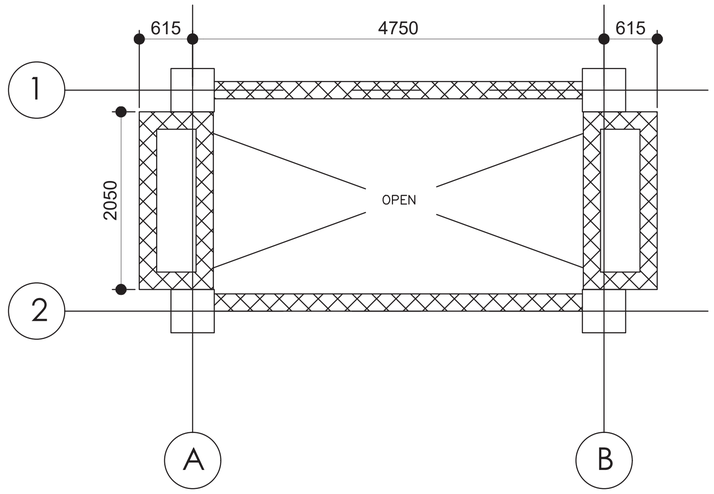
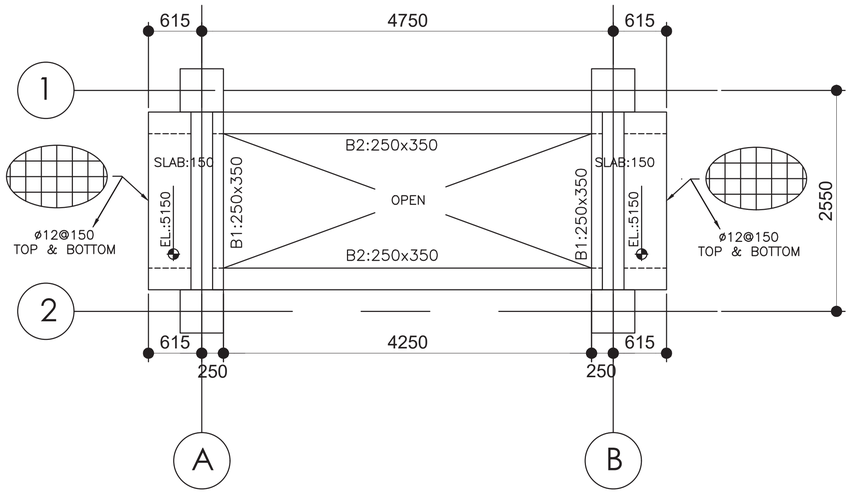


WALLS ON
SLAB-on-GRADE

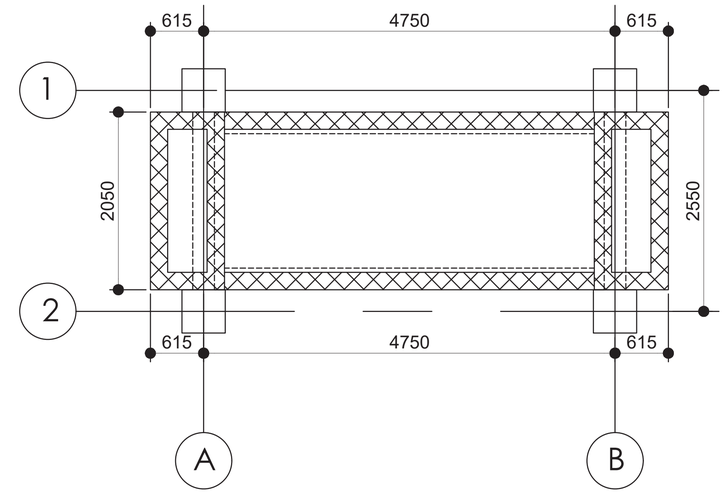


WALLS AT ARCH
LEVEL

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 16–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.



SLAB AT LOWER ROOF



WALLS AT LOWER
ROOF

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL ELEMENT CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 16–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.
9. PROVIDE ø10@150 EACHWAY & EACH DIRECTION AT MDI–DEPT OF SLAB–ON–GRADE

ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

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Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: GATEWAY II

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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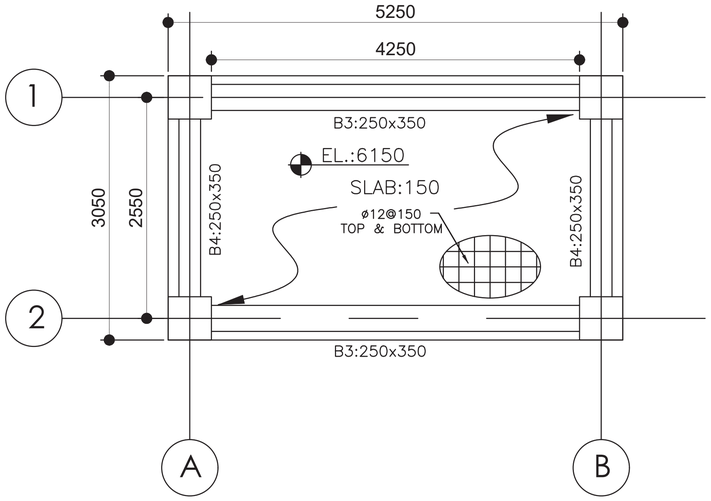
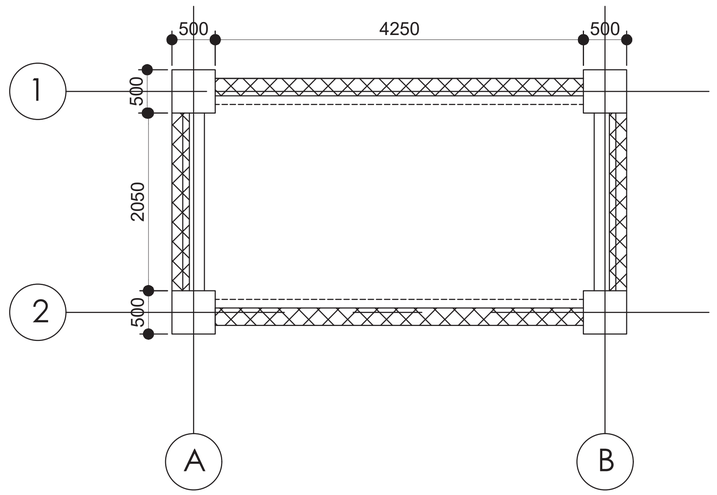
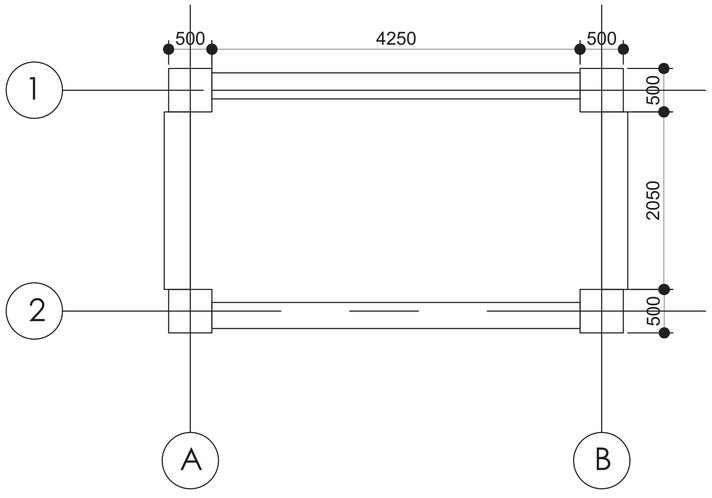


SLAB AT UPPER ROOF

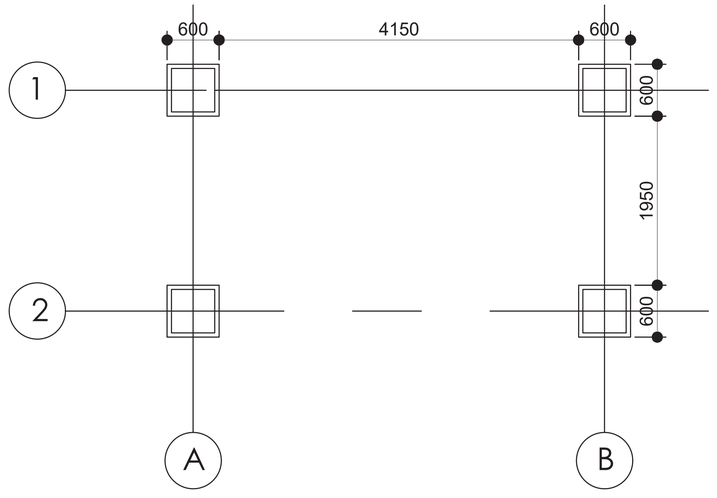


WALL AT UPPER ROOF

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 16–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.



CAPS ON WALL AT UPPER ROOF



CAPS ON WALL AT COLUMNS

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL ELEMENT CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 16–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.
9. PROVIDE ø10@150 EACHWAY & EACH DIRECTION AT MDI–DEPT OF SLAB–ON–GRADE

ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

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sikastaba | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: GATEWAY III

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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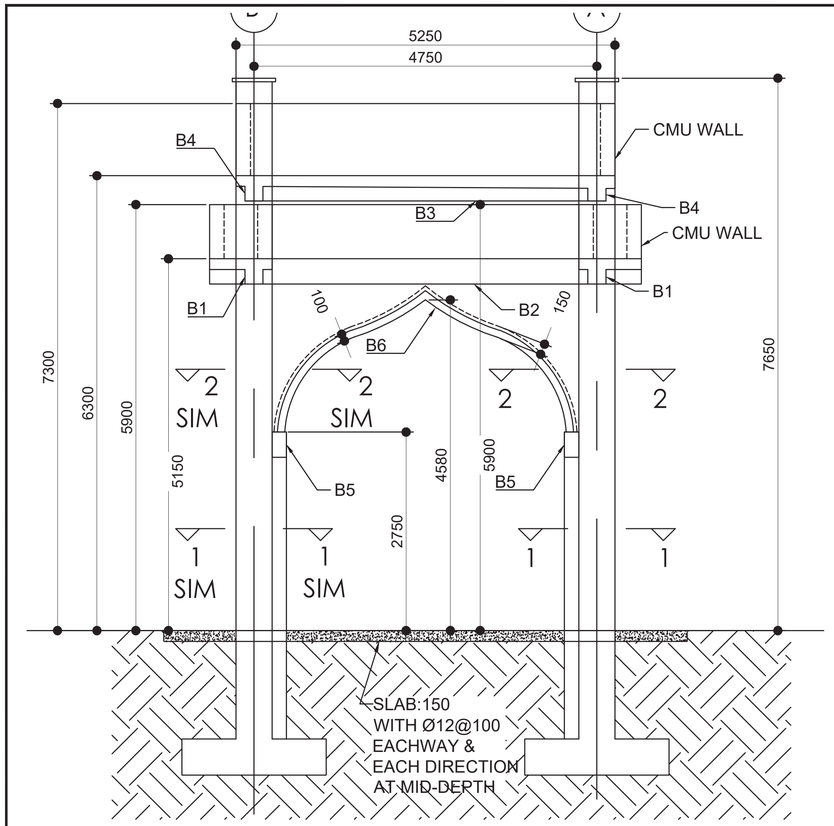
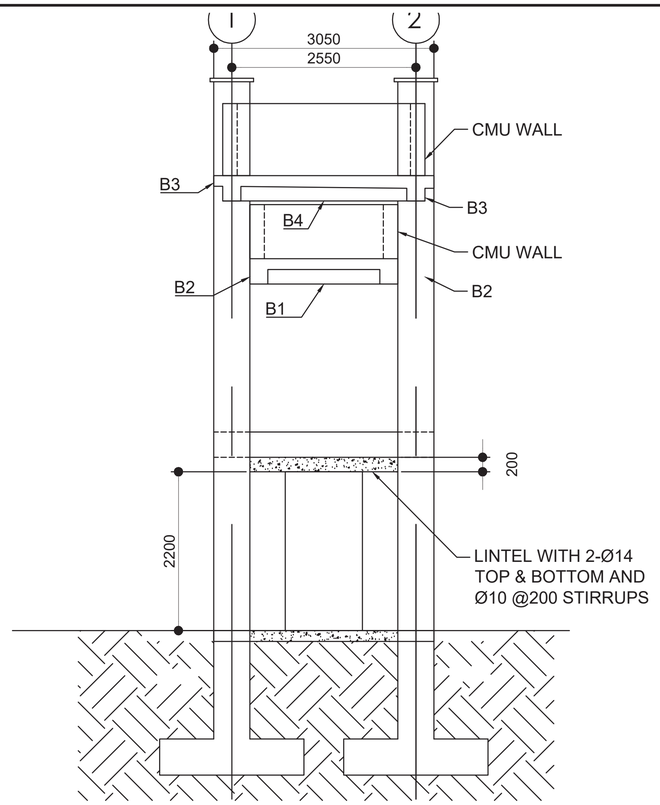
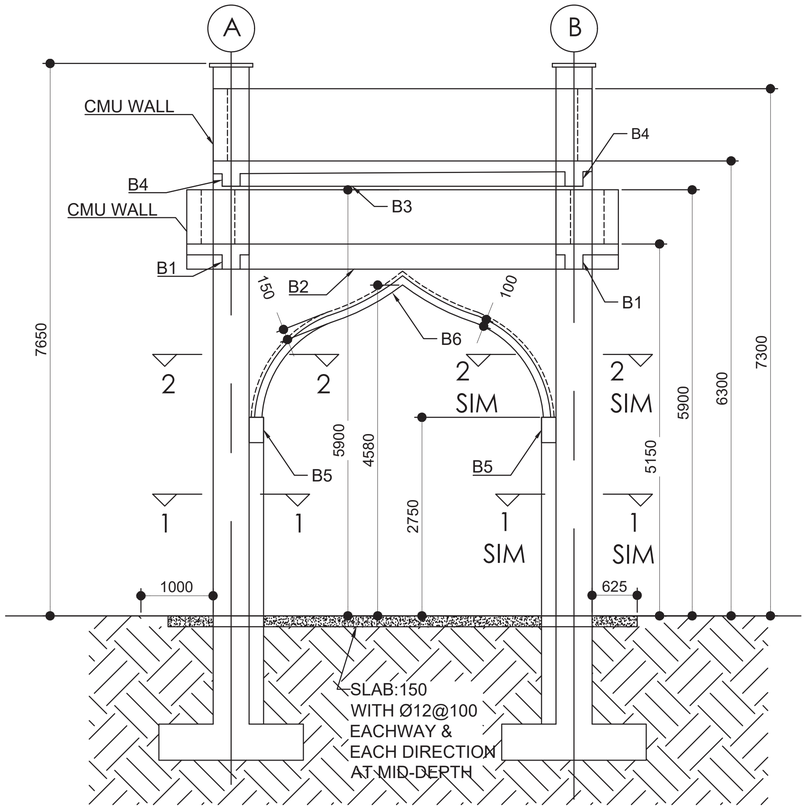


GATEWAY BACK VIEW

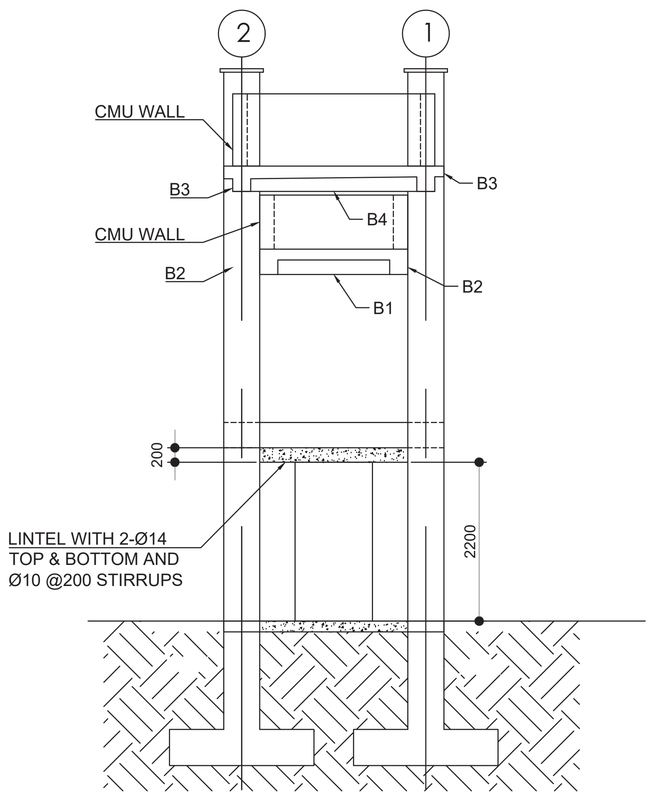


GATEWAY SIDE VIEW-1

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 16–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.



GATEWAY FRONT VIEW



GATEWAY SIDE VIEW-2

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL ELEMENT CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 16–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.
9. PROVIDE ø10@150 EACHWAY & EACH DIRECTION AT MDI–DEPT OF SLAB–ON–GRADE

ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

sinaan
sikastaba | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: GATEWAY IV - ELEVATIONS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM
ACTIVITY NO:	DRAWING NO:		REVISION:
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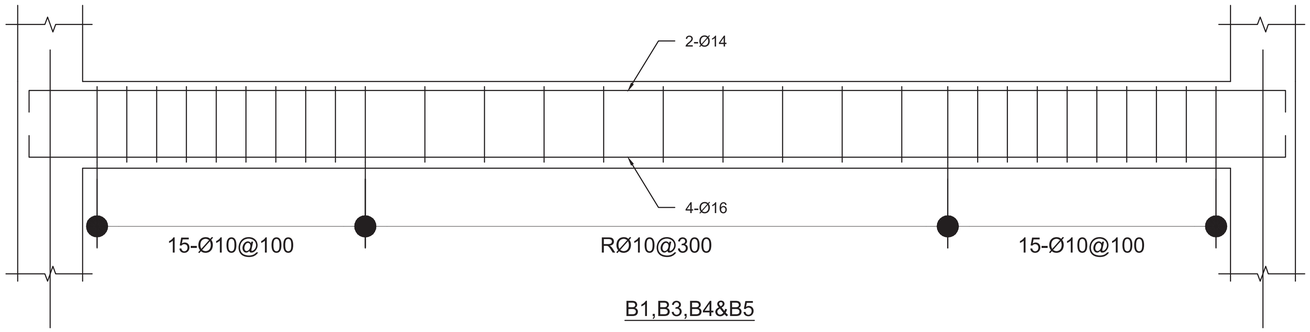

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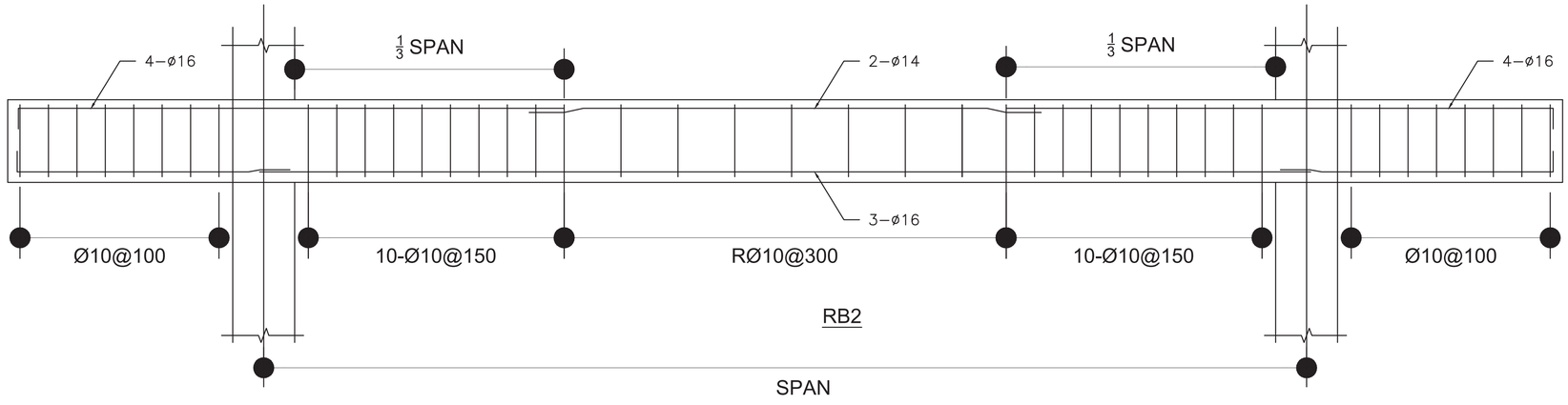
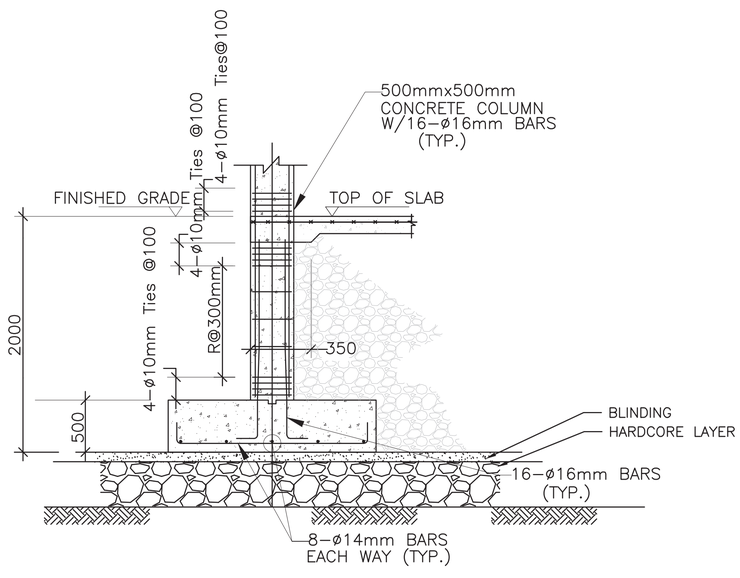
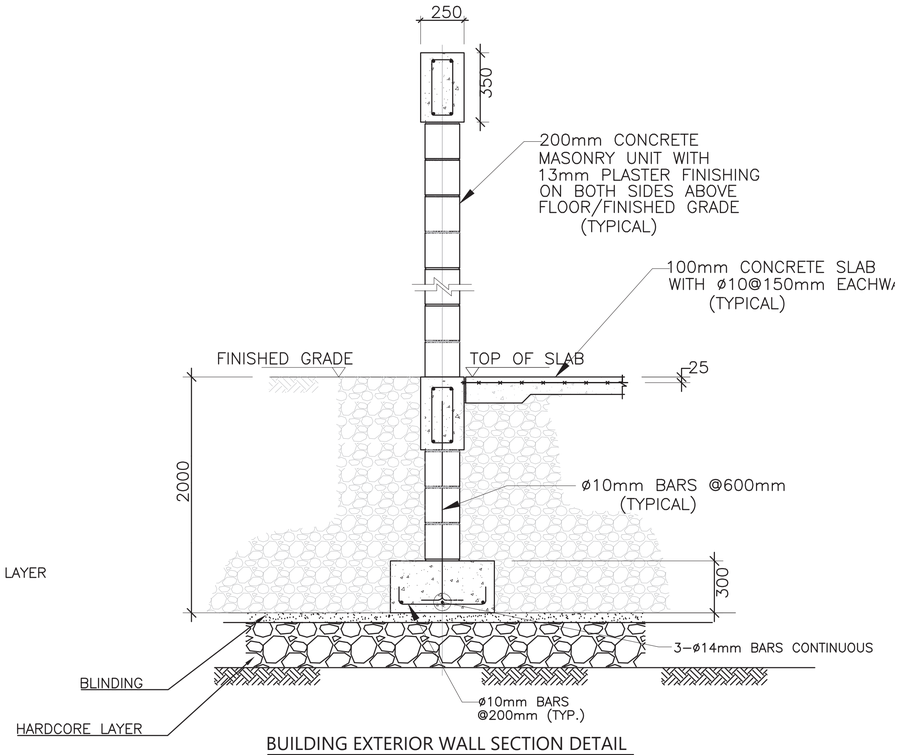


RB2

NOTES:
1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 16–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.



EXTERIOR COLUMN DETAIL
N.T.S.



BUILDING EXTERIOR WALL SECTION DETAIL
N.T.S.

NOTES:
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9. PROVIDE ø10@150 EACHWAY & EACH DIRECTION AT MDI–DEPT OF SLAB–ON–GRADE

ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

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sikastaba | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: GATEWAY V - ELEVATIONS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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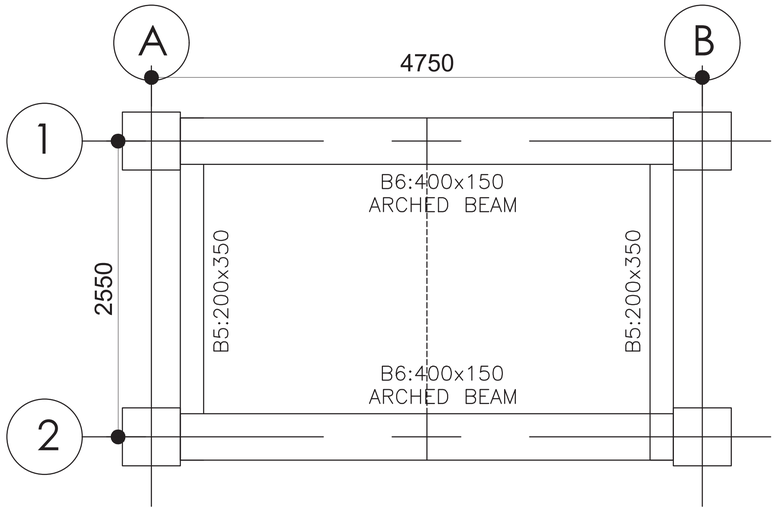

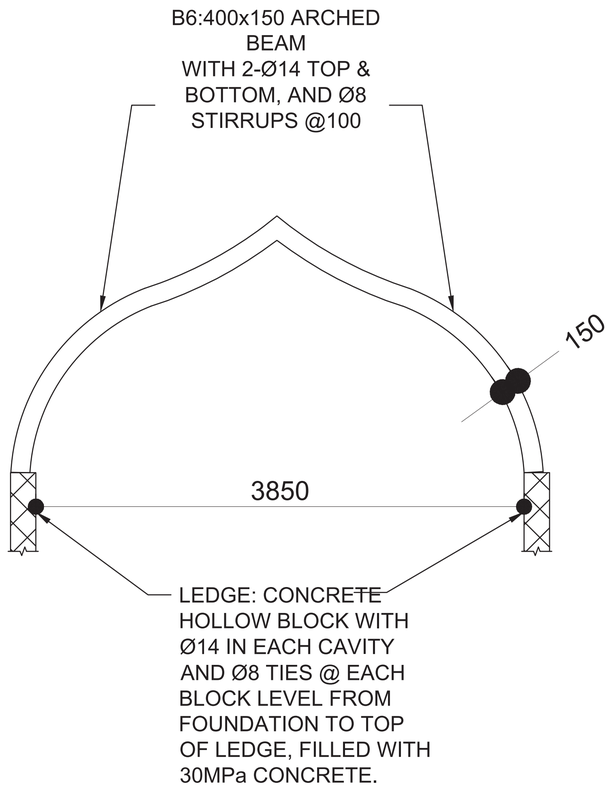

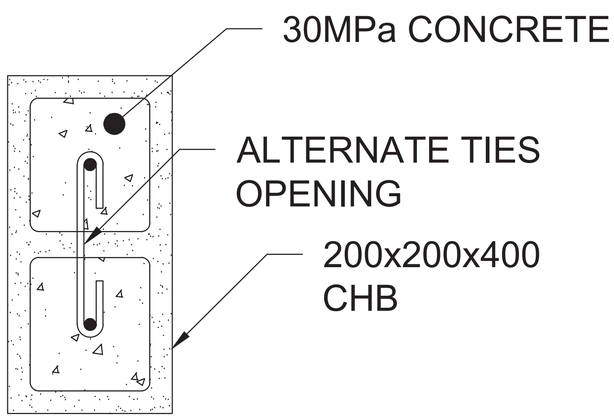

SECTION 1-1
LEDGE DETAIL

NOTES:
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6. REINFORCE COLUMNS WITH 16–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.

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PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

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Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: GATEWAY VI - ARCH DETAILS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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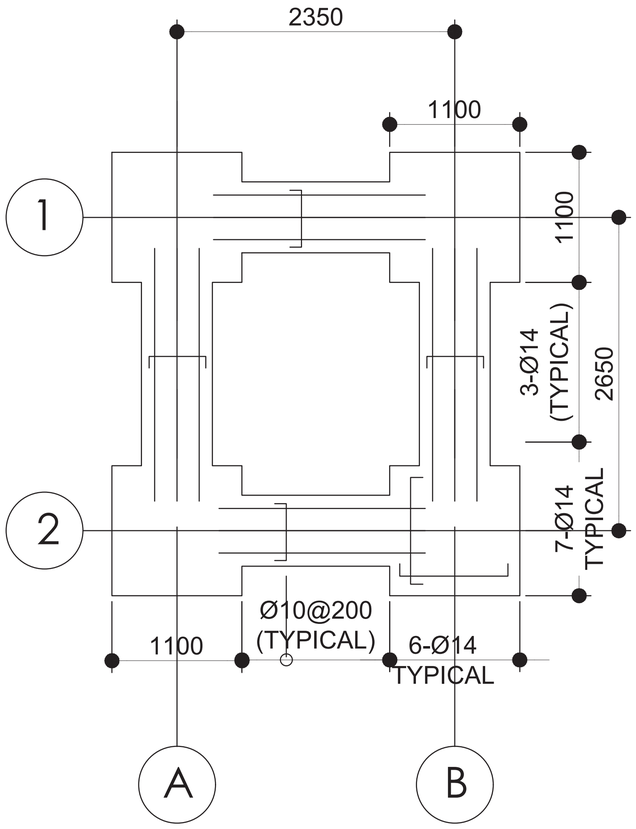
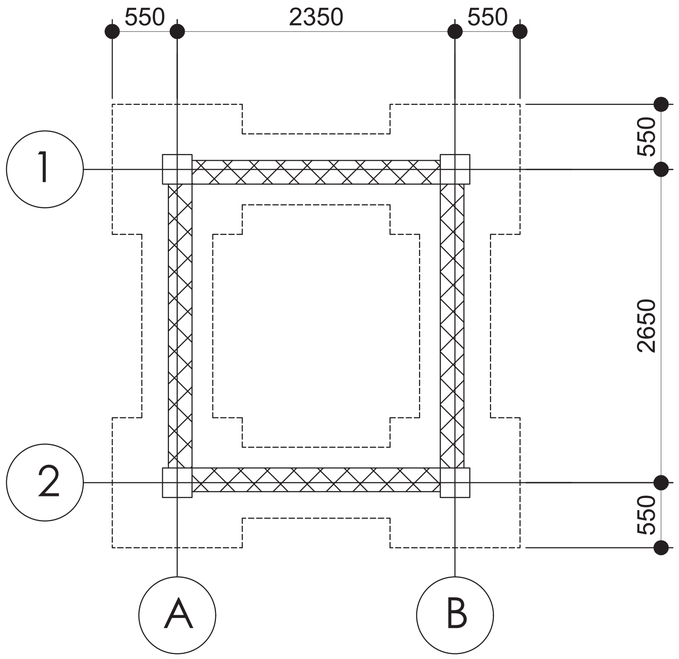
KIOSKS





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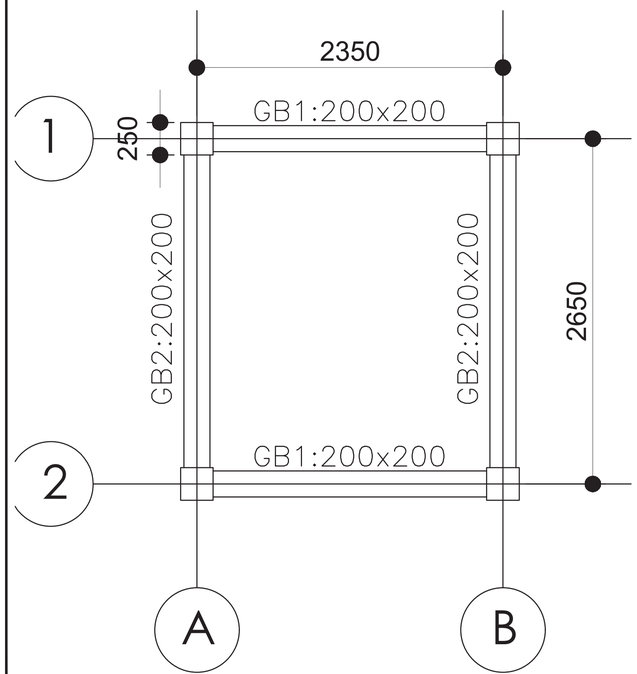

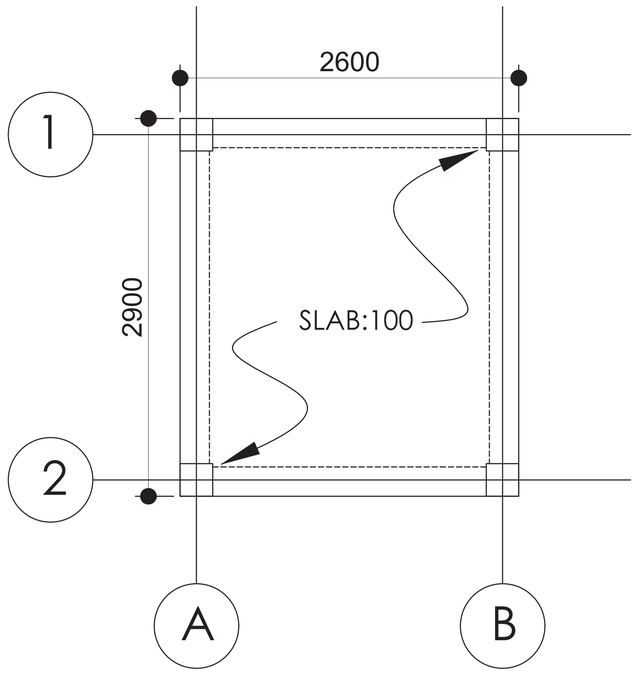

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PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

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sikaastaba | in every way

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Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: KIOSK I

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	03/08/2026	AM	AM
ACTIVITY NO:	DRAWING NO:		REVISION:
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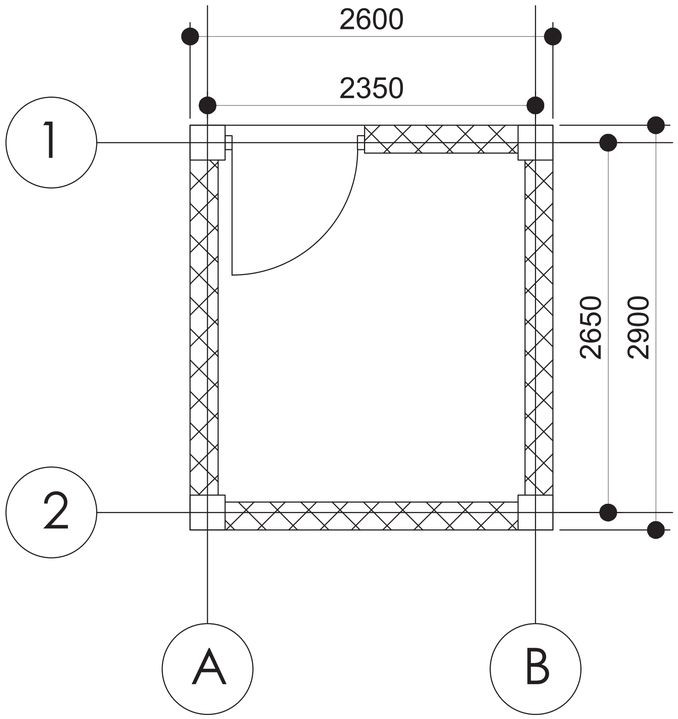

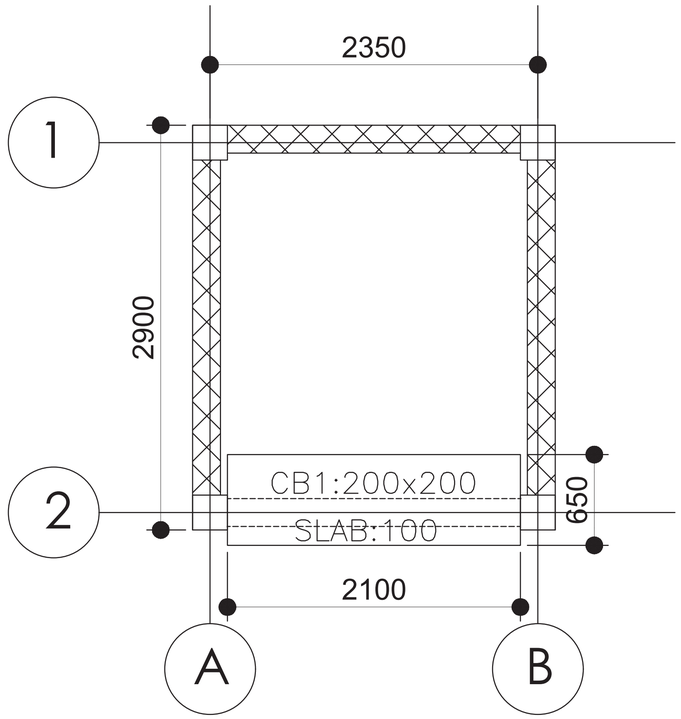

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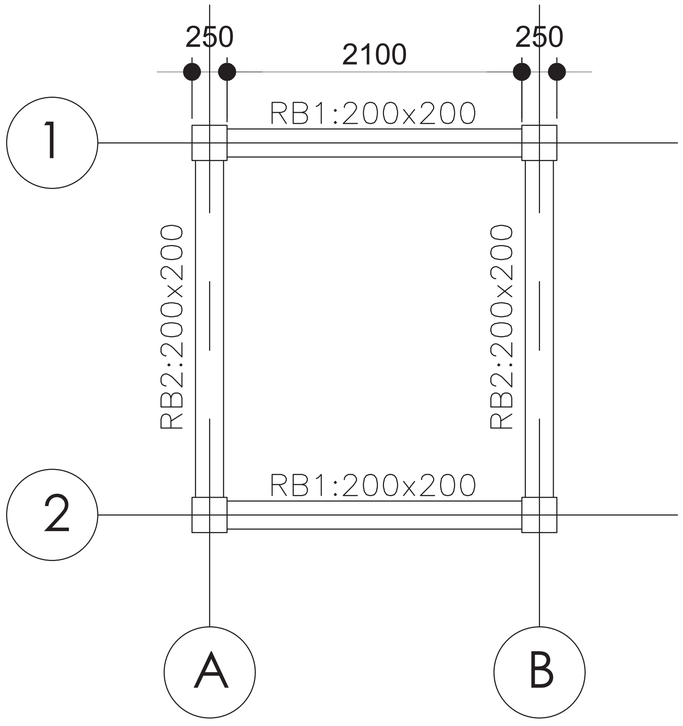

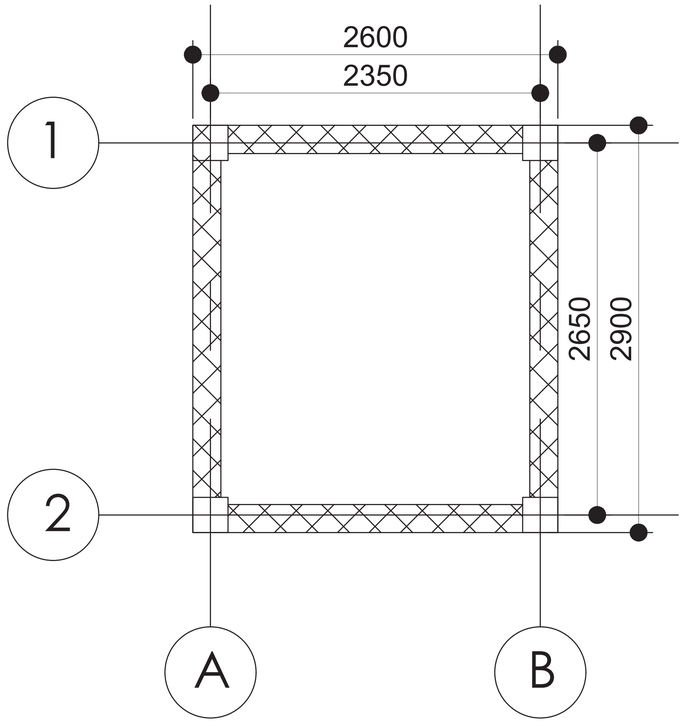

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PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

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Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: KIOSK II

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
1:40	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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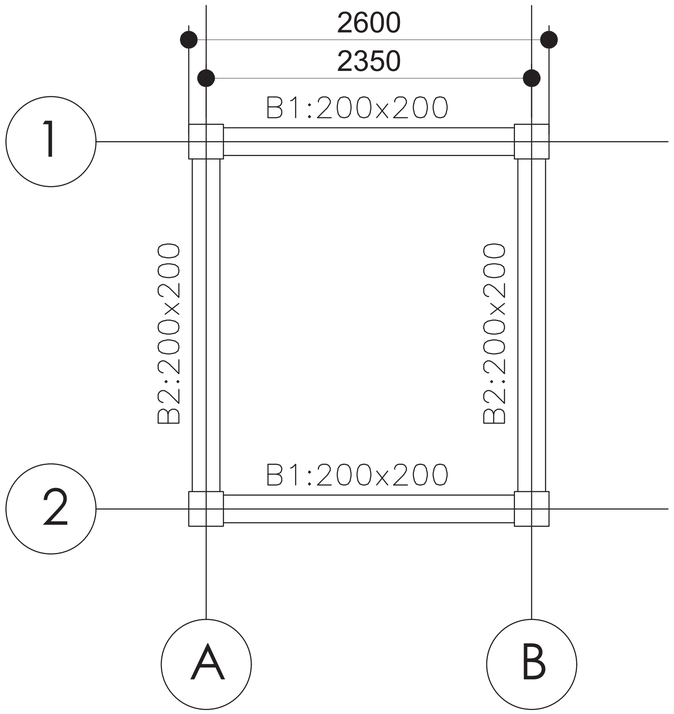

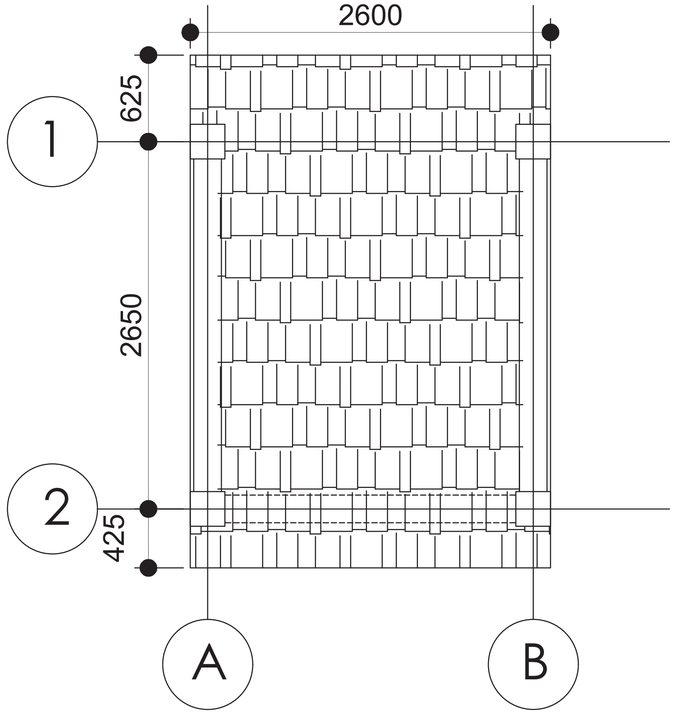

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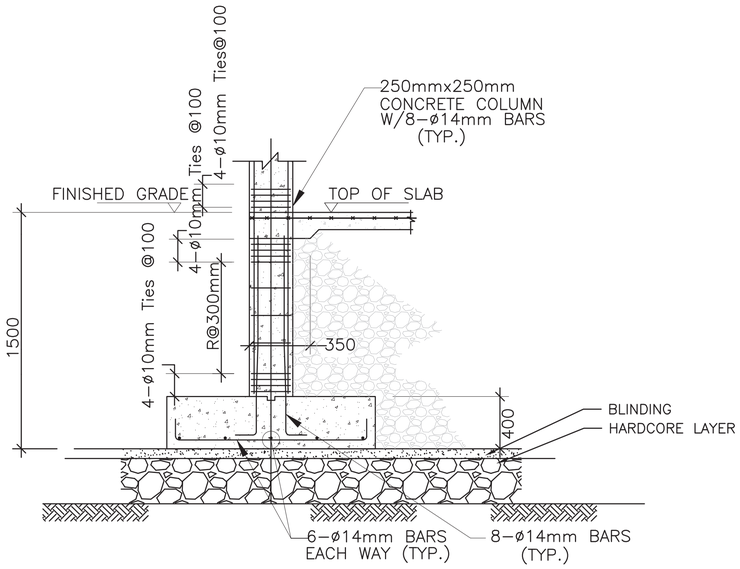
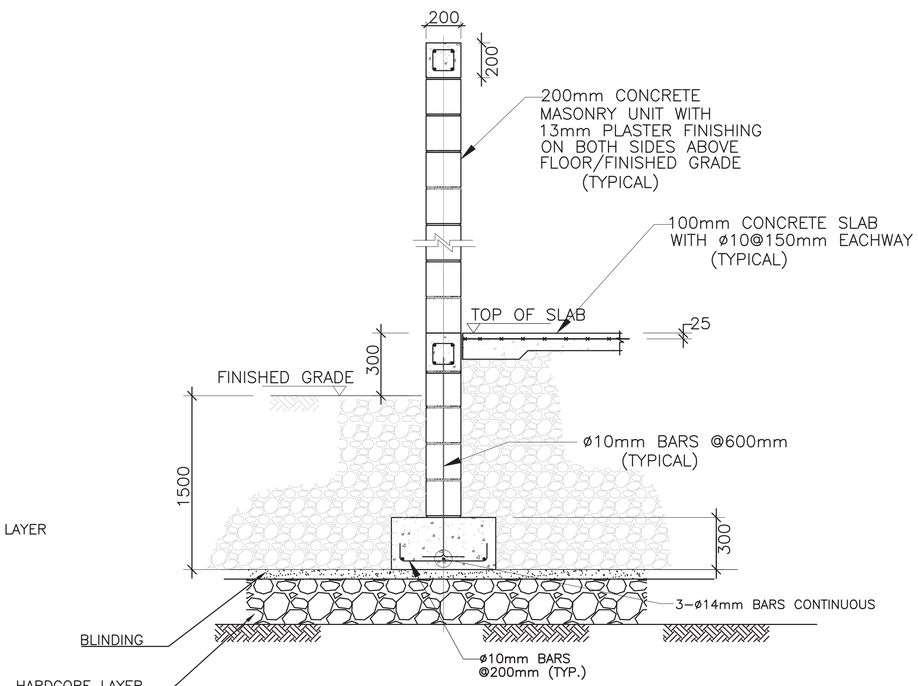


EXTERIOR COLUMN DETAIL
N.T.S.



BUILDING EXTERIOR WALL SECTION DETAIL
N.T.S.

NOTES:
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PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

SINAAN - DT GLOBAL

DT Global

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sikastaba | in every way

Airport Hotel
Aden Abdulle International Airport
Mogadishu, Somalia
www.dt-global.com

REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: KIOSK III

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
1:40	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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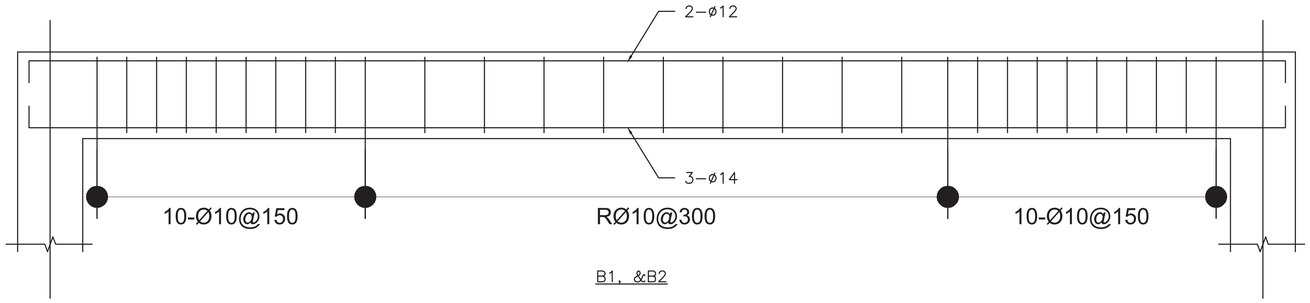
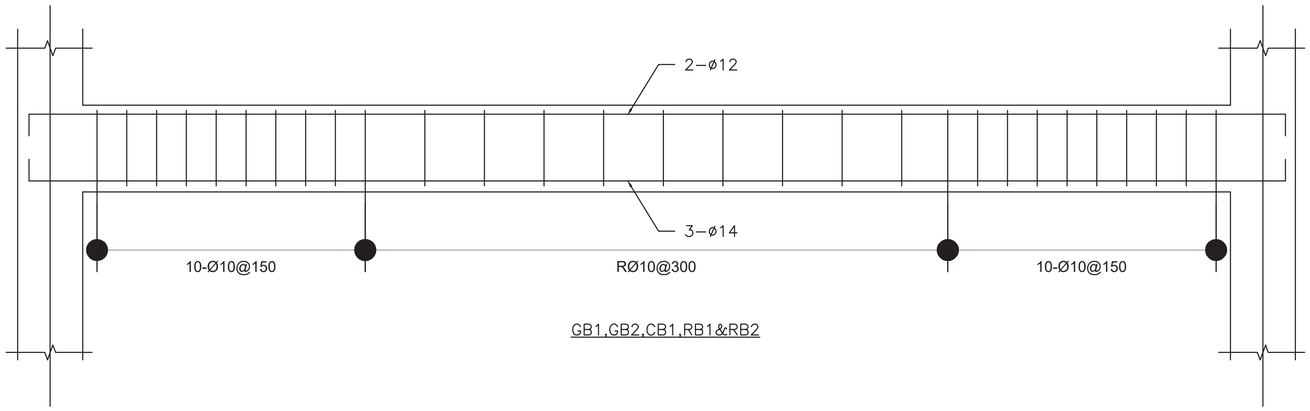


B1, &B2



GB1,GB2,CB1,RB1&RB2

NOTES:

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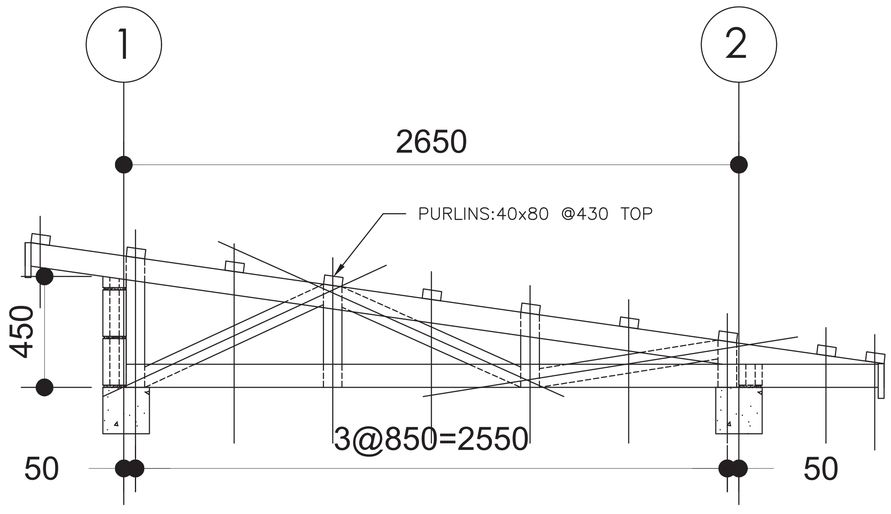
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.



ROOF TRUSS DETAIL

NOTES:

1. DO NOT ALIGN ANY JOINT CONNECTIONS OF THE TOP & BOTTOM CHORD BOARDS.
2. ALL JOINT CONNECTIONS SHALL BE MADE WITH 100x25x500 JOINT BOARD FOR ALL BOTTOM CHORDS AND 100x25x500 JOINT BOARD FOR ALL TOP CHORDS AND ALL JOINTS WITH #6 NAILS SPACED AT 80mm MAXIMUM IN EACH DIRECTION AND STAGGERED ON EVERY OTHER LINE OF NAILS.
3. ALL TOP CHORDS SHALL BE MADE OF 2x100x25 BOARDS AND BOTTOM CHORDS SHALL BE MADE OF 2x100x25 AT NECESSARY LENGTH TO AVOID ALIGNMENT OF JOINTS.
4. ALL VERTICAL & DIAGONAL STUDS SHALL BE 80x80 AND DETAILED AS SHOWN IN THE TRUSS AND JOINT DETAILS.
5. ALL NAILING IN THE TRUSS JOINTS SHALL BE SPACED MAXIMUM AT 80mm CENTER–TO–CENTER AND ALL CENTRALLY ALIGNED IN EACH HORIZONTAL ROW AND STAGGERED ON EACH VERTICAL COLUMN.
6. ALL PURLINS ON TOP & BOTTOM CHORDS SHALL BE 40X80 SPACED AT 430 TIMBER.

ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL FOR MUNICIPALITY OF BOSSASO PUNTLAND STATE SOMALIA:

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REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

DT-GLOBAL
MOGADISHU OFFICE

CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

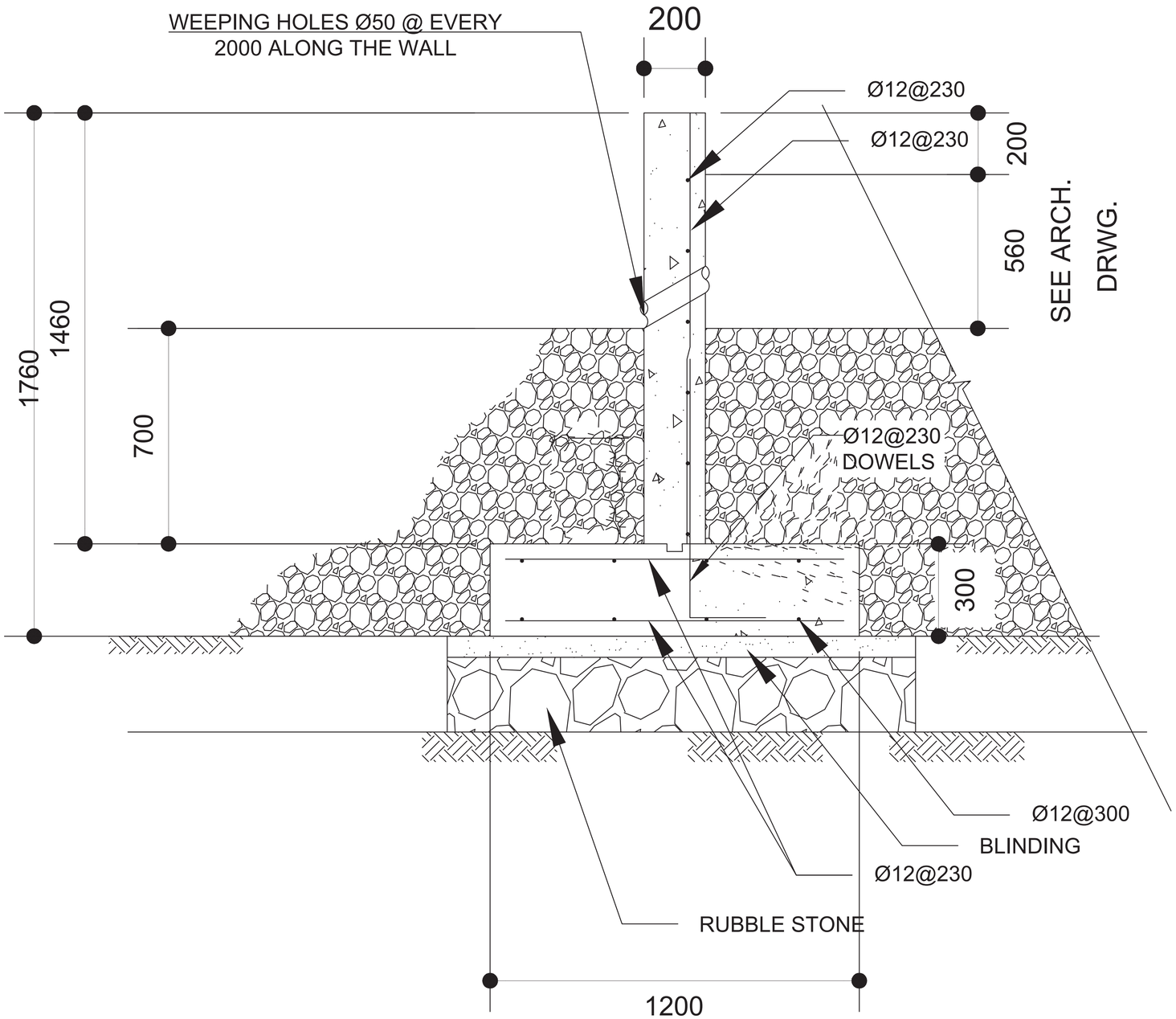
SITE: BOSSASSO

TITLE: KIOSK IV

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
1:40	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
----------	S-04	00

RETAINING WALL, BENCHES, LADDER, CONCRETE HAND WASH BASIN , KERB STONE AND STONE MASONARY WALL



NOTES:

1. CONTRACTOR SHALL COORDINATE WITH ARCHITECT–ON–RECORD FOR ALL DIMENSIONS.
2. CONTRACTOR SHALL SEEK PRIOR APPROVAL FROM STRUCTURAL ENGINEER–ON–RECORD FOR ANY STRUCTURAL CHANGES.
3. ALL CONCRETE BELOW GRADE & UP TO 1 METER ABOVE GRADE SHALL BE SULPHATE RESISTING PORTLAND CEMENT.
4. FOUNDATIONS CONCRETE SHALL BE f'_c=21MPa.
5. COLUMNS CONCRETE SHALL BE f'_c=30MPa.
6. REINFORCE COLUMNS WITH 8–ø16 WITH ø10 TIES SPACED AT 300. SEE COLUMN TIES DETAIL IN THE TYPICAL DETAILS.
7. PROVIDE ø10@600 AT EVERY OTHER CAVITY OF ALL CONCRETE HOLLOW BLOCKS BELOW GRADE.
8. WALL DIMENSIONS, SEE ARCHITECTURAL DRAWINGS.

ALL DIMENSIONS ARE IN MILLIMETERS (mm)

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

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STATUS: CONSTRUCTION ISSUE

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CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: WALKWAYS RETAINING

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
1:15	03/08/2026	AM	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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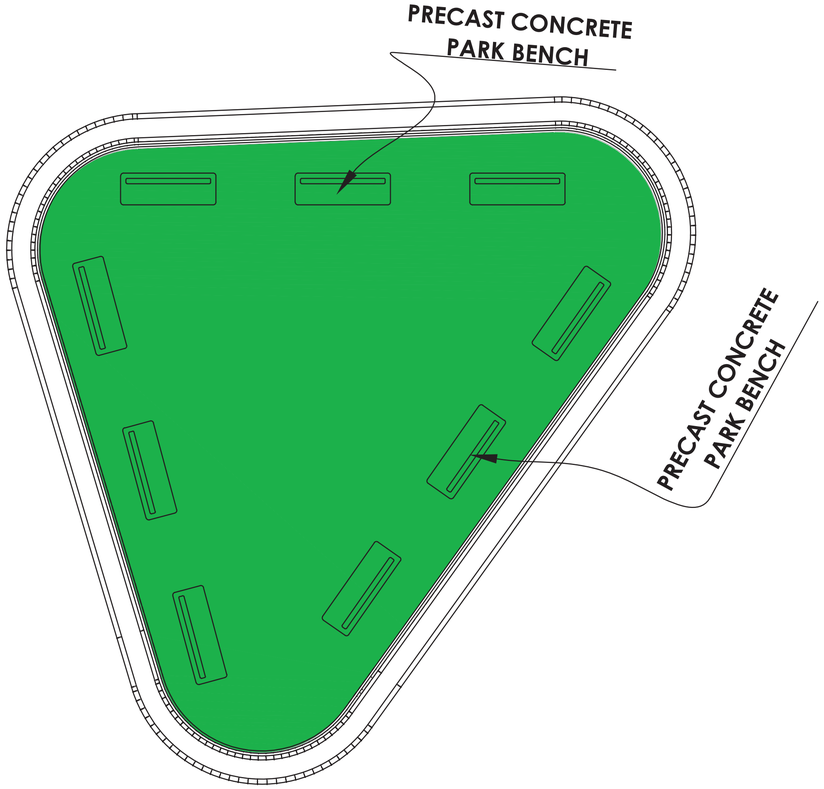

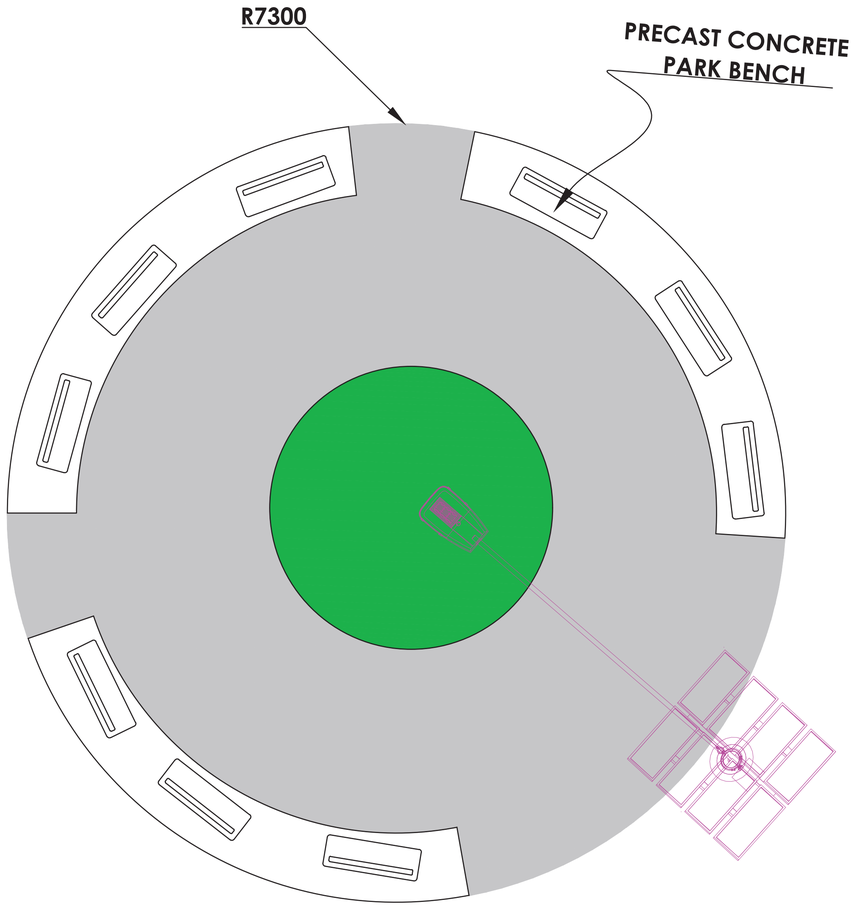

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
FOR
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PUNTLAND STATE
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STATUS: CONSTRUCTION ISSUE

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CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: PARK BENCH PLAN

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	05/08/2026	AA	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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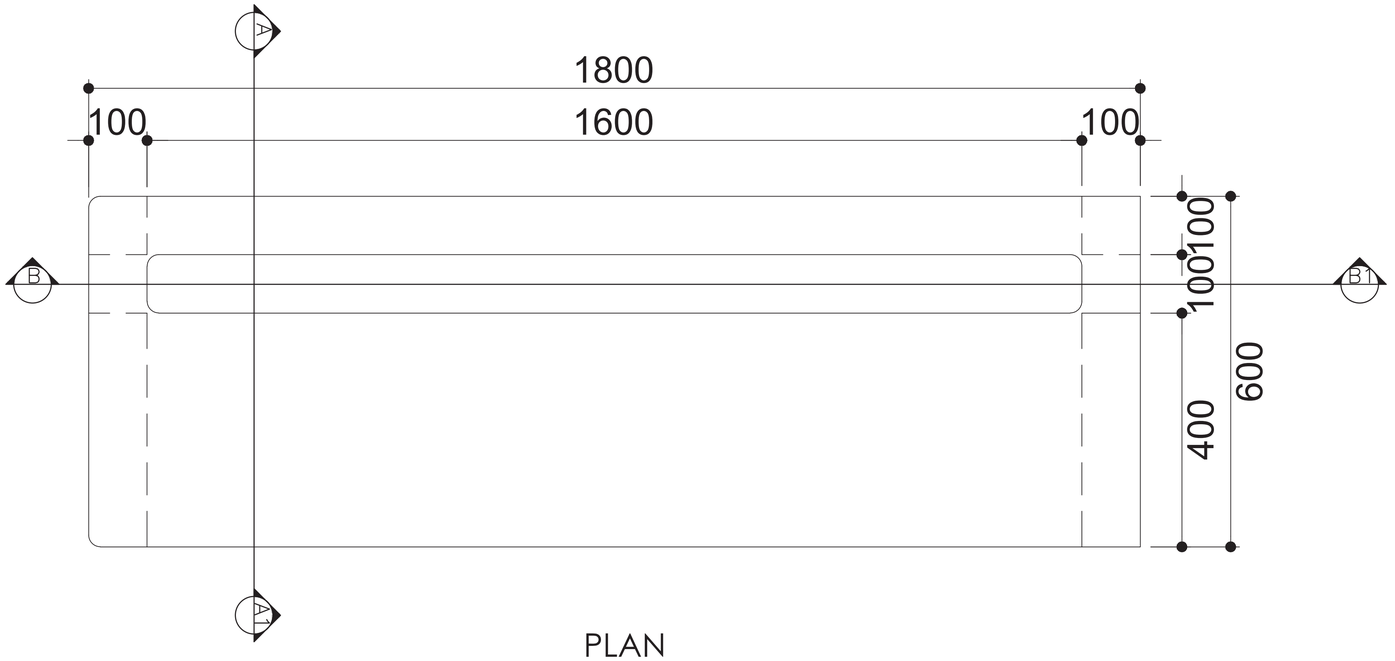
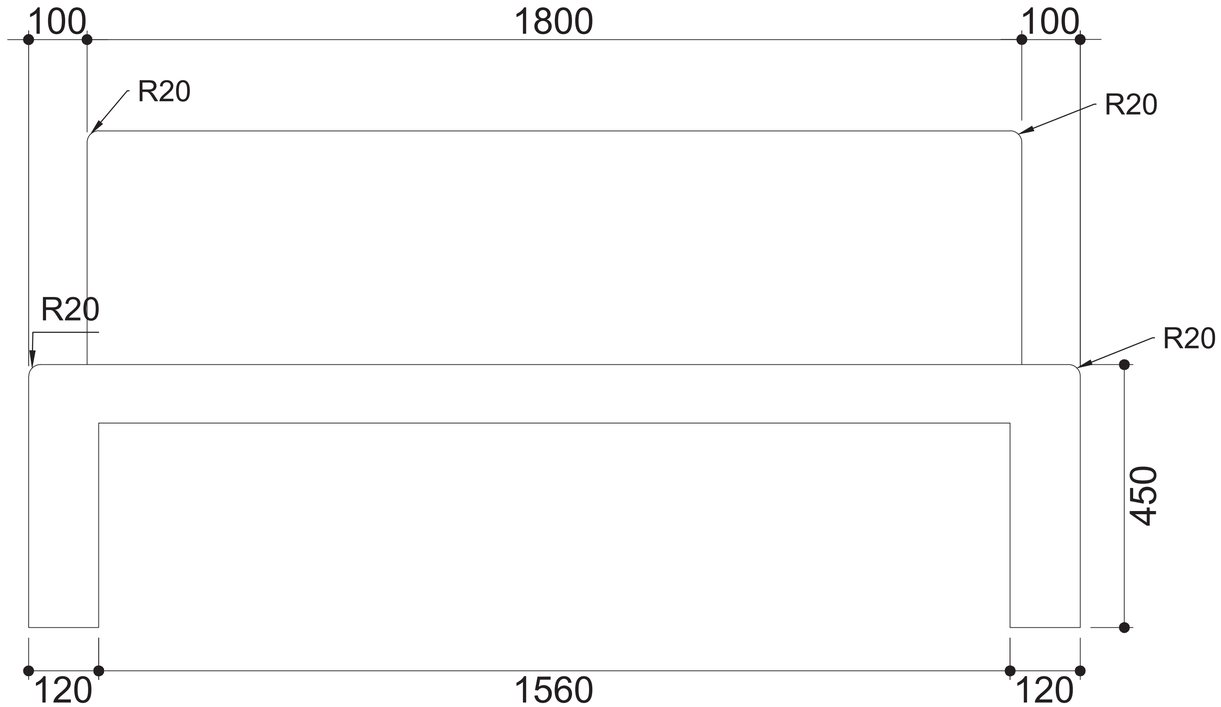
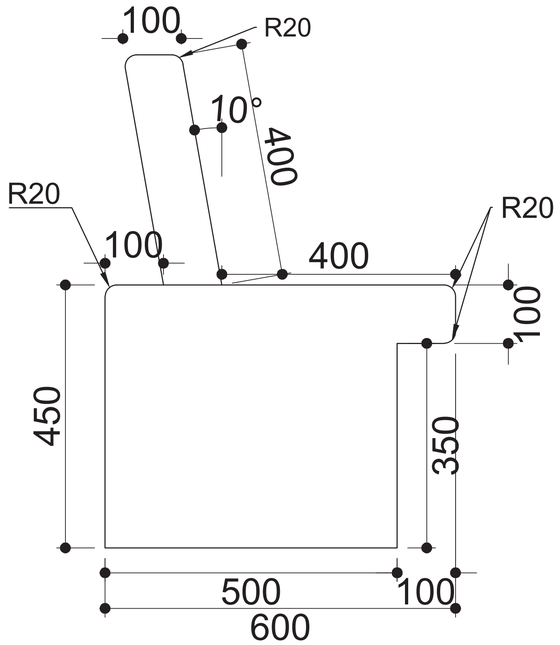


PLAN



FRONT VIEW



SIDE VIEW

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
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PUNTLAND STATE
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PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: PARK BENCH PLAN 2

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	05/08/2026	AA	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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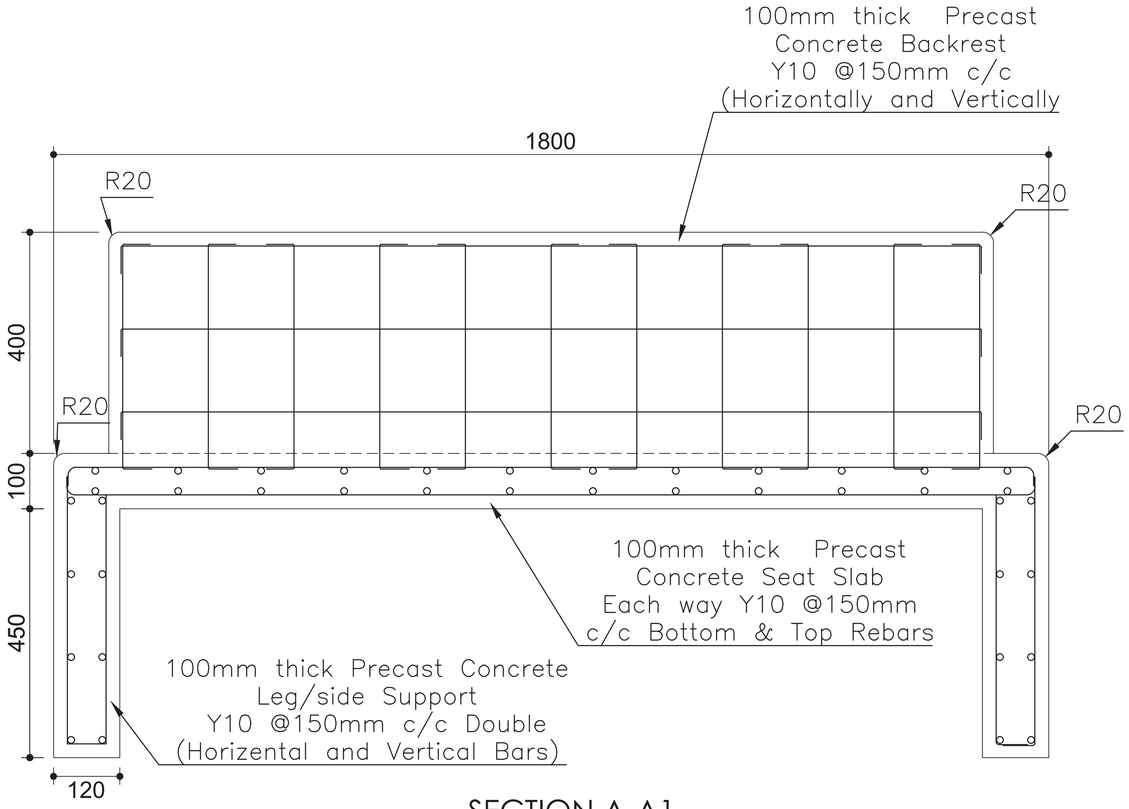
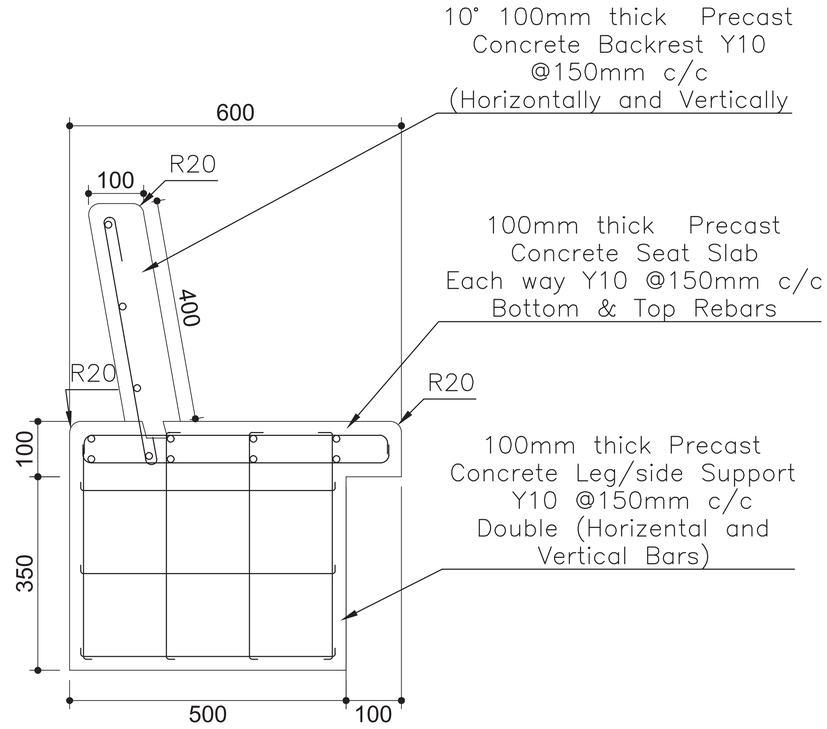


SECTION A-A1



SECTION B-B1

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

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MUNICIPALITY OF BOSSASO
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BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: PARK BENCH STRUCTURAL DETAILS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	05/08/2026	AA	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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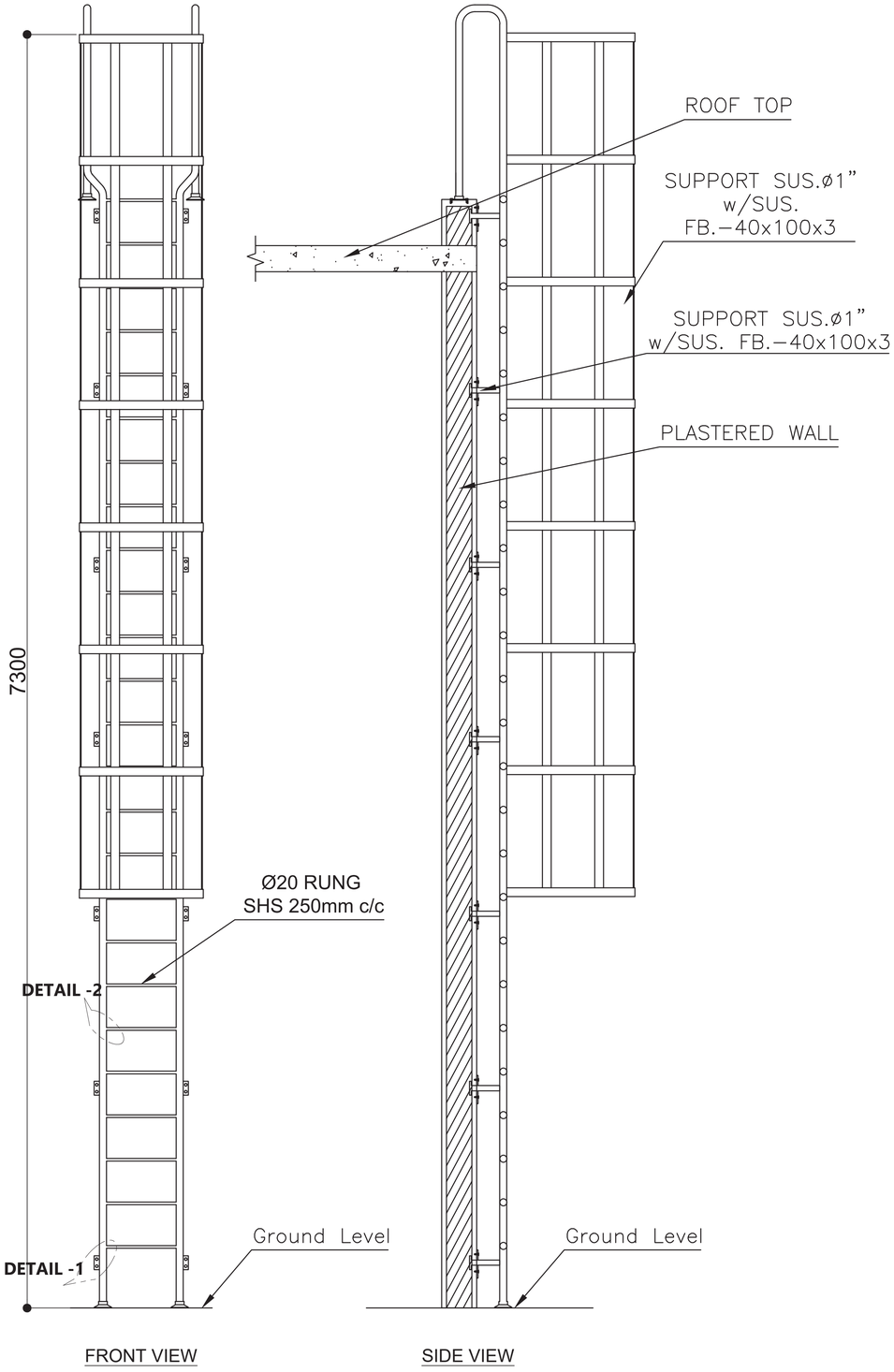
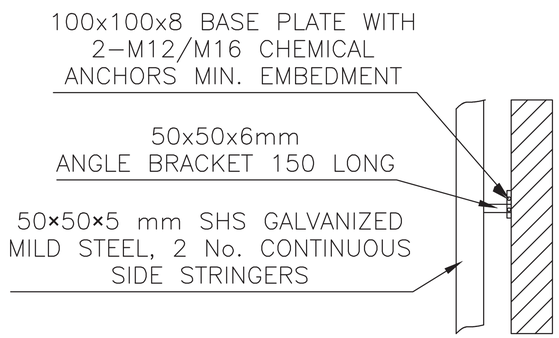
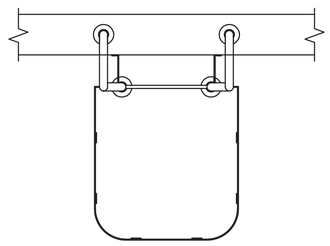


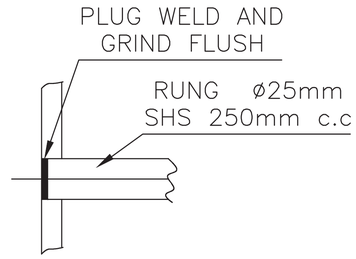
FRONT VIEW SIDE VIEW



DETAIL-1



TOP VIEW



DETAIL-2

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL
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CLIENT: BOSSASO CORNICHE
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BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: LADDER DETAILS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	05/08/2026	AA	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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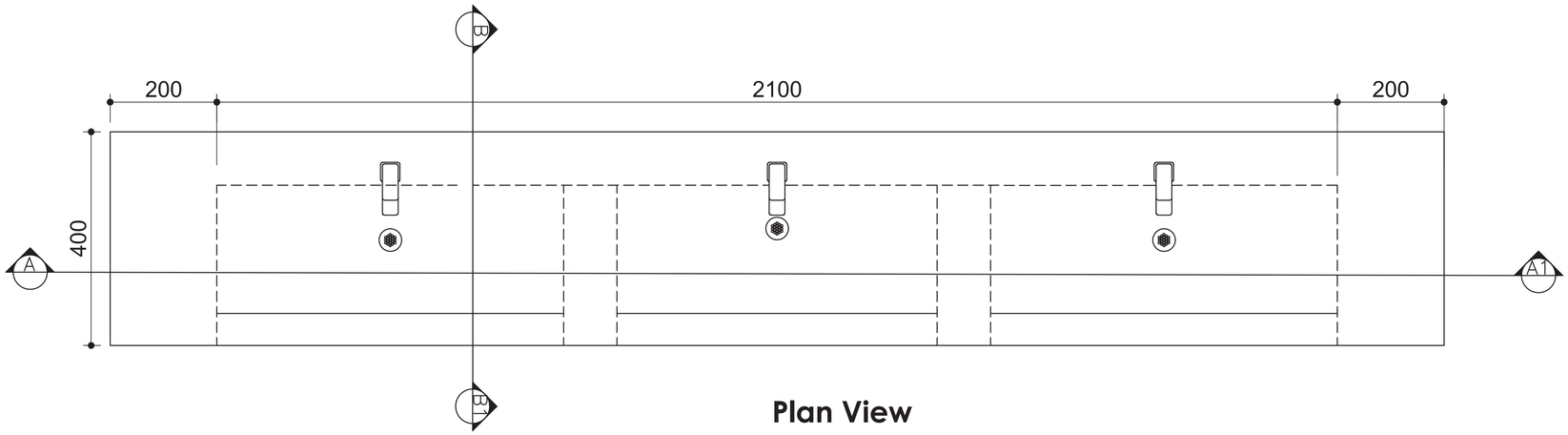
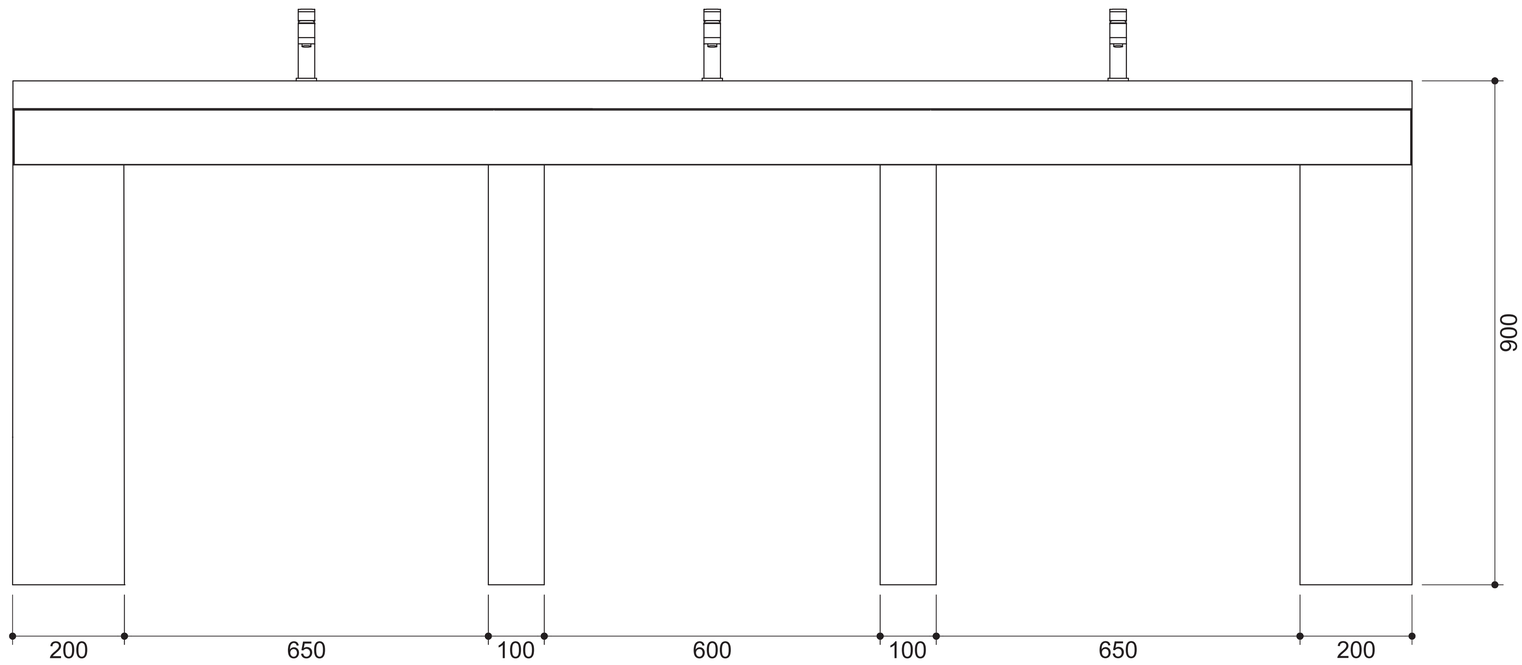
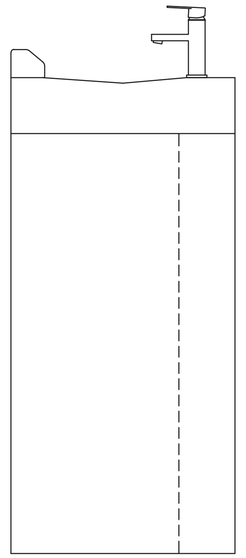


Plan View



Front View



Side View

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL FOR MUNICIPALITY OF BOSSASO PUNTLAND STATE SOMALIA:

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REV:	DESCRIPTION:	BY:	DATE:

STATUS: CONSTRUCTION ISSUE

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CLIENT: BOSSASO CORNICHE
MUNICIPALITY OF BOSSASO
BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: CONCRETE WASH-UP TROUGH PLAN

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	05/08/2026	AA	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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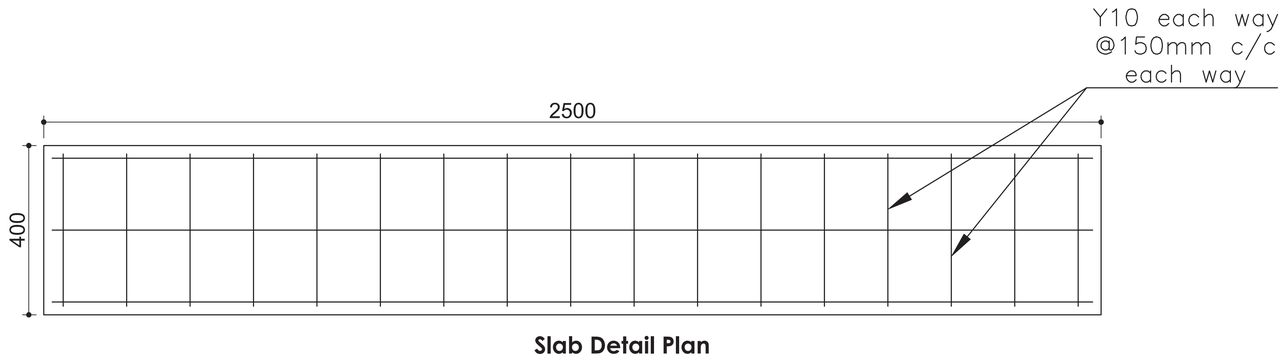
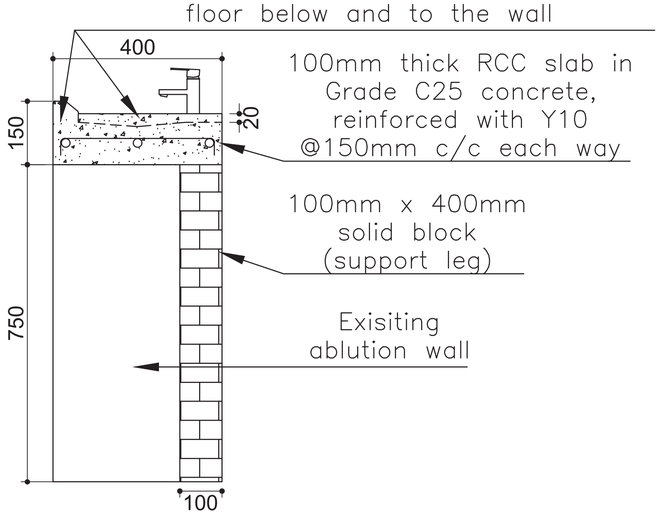
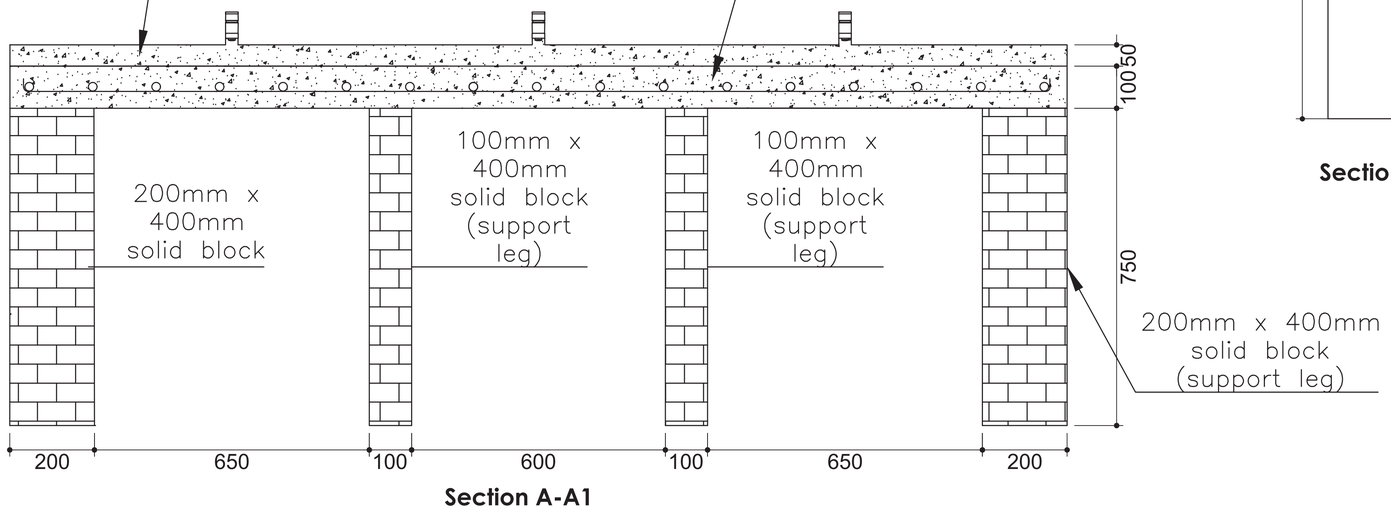


Slab Detail Plan



Section B-B1



Section A-A1

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL FOR MUNICIPALITY OF BOSSASO PUNTLAND STATE SOMALIA:

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BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASSO

TITLE: CONCRETE WASH-UP TROUGH DETAILS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	05/08/2026	AA	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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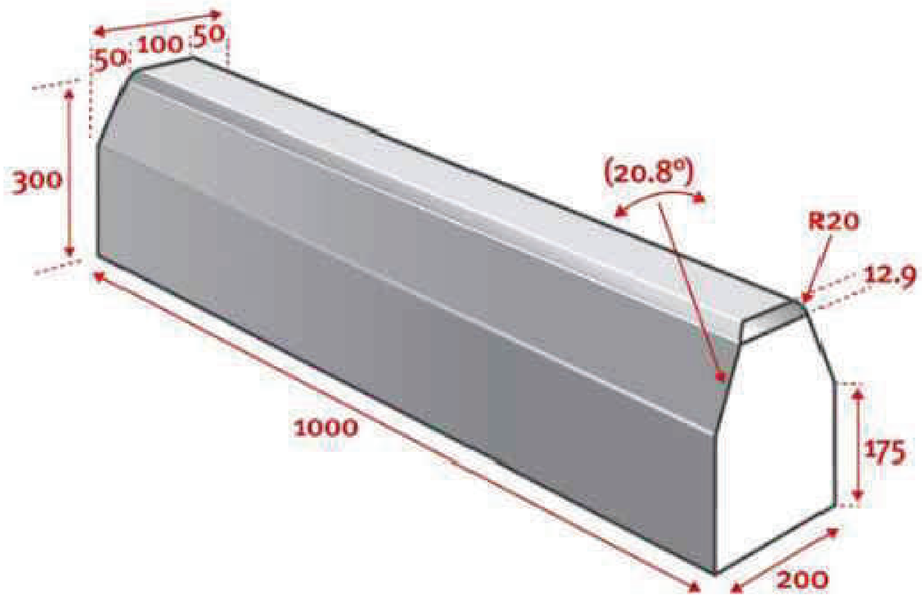
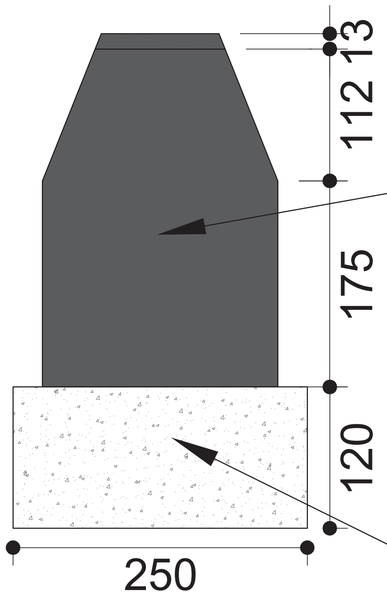


Isometric View



300mm high × 200mm wide delineator kerb, 1,000mm long, with 100mm top width, 175mm vertical face, 50mm chamfers, R20 rounded top edge and 20.8° sloping face, laid on 80mm thick C12/15 lean concrete bedding.

80mm thick C12/15 lean concrete bedding (1:3:6 cement:sand:20mm aggregate) below the delineator kerb

Delineator Kerb Details

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

PREPARED BY DT GLOBAL FOR
MUNICIPALITY OF BOSSASO
PUNTLAND STATE
SOMALIA:

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BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: DELINEATOR KERB DETAILS

SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	05/08/2026	AA	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
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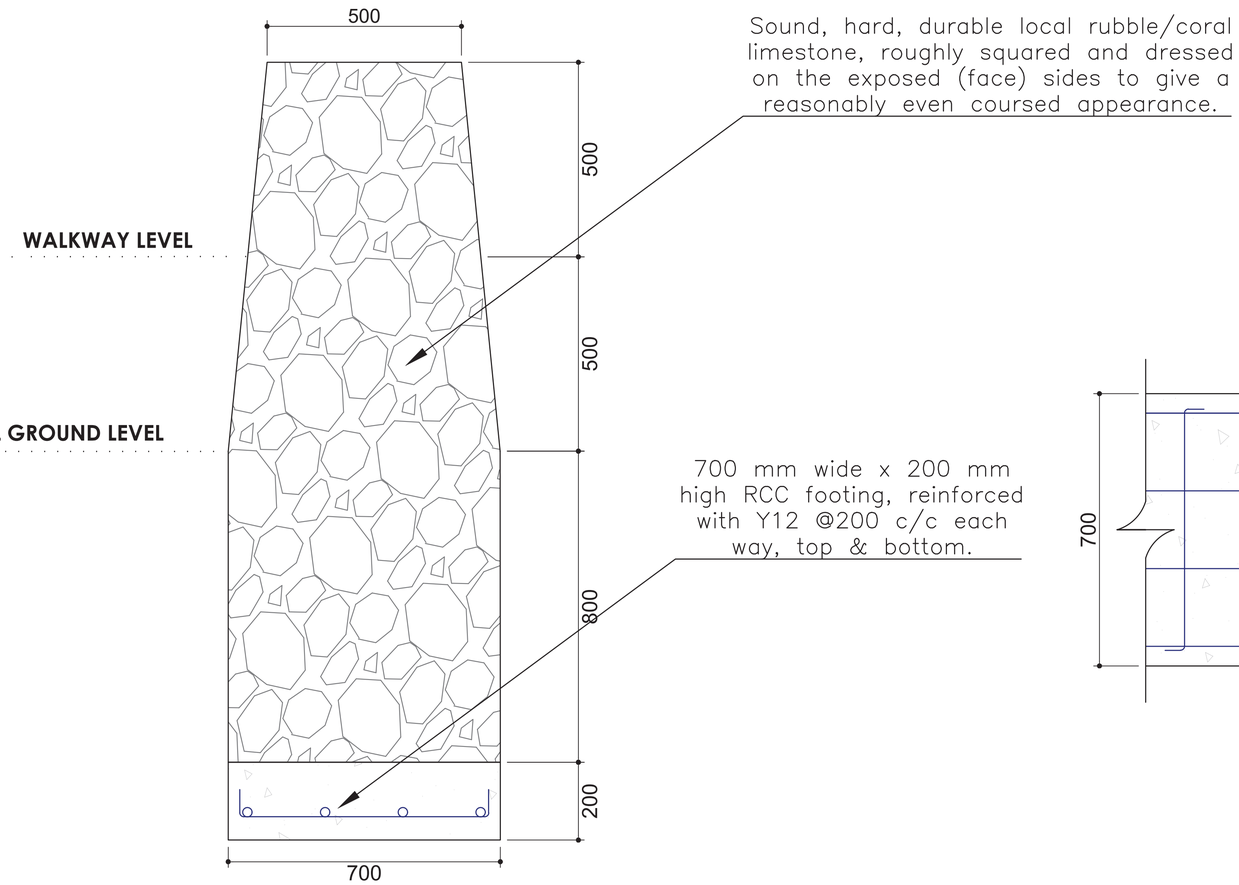
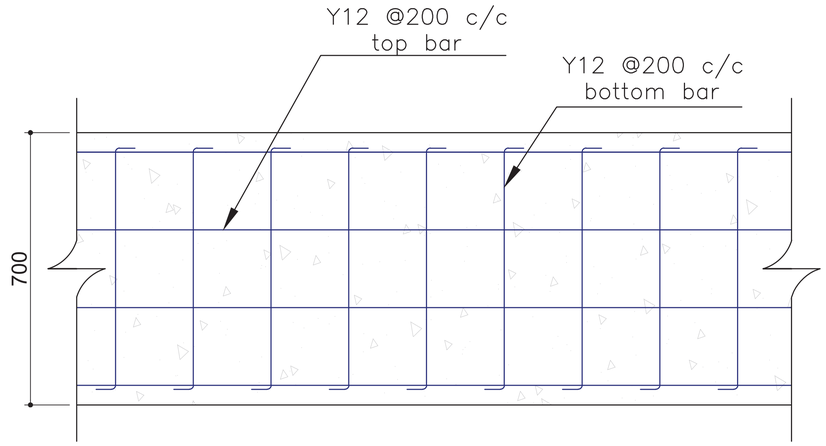


Walkway stone wall detail - 1



Walkway stone wall detail - 2

PROGRAMME:

SINAAN PROGRAMME

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATERFRONT PROJECT

CLIENT:

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STATUS: CONSTRUCTION ISSUE

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CLIENT: BOSSASO CORNICHE
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BOSSASO
PUNTLAND STATE, SOMALIA

ARCHITECT: DT-GLOBAL
Airport Hotel
Mogadishu
Somalia

SITE: BOSSASO

TITLE: WALKWAY STONE WALL DETAILS

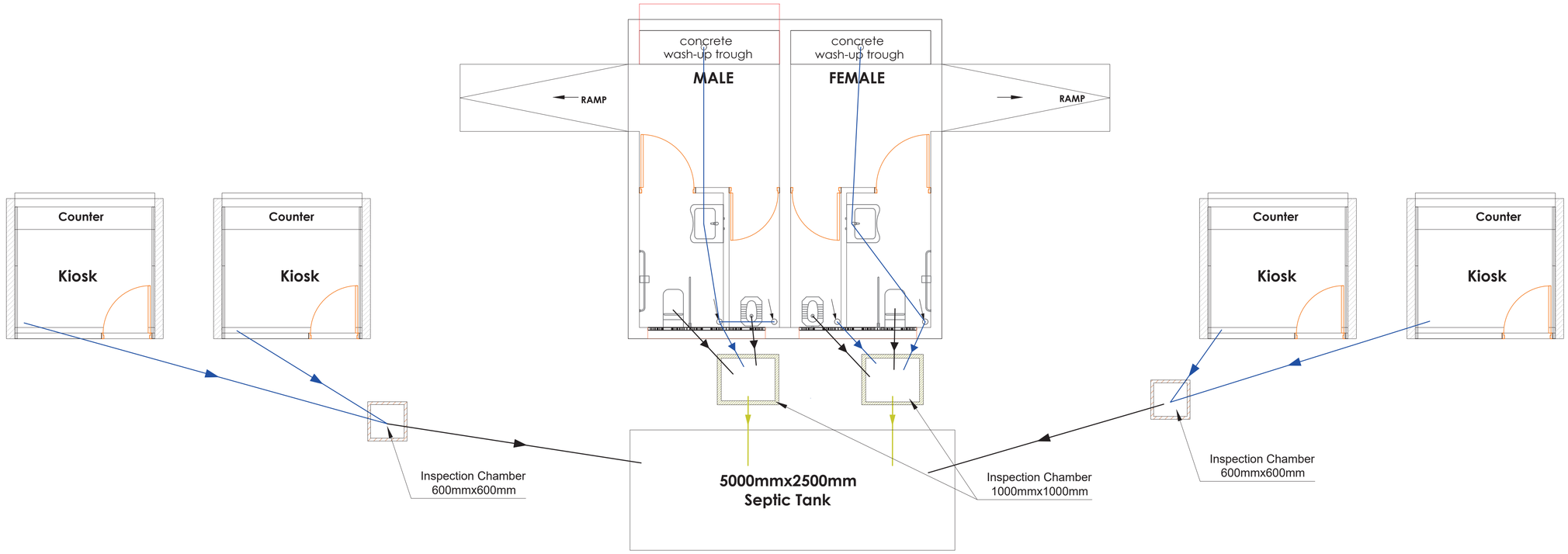
SCALE AT A2:	DATE:	DRAWN:	CHECKED:
N/A	05/08/2026	AA	AM

ACTIVITY NO:	DRAWING NO:	REVISION:
----------	S-02	00

MECHANICAL AND PLUMBING DRAWINGS

ISO A3 (420.0 x 297.0mm)

Last Saved by: (Aug. 20, 26)
Last Plotted by: (Oct. 19, 23)



Legend

4" PVC Pipe

6" PVC Pipe

8" PVC Pipe

PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

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SURVEYED BY:	
DESIGNED BY:	
CAD BY:	A.A.
CHECKED BY:	A.M.
REVIEWED BY:	A.M.
DATE:	August 05, 2026

ISSUE

#		REVISION_TEXT
NO.	**DATE**	**REVISIONS**

PROJECT NUMBER:

PSSxxx

SHEET TITLE:

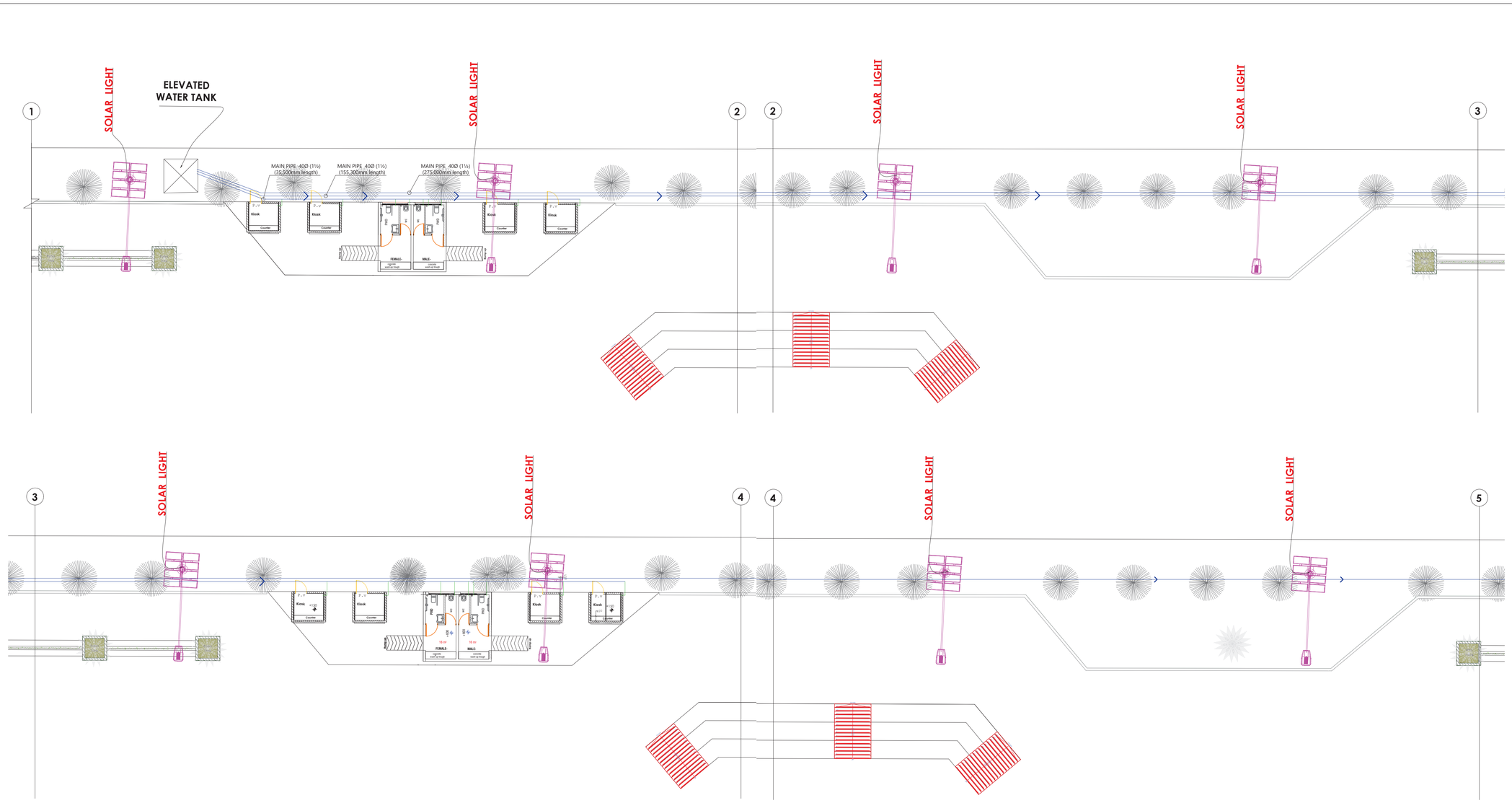
LATRINES SEWAGE LAYOUTS

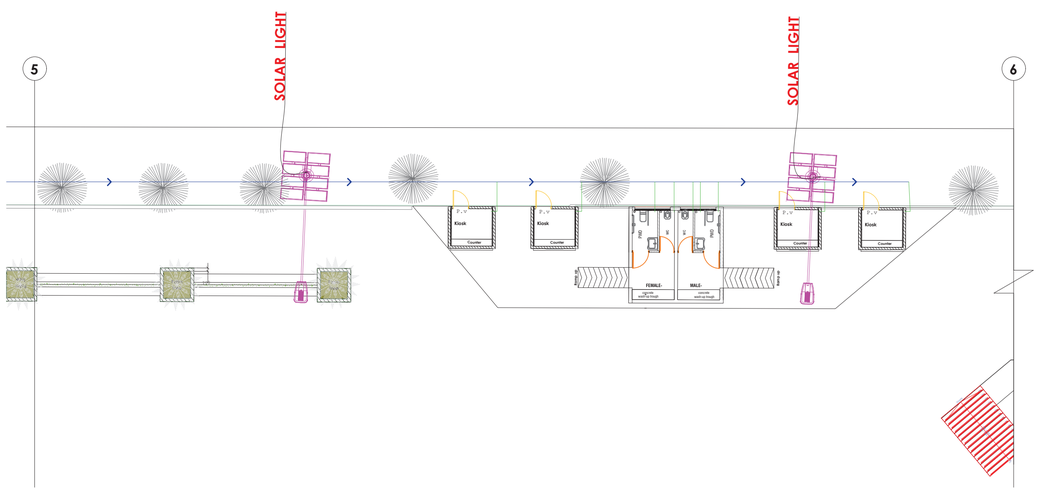
SHEET NUMBER

P 100

ISO A3 (420.0 x 297.0mm)

Last Saved by: (Aug. 20, 26)
Last Plotted by: (Oct. 19, 23)





1. General / Scope

1.1 These notes apply to all water supply, distribution, and sanitary plumbing works shown on drawings P200 and P300, and are to be read in conjunction with all other architectural, structural, and MEP drawings.

1.2 The Contractor shall verify all pipe routes, lengths, and levels on site prior to procurement and installation. Any discrepancy between drawings or with site conditions shall be reported to the Engineer/Consultant before proceeding.

1.3 All work shall be carried out by qualified and experienced plumbers under the supervision of a competent site engineer.

1.4 Nothing in these notes relieves the Contractor of responsibility for compliance with the Employer's/Client's technical specifications and the applicable donor or national standard (e.g., UNICEF WASH minimum standards, Sphere standards, or local Puntland/Somali water authority requirements), where these govern.

2. Codes & Standards

2.1 All plumbing and water supply installation works shall comply with applicable international plumbing standards (e.g., relevant ISO standards for pipes and fittings) and any donor/client-specified WASH technical guidelines.

2.2 Where a conflict exists between these notes and the project specification/BOQ, the project specification/BOQ shall govern; the Contractor shall notify the Consultant of any such conflict in writing.

3. Pipe Materials & Specification

3.1 Main supply pipe: 40mm Ø (1½") as indicated on P200/P300.

3.2 Branch/service pipe to each kiosk counter: 25mm Ø (1") as indicated on P200.

3.3 Pipe material and pressure class (PN rating) shall be confirmed with the Consultant/Engineer before procurement, and shall conform to the project specification/BOQ (e.g., uPVC, HDPE, or GI as specified).

3.4 All pipes, fittings, and valves shall be new, unused, and free of defects, and shall bear manufacturer markings for size, class, and standard of manufacture.

3.5 Only fittings and jointing methods compatible with the specified pipe material shall be used (e.g., solvent-weld/threaded for uPVC, fusion/compression for HDPE).

4. Excavation & Trenching

4.1 Trench width and depth shall be sufficient to allow proper pipe laying, jointing, and compaction, and shall provide adequate cover to protect the pipe from surface loads and mechanical damage.

4.2 Minimum depth of cover shall be 500mm (standard minimum for potable water pipework under pedestrian/light-load areas), increased where the pipe crosses vehicular or heavier-load crossing points as shown on P300, subject to the Engineer's confirmation on site.

4.3 Trench bottoms shall be free of rock, debris, and sharp objects, and shall be prepared with a bedding layer (sand or fine granular material, min. 100mm) before pipe laying.

4.4 Trenches shall not be left open longer than necessary and shall be adequately barricaded/signed for public safety, particularly where they cross pedestrian walkways (as shown by the red hatched crossing details on P300).

5. Pipe Laying & Jointing

5.1 Pipes shall be laid true to line and level as shown on P300, with continuous, uniform bedding support along their full length — no point loading on joints or fittings.

5.2 All joints shall be made strictly in accordance with the pipe manufacturer's recommendations.

5.3 Pipes shall be capped/plugged at the end of each working day to prevent ingress of debris, soil, or vermin.

5.4 Changes in direction, and connections to isolation valves, shall be made using proper fittings — no field-bending of rigid pipe is permitted.

6. Valves & Fittings

6.1 A Main Isolation Valve shall be installed at the point marked "From Water Supply" before the main pipe enters the site, as shown on P200/P300.

6.2 Isolation Valves shall be installed on each branch line to the kiosk counters and to the Male/Female wash-up troughs, as shown, to allow independent shut-off of each fixture group without interrupting supply to the rest of the network.

6.3 All valves shall be installed in accessible locations (with valve boxes/chambers where buried) to allow future operation and maintenance.

6.4 A Future Extension point is indicated on P200 — this shall be capped with a valve and blank end, suitably marked, to allow future tie-in without disruption to the operating system.

7. Thrust Blocks & Anchorage

7.1 Thrust blocks shall be provided at all bends, tees, valves, and dead ends as indicated on P200/P300, to resist hydrostatic thrust and prevent joint separation.

7.2 Thrust blocks shall be cast against undisturbed ground and sized in accordance with pipe diameter and anticipated test/working pressure; concrete shall be allowed to cure fully before the line is pressurized.

8. Testing & Commissioning

8.1 Upon completion of installation and before backfilling of joints, the full pipe network shall undergo a hydrostatic pressure test in accordance with the pipe manufacturer's/relevant standard's requirements, witnessed by the Consultant/Engineer.

8.2 Any leakage, joint failure, or pressure drop identified during testing shall be rectified and the section re-tested before acceptance.

8.3 All fittings, valves, and thrust blocks shall remain exposed and accessible for inspection until testing is successfully completed and approved.

9. Disinfection & Flushing

9.1 Prior to commissioning for potable use, the entire pipe network shall be flushed and disinfected in accordance with standard water supply commissioning practice (e.g., chlorination and flushing until acceptable residual chlorine/bacteriological results are achieved).

9.2 Water quality test results shall be submitted to the Consultant/Client for approval before the system is handed over for use.

10. Backfilling & Reinstatement

10.1 Backfilling shall only proceed after successful pressure testing and Engineer's approval of pipe laying.

10.2 Initial backfill (min. 100-150mm above pipe crown) shall be granular material free of stones/debris, hand-compacted to avoid pipe damage; subsequent backfill may be compacted in layers using mechanical means.

10.3 All disturbed surfaces (walkway paving, kerbs, planted areas) shall be reinstated to match existing/adjacent finishes.

11. Coordination & Protection

11.1 The Contractor shall coordinate pipe routing with all other underground services (electrical conduits for solar lighting, drainage) shown on the drawings to avoid clashes, maintaining minimum separation distances per good practice.

11.2 Pipework crossing vehicular/pedestrian crossing points (as shown by red hatched details on P300) shall be adequately protected (e.g., sleeved or cased) against surface loading and future excavation risk.

11.3 All exposed pipework at kiosk counters, wash-up troughs, and toilet blocks shall be protected from accidental damage during ongoing construction of adjacent works.

12. Safety

12.1 All excavation, pipe-laying, and testing activities shall be carried out in accordance with the project's Health & Safety Plan and applicable local safety regulations.

12.2 Pressure testing shall only be carried out under controlled conditions with all personnel clear of thrust zones.

PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

www.dt-global.com

SURVEYED BY:	
DESIGNED BY:	
CAD BY:	A.A.
CHECKED BY:	A.M.
REVIEWED BY:	A.M.
DATE:	August 05, 2026

ISSUE

#		REVISION_TEXT
NO.	**DATE**	**REVISIONS**

PROJECT NUMBER:

PSSxxx

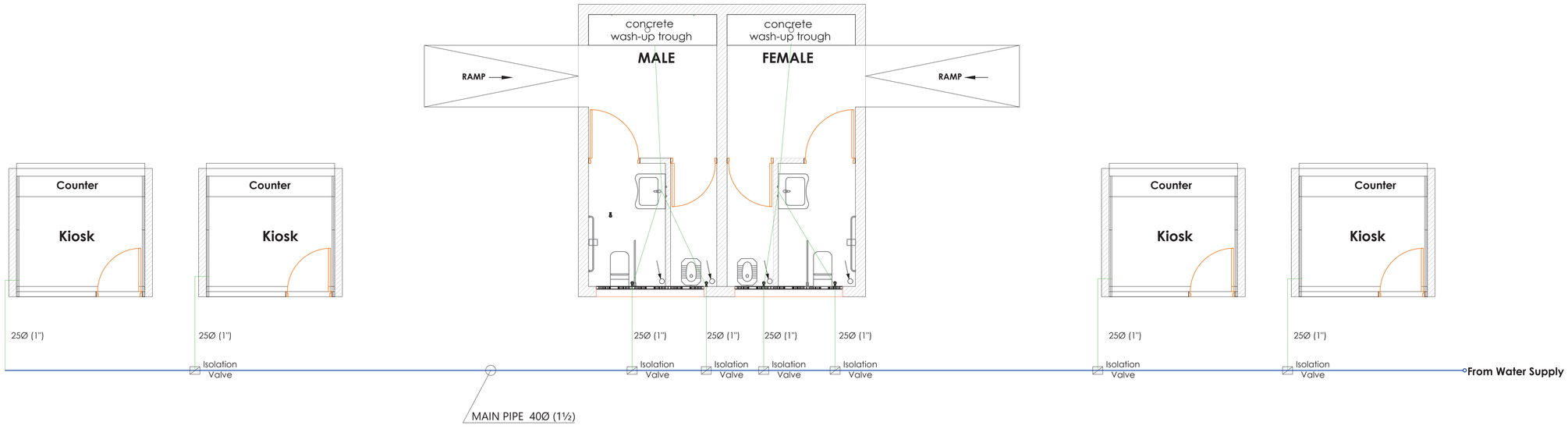
SHEET TITLE:

MAIN WATER SUPPLY PIPE-LINE PLAN

SHEET NUMBER

P 200

Last Saved by: (Aug. 20, 26)
Last Plotted by: (Oct. 19, 23)
ISO A3 (420.0 x 297.0mm)



PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

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#		REVISION_TEXT
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PROJECT NUMBER:

PSSxxx

SHEET TITLE:

MAIN WATER SUPPLY PLAN

SHEET NUMBER

P 300

ISO A3 (420.0 x 297.0mm)

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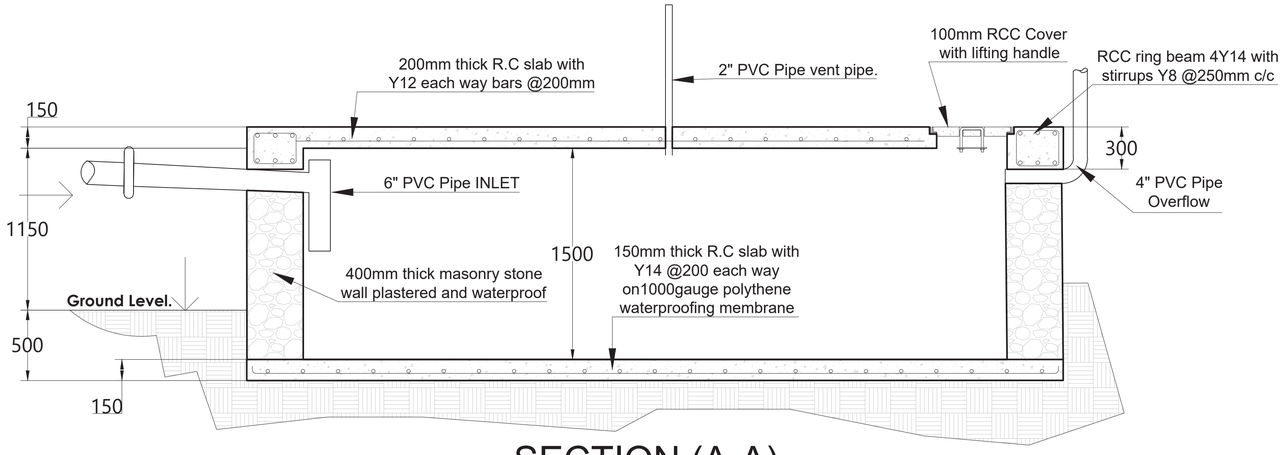

SECTION (A-A)
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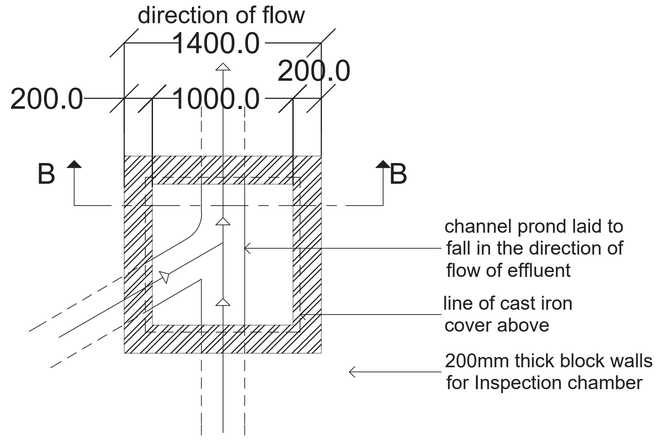
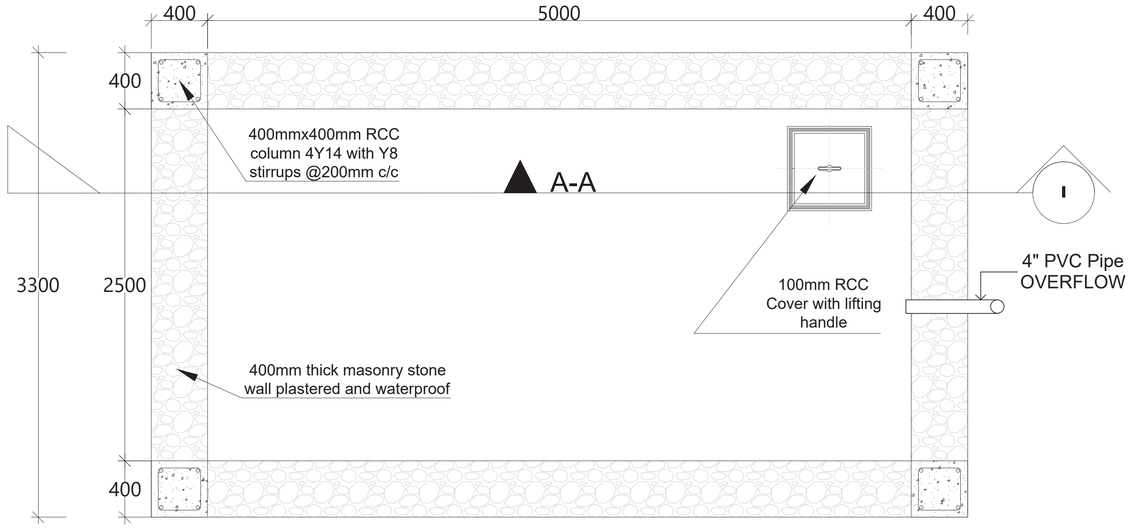
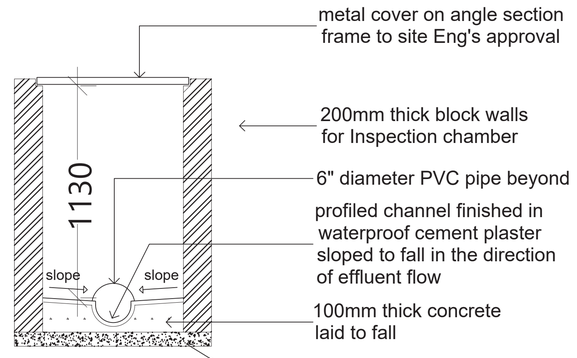


INSPECTION CHAMBER
DETAIL PLAN
N.T.S



SEPTIC TANK PLAN
N.T.S



SECTION (B-B)
N.T.S

PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

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DATE:	August 05, 2026

ISSUE

#		REVISION_TEXT

NO.	DATE	REVISIONS

PROJECT NUMBER:

PSSxxx

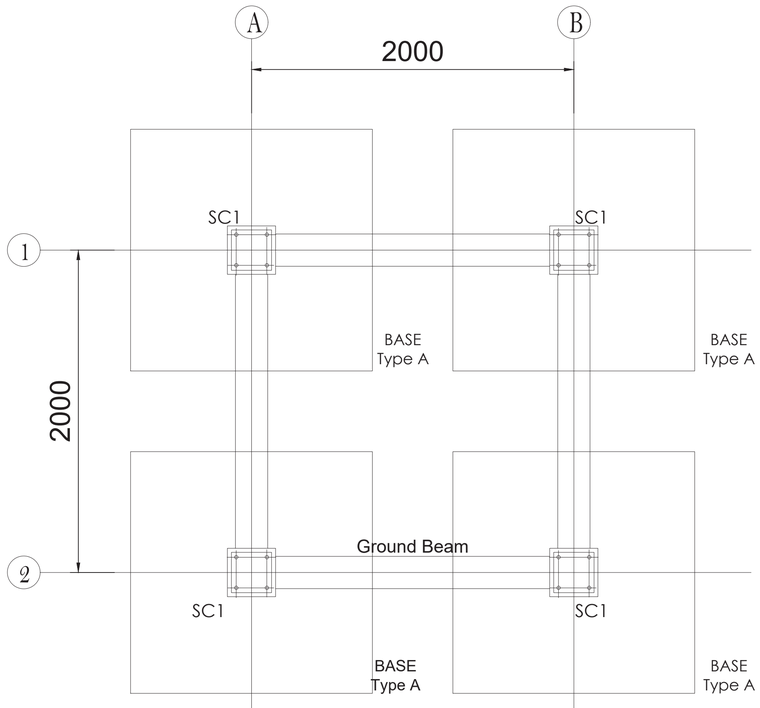
SHEET TITLE:

SEPTIC TANK DETAILS

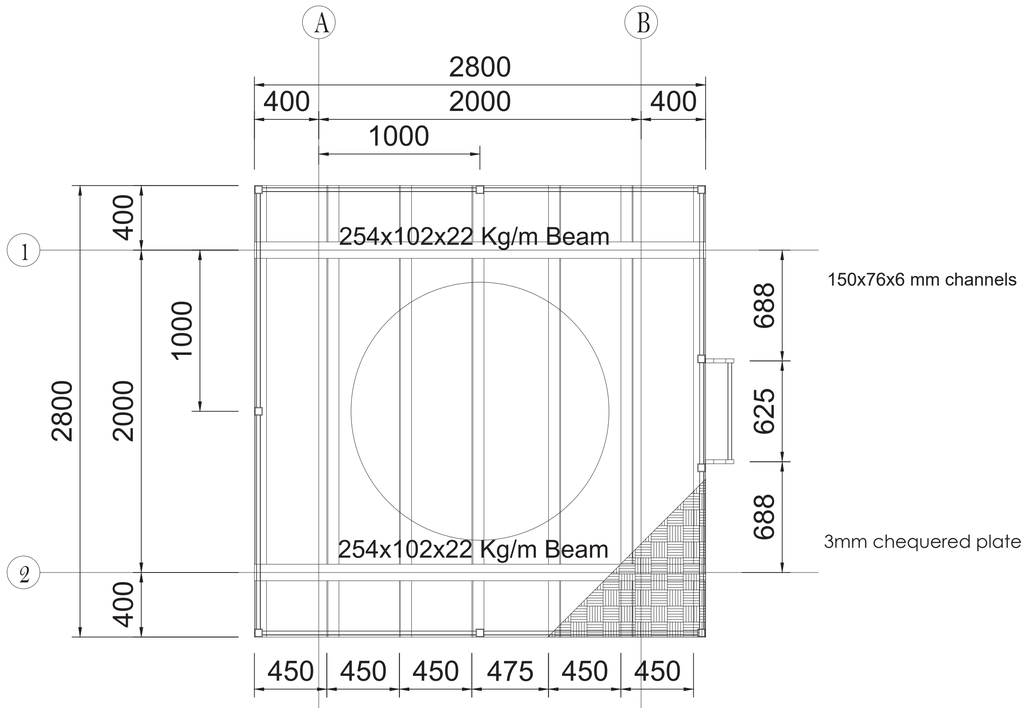
SHEET NUMBER

P 400

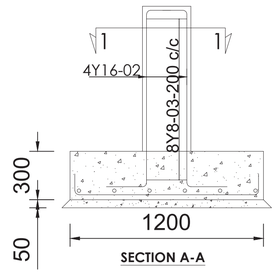
ISO A3 (420.0 x 297.0mm)
Last Saved by: (Aug. 20, 26)
Last Plotted by: (Oct. 19, 23)



FOUNDATION PLAN
N.T.S



TOP VIEW PLAN
N.T.S



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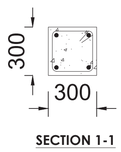

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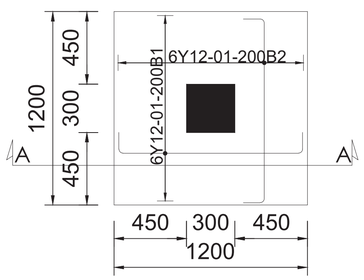

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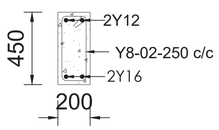

TYPICAL SECTION
GROUND BEAM
N.T.S

PROGRAM:
SINAAN

PROJECT NAME:
COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global
Office: Airport Hotel, Mogadishu,Somalia
www.dt-global.com

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REVIEWED BY:	A.M.
DATE:	August 05, 2026

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PROJECT NUMBER:
PSSxxx

SHEET TITLE:
ELEVATED WATER TANK DETAILS

SHEET NUMBER
P 500

ISO A3 (420.0 x 297.0mm)
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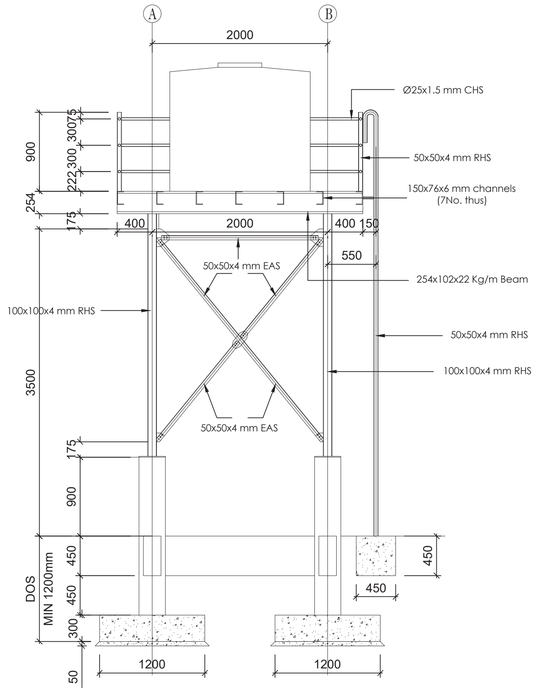
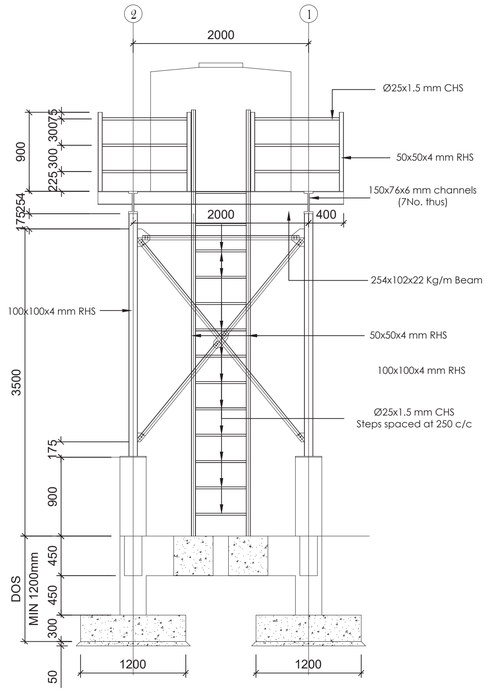
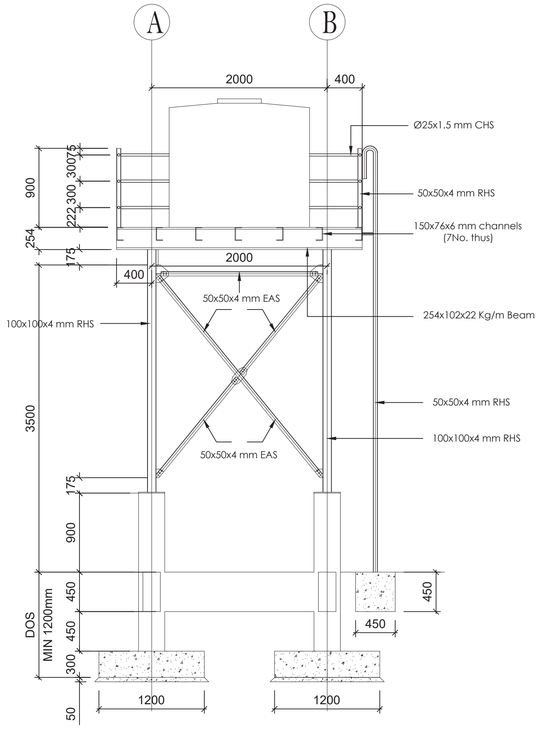
Last Plotted by: (Oct. 19, 23)



FRONT VIEW
N.T.S



LEFT-SIDE VIEW
N.T.S



RIGHT-SIDE VIEW
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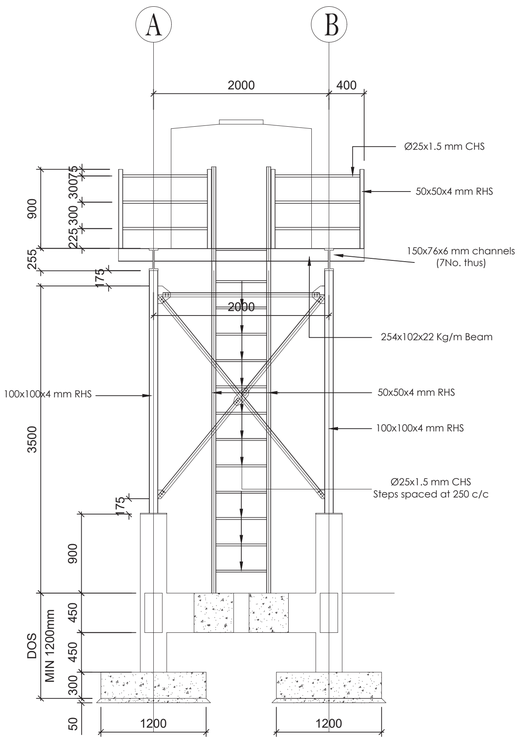

BACK-SIDE VIEW
N.T.S

PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

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#		REVISION_TEXT

NO.	DATE	REVISIONS

PROJECT NUMBER:

PSSxxx

SHEET TITLE:

ELEVATED WATER TANK ELEVATIONS

SHEET NUMBER

P 600

Last Saved by: (Aug. 20, 26)
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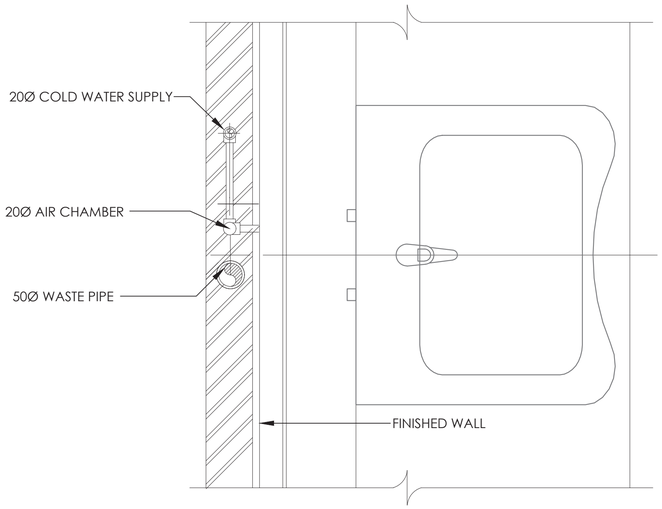
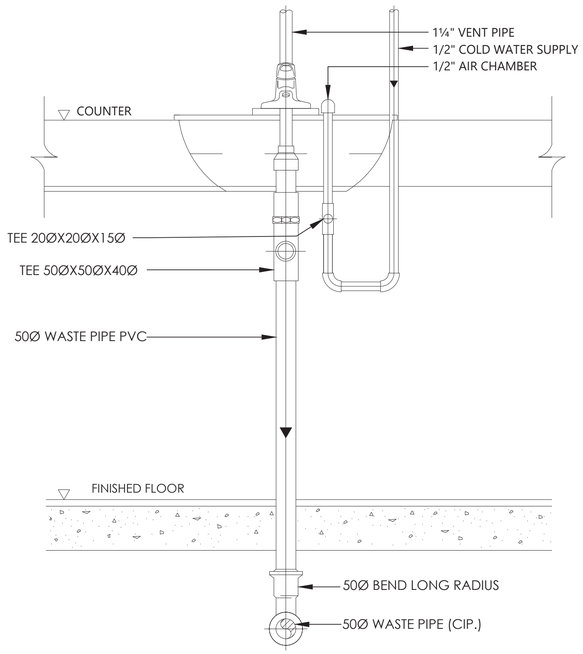
ISO A3 (420.0 x 297.0mm)

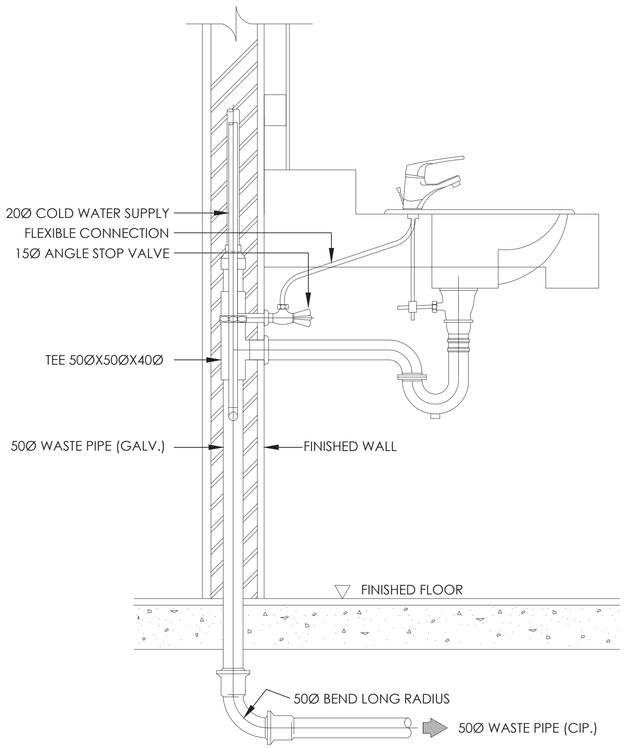
COLD WATER SUPPLY



TOP VIEW



FRONT VIEW



ELEVATION VIEW

PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

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DATE:	August 05, 2026

ISSUE

#		REVISION_TEXT
NO.	**DATE**	**REVISIONS**

PROJECT NUMBER:

PSSxxx

SHEET TITLE:

COLD WATER SUPPLY

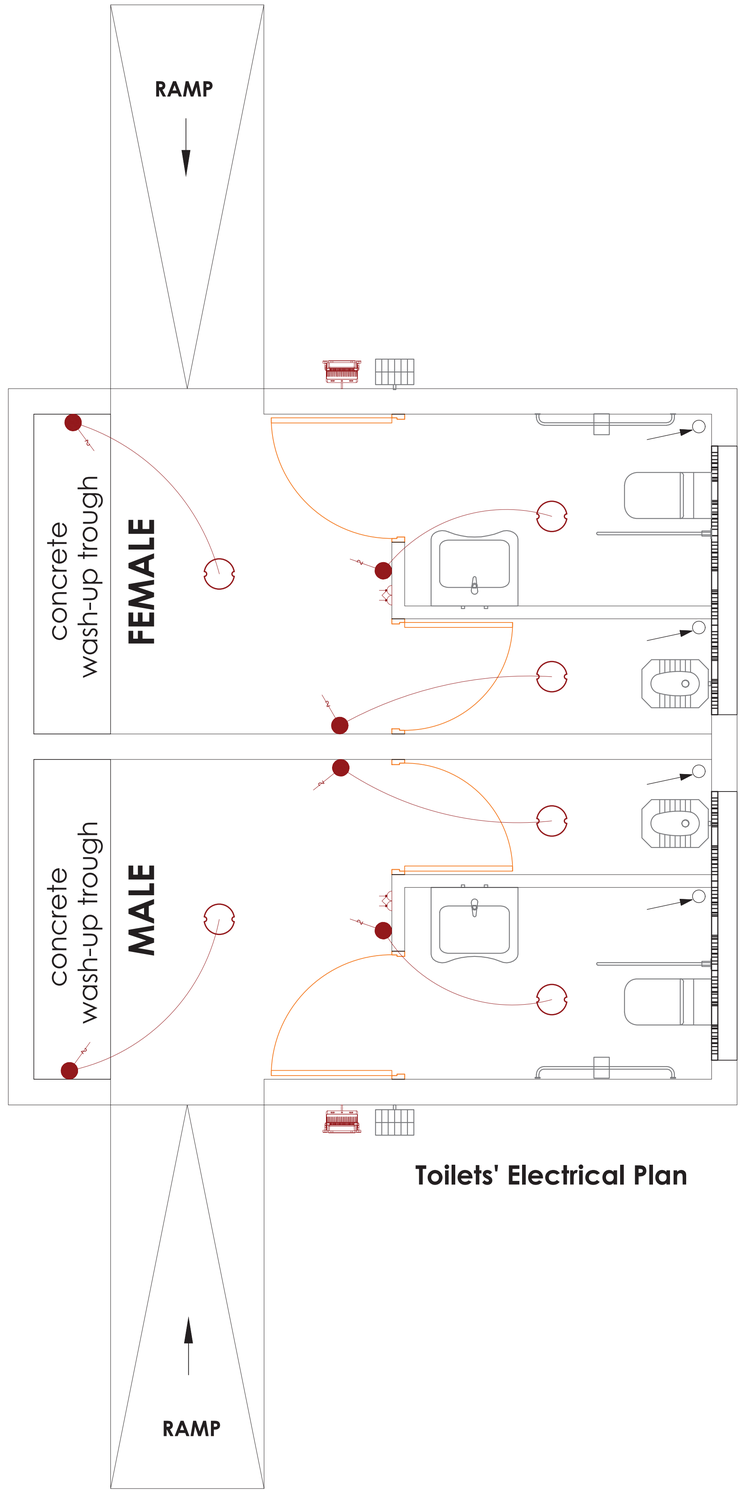
SHEET NUMBER

P 700

ELECTRICAL DRAWINGS

ISO A3 (420.0 x 297.0mm)

Last Saved by: (Aug. 20, 26)
Last Plotted by: (Oct. 19, 23)



Toilets' Electrical Plan

PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

www.dt-global.com

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DATE:	August 05, 2026

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#		REVISION_TEXT
NO.	**DATE**	**REVISIONS**

PROJECT NUMBER:

PSSxxx

SHEET TITLE:

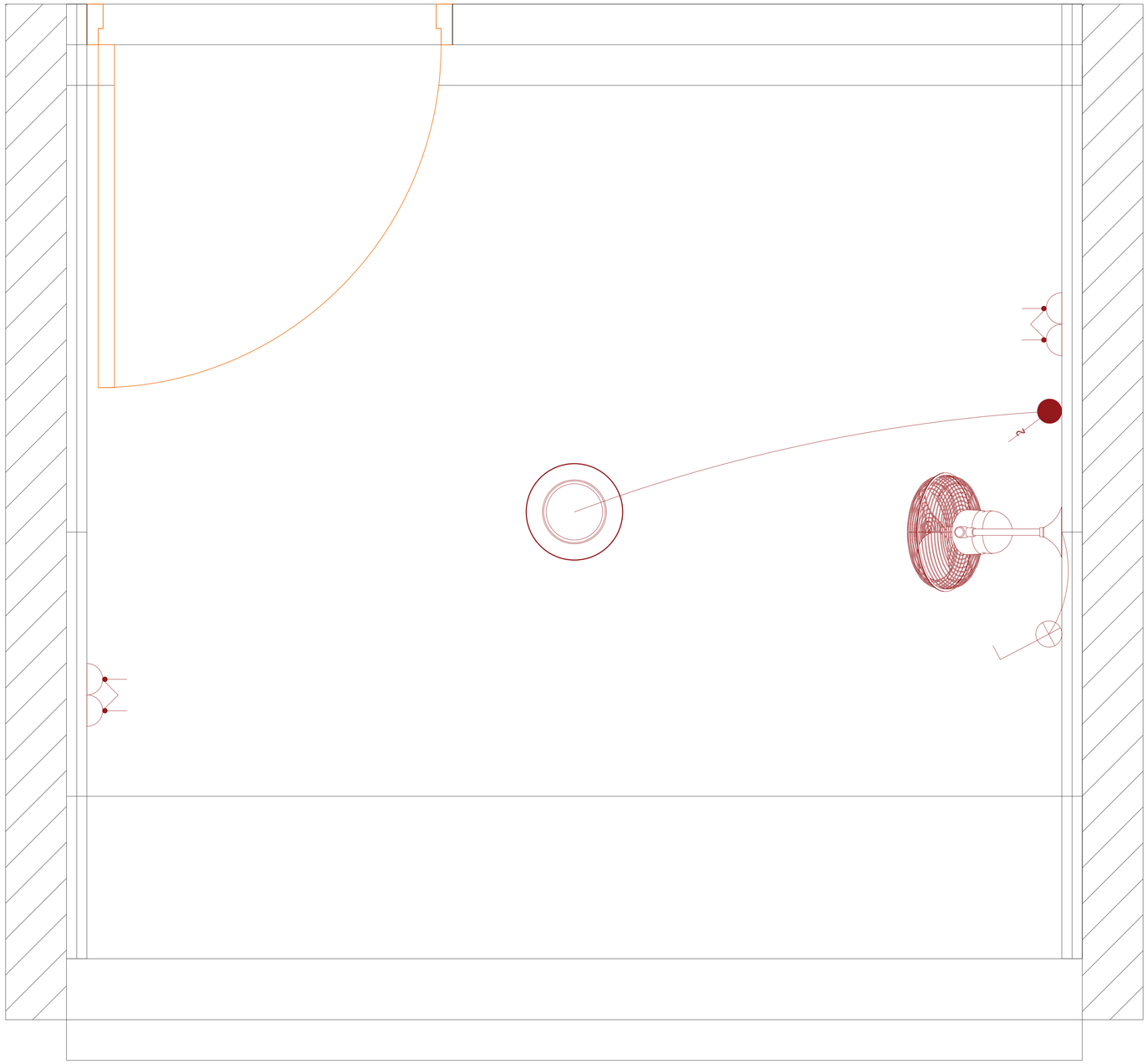
TOILET ELECTRICAL PLAN

SHEET NUMBER

E 100

Last Saved by: (Aug. 20, 26)
Last Plotted by: (Oct. 19, 23)

ISO A3 (420.0 x 297.0mm)



Kiosk Electrical Plan

PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

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DATE:	August 05, 2026

ISSUE

#		REVISION_TEXT
NO.	**DATE**	**REVISIONS**

PROJECT NUMBER:

PSSxxx

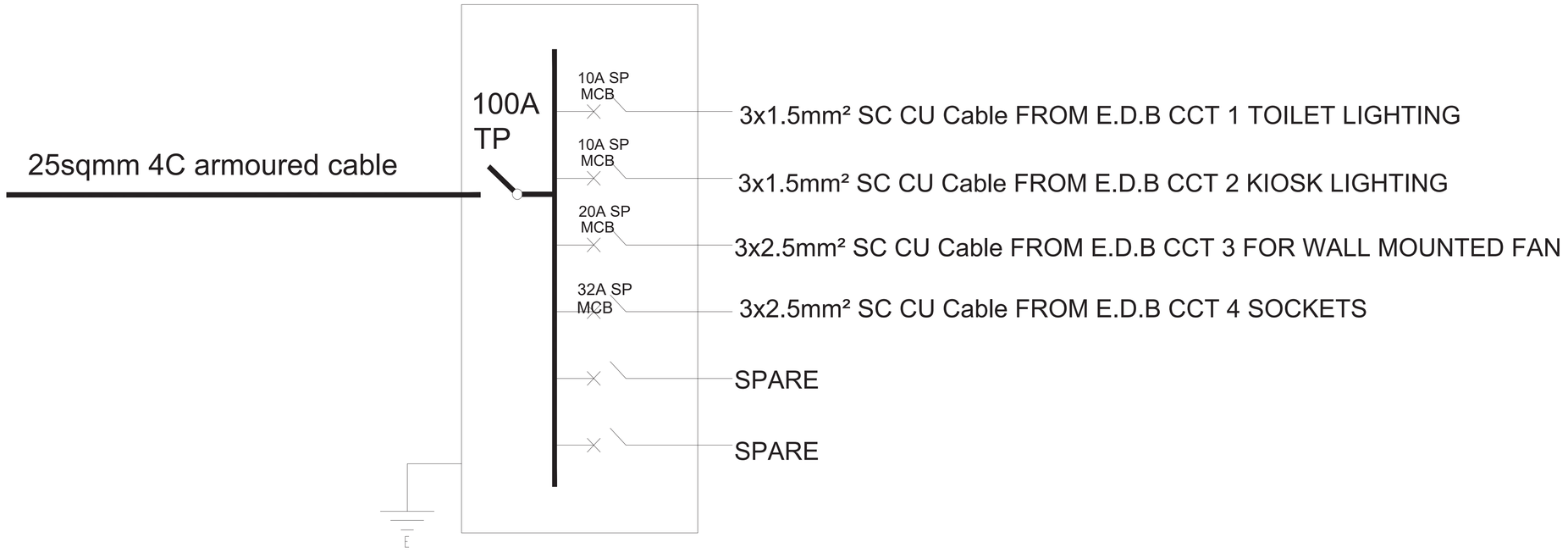
SHEET TITLE:

KIOSK ELECTRICAL PLAN

SHEET NUMBER

E 200

ISO A3 (420.0 x 297.0mm)
Last Saved by: (Aug. 20, 26)
Last Plotted by: (Oct. 19, 23)



100A TPN 6 WAY PUBLIC AMENITIES D.B.

PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

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DATE:	August 05, 2026

ISSUE

#		REVISION_TEXT
NO.	**DATE**	**REVISIONS**

PROJECT NUMBER:

PSSxxx

SHEET TITLE:

SINGLE LINE DIAGRAM

SHEET NUMBER

E 300

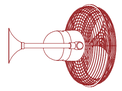
ISO A3 (420.0 x 297.0mm)
Last Saved by: (Aug. 20, 26)
Last Plotted by: (Oct. 19, 23)

LIGHTING & POWER LEGEND:

13A TWIN SOCKET - WALL MOUNTED

1 GANG 2WAY SWITCH - WALL MOUNTED

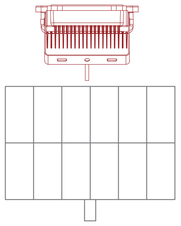
FAN CONTROLLER SWITCH - WALL MOUNTED



16" WALL-MOUNT OSCILLATING FAN

TRONIC LED RECESSED DOWNLIGHT 16 WATTS DAYLIGHT

TRONIC BLACK ROUND LED WARM WHITE BULKHEAD 12 WATTS



WALL MOUNTED SOLAR LED FLOODLIGHT, INTEGRATED SOLAR PANEL, MOTION SENSOR, ~30W, IP65, ≥3000LM, 6000K

PROGRAM:

SINAAN

PROJECT NAME:

COASTAL RESILIENCE DEVELOPMENT IN BOSSASO WATER FRONT PROJECT

CLIENT:

DT Global

Office: Airport Hotel, Mogadishu,Somalia

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DATE:	August 05, 2026

ISSUE

#		REVISION_TEXT
NO.	**DATE**	**REVISIONS**

PROJECT NUMBER:

PSSxxx

SHEET TITLE:

LIGHTINH & POWER LEGENDS

SHEET NUMBER

E 400

THE PROPOSED BOSSASO CORNICHE

SCHEDULE OF FITTINGS — TOILET BLOCK & KIOSK

Combined lighting and mechanical items

ITEM	PHOTO	DESCRIPTION	LIFETIME	LUMEN	W	IP	IK	CCT	CRI	HOUSING
TYPE C (Kiosk)		Tronic LED Recessed Downlight 16 Watts Daylight. Or approved equivalent.	50000h L70	1580	18W	IP20	IK02	4000K	>80	White Aluminium die cast
TYPE B (Toilets)		Tronic Black Round LED Warm White Bulkhead 12 Watts. Or approved equivalent.	50000h L70	1080	12W	IP54	IK08	4000K	>80	White Polycarbonate
TYPE G2 (External wall)		Wall mount Solar powered LED floodlight. LED Lamp: 400pcs 2835 SMD LED. Solar Panel: 6V 25W Polycrystalline. Battery: Lithium-Ion 3.2V 26AH. Charging 4-6h, discharge 10-15h. Or approved equivalent.	50000h L70	48000	300W	IP67	IK10	6500K	80	Black aluminium die cast housing

ITEM	PHOTO	DESCRIPTION	LIFETIME	SPEEDS	W	IP	LOCATION
F1		Comfort Zone CZ16W, 16" wall-mounted oscillating fan, metal grille, pull-chain speed/power control (2x 13" cords), adjustable tilt, 90° oscillation. Not a ducted extractor circulates room air only. Or approved equivalent.	Not stated	3-speed	55W	Not rated	Kiosk Indoor

ANNEX 3 - QUALITY ASSURANCE PLAN

Submit a Detailed Proposed Quality Assurance Plan. Below is a guide.

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QUALITY ASSURANCE/QUALITY CONTROL PLAN FOR COASTAL DEVELOPMENT IN THE BOSSASO WATER FRONT PROJECT

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1. Introduction

This Quality Assurance / Quality Control (QA/QC) Plan defines the procedures, responsibilities, inspections, tests, documentation, and acceptance criteria to ensure that the construction activities are in full compliance with approved designs, technical specifications, applicable codes and standards, manufacturer requirements, and contractual obligations.

The plan applies to all phases of the project including procurement, delivery, installation, testing, commissioning, and handover.

2. Objectives

The objective of this Quality Assurance and Quality Control document is to:

- Ensure installation quality, safety, and long-term system reliability
- Prevent defects, rework, and performance losses
- Verify compliance with approved drawings, specifications, and codes
- Establish clear inspection, testing, and documentation requirements
- Provide traceability and accountability throughout the project lifecycle

3. Scope of Work

The Quality Control Plan covers:

- Site preparation and earthworks
- Foundations (isolated footings / strip footings as applicable)
- Reinforced concrete works
- Masonry works
- Structural steel / light steel frame works
- Roofing system (GI sheets / polycarbonate / shade net structure)
- Plumbing and sewerage work
- PV System Installation
- Electrical Works

4. Roles and Responsibilities

4.1 Project Manager

The Project Manager will be responsible for:

- Overall responsibility for QA/QC implementation
- Ensure resources and trained personnel are available
- Approve corrective actions

4.2 Site Engineer / Supervisor

The Site Engineer who will also act as QA/QC Engineer will be responsible for

- Implement and monitor this QA/QC plan
- Prepare inspection and test plans (ITPs)
- Conduct inspections and witness tests
- Ensure installation follows approved drawings and method statements
- Maintain QA/QC records and reports
- Request inspections and tests at hold points
- Rectify non-conformances

5. Material Control Procedures

Quality shall be implemented through structured control stages. Each stage includes defined activities, inspection points, responsibilities, and acceptance criteria to ensure defects are prevented rather than corrected at later stages.

The main QA/QC control stages are:

1. Material Procurement and Approval process
2. Inspection and Test Plan
3. Final Inspection and Handover

5.1 Material Procurement and Delivery Inspection

This stage ensures that all materials supplied to the project meet the approved technical specifications and quality requirements.

Key activities include:

- Verification that procurement is based strictly on approved submittals and manufacturer datasheets
- Inspection of materials upon delivery for quantity, and physical condition
- Ensuring materials are accompanied by test certificates, conformity certificates, and warranties
- Proper storage and handling of materials to prevent damage, deterioration, or loss

Any damaged, non-compliant, or unapproved materials shall be rejected, quarantined, and reported through a Material Inspection Report (MIR).

5.2 Inspection and Test Plan

5.2.1 Site Preparation

Activity	Inspection	Frequency	Acceptance Criteria
Setting out	Survey check	Each grid	±10mm tolerance
Excavation	Depth & width check	Each footing	As per drawings

5.2.2 Concrete Works

Pre-Pour Inspection:

- Formwork alignment and rigidity
- Reinforcement size, spacing, cover
- Anchor bolts alignment
- Embedded items

Concrete Testing:

- Slump test – Each truck
- Cube test – 3 cubes per 25 m^3
- Compressive strength – 7 & 28 days

Acceptance based on approved design mix

5.2.3 Steel Reinforcement Works

- Verify bar diameter
- Check spacing

- Ensure adequate concrete cover
- Confirm lapping length as per design

5.2.4 Structural Steel Works

- Manufacturer certificates verification
- Welding inspection (visual)
- Bolt torque check
- Alignment and plumb check

5.2.5 Roofing Works

- Slope verification
- Proper fixing of sheets
- Overlap compliance
- Leak test (if required)

5.2.6 Testing Requirements

Below are the minimum Testing requirements for concrete and steel

Test	Standard	Frequency
Concrete Compressive Strength	ASTM / BS	As per mix
Steel Tensile Test	Manufacturer Certificate	Per batch

6. Non-Conformance Management

In case of non-conformance:

- Non-Conformance Reports (NCR) will be issued for deviations
- Root cause analysis will be conducted
- Corrective and preventive actions will be implemented
- Re-inspection and closure documented

7. Documentation and Records

Comprehensive and accurate documentation is essential to demonstrate compliance with QA/QC requirements and to support operation, maintenance, and warranty claims throughout the system life.

The following QA/QC records shall be maintained, controlled, and submitted as part of the project QA/QC dossier:

- Approved design drawings, specifications, and revisions
- Method Statements
- Material Inspection Reports (MIR) and delivery notes
- Site inspection checklists
- Inspection and Test Plans (ITPs) and completed test records
- Non-Conformance Reports (NCR), corrective and preventive action records
- As-built drawings reflecting actual installation
- Operation & Maintenance (O&M) manuals
- Equipment warranties, guarantees, and certificates of conformity
- Training records and handover certificates

All documents shall be properly indexed, version-controlled, and retained for the duration of the warranty and defects liability period, or as required by contract and regulatory authorities.

8. Method Statements

8.1 Excavation and Back Filling

The purpose is to define the procedure for safe and controlled excavation, foundation preparation, and backfilling works to ensure compliance with project specifications and approved drawings. This method statement will cover

- Setting out: The Surveyor shall establish grid lines and reference levels and mark foundation boundaries. The site engineer approval required prior to excavation.
- Excavation for foundations: The contractor will be responsible to perform excavation to required depth and width as per drawings and to maintain side slopes to prevent collapse.

  Bottom trimming and levelling will be done manually. In event of Over-excavation, it shall be corrected with lean concrete without any extra cost to client. The contractor will raise Inspection Request (IR) for approval before proceeding
- Subgrade Inspection: The contractor will Confirm that levels are according to design. The contractor will check soil bearing condition and if unsuitable soil encountered, the contractor will inform Engineer immediately.
- Compaction of Subgrade: Compaction of subgrade will be done using mechanical compactor to achieve minimum 95% MDD. Field density test conducted (as per ITP) if required.
- Backfilling: Backfilling will only be done after the concrete achieves required strength. The layer thickness for backfilling shall not exceed 200mm. Each layer will be compacted to minimum 95% MDD. Field density tests will be conducted per layer.
- Safety Precautions: The contractor will be responsible to Barricade excavation area and No personnel will be allowed near unsupported edges. Contractor will ensure proper PPE at site all the times

Inspection and Test Plan for Excavation

Sr	Activity	Inspection / Test	Acceptance Criteria	Method/ Standard	Frequency	Responsibility	Record
1	Setting Out	Grid & level verification	±10mm tolerance	Survey equipment	Each location	Surveyor	Survey Report
2	Excavation	Depth & width check	As per drawing	Tape/Level	Each footing	Site Eng.	Inspection report
3	Excavation Bottom	Soil bearing verification	As per soil report	Visual/Engineer review	Each footing	QA/QC Eng.	Inspection report
4	Subgrade Preparation	Compaction test	≥95% MDD	Field Density Test	Each layer	QA/QC Eng.	Test Report
5	Backfilling	Layer thickness check	≤200mm per layer	Visual	Each layer	Site Eng.	Inspection report
6	Backfilling	Compaction test	≥95% MDD	Field Density Test	Per layer	QA/QC Eng.	Lab Report
7	Final Level	Finished level check	±10mm	Survey	Each area	Surveyor	Level Report

8.2 Concrete Casting Works

The purpose is to define procedure for batching, placing, compacting, finishing and curing of concrete works. The scope of concrete for this project is Column bases, Strip footing and pedestals. Contractor is required to ensure provision of following equipment at site.

- Concrete mixer
- Needle/Poker vibrator
- Slump cone apparatus
- Cube molds

- Trowels and finishing tools

In order to ensure the concrete casting quality following procedures shall be followed

- Pre-Pour Inspection: The site engineer jointly with contractor will verify formwork alignment and rigidity. He will check reinforcement size and spacing and will ensure adequate cover blocks. He will confirm that Anchor bolts properly aligned and will ensure that the contractor has removed the debris and standing water.
- Concrete Mixing: Concrete mixing will only be done by approved mechanical means as per approved mixing ratio. Slump test will be conducted for each batch.
- Placing and Compaction: Concrete shall be placed within 30 minutes of mixing. The contractor will compact the concrete using Poker vibrator and will ensure that there is no segregation and honey combing in the concrete.
- Finishing: Surface finishing will be done as specified
- Curing: The contractor will ensure curing of the concrete using water or curing compound for 14 days in order to achieve required strength
- Acceptance Criteria: Concrete strength should be as per required criteria. Finish surface shall be free from cracks and honey combing. The acceptable alignment tolerance is ±5mm.

Inspection and Test Plan for Concrete Casting

Sr	Activity	Inspection / Test	Acceptance Criteria	Method/ Standard	Frequency	Responsibility	Record
1	Formwork	Alignment & dimensions	±5mm tolerance	Visual/Level	Each pour	QA/QC Eng.	Inspection report
2	Reinforcement	Bar size & spacing	As per drawings	Visual/ Measurement	Each pour	QA/QC Eng.	Inspection report
3	Cover Blocks	Concrete cover	As per drawing	Cover meter/Visual	Each pour	QA/QC Eng.	Checklist
4	Embedded Items	Anchor bolt alignment	±3mm tolerance	Measurement	Each location	QA/QC Eng.	Inspection report
5	Concrete Delivery	Slump Test	75–100mm (or design value)	Slump cone	Each truck	QA/QC Eng.	Slump Report
6	Sampling	Cube casting	3 cubes / 25m³	Lab test	Each batch	QA/QC Eng.	Cube Register
7	Placing	Vibration check	No honeycombing	Visual	Continuous	Site Eng.	Site Log
8	Curing	Curing duration	Min 7 days	Visual	Daily	Site Eng.	Curing Log
9	Strength Test	7&28 days compressive strength	As per design	Lab Test	Each sample	QA/QC Eng.	Lab Report

8.3 Block Masonry Works

The purpose is to define and ensure that all masonry works are executed in accordance with approved drawings, specifications, and applicable standards, achieving the required quality, strength, and durability. The scope includes

- Block/brick work
- Mortar preparation and application
- Reinforced masonry (if applicable)
- Plastering interfaces related to masonry
- Openings, lintels, and embedded items

Applicable Standards are:

- ASTM C90 / BS EN 771 – Masonry Units
- ASTM C270 – Mortar
- ASTM E447 – Inspection of Masonry
- Project Specifications & Approved Drawings

In order to ensure the quality following procedures shall be followed

- For Masonry Units (Blocks/Bricks): Ensure that the contractor procure from approved source. Blocks should be free from cracks, defects, and damage.
- Cement: Check for the manufacturer certificate and date of manufacturing. Store in a dry condition.
- Sand: Ensure that sand is Clean, well-graded, free from organic impurities.
- Water: Water should be clean and potable.
- Mortar Mix Control: Ensure that mix ratio is as per specifications. Mortar should be used with in specified time i.e. between 30 to 45 min after mixing.

Inspection and Test Plan for Masonry Works

Sr	Activity	Inspection / Test	Frequency	Responsibility	Record
1	Material approval	Visual & lab tests	Each batch	QA/QC Eng.	MTC File
2	Mortar Mix	Ratio Check	Daily	QA/QC Eng.	Inspection report
3	Block Work Alignment	Line and Level Check	Continuous	Site Eng.	Alignment Report
4	Joint Thickness	Measurement	Random	Site Eng.	Inspection report
5	Compressive Strength	Lab test	As required	QA/QC Eng.	MTC File
6	Final Inspection	Visual inspection	Each area	QA/QC Eng.	Final Inspection report

8.4 Steel Erection Works

The purpose is to define safe erection of steel frame for proposed structures. The scope will include erection of Columns, rafters, trusses, purlins and bracing members. Contractor is required to ensure provision of following equipment at site.

- Mobile crane
- Chain blocks
- Torque wrench
- Spirit level
- Scaffolding

In order to ensure the Structural steel installation/erection quality following procedures shall be followed

- Pre-Erection Checks will include Verification of anchor bolt alignment. Verification of bolt size and grade. Inspection of any damages.
- Erection: As a first step Erection of column will be conducted followed by installation of trusses, purlins and bracings
- Alignment: Check the plumbness for each column. Verify levels and tighten the bolts using torque wrench
- Welding (if applicable): Visual inspection for cracks or porosity
- Safety: PPE required all the time for working at elevations and for welding works

Inspection and Test Plan for Steel Erection Works

Sr	Activity	Inspection / Test	Acceptance Criteria	Method/ Standard	Frequency	Responsibility	Record
1	Material Delivery	Manufacturer certificate review	Approved material grade	Document review	Each batch	QA/QC Eng.	MTC File
2	Anchor Bolts	Position & projection	±3mm	Measurement	Each column	QA/QC Eng.	Inspection report
3	Column Erection	Plumbness	1/1000 height	Level	Each column	Site Eng.	Alignment Report
4	Beam Installation	Level check	±5mm	Level	Each beam	Site Eng.	Inspection report
5	Bolt Tightening	Torque test	As per bolt spec	Torque wrench	Random 10%	QA/QC Eng.	Torque Log
6	Welding	Visual inspection	No cracks/ porosity	Visual	Each joint	QA/QC Eng.	Weld Log
7	Final Alignment	Structural alignment	Within tolerance	Survey	Entire frame	QA/QC Eng.	Final Inspection report

8.5 Roof Installation Works

The purpose is to define installation procedure of roofing sheets for proposed structures. The scope includes Installation of GI sheets and ridge cap.
In order to ensure the quality of roof sheet installation following procedures shall be followed.

- Pre installation checks will include verification of steel alignment, confirmation of purlins spacing and ensure safety harness and access
- Sheet Installation procedure will include to start installation from Leeward side and maintaining a minimum specified side overlap. End overlap should be 150mm. Fastener spacings should be as per drawings
- Ridge cap: Contractor will ensure installation of ridge cap with proper sealing.
- Final Inspection will be conducted to ensure the correctness of alignment, tightening of all screws, and sealing of all joints
- Safety: PPE required all times. Contractor will provide full fall protection system.

Inspection and Test Plan for Roof Installation Works

Sr	Activity	Inspection / Test	Acceptance Criteria	Method/ Standard	Frequency	Responsibility	Record
1	Structure Readiness	Purlin spacing & alignment	As per drawing	Measurement	Entire roof	QA/QC Eng.	Inspection report
2	Sheet Placement	Overlap check	1 corrugation min	Visual	Each sheet row	Site Eng.	Checklist
3	Fastening	Screw spacing	As per spec	Visual	Random check	QA/QC Eng.	Inspection report
4	Ridge Cap	Installation check	Proper sealing	Visual	Each ridge	Site Eng.	Inspection report
5	Sealant	Application check	No visible gaps	Visual	Random	QA/QC Eng.	Checklist
6	Water Tightness	Spray test (if required)	No leakage	Water spray	Entire roof	QA/QC Eng.	Test Report
7	Final Inspection	Overall alignment	Acceptable finish	Visual	Entire roof	QA/QC Eng.	Final Inspection

							report

8.6 Plastering and Painting Works

The purpose is to ensure plastering and painting works are executed in compliance with project specifications, achieving required surface finish, durability, and aesthetic quality.

The scope covers

- Internal and external plastering
- Surface preparation
- Putty works
- Primer and painting applications
- Final finishing and touch-ups

Below are the applicable standards

- ASTM C926 – Application of Portland Cement-Based Plaster
- ASTM C840 – Finishing of Gypsum Board (if applicable)
- ASTM D3359 – Adhesion Test for Paint
- Project Specifications & Approved Material Submittals

In order to ensure the quality of plastering and painting following procedures shall be followed.

- **Plaster Materials**: Cement should be of approved brand with valid tests. Sand should be clean and free from all impurities. Water should be clean and potable.
- For workman ship quality control:
  - Before Plastering ensure that the surface is clean from dust, oil or any loose particles. Joints are properly raked. Masonry surface is wetted. Chicken mesh is fixed at joints. Level dots and screed is established.
  - During execution ensure mixing ratio is as per specifications. Plater should be applied in uniform thickness. Should be smooth with even finish. Curing should be dome at least for 7 days.
- **Paint Material:** Ensure that the paint material i.e primer, putty, finish coat are preapproved. Manufacturers certification and data sheet is provided. Materials should be stored in dry and shaded area.
- For workman ship quality control:
  - Before painting surface should be fully cured and dry. Cracks should be repaired and surface sanded smooth. Ensure that all dust and contamination have been removed.
  - During execution ensure to follow the sequence i.e. Surface Preparation, Putty application, Sanding, Primer coat, First paint coat, Final paint coat. Also ensure proper drying time between coats. Application should be uniform. Paint should be diluted as per manufacture recommendation.

Inspection and Test Plan for Plaster and Paint Works

Sr	Activity	Inspection / Test	Acceptance Criteria	Frequency	Responsibility	Record
1	Material approval (cement, sand, paint)	Document review & visual	As per approved submittals and specs	Each batch	QA/QC Eng.	Inspection report
2	Surface preparation (plaster)	Visual inspection	Clean, dust-free, properly wetted, mesh fixed at joints	Each area	QA/QC Eng	Checklist
3	Plaster thickness	Measurement	±3 mm from specified thickness	Random	QA/QC Eng	Inspection report
4	Surface evenness (plaster)	2 m straight edge	Max deviation ±3 mm	Random	QA/QC Eng	Inspection report

5	Verticality (plaster)	Plumb check	Max deviation ±5 mm per 3 m height	Random	QA/QC Eng.	Checklist
6	Plaster finish	Visual & tapping	No cracks, no hollow sound, uniform finish	Continuous	QA/QC Eng.	Inspection report
7	Curing	Visual	Minimum 7 days curing maintained	Each area	Site Eng.	Final Inspection report
8	Surface preparation (painting)	Visual inspection	Smooth, dry, crack-free, properly sanded	Each area	QA/QC Eng.	Checklist
9	Putty application	Visual & thickness	Even surface, no undulations or pinholes	Each coat	QA/QC Eng.	Checklist
10	Primer application	Visual	Uniform coverage, no patchiness	Each coat	QA/QC Eng.	Checklist
11	Paint coat application	Visual	No streaks, roller marks, or color variation	Each coat	QA/QC Eng.	Checklist
12	Paint thickness (if specified)	DFT measurement	As per manufacturer specs (±10% typical)	Random	QA/QC Eng.	Checklist
13	Paint adhesion test	Cross-cut test	Minimum rating as per ASTM D3359 (e.g., 4B/5B)	Random	QA/QC Eng.	Checklist
14	Final finish inspection	Visual	Uniform color, smooth finish, no defects	Each Area	QA/QC Eng.	Final Inspection report

8.7 Electrical Works

This Quality Assurance and Quality Control (QA/QC) Plan defines the procedures, inspection requirements, testing activities, and quality control measures to be implemented during the execution of electrical works. The purpose of this plan is to ensure that all electrical installations are carried out in accordance with approved drawings, project specifications, contract requirements, applicable international standards, manufacturer recommendations, and relevant statutory regulations. The plan establishes a systematic approach to monitoring, inspecting, testing, and documenting all electrical activities to achieve the required quality standards and ensure safe, reliable, and defect-free electrical systems.

Scope: This QA/QC Plan applies to all electrical installation activities associated with the project, including the installation of conduits, trunking systems, cable trays and ladders, power and lighting systems, switchboards and distribution boards, transformers, generators, earthing and bonding systems, low-current systems, fire alarm systems, cable pulling and termination, testing, commissioning, and final handover. All subcontractors, suppliers, supervisors, and quality personnel involved in electrical works shall comply with the requirements outlined in this plan.

Below are the applicable standards

- IEC Standards
- IEEE Standards
- NEC (where applicable)

- Local Electrical Authority Regulations
- Project Specifications
- Approved Shop Drawings
- Manufacturer Recommendations
- Contract Requirements

8.7.1 Material Quality Control

All electrical materials and equipment delivered to the project site shall be inspected upon receipt to verify compliance with approved material submittals and project specifications. Material inspections shall include verification of manufacturer certificates, test certificates, product data sheets, delivery documentation, and physical condition. Electrical cables shall be inspected for correct size, insulation type, voltage rating, and physical damage. Conduits, cable trays, switchboards, distribution boards, light fixtures, and earthing materials shall be checked for dimensions, ratings, finishes, and compliance with approved specifications. Materials shall be stored in suitable conditions to prevent deterioration, moisture ingress, corrosion, contamination, or mechanical damage.

8.7.2 Installation Quality Control

Prior to commencement of installation activities, approved shop drawings, material approvals, method statements, and work permits shall be verified. Conduit installations shall be inspected for correct routing, sizing, support spacing, bend radius, accessibility of junction boxes, and compliance with approved drawings. Cable trays and ladders shall be inspected for alignment, support spacing, grounding continuity, expansion provisions, and overall workmanship. During cable pulling operations, cable identification, pulling methods, bending radius, pulling tension, and cable condition shall be monitored to prevent damage. Cable terminations shall be inspected for proper gland installation, lug crimping, torque application, phase identification, and insulation protection. Electrical panels and switchboards shall be checked for mounting, alignment, anchorage, labeling, internal wiring, and accessibility for operation and maintenance. Earthing and bonding systems shall be inspected to verify conductor sizing, continuity, connection integrity, and compliance with design requirements. Lighting installations shall be inspected for fixture type, mounting arrangement, alignment, wiring integrity, and operational functionality.

8.7.3 Testing and Commissioning

Testing and commissioning activities shall be conducted in accordance with approved procedures and applicable standards. Insulation resistance testing shall be performed on power and control cables prior to energization to verify insulation integrity. Continuity testing shall be conducted on conductors, earthing systems, and bonding networks to ensure electrical continuity. Earth resistance measurements shall be carried out to verify compliance with project requirements. Phase sequence testing shall be performed before energizing three-phase systems to ensure correct phase rotation. Functional testing shall be conducted for lighting systems, power distribution systems, protective devices, emergency systems, fire alarm systems, control systems, and interlocking arrangements. All test results shall be recorded and reviewed before acceptance.

8.7.4 Non-Conformance Management

Any deviation from approved specifications, drawings, standards, or quality requirements shall be documented through a Non-Conformance Report (NCR). The NCR process shall include identification of the non-conformance, investigation of the root cause, implementation of corrective actions, re-inspection of affected work, and formal closure following verification of compliance. Preventive actions shall be implemented to eliminate recurring issues and improve overall quality performance.

8.7.5 Calibration of Test Equipment

All measuring and testing equipment used for inspections and commissioning activities shall possess valid calibration certificates issued by accredited laboratories. Calibration records shall be maintained on site and made available for review during audits and inspections. Equipment requiring calibration may include insulation resistance testers, earth resistance testers, multimeters, clamp meters, power analyzers, torque wrenches, and other specialized instruments.

8.7.6 Documentation and Records

Comprehensive quality records shall be maintained throughout the project. Documentation shall include material inspection reports, inspection requests, inspection checklists, test reports, calibration certificates, NCR records, corrective action reports, commissioning reports, approved shop drawings, as-built drawings, and final handover documentation. All records shall be maintained in an organized and traceable manner to demonstrate compliance with project quality requirements.

8.7.7 Final Inspection and Handover

Upon completion of electrical works, a final inspection shall be conducted to verify that all installations have been completed in accordance with approved drawings and specifications. All inspection and testing activities shall be completed, outstanding non-conformances shall be closed, and punch-list items shall be resolved prior to handover. Final handover documentation shall include test certificates, commissioning reports, operation and maintenance manuals, warranties, calibration certificates, approved as-built drawings, and quality records necessary for project acceptance.

Inspection and Test Plan (ITP) – Electrical Works

Sr	Activity	Inspection / Test	Acceptance Criteria	Inspection Type	Responsibility
1	Material Receiving	Verification of certificates and physical inspection	Approved material submittal and specifications	Review & Visual	QA/QC Engineer
2	Conduit Installation	Routing, support spacing, bends, sizing	Approved drawings and specifications	Visual Inspection	QA/QC Engineer
3	Concealed Conduits	Inspection before concrete pour or closure	Approved installation completed	Hold Point (H)	QA/QC Engineer
4	Cable Tray Installation	Alignment, supports, grounding	Approved drawings and workmanship standards	Visual Inspection	QA/QC Engineer
5	Earthing Conductor Installation	Size, routing, connections	Approved drawings and specifications	Visual Inspection	QA/QC Engineer
6	Earth Electrode Installation	Location and installation method	Design requirements	Visual Inspection	QA/QC Engineer
7	Cable Pulling	Identification, bending radius, damage check	No physical damage and correct routing	Surveillance	QA/QC Engineer
8	Cable Termination	Glands, lugs, torque, identification	Manufacturer recommendations and specifications	Visual Inspection	QA/QC Engineer
9	Distribution Board Installation	Alignment, mounting, labeling	Approved drawings and specifications	Visual Inspection	QA/QC Engineer
10	Switchboard Installation	Anchoring, accessibility, internal inspection	Approved drawings and manufacturer requirements	Visual Inspection	QA/QC Engineer
11	Lighting Fixture Installation	Type, location, mounting	Approved drawings and specifications	Visual Inspection	QA/QC Engineer
12	Insulation Resistance Test	Megger test of cables	Minimum value as per specification	Test	QA/QC Engineer
13	Continuity Test	Conductors and earthing systems	Continuous electrical path	Test	QA/QC Engineer
14	Earth	Grounding system	Project specified	Test	QA/QC Engineer

	Resistance Test	testing	value (typically ≤ 5 Ω)		
15	Phase Sequence Test	Verify phase rotation	Correct phase sequence	Test	QA/QC Engineer
16	Functional Testing	Operation of lighting, power, controls	Fully functional system	Test	QA/QC Engineer
17	Protection Relay Testing	Relay operation and settings	Approved protection settings	Test	Specialist / QAQC
18	Pre-Commissioning Inspection	Complete installation review	No outstanding defects	Hold Point (H)	QA/QC Manager
19	Final Commissioning	System performance verification	Meets design and operational requirements	Hold Point (H)	QA/QC Manager
20	Final Handover Inspection	Documentation and system acceptance	All records completed and approved	Hold Point (H)	QA/QC Manager

Legend
H = Hold Point (Work cannot proceed until approval is obtained.

8.8 Plumbing and Sewage Works

This Quality Assurance and Quality Control (QA/QC) Plan establishes the quality management procedures, inspection requirements, testing activities, and documentation controls necessary to ensure that all plumbing and sewage works are executed in accordance with approved drawings, project specifications, contract requirements, applicable standards, and local authority regulations. The purpose of this plan is to ensure that plumbing and drainage systems are installed safely, efficiently, and in compliance with the required quality standards to achieve reliable long-term performance and client satisfaction.

Scope: This QA/QC Plan applies to all plumbing and sewage installation activities associated with the project, including potable water distribution systems, hot and cold-water piping, sanitary drainage systems, vent piping systems, underground sewer networks, manholes, inspection chambers, grease traps, sump pits, pumps, plumbing fixtures, water storage tanks, testing, commissioning, and final handover. The plan shall be implemented by all contractors, subcontractors, suppliers, supervisors, and quality personnel involved in plumbing and sewage works.

8.8.1 Material Quality Control

All plumbing and sewage materials shall be inspected upon delivery to the site to verify compliance with approved material submittals and project specifications. Material inspections shall include verification of manufacturer certificates, compliance certificates, test reports, delivery documents, and physical condition. Pipes, fittings, valves, fixtures, pumps, tanks, manhole components, and accessories shall be checked for size, pressure rating, material type, dimensions, and physical damage. Defective or non-compliant materials shall be rejected and removed from the site. Approved materials shall be stored in designated areas and protected from sunlight, contamination, corrosion, moisture, and mechanical damage.

8.8.2 Installation Quality Control

Prior to installation, approved shop drawings, material approvals, and method statements shall be reviewed and verified. Plumbing pipework shall be inspected for correct routing, alignment, support spacing, slope, jointing methods, and accessibility for maintenance. Water supply piping shall be installed according to approved layouts with proper support, insulation, identification, and pressure ratings. Sanitary drainage and vent systems shall be installed with the specified gradients to ensure effective flow and prevent blockages. Underground sewer pipelines shall be inspected for alignment, bedding preparation, joint integrity, and compliance with approved levels. Manholes and inspection chambers shall be constructed in accordance with approved drawings and checked for dimensions, benching, channel formation, watertightness, and cover installation. Plumbing fixtures shall be inspected for proper mounting, alignment, connection, and functionality. Pumps, tanks, and associated equipment shall be installed according to manufacturer recommendations and project specifications.

8.8.3 Testing and Commissioning

All plumbing and sewage systems shall undergo testing and commissioning before acceptance. Potable water piping systems shall be subjected to hydrostatic pressure testing to verify joint integrity and leak-free performance. Sanitary drainage and vent systems shall undergo water tests or air tests to confirm watertightness and proper installation. Underground sewer lines shall be tested for leakage, alignment, and flow performance. Manholes and inspection chambers shall be checked for watertightness and proper operation. Water storage tanks shall be inspected and tested for leakage and cleanliness before commissioning. Pumps shall undergo operational testing to verify flow rates, pressure performance, automatic controls, and overall functionality. All test results shall be documented and approved before the systems are placed into service.

8.8.4 Non-Conformance Management

Any work that does not comply with approved drawings, specifications, standards, or quality requirements shall be documented through a Non-Conformance Report (NCR). The NCR process shall include identification of the deficiency, investigation of the root cause, implementation of corrective actions, re-inspection, and formal closure following verification of compliance. Corrective and preventive actions shall be implemented to prevent recurrence and improve quality performance.

8.8.5 Calibration of Testing Equipment

All testing and measuring equipment used during inspections and commissioning shall possess valid calibration certificates. Calibration records shall be maintained and made available for review. Equipment requiring calibration may include pressure gauges, flow meters, laser levels, water level gauges, measuring tapes, and other testing instruments.

8.8.6 Documentation and Quality Records

Comprehensive quality records shall be maintained throughout the project. These records shall include material inspection reports, inspection requests, approved submittals, pressure test reports, leakage test reports, manhole inspection records, calibration certificates, NCR records, corrective action reports, commissioning reports, operation and maintenance manuals, and approved as-built drawings. All records shall be filed and maintained in a controlled and traceable manner.

8.8.7 Final Inspection and Handover

A final inspection shall be conducted upon completion of all plumbing and sewage works to verify compliance with approved drawings and specifications. All inspections, tests, and commissioning activities shall be completed successfully, and all punch-list items and non-conformances shall be closed before handover. The final handover package shall include test certificates, commissioning reports, warranties, operation and maintenance manuals, calibration certificates, approved as-built drawings, and all required quality records for project acceptance.

Inspection and Test Plan (ITP) – Plumbing and Sewage Works

Sr	Activity	Inspection / Test	Acceptance Criteria	Inspection Type	Responsibility
1	Material Receiving	Verification of materials, certificates, dimensions	Approved submittals and specifications	Review & Visual	QA/QC Engineer
2	Pipe Storage	Storage conditions and protection	Manufacturer requirements	Visual Inspection	QA/QC Engineer
3	Excavation for Underground Pipes	Depth, width, safety, bedding preparation	Approved drawings and specifications	Visual Inspection	Site Engineer / QAQC
4	Pipe Bedding	Material, thickness, compaction	Project specification requirements	Inspection	QA/QC Engineer
5	Underground Sewer Pipe Installation	Alignment, gradient, joints	Approved drawings and specifications	Visual Inspection	QA/QC Engineer

6	Backfilling of Underground Pipes	Layer thickness and compaction	Approved specification	Hold Point (H)	QA/QC Engineer
7	Water Supply Pipe Installation	Routing, supports, joints	Approved drawings and standards	Visual Inspection	QA/QC Engineer
8	Drainage and Vent Pipe Installation	Slope, support spacing, jointing	Approved drawings and specifications	Visual Inspection	QA/QC Engineer
9	Valve Installation	Location, accessibility, direction	Approved drawings and manufacturer requirements	Visual Inspection	QA/QC Engineer
10	Plumbing Fixture Installation	Position, alignment, connections	Approved drawings and specifications	Visual Inspection	QA/QC Engineer
11	Water Tank Installation	Foundation, level, connections	Approved drawings and manufacturer recommendations	Visual Inspection	QA/QC Engineer
12	Pump Installation	Alignment, anchoring, connections	Approved specifications	Visual Inspection	QA/QC Engineer
13	Manhole Construction	Dimensions, benching, channels	Approved drawings and specifications	Visual Inspection	QA/QC Engineer
14	Inspection Chamber Construction	Dimensions and workmanship	Approved drawings and specifications	Visual Inspection	QA/QC Engineer
15	Hydrostatic Pressure Test (Water Pipes)	Pressure test for leaks	No pressure loss or leakage	Test	QA/QC Engineer
16	Drainage Water Test	Water-tightness verification	No leakage observed	Test	QA/QC Engineer
17	Air Test (Drainage System)	Air pressure retention	Within specified limits	Test	QA/QC Engineer
18	Sewer Line Leakage Test	Leak and infiltration check	No leakage	Test	QA/QC Engineer
19	Flow Test	Drainage performance verification	Free and unobstructed flow	Test	QA/QC Engineer
20	Pump Functional Test	Capacity, controls, alarms	Meets design requirements	Test	QA/QC Engineer
21	Tank Leakage Test	Water retention verification	No leakage	Test	QA/QC Engineer
22	System Flushing and Cleaning	Cleanliness of piping systems	No debris or contamination	Inspection	QA/QC Engineer
23	Pre-Commissioning Inspection	Completion of installations and tests	No outstanding defects	Hold Point (H)	QA/QC Manager
24	Final Commissioning	Operational performance verification	Fully functional system	Hold Point (H)	QA/QC Manager
25	Final Handover Inspection	Documentation and acceptance review	All quality records approved	Hold Point (H)	QA/QC Manager

Legend
H = Hold Point (Work cannot proceed without approval)

9. Final Inspection and Handover

- Completion of all inspections and tests

- Submission of QA/QC dossier
- Client/Engineer final walkthrough
- Issuance of completion certificate

ANNEX 4 - ENVIRONMENTAL MITIGATION REQUIREMENTS

S/No	Project Stage and Activity	Potential for Negative Impacts	Mitigation Action for the Negative Impacts
1.	**Implementation**		
1.1	Demolition of existing failed structures, and carting away surplus materials	Avoid adjacent building, and damaging or destroying sensitive terrestrial ecosystems in the course of site	Develop plan to reduce and minimize impacts of falling objects and native flora during construction from damaging inhabitants, ecosystems and labours. Remove large objects without destroying. Cart away surplus debris and other hazardous materials to recommended proper damp sites.
1.2	Site clearing and/ or levelling, and construction stake out	Disturbing natural flow of accumulation of watershed of the land topography and property line	Minimize disturbance of native flora during construction. Remove, without destroying, large
1.3	Drainage	Cause erosion, siltation, changes in natural water flow, and/or damage to aquatic ecosystems when excavated soil is piled inappropriately. Expose inhabitants and crew to risk of falls and injuries in excavation pits.	• Install drainage structure during construction • Putting operation and maintenance programme into effect to prevent and mitigate environmental impacts • Factor climate change scenario • Clearly define the type of the drainage purposing, ditches or self-drainage to control surface water drainage system • Extend run out drains for enough to allow water to dissipate evenly into ground. • Add Gutters to roofs. • Clean and Extend volume of Septic tanks.

1.4	Cladding of the structures	Possibility of contamination of soil and ground water by Ferrous (III) Oxide when rain water falls and drains on rusted iron sheets	The design and specifications binding with BoQ will recommend the use of pre-painted iron sheets to avoid rust. The site supervisors will ensure that the iron sheets delivered for the works are pre-painted and the correct gauge. No Painting at all
2	**Operation**		
1.1	Dust	Pollution of surface or ground water due to dust	Water trucks for reducing dust during rehab of roads
1.2	Concrete Mixing	Hardening of extra concrete after every stage of concrete mixing.	Site supervisors should make sure to be cleaned and removed extra concretes after mixing and casting is completed.

ANNEX 5 - HEALTH, ENVIRONMENTAL, SAFETY & SECURITY PLAN (HESSP) GUIDE

Submit Detailed HESSP Plan. Below is a guide.

DT Global

sinaan
sikastaba | in every way

UK International Development
Partnership | Progress | Prosperity

Health, Environmental, Safety & Security Plan (HESSP) Template

Table of Content

1. Introduction
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7. PERSONAL PROTECTIVE EQUIPMENT
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Construction Environmental, Health, Safety & Security Plan

for

Project Name

Project Location: Insert Project Location

Project Number: Insert Project Number

Prepared By: XYZ Company

Submitted To: SINAAN

Submission Date: ……/…../20….

There is no work, or the job is important than human life and health. This Health, Environmental, Safety & Security Plan (HESSP) will guide the contractor to plan their employees safe working conditions and will not create any damage to the public health or the environment due to the construction activities. Safety must be an integral part of each job. Full participation, cooperation, and support are necessary to ensure the safety and health of all persons and property involved in the project. Good project managers are trying to prepare precise action plans for safety and QC to ensure that the job is done right in a safe surrounding and that no major accidents occur on project site.

XYZ company policy about safety is to perform all tasks and construction activities, safely with full regard to the well-being of workers, visitors, public, and the environment. If a job represents potential safety or health threat, every effort will be made to plan a safe way to do the job. We believe that if there is no any way to do a job safely, then it shall not be done at all. The following pages describe the **XYZ** performance in regard to safety assurance during the implementation of **Insert Project # & Name**, projects that comprises of the following major activities or tasks.

1. ----------

2. ----------
3. ----------
4. ----------
5. ----------
6. ----------
7. ----------
8. ----------
9. ----------

1. Introduction

XYZ Company as a contractor for implementing the project **Insert Project # and Name**

And according to his contractual responsibility has to provide safety plan to maintain safe work performance, protect labor's life and health and not damage the environment. A safety plan is a fundamental element of the subproject implementation system. The plan in general; outlines all activities that should be considered for safety performing construction work on site and includes steps that to be taken during all phases of implementation of the project. This plan has been arranged according to the international safety acts, by SINAAN as a measure to meet local best management practices.

It should be mentioned that this plan is prepared in accordance to the size, extent, and the complexity of the project to be implemented as well as according to the present condition, existing facilities and potential resources available in the region. All management, particularly line managers are responsible for controlling the project site during the implementation of the subproject, and supervise all the issues and mitigation measures that relate to workplace secure, safe, healthy, and without causing environment problems.

2. Objectives

This Safety Plan provides both general and specific information to XYZ Contractors on the requirements and procedures for accident prevention, safety, and security at **(Insert Project # and Name)** construction site. This includes construction, rehabilitation, repair, or services required by SINAAN.

The XYZ Company safety objective is to achieve accident-free construction/PV installation projects. It can only be achieved when all operations have been conducted in a manner that will provide safe working conditions for all employees and labors, and protect the public and all others who may be affected by construction activities. The main objectives of this safety plan can be summarized as follow:

- To eliminate hazards, or minimize it to an acceptable level of risk for people, plant and the environment.
- To promote and maintain (provide) healthy and safe work condition for employee, labors, service providers and all others involving in the construction of the project.

3. Scope

This Site Construction Safety Plan applies to all aspects of the construction/rehabilitation/PV Installation works and associated activities, to be performed for carrying out subproject **(Insert Project # and Name)** from start to the end. XYZ Company is responsible for considering all clauses of these documents during the implementation of the project.

4. Responsibilities

Safety must be an integral part of each job especially construction activities. Full participation, cooperation, and support are necessary to ensure the safety and health of all persons and property involved in the project. So that throughout all phases of construction, managers, supervisors, project managers, construction inspectors, construction safety specialists, and other personnel overseeing construction must monitor field activities frequently to ensure that they are conducted safely. They must ensure that appropriate measures are taken to minimize the possibility of personal injury, damage to property, adverse effects to the environment, and program disruptions or delays resulting from the accident.

All management staffs and especially line managers in XYZ Company will combine their efforts to produce a safe surrounding in the project site. Following is a short description of responsibilities of relevant management authority at the different level of XYZ Company in this regard.

4.1 Director of the Company

The director of the company is ultimately responsible for the safe performance of onsite activities, from start to end of the project. So that:

a- He/She is responsible for producing and enhancing the system of HES&S for the project and facilitate for the smooth running of the system.

b- He should frequently supervise the activities, project management staffs, labors, equipment and job site for safety, and analyze the safety system time by time to bring farther more improvement in HES&S system.

c- He will assign an on-site safety and health professional with authority to enforce all the safety requirements for the project to control all aspects related directly or indirectly to safety issues. It is not necessary the safety, and health professional is a full-time employee of XYZ Company, but he shall visit the site daily, or as common understanding between XYZ Company and SINAAN.

4.2 Project Manager

a- As a main responsible person on job site, the project manager will maintain his close cooperation with the safety specialist. He will always supervise the activities don by safety specialist and provide good support for him to perform his duty in the best manner.

b- He will prepare and maintain necessary facilities for safety and health professional to perform his duties properly and without anxiety. He will cooperate with him to apply safety requirement and regulation in the job site.

4.3 Safety and Health Professional

a- As the focal person for implementing SH&E regulations and plan on job site, he is responsible for creating, developing, applying and conducting safety and health principles in the workplace.

b- He will analyze situations and conditions, predict probably risks and hazards and prepare an action plan to mitigate or eliminate the effects of risk if it happens.

c- He will recognize the urgent needs of all those who are working in job site for protective wearing and equipment and furnish them with required wearing and equipment.

d- In the case of occurrence an accident, he will spend his all efforts to control the situation and take urgent action to mitigate the accident effects to the minimum possible level.

e- The safety and health professional will schedule and hold safety meetings (training) for employees, skilled and unskilled labors and all other those who are involving in construction activities.

f- In addition to above, he will do the short sentence we can summarize the job of safety and health professional as follow:

- Assist in conducting a workplace hazard assessment.
- Assist in PPE selection.
- Assist in developing worker training.
- Conduct periodic audits of PPE program.

4.4 Labors and workers

- Attend training.
- Use personal protection equipment (PPE) when necessary

5. Submittal

XYZ company will submit the following documentation, for review and acceptance by the SINAAN.

- SH&F plan prepared by the company at least one week before commencing physical activities of the project.
- Documented evidence (CV/RESUME) of the Safety Professional.
- On time accident report, if it happened, not latter then the first 12 hrs.

6. Risks & Hazards

Construction sites are hazardous by nature. The environment is not only dangerous, the materials and chemicals that are used also pose a health threat to construction workers and others at the site. To make construction site safe, we can minimize the hazards, train employees in safe work practices and increase awareness of construction site safety. In general, there are several types of risks in construction sites that to be predicted and protected. These risks if happen; produce death, injury,

and delay in project duration, waste of resources and a series of other problems. The important type of them which XYZ company is dealing whit here is health hazards on job site that can be predicted and take protective action plan for them.

Following table describes tasks, related risk, results and how to protect employees and labors.

SAMPLE TABLE FOR SITE RELATED SITE RELATED RISKS AND PREVENTIVE ACTIONS			
Type of work	Risk	Result	Protection and preventive actions
Excavations and trenches	The collapse of the side walls, Damage to underground utilities, falling of humans, equipment, and animals	Death, Physical Injury, Waste of Resources	Prevent the side walls from collapsing or slide, by battering them to a safe angle or supporting them with timber, sheeting or other proper supporting systems. Be aware of underground utilities. Provide substantial barriers: e.g., guard rails and toe boards.
Demolition	Falling material, Dust, and Pollutions, Noise, Vibration	Physical Injury, Sickness, environment damage	Always choose the lowest impact tool available that will still effectively perform the task When breaking up a slab, angle the tool to the surface and make fissures in the material. Avoiding positioning the tool perpendicular to the work
Scaffoldings	The disintegration of Scaffolding parts, Falling workers, and things	Death, Physical Injury, Waste of Resources	Assigning professional scaffolding worker. Selecting the Right Scaffold for the Job. Sound design and proper erection. Installing proper guardrails. Shall not be loaded beyond their rated and maximum capacity. Tag any incomplete scaffold or damaged component out of service
Work in elevations and towers	Falling workers and things	Death, Physical Injury, Waste of Resources	Provide -Safe access to workplace. - full body harness -Anchorage points. –Guardrails. – Maybe canopy
Painting	Existing of lead in oil paint composition	Illness	Using lead-free paints

Note: This table is prepared just as a sample. Companies shall prepare their own according to their projects

7. Personal Protective Equipment

Personal protective equipment (PPE) is used to increase individual safety while performing potentially hazardous tasks. PPE may include safety glasses, hard hats, gloves, respirators, or any equipment or clothing used to protect against injury or illness. XYZ Construction Company will ensure that the proper types of PPE are available and used by employees.

PPE comprises of special clothes and other protective elements as follows

7.1 Safety glasses

With side shields to protect against flying particles (e.g., sawdust, nails, metal shavings, etc.). Goggles should be used to protect against molten metal, liquid chemicals, acids and caustic liquids, chemical gases and vapors. Shaded eyewear should be used to protect against potentially injurious light radiation (e.g., cutting and welding, lasers).

7.2 Hard hats

Must be worn at all times during a construction project until the ceiling is finished or equivalent has been installed. All workers in areas where there is a possible danger of head injury from impact, from falling or flying objects, or from electrical shock and burns must also be protected by a hardhat.

7.3 Footwear:

Leather work shoes are required. Sneakers are not permitted. Protective footwear (e.g., steel toe boots, reinforced soles, insulated, etc.) must be worn in areas where there is the potential for foot injuries from falling or rolling objects, from objects piercing the sole, or from exposed energized electrical conductors that could contact the feet.

7.4 Clothing:

Pants must be worn while at a construction site. Shorts are not permitted.

7.5 Hand protection:

Proper hand protection (e.g., leather work gloves, welder's gloves, appropriate chemical protective gloves, etc.) to protect against cuts or lacerations, abrasions, punctures, hazards of skin absorption of harmful substances, chemical burns, thermal burns, or harmful temperature extremes must be worn.

7.6 Hearing protection

Must be worn on the job site when noise levels exceed the permissible exposure limit defined by the Occupational Safety and Health Administration under requirements outlined in OSHA 1910.95

8. Training

Each worker required to use PPE must receive training in the following:

- how to properly wear PPE
- what types of PPE protect against the hazards identified during the assessment
- when PPE must be used · the proper care and useful life of PPE
- proper disposal of damaged PPE

XYZ Company will certify in writing that workers have received and understood this training. Training assistance is available through EHS.

9. Environmental Mitigation Measures

Environmental protection is a requirement for work on SINAAN projects and will be monitored by SINAAN Engineers. The XYZ Company is therefore required to submit as part of the HESSP, a list of mitigation measures that will be used to reduce or eliminate the risk of adverse environmental impacts. There are several types of environmental risks on construction sites that can be predicted and protected. These risks if they occur can result in degradation of natural resources including surface and groundwater, soil and air quality.

The following table provides a list of standard mitigation measures that should be considered before submitting the HESSP to SINAAN for review and approval.

Project Phase	Activity	Potential Environmental / Social Impact	Mitigation Measures
Pre-Construction	Site selection and layout design	Impacts on sensitive habitats, land use conflicts	• Conduct environmental and social screening • Avoid protected areas, wetlands, cultural heritage sites • Optimize layout to minimize footprint
	Land acquisition and access	Land disputes, loss of livelihoods	Use government/municipal land where possible • Avoid involuntary resettlement • Prepare Resettlement Action Plan/Livelihood Restoration Plan if required

Construction	Site clearing and earthworks	Vegetation loss, soil erosion	• Limit clearing to approved areas • Mark no-go zones • Restore disturbed areas after works
	Excavation and trenching	Soil erosion, sediment runoff	• Install erosion and sediment control (berms, silt fences) • Avoid works during heavy rains
	Material transport and site traffic	Dust emissions, nuisance to communities	• Water spraying on access roads • Cover transported materials • Enforce speed limits
	Construction machinery and equipment	Noise and vibration impacts	• Restrict noisy works to daytime • Maintain equipment • Provide PPE to workers
	Construction waste generation	Soil and visual pollution	• Prepare Waste Management Plan • Segregate recyclable waste • Dispose at approved sites
	Fuel and oil storage	Soil and water contamination	• Store fuel in bunded areas • Spill kits available onsite • Train staff in spill response
	Electrical and working-at-height activities	Worker accidents and injuries	• Implement OHS Plan • Provide PPE • Toolbox talks • Emergency response plan
Operation	PV system operation	Glare and visual impacts	• Use anti-reflective PV modules • Maintain buffer distances
	Routine maintenance	Waste from damaged panels	• Store damaged panels safely • Recycle through approved recyclers

	Electrical systems	Fire and safety risks	• Install fire protection systems • Routine inspections and maintenance
	Stormwater management	Localized flooding or erosion	• Maintain drainage channels • Inspect after heavy rains
Decommissioning	Dismantling of PV system	Waste generation, land degradation	• Prepare Decommissioning Plan • Recycle panels, metals, cables • Restore site

Note: This table is prepared just as a sample. Companies shall prepare their own according to their projects

10. Security Program,

Contractors Security Program should include minimum of the following

a. Project Site Entry Control
b. Restrictions
c. Project Site Security Services
d. CV of a security person
e. Transportation of DT GLOBAL SINAAN Local National staff to and from the job site (if required)
f. Security Plan for provided Facilities/ Equipment (office …etc.)
g. Site Security Plan
h. Security Organization Chart
i. Emergency Procedures
j. Parking of Machinery at site
k. Ascertaining of the Security Threats in advance
l. Reporting Mechanism
m. Evacuation Plan

ANNEX I

BIDDER'S DECLARATION CONFIRMING THE ABSENCE OF ANY CONFLICT OF INTEREST

Subject: BIDDER'S DECLARATION CONFIRMING THE ABSENCE OF ANY CONFLICT OF INTEREST

Ref: PR 051 – Construction of Coastal Development in the Bossaso Waterfront Project (PR 051)

I/We, as authorised representative of_____ (**Insert Company Name Here, and Fill in and sign table below)** certify that:

- I/We do not have any material, personal or financial relationship with **SINAAN Programme/ BOSSASO MUNICIPALITY**, or to its employees;
- I/We will uphold the integrity and impartiality of this procurement process in spirit and in fact;
- I/We will not engage in any corrupt practice during the procurement process i.e. solicit or accept, either directly or indirectly any gift, favour, loan, kickback, payment, commission or any other thing of monetary value from a potential or actual bidder;
- I/We will not engage in fraudulent practice (misrepresentation or omission of facts in order to influence a procurement process;
- I/We will immediately notify the **SINAAN Programme** of any attempt to influence me.

Signed:

NAME	ORGANISATION	TITLE	SIGNATURE