



**Uva Wellassa
University**

**UVA WELLASSA UNIVERSITY OF
SRI LANKA**

**INVITATION FOR BIDS
FOR
CONSTRUCTION OF THE EXAMINATION HALL COMPLEX
FOR THE FACULTY OF MEDICINE OF UVA WELLASSA
UNIVERSITY
(UWU/CW/NCB/25/02)**

Bidder's Name:

Address:

Date:

Non-refundable fee receipt no. & date:

This Bidding Document is Consisted With
Volume 01 And Volume 02 Of The
SBD II

Volume 01

SECTION 1 INSTRUCTION TO BIDDERS

SECTION 3 CONDITIONS OF CONTRACT

SECTION 5 STANDARD FORMS [CONTRACT]

Volume 02

SECTION 2 BIDDING DATA

SECTION 4 CONTRACT DATA

SECTION 6 SPECIFICATIONS

SECTION 7 FORM OF BID

SECTION 8 BILLS OF QUANTITIES

SECTION 9 SCHEDULES

SECTION 10 DRAWINGS

SECTION 11 STANDARD FORMS [BID]

Volume 01

INSTRUCTION TO BIDDERS

Section - 1

INSTRUCTIONS TO BIDDERS

Notes:

Instructions to Bidders shall be read in conjunction with Bidding Data under Section 2 (Volume 2). Matters governing the performance of the Contractor, payments under the Contract, or matters affecting the risks, rights, and obligations of the parties under the Contract are included under Section 3 - Conditions of Contract (Volume 1) and Contract Data under Section 4 (Volume 2). However, a few such information is reproduced in this section to facilitate the bidders to price their bids.

Instructions to Bidders will not be a part of the Contract and will cease to have effect once the Contract is signed.

Note :

Bidders may consider the information printed in blue colour in the document as a checklist, when preparing their bids. However, it is the responsibility of the bidders to comply with all the requirements given in the bidding document.

INVITATION FOR BIDS (IFB)

Invitation for Bids (IFB)**CONSTRUCTION OF THE EXAMINATION HALL COMPLEX FOR THE
FACULTY OF MEDICINE OF UVA WELLASSA UNIVERSITY
(UWU/CW/NCB/25/02)**

1. The Chairman of the Department Procurement Committee of the Uva Wellassa University now invites sealed bids from eligible and qualified bidders for the Construction of the examination hall Complex for the Faculty of Medicine Uva Wellassa University as described below

Scope of work : The contract is consisting of constructing 2 storied building with MEP works, landscaping works etc. The construction period is 7 months

2. Bidding will be conducted through National Competitive Bidding Procedure.
3. To be eligible for contract award, the successful bidder shall not have been blacklisted and shall meet the requirements of being registered in CIDA as a Grade C4 or above under Building Construction.
4. Qualification requirements to qualify for contract award included in the bidding data and contract data.
5. Interested bidders may obtain further information from Deputy Registrar, Capital Works Division of the Uva Wellassa University, Passara road Badulla, and inspect the bidding documents at the address given below from 9.00 a.m. to 3.00p.m on working days.
6. A complete set of Bidding Documents in English language may be purchased by interested bidders on the submission of a written application to the Deputy Registrar, Capital Works Division, Uva Wellassa University, Passara Road, Badulla from 19th October 2025 until 10th November 2025 from 0900 hrs to 1500 hrs. upon payment of a non refundable fee of Rs.30,000.00 The method of payment will be in cash to the Shroff counter/ deposit to the Bank of Ceylon account No 3114820 of Uva Wellassa University.
7. Bids shall be delivered to the Office of the Registrar, Uva wellassa University, Passara Road Badulla on or before 2.00p.m on 11th November 2025. Late bids will be rejected. Bids will be opened soon after closing in the presence of the bidders' representatives who choose to attend.
8. All bids shall be accompanied by an unconditional Valid Bid Bond issued from the bank approved by the Central Bank of Sri Lanka for a value of Rs.1,520,000.00.
9. All the bids shall be enclosed with the PCA-03 certificate by registering the bid under public contract Act,Otherwise.The bid will be rejected.

Deputy Registrar,

Capital Works Division

Tel :055-3050847.Fax :055-2226633

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Instructions to Bidders

A. General

1. **Scope of Bid**
 - 1.1 The Employer, as defined in the Bidding Data and Contract Data hereinafter “the Employer,” wishes to receive Bids for the construction of Works, and remedying defects as described in this document hereinafter referred to as “the Works.”
 - 1.2 The successful bidder will be expected to complete the Works within the period stated in the Bidding Data and Contract Data from the date of commencement of the Works.
2. **Source of Funds**
 - 2.1 Works will be financed by the source given in Bidding Data.
3. **Ethics, Fraud and Corruption**
 - 3.1 The attention of the bidders is drawn to the following guidelines of the Procurement Guidelines published by National Procurement Agency:
 - Parties associated with procurement actions, namely, suppliers/contractors and officials shall ensure that they maintain strict confidentiality throughout the process;
 - Officials shall refrain from receiving any personal gain from any Procurement Action. No gifts or inducement shall be accepted. Suppliers/contractors are liable to be disqualified from the bidding process if found offering any gift or inducement which may have an effect of influencing a decision or impairing the objectivity of an official.
 - 3.2 The attention of the bidders is also drawn to the Sub-Clause 15.2 (g) of the Conditions of Contract (Section 3) which shall apply to any bidder.
4. **Eligibility and Qualification of the Bidder**
 - 4.1 All bidders shall include the following information and documents with their Bid in Section 9 - Schedules:
 - (a) Certified copies of original documents defining the constitution or legal status, place of registration, and principle place of business: written power of attorney authorizing the signatory of the Bid to commit the bidder; and
 - (b) In the event that pre-qualification of bidder is a requirement, only Bids from those who satisfy the pre-qualification criteria will be considered for award of Contract. These qualified bidders should submit with their Bids any information updating their original pre-qualification applications or, alternatively, confirm in their Bids that the information submitted with their applications for pre-qualification has not materially changed from the date of Bid submission. The update or confirmation should be provided in Section 9.

As a minimum requirement, bidders shall update the following information:

- (i) evidence of access to lines of credit and availability of other financial resources;
 - (ii) a statement of financial predictions of the bidder for the 12 months, commencing from the closing date of Bids including the effect of known commitments;
 - iii) work commitments of the other projects under taken since pre-qualification;
 - iv) availability of equipment that may be required for the project.
- (c) In the event that pre-qualification of bidders is not a requirement, unless otherwise stated in the Bidding Data, all bidders shall include the following information and documents as a minimum with their Bids in Section 9 – Schedules:
- i) reports on the financial standing of the bidder, such as profit and loss statements and auditor's reports for the past three years;
 - ii) evidence of adequacy of working capital for this Contract (access to line(s) of credit and availability of other financial resources);
 - iii) total monetary value of construction work performed for each of the last five years;
 - iv) experience in works of a similar nature and size for each of the last five years, and details of work under way or contractually committed;
 - v) major items of construction equipment proposed to carry out the Contract;
 - vi) qualifications and experience of key Site Management and Technical Personnel proposed for the Contract;
 - vii) proposals for subcontracting components of the Works amounting to more than 10 percent of the Contract Amount; and
 - viii) All bidders shall confirm in Section 7, Form of Bid, a statement that the bidder (including all members of a joint venture and subcontractors) is not associated directly or indirectly in the preparation of the bidding document.
 - ix) list any other

4.2 To qualify for the award of the Contract, bidder shall meet the following minimum qualifying criteria:

- (a) Domestic bidders, should have been registered and hold a valid registration with Institute for Construction Training and Development (ICTAD), under the grade and specialty given in Bidding Data, Section 2;



- (b) average annual volume of construction work performed in last five years shall be not less than the amount specified in Bidding Data;
- (c) ✓ experience as prime contractor in the construction of at least one works of a nature and complexity similar to the Works over the last 10 years (to comply with this requirement, works cited should be at least 70 percent complete).
- (d) proposals for the timely acquisition (own, lease, hire, etc.) of the essential equipment if any specified in Bidding Data;
- (e) a Contract Manager with qualifications and experience as given in Bidding Data;
- (f) liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, of not less than the amount specified in Bidding Data.
- (g) shall not be a blacklisted contractor at the time of bidding and at the time of award of contract.

5. Joint Ventures

- 5.1 Bids submitted by a joint venture of two or more firms as partners shall comply with the following requirements:
- (a) the Bid shall include all the information listed in Clause 4.1 above for each joint venture partner
 - (b) the bid security, the Bid, and in case of a successful Bid, the Agreement, shall be signed so as to be legally binding on all partners;
 - (c) one of the partners shall be nominated by others authorizing to act for an on behalf of the joint venture. This authorization shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners;
 - (d) the partner so authorized shall be authorized to incur liabilities and receive instructions for and on behalf of any and all partners of the joint venture and the entire execution of the Contract, including payment, shall be done exclusively with the partner in charge;
 - (e) all partners of the joint venture shall be liable jointly and severally for the execution of the Contract in accordance with the contract terms, and a statement to this effect shall be included in the authorization mentioned under (c) above, as well as in the Bid and in the Agreement (in case of a successful Bid); and
 - (f) a copy of the joint venture agreement entered into by all partners shall be submitted with the Bid. Alternatively, a memorandum of understanding to execute a joint venture agreement in the event of a successful Bid shall be signed by all partners and submitted with the Bid, together with a copy of the proposed agreement.



- 5.2 The qualification for each of the partners of a joint venture shall be added together to determine the bidder's compliance with the minimum qualifying criteria of Sub-Clause 4.2(a), (b) and (e); however, for a joint venture to qualify, each of its partners must meet at least 25 percent of minimum criteria 4.2 (a), (b), and (e); and the partner in charge must satisfy at least 40 percent of those minimum criteria. Failure to comply with this requirement will result in rejection of the joint venture's Bid. Subcontractors' experience and resources will not be taken into account in determining the bidder's compliance with the qualifying criteria.

6. One Bid per Bidder

- 6.1 Each bidder shall submit only one Bid, either by himself, or as a partner in a joint venture. A bidder who submits or participates in more than one Bid will be disqualified.

7. Cost of Bidding

- 7.1 The bidder shall bear all costs associated with the preparation and submission of its Bid, and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

8. Site Visit

- 8.1 The bidder is advised to visit and examine the Site of Works and its surroundings and obtain 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.

- 8.2 The bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and lands for the purpose of such visit, but only upon the express condition that the bidder, its personnel, and agents will release and indemnify the Employer and its personnel and agents from and against all liability in respect thereof, and will be responsible for death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the inspection.

- 8.3 The Employer may conduct a Site visit concurrently with the pre-bid meeting referred to in Clause 19.

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B. Bidding Documents

9. Content of Bidding Documents

- 9.1 The bidding documents, consists of two volumes are those stated below and should be read in conjunction with any addenda with Clause 11:

Volume 1

Section 1 - Instructions to Bidders

Section 3 - Conditions of Contract

Section 5 - Standard Forms [Contract]

Volume 2

Invitation for Bids

Section 2 - Bidding Data

Section 4 - Contract Data

Section 6 - Specifications

Section 7 - Form of Bid

Section 8 - Bills of Quantities

Section 9 - Schedules

Section 10 - Drawings

Section 11 - Standard Forms [Bid]

**10. Clarification of
Bidding Documents**

- 10.1 A prospective bidder requiring any clarification of the bidding documents or any objection to restrictive specifications, may notify the Employer in writing or facsimile at the Employer's address indicated in the Bidding Data. The Employer will respond to any such request for clarification that he receives earlier than 14 Days prior to the deadline for submission of Bids. Copies of the Employer's response will be forwarded to all purchasers of the bidding documents, including a description of the inquiry but without identifying its source.

**11. Amendment of
Bidding Documents**

- 11.1 At any time prior to the deadline for submission of Bids, the Employer may amend the bidding documents by issuing addenda.
- 11.2 Any addendum thus issued shall be part of the bidding documents pursuant to Sub-Clause 9.1 and shall be communicated in writing or by facsimile to all purchasers of the bidding documents. Prospective bidders shall promptly acknowledge receipt of each addendum by facsimile to the Employer.
- 11.3 To give prospective bidders reasonable time in which to take an addendum into account in preparing their Bids, the Employer shall extend as necessary the deadline for submission of Bids, in accordance with Clause 22.

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C. Preparation of Bids**12. Language of Bid**

- 12.1 The Bid, and all correspondence and documents related to the Bid exchanged by the bidder and the Employer, shall be written in English Language. Supporting documents and printed literature furnished by the bidder may be in another language provided they are accompanied by an accurate translation of the relevant passages in English language, in which case, for purposes of interpretation of the Bid, the English translation shall prevail.

13. Documents Comprising the Bid

13.1 The Bid submitted by the bidder shall comprise the following:

- (A) Enclosed in the envelope marked as “ORIGINAL” ;
 - (a) Duly filled and signed Form of Bid (in the format indicated in Section 7);
 - (b) Bid Security
 - (c) Power of Attorney for the signatory to the Bid
 - (d) Section 2 - Bidding Data;
 - (e) Section 4 - Contract Data;
 - (f) Section 6 - Specifications;
 - (g) Section 8 – Priced Bills of Quantities;
 - (h) Section 9 – Duly filled Schedules;
 - (i) Section 10 – Drawings; and
 - (j) Any other information required to be completed and submitted by bidders, as specified in the Bidding Data.

and

- (B) Enclosed in the envelope marked as “COPY”
 - (a) Duly filled and signed Form of Bid (in the format indicated in Section 7);
 - (b) Section 8 – Priced Bills of Quantities;
 - (c) Section 9 – Duly filled Schedules; and
 - (d) Any other information required to be completed and submitted by bidders, as specified in the Bidding Data.

14. Bid Prices

14.1 Unless stated otherwise in the bidding documents, the Contract shall be for the whole Works as described in Sub-Clause 1.1, based on the unit rates and prices in the Bills of Quantities submitted by the bidder.

14.2 The bidder shall fill in rates and prices for all items of the Works described in the Bills of Quantities. Items against which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the rates for other items and prices in the Bills of Quantities.

14.3 All duties, taxes, and other levies payable by the Contractor under the Contract, or for any other cause, as of the date 28 Days prior to the deadline for submission of Bids, shall be included in the rates and prices and the total bid price submitted by the bidder. However the VAT component shall be entered separately in the space provided in the BOQ.

14.4 Unless otherwise provided in the Bidding Data, the rates and prices quoted by the bidder are subject to adjustment during the performance of the Contract in accordance with the provisions of Sub-Clause 13.7 of the Conditions of Contract.

- 15. Currencies of Bid and Payment**
- 15.1 The rates and prices shall be quoted by the bidder entirely in Sri Lanka Rupees unless otherwise provided in Bidding Data.
- 16. Bid Validity**
- 16.1 Bids shall remain valid for the period stipulated in the Bidding Data, after the deadline for Bids submission as specified in sub clause 22.1.
- 16.2 In exceptional circumstances, prior to expiry of the original Bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing. A bidder may refuse the request without forfeiting its bid security. A bidder agreeing to the request will not be required or permitted to modify its Bid, but will be required to extend the validity of its bid security for the period of the extension and in compliance with Clause 17 in all respects.
- 17. Bid Security**
- 17.1 The bidder shall furnish, as part of its Bid, a bid security in the amount stipulated in the Bidding Data.
- 17.2 The bid security shall, at the bidder's option, be in the form of a bank draft, letter of credit or a guarantee from a reputed bank or insurance guarantee from a company located in Sri Lanka or from an acceptable bonding organization in Sri Lanka. The format of the bid security should be in accordance with the specimen form of bid security included in the bidding document or another form acceptable to the Employer. bid security shall be valid for the period given in the Bidding Data;
- 17.3 Any Bid not accompanied by an acceptable bid security shall be rejected by the Employer as non-responsive. The bid security of a joint venture shall be issued so as to commit fully all partners to the proposed joint venture.
- 17.4 The bid securities of unsuccessful bidders will be returned as promptly as possible, but not later than 28 Days after the expiration of the original period, or any subsequently extended period, of Bid validity.
- 17.5 The bid security of the successful bidder will be returned when the bidder has signed the Agreement and furnished the required Performance Security.
- 17.6 The bid security may be forfeited:
- (a) if the bidder withdraws its Bid, after Bid opening during the period of Bid validity;
 - (b) bidder does not accept the correction of its bid price, pursuant to Clause 29; or
 - (c) in the case of a successful bidder, if he fails within the specified time limit to:
 - (i) sign the Agreement; or
 - (ii) furnish the required Performance Security

**18. Alternative
Proposals by
Bidders**

18.1 Except as provided under Sub-Clause 18.2 below, bidders wishing to offer technical alternatives to the requirements of the bidding documents must first price the Employer's design as described in the bidding documents and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methodology and other relevant details. Only the technical alternatives, if any, of the lowest evaluated bidder conforming to the basic technical requirements shall be considered by the Employer.

18.2 When bidders are permitted to submit alternative technical solutions for specified parts of the Works, such parts shall be described in Section 6 – Specifications.

19. Pre-Bid Meeting

19.1 The bidder's designated representative is invited to attend a pre-bid meeting, which, if convened, will take place at the venue and time stipulated in the Bidding Data.

19.2 The purpose of the meeting will be to clarify issues and to answer questions on any matter that may be raised at that stage.

19.3 The bidder is requested, as far as possible, to submit any questions in writing or by facsimile, to reach the Employer not later than one week before the meeting. It may not be practicable at the meeting to answer questions received late, but questions and responses will be transmitted in accordance with the following sub-clause.

19.4 Minutes of the meeting, including the text of the questions raised and the responses given, together with any responses prepared after the meeting, will be transmitted without delay to all purchasers of the bidding documents. Any modification of the bidding documents listed in Sub-Clause 10.1 that may become necessary as a result of the pre-bid meeting shall be made by the Employer exclusively through the issue of an addendum pursuant to Clause 11 and not through the minutes of the pre-bid meeting.

19.5 Non-attendance at the pre-bid meeting will not be a cause for disqualification of a bidder.

**20. Format and
Signing of Bid**

20.1 The bidder shall prepare one original of the documents comprising the Bid as described in Clause 13 of these Instructions to bidders clearly marked "ORIGINAL." In addition, the bidder shall submit a copy of the Bid, clearly marked "COPY." In the event of discrepancy between them, the original shall prevail.

20.2 The original and the copy of the Form of Bid shall be typed or written in indelible ink and shall be signed by a person or persons duly authorized to sign on behalf of the bidder, pursuant to Paragraphs 4.1 (a) or 5.1 (c), as the case may be. All pages of the Bid where entries or amendments have been made shall be initialed by the person or persons signing the Bid.

20.3 The Bid shall contain no alterations, omissions, or additions, unless such corrections are initialed by the person or persons signing the Bid.

D. Submission of Bids

21. Sealing and Marking of Bids

21.1 The bidder shall seal the original and the copy of the Bid in separate envelopes, duly marking the envelopes as "ORIGINAL" and "COPY." The envelopes shall then be sealed in an outer envelope.

21.2 The inner and outer envelopes shall :

- (a) be addressed to the Employer at the address provided in the Bidding Data;
- (b) bear the name and identification number of the Contract as defined in the Bidding Data; and
- (c) provide a warning not to open before the time and date for bid opening, as specified in the Bidding Data.

21.3 In addition to the identification required in Sub-Clause 21.2, the inner envelopes shall indicate the name and address of the bidder to enable the Bid to be returned unopened in case it is declared "late" pursuant to Clause 23, and for matching purposes under Clause 24.

21.4 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the Bid. If the outer envelope discloses the bidder's identity, the Employer will not guarantee the anonymity of the Bid submission, but this shall not constitute grounds for rejection of the Bid.

22. Deadline for Submission of Bids

22.1 Bids must be received by the Employer at the address specified in Sub-Clause 21.2 no later than the time and date stipulated in the Bidding Data.

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

23. Late Bids

23.1 Any Bid received by the Employer after the deadline for submission of Bids prescribed in Clause 22 will be returned unopened to the bidder.

24. Modification and Withdrawal of Bids

24.1 The bidder may modify or withdraw its Bid after Bid submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline for submission of Bids.

24.2 The bidder's modification or withdrawal notice shall be prepared, sealed, marked, and delivered in accordance with the provisions of Clauses 20 & 21, with the outer and inner envelopes additionally marked "Modification" or "Withdrawal," as appropriate.

- 24.3 No Bid may be modified by the bidder after the deadline for submission of Bids, except in accordance with sub clause 29.2.
- 24.4 Withdrawal of a Bid during the interval between the deadline for submission of Bids and expiration of the period of Bid validity specified in Clause 16 may result in the forfeiture of the bid security pursuant to Sub-Clause 17.6.
- 24.5 Bidders may only offer discounts to, or otherwise modify the prices of their Bids by submitting Bid modifications in accordance with this clause, or included in the original Bid submission.

E. Bid Opening and Evaluation

25. Bid Opening

- 25.1 The Employer will open the Bids, including withdrawals and modifications made pursuant to Clause 24, in the presence of bidders' authorized representatives who choose to attend, at the time, date, and location stipulated in the Bidding Data. The bidders' representatives who are present shall sign a register evidencing their attendance.
- 25.2 Envelopes marked "WITHDRAWAL" shall be opened first, and the name of the bidder shall be read out. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause 24 shall not be opened. Subsequently, all envelopes marked "MODIFICATION" shall be opened and the submissions therein read out in appropriate detail.
- 25.3 The envelope marked as "Original" will be opened. If no envelope is marked as "Original" the Employer may open one of the envelopes. If the required documents are available in that envelope, Employer may mark it as the "Original" and the unopened envelope as the "Copy". If so the envelope marked as copy will remain unopened. If any of the required document is missing in the envelope opened first, the Employer may open the other envelope to search such missing information and transfer such documents to one envelope and mark it as "Original" and resealed the other envelope and mark as "Copy".
- 25.4 The bidders' names, the bid prices, including any alternative bid price or deviation, any discounts, Bid modifications and withdrawals, the presence (or absence) and amount of bid security, and any such other details as the Employer may consider appropriate, will be announced by the Employer at the opening. No Bid shall be rejected at Bid opening except for late Bids pursuant to Clause 23.
- 25.5 The Employer shall prepare minutes of the Bid opening, including the information disclosed to those present in accordance with Sub-Clause 25.3.
- 25.6 Bids not opened and read out at Bid opening shall not be considered further for evaluation, irrespective of the circumstances.

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- 26. Process to be Confidential**
- 26.1 Information relating to the examination, clarification, evaluation, and comparison of Bids, and recommendations for the award of a contract, shall not be disclosed to bidders or any other persons not officially concerned with such process until the award to the successful bidder has been announced. Any effort by a bidder to influence the Employer, with respect to processing of Bids or award decisions may result in the rejection of the bidder's Bid.
- 27. Clarification of Bids**
- 27.1 To assist in the examination, evaluation, and comparison of Bids, the Employer may, at its discretion, ask any bidder for clarification of its Bid, including breakdowns of unit rates. The request for clarification and the response shall be in writing or by facsimile, but no change in the price or substance of the Bid shall be sought, offered, or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the Bids in accordance with Clause 29.
- 27.2 From the time of Bid opening to the time of Contract award, if any bidder wishes to contact the Employer on any matter related to the Bid, it should do so in writing.
- 28. Examination of Bids and Determination of Responsiveness**
- 28.1 Prior to the detailed evaluation of bids, the Employer will determine whether each Bid (a) meets the eligibility criteria; (b) has been properly signed; (c) is accompanied by the required securities; (d) is substantially responsive to the requirements of the bidding documents; and (e) provides any clarification and/or substantiation that the Employer may require to determine responsiveness pursuant to Sub-Clause 28.2. Furthermore, the bidder shall, if required, provide substantiation that the Employer may require, pursuant to Clause 27.
- 28.2 A substantially responsive Bid is one that conforms to all the terms, conditions, and specifications of the bidding documents without material deviation or reservation. A material deviation or reservation is one (a) that affects in any substantial way the scope, quality, or performance of the Works; (b) that limits in any substantial way, inconsistent with the bidding documents, the Employer's rights or the bidder's obligations under the contract; or (c) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive Bids.
- 28.3 If a Bid is not substantially responsive, it will be rejected by the Employer and may not subsequently be made responsive by correction or withdrawal of the nonconforming deviation or reservation.
- 29. Correction of Errors**
- 29.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic errors. Errors will be corrected by the Employer as follows:
- (a) where there is a discrepancy between the amounts in figures and in words, the amount in words will govern; and
 - (b) where there is a discrepancy between the unit rate and the line item total resulting from multiplying the unit rate by the quantity, the unit rate as quoted will govern, unless in the opinion of the Employer there is an obviously gross

mis-placement 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.

29.2 If the bid price changes by the above procedure, the amount stated in the Form of Bid shall be adjusted with the concurrence of the bidder and shall be considered as binding upon the bidder.

29.3 If the bidder does not accept the corrected amount of Bid, its Bid will be rejected, and the bid security may be forfeited in accordance with paragraph 17.6 (b).

**30. Evaluation and
Comparison of Bids**

30.1 The Employer will evaluate and compare only the Bids determined to be substantially responsive in accordance with Clause 28.

30.2 In evaluating the Bids, the Employer will determine for each Bid the Evaluated bid price by adjusting the Bid price as follows:

- (a) making any correction for errors pursuant to Clause 29;
- (b) excluding provisional sums and the provision, if any, for contingencies in the Bills of Quantities, but including Dayworks, where priced competitively;
- (c) converting the amount resulting from applying (a) to (b) above, if relevant, to Sri Lanka Rupees in accordance with Bidding Data Clause 15.1; and
- (d) making an appropriate adjustment on sound technical and/or financial grounds for any other quantifiable acceptable variations, deviations, or alternative offers.

30.3 The Employer reserves the right to accept or reject any variation, deviation, or alternative offer. Variations, deviations, alternative offers, and other factors that are in excess of the requirements of the bidding documents shall not be taken into account in Bid evaluation.

30.4 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied over the period of execution of the Contract, shall not be taken into account in Bid evaluation.

30.5 If the Bid, which results in the lowest evaluated bid price, is seriously unbalanced or front loaded in relation to the Engineer's estimate of the items of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analyses for any or all items of the Bills of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, taking into consideration the schedule of estimated Contract payments, the Employer may require that the amount of the Performance Security set forth in Clause 35 be increased at the expense of the bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

**31. Preference for
Domestic Bidders**

31.1 Not used unless specified in Bidding Data.

F. Award of Contract

32. Award

32.1 Subject to procedures if provided under Sub-Clause 32 under Bidding Data and Subject to Clause 33, the Employer will award the Contract to the bidder whose Bid has been determined to be substantially responsive to the bidding documents and who has offered the lowest Evaluated bid price pursuant to Clauses 30 and 31 (if applicable), provided that such bidder has been determined to be (a) eligible in accordance with the provisions of Sub-Clause 3, and (b) qualified in accordance with the provisions of Clause 4 & 5.

32.2 Even though the bidders meet the eligibility and qualification criteria specified they are subjected to disqualify if they have:

- (a) made misleading or false representation in the forms, statement and attachments submitted in proof of the eligibility and qualification requirements ; or
- (b) record of poor performance in previous contracts, such as abandoning the works, inordinate delays resulted in payment of liquidated damages up to the maximum limit specified in the contract etc.

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

33.1 The Employer reserves the right to accept or reject any Bid, and to annul the bidding process and reject all Bids, at any time prior to award of Contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the grounds for the Employer's action.

34. Notification of Award and signing of Agreement

34.1 Prior to expiration of the period of Bid validity prescribed by the Employer, the Employer will notify the successful bidder that its Bid has been accepted. This letter (hereinafter and in the Conditions of Contract called the "Letter of Acceptance") shall specify the sum that the Employer will pay the Contractor in consideration of the execution and completion of the Works and the remedying of any defects therein by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called "the Initial Contract Price").

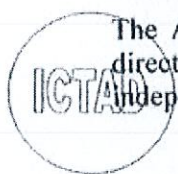
34.2 The notification of award will constitute the formation of the Contract.

34.3 Upon the successful bidder's furnishing of the Performance Security pursuant to ITB Clause 35, the Employer will promptly notify the name of the winning bidder to each unsuccessful bidder and will discharge the bid security of the unsuccessful bidders, pursuant to ITB Clause 17.

34.4 At the same time that the Employer notifies the successful bidder that its Bid has been accepted, the Employer will send the bidder the Agreement in the form provided in the bidding documents, incorporating all Agreements between Parties.

34.5 The Agreement will incorporate the Memorandum of Understanding (if any) between the Employer and the successful bidder, and shall be signed by the Employer and the successful bidder.

- 34.6 The Employer shall notify the successful bidder the date, time and venue for the signing of the Agreement. The Agreement shall be signed within 28 Days of Letter of Acceptance.
- 35. Performance Security**
- 35.1 Within 14 Days of receipt of the Letter of Acceptance, the successful Bidder shall furnish to the Employer a Performance Security in the amount specified in the Bidding Data in the form given in the Bidding Data or some other form acceptable to the Employer.
- 35.2 Failure of the successful bidder to comply with the requirements of Clauses 34 or 35 shall constitute a breach of Contract, cause for annulment of the award, forfeiture of the bid security, and any such other remedy the Employer may take under the Contract, and the Employer may resort to awarding the Contract to the next ranked bidder.
- 35.3 During the bid evaluation if the Employer found that the rate/s or amount/s quoted by the bidder is/ are unreasonably low and could not furnish rational justification to the Employer, the Employer may request the bidder to furnish a Performance Security to an increased amount than that specified in the Contract Data.
- 36. Advance Payment & Security**
- 36.1 The Employer will provide an advance payment as stipulated in the Conditions of Contract, subject to a maximum amount of 20% of the Initial Contract Price, within 14 Days of the Contractor submitting an acceptable guarantee and upon submission of Performance Security.
- 37. Adjudicator**
- 37.1 The Employer and the Contractor shall mutually agree on the appointment of an Adjudicator within 28 Days from the Commencement Date.
- If mutual consent is not reached or resorted to or the Adjudicator was not proposed then the Adjudicator shall be appointed by the Institute for Construction Training and Development (ICTAD) at the request of either Party after the expiry of 28 Days.
- The Adjudicator shall be a person not associated with the project directly or indirectly and who could demonstrate impartiality and independence in his functions.



Section - 3

CONDITIONS OF CONTRACT

Conditions of Contract shall be read in conjunction with the Section 4 - Contract Data in Volume 2, which shall take precedence over the Conditions of Contract

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Conditions of Contract

1.0 General Provisions

- 1.1 Definitions** In the Conditions of Contract ("these Conditions"), and Contract Data, the following words and expressions shall have the meanings stated.
- 1.1.1 The Contract**
- 1.1.1.1 **"Contract"** means the Contract Agreement, the Letter of Acceptance, Memorandum of Understanding (if any), the Form of Bid, these Conditions, the Contract Data, the Specifications, the Drawings, the Bills of Quantities, the Schedules and further documents (if any) which are listed in the Contract Agreement or in the Letter of Acceptance.
- 1.1.1.2 **"Contract Agreement"** means the contract agreement (if any) referred to Sub-Clause 1.6 (*Contract Agreement*)
- 1.1.1.3 **"Letter of Acceptance"** means the letter issued by the Employer indicating the acceptance of the Bid.
- 1.1.1.4 **"Contract Data"** means the completed pages entitled contract data and given in Section 4 which forms part of the conditions of contract.
- 1.1.1.5 **"Specification"** means the document entitled specification, as included in the Contract, and any additions and modifications to the specification in accordance with the Contract. Such document specifies the Works.
- 1.1.1.6 **"Schedules"** means the document(s) entitled schedules and given in Section 9 completed by the Contractor and submitted with the Bid, as included in the Contract.
- 1.1.1.7 **"Form of Bid"** means the document entitled form of bid, which is completed by the Contractor and includes the signed offer to the Employer for the Works.
- 1.1.1.8 **"Bid"** means the Form of Bid and all other documents, which the Contractor submitted with the Bid, as included in the Contract.
- 1.1.1.9 **"Drawings"** means the drawings of the Works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Employer in accordance with the Contract.
- 1.1.1.10 **"Bills of Quantities" and "Dayworks Schedule"** means the documents so named (if any) which are comprised in the Contract.
- 1.1.2 Parties and Persons**
- 1.1.2.1 **"Party"** means either or both the Employer or the Contractor, as the context requires.

- 1.1.2.2 **"Employer"** means the person named as employer in the Contract Data and the legal successors in title to this person.
- 1.1.2.3 **"Contractor"** means the person(s) named as contractor in the Bid accepted by the Employer and the legal successors in title to this person(s).
- 1.1.2.4 **"Engineer"** is the person named in the Contract Data (or any other competent person appointed by the Employer and notified to the Contractor) who is responsible for administering and supervising the execution of the work. Such person may be an engineer, architect or any other technical person. In the absence of such appointment the Employer himself.
- 1.1.2.5 **"Contractor's Representative"** means the person appointed from time to time by the Contractor and notified to the Engineer, under Sub-Clause 4.3 (*Contractor's Representative*), who acts on behalf of the Contractor.
- 1.1.2.6 **"Employer's Personnel"** means staff, labour and other employees of the Employer; and any other personnel notified to the Contractor, by the Employer, as Employer's Personnel.
- 1.1.2.7 **"Contractor's Personnel"** means the Contractor's Representative and all personnel whom the Contractor utilises on Site, who may include the staff, labour and other employees of the Contractor and of each Subcontractor; and any other personnel assisting the Contractor in the execution of the Works.
- 1.1.2.8 **"Subcontractor"** means any person named in the Contract as a subcontractor, or any person appointed as a subcontractor, for a part of the works; and the legal successors in title to each of these persons.
- 1.1.2.9 **"The Adjudicator"** is the person appointed jointly by the Employer and the Contractor or by the Institute for Construction Training and Development (ICTAD) as the case may be, in accordance with Sub-Clause 19.3 (*Procedure for Adjudication*) or Sub-Clause 19.4 (*Replacement of Adjudicator*) for determination of the disputes in the first instance, as provided for in Clause 19.0 (*Claims, Disputes and Arbitration*) hereunder.
- 1.1.3 **Dates, Tests, Periods and Completion**
- 1.1.3.1 **"Base Date"** means the date 28 Days prior to the latest date for submission of the Bid.
- 1.1.3.2 **"Commencement Date"** means the date notified under Sub-Clause 8.1 (*Commencement of Works*)
- 1.1.3.3 **"Time for Completion"** means the time for completing the Works or a Section (as the case may be) under Sub-Clause 8.2 (*Time for Completion*) as stated in the Contract Data with any extension under Sub-Clause 8.4 (*Extension of Time for Completion*), calculated from the Commencement Date.

- 1.1.3.4 **"Tests on Completion"** means the tests which are specified in the Contract or agreed by both Parties or instructed as a variation, and which are carried out under Clause 9.0 (*Tests on Completion*) before the Works or a Section (as the case may be) are taken over by the Employer.
- 1.1.3.5 **"Taking-Over Certificate"** means a certificate issued under Clause 10.0 (*Employer's Taking Over*).
- 1.1.3.6 **"Tests after Completion"** means the tests (if any) that are specified in the Contract and which are carried out in accordance with the provisions of the Contract after the Works or a Section (as the case may be) is taken over by the Employer.
- 1.1.3.7 **"Defects Notification Period"** means the period for notifying defects in the Works or a Section (as the case may be) under Sub-Clause 11.1 (*Completion of Outstanding Work and Remedying Defects*) as stated in the Contract Data with any extension under Sub-Clause 11.3 (*Extension of Defects Notification Period*), calculated from the date on which the Works or Section is completed as certified under Sub-Clause 10.1 (*Taking Over of the Works and Sections*).
- 1.1.3.8 **"Performance Certificate"** means the certificate issued under Sub-Clause 11.8 (*Performance Certificate*).
- 1.1.3.9 **"Day"** means a calendar day and **"Year"** means 365 Days.
- 1.1.4 **Money and Payments**
- 1.1.4.1 **"Initial Contract Price"** means the amount stated in the Letter of Acceptance for the execution and completion of the Works and remedying of any defects.
- 1.1.4.2 **"Contract Price"** means the amount stated in the Letter of Acceptance, subjected to adjustments in accordance with the Contract.
- 1.1.4.3 **"Cost"** means all expenditure reasonably incurred (or to be incurred) by the Contractor, whether on or off the Site, including overhead and similar charges, but does not include profit.
- 1.1.4.4 **"Final Payment Certificate"** means the payment certificate issued under Sub-Clause 14.12 (*Issue of Final Payment Certificate*).
- 1.1.4.5 **"Final Statement"** means the statement defined in Sub-Clause 14.10 (*Application for Final Payment Certificate*).
- 1.1.4.6 **"Interim Payment Certificate"** means a payment certificate issued under Clause 14.0 (Contract Price and Payment) other than the Final Payment Certificate.
- 1.1.4.7 **"Payment Certificate"** means a payment certificate issued under Clause 14.0 (Contract Price and Payment).
- 1.1.4.8 **"Provisional Sum"** means a sum (if any), which is specified in the Contract as a provisional sum, for the execution of any part

of the Works or for the supply of Plant, Materials or services under Sub-Clause 13.4 (*Provisional Sums*)

1.1.4.9 **"Retention Money"** means the accumulated retention moneys, which the Employer retains under Sub-Clause 14.3 (*Application for Interim Payment Certificates*) and pays under Sub-Clause 14.8 (*Payment of Retention*).

1.1.4.10 **"Statement"** means a statement submitted by the Contractor as part of an application, under Clause 14.0 (*Contract Price and Payment*) for a payment certificate.

1.1.5 Works and Goods

1.1.5.1 **"Contractor's Equipment"** means all apparatus, machinery, vehicles and other things required for the execution and completion of the Works and the remedying of any defects.

1.1.5.2 **"Goods"** means Contractor's Equipment, Materials, Plant and Temporary Works, or any of them as appropriate.

1.1.5.3 **"Materials"** means things of all kinds (other than Plant) intended to form or forming part of the Permanent Works, including the supply-only materials (if any) to be supplied by the Contractor under the Contract.

1.1.5.4 **"Permanent Works"** means the permanent works to be executed by the Contractor under the Contract.

1.1.5.5 **"Plant"** means the apparatus, machinery and vehicles intended to form or forming part of the Permanent Works.

1.1.5.6 **"Section"** means a part of the Works specified in the Contract Data as a Section (if any).

1.1.5.7 **"Temporary Works"** means all temporary works of every kind (other than Contractor's Equipment) required on Site for the execution and completion of the Permanent Works and the remedying of any defects.

1.1.5.8 **"Works"** mean the Permanent Works, Contractor's Documents and the Temporary Works, or either of them as appropriate.

1.1.6 Other Definitions

1.1.6.1 **"Contractor's Documents"** means the calculations, computer programs and other software, drawings, manuals, models and other documents of a technical nature (if any) supplied by the Contractor under the Contract.

1.1.6.2 **"Employer's Equipment"** means the apparatus, machinery and vehicles (if any) made available by the Employer for the use of the Contractor in the execution of the Works, as stated in the Specification; but does not include Plant which has not been taken over by the Employer.

1.1.6.3 **"Site"** means the places where the Permanent Works are to be executed and to which Plant and Materials are to be delivered, and any other places as may be specified in the Contract as forming part of the Site.

- 1.1.6.4 **'Laws'** means all legislation, statutes, ordinances and other laws, and regulations and by-laws of any legally constituted public authority.
- 1.1.6.5 **"Performance Security"** means the security (or securities, if any) under Sub-Clause 4.2 (*Performance Security*).
- 1.1.6.6 **"Variation"** means any change to the Works, which is instructed or approved as a variation under Clause 13.0 (*Variations and Adjustments*).
- 1.1.6.7 **"Unforeseeable"** means not reasonably foreseen by an experienced Contractor.

1.2 Interpretation

In the Contract, except where the context requires otherwise:

- (a) words indicating one gender include all genders;
- (b) words indicating the singular also include the plural and words indicating the plural also include the singular;
- (c) provisions including the word "agree", "agreed" or "agreement" require the agreement to be recorded in writing; and
- (d) "written" or "in writing" means hand-written, type-written, printed or electronically made, and resulting in a permanent record.

The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

1.3 Communications

Wherever these Conditions provide for the giving or issuing of approvals, certificates, consents, determinations, notices and requests, these communications shall be:

- (a) In writing and delivered by hand, sent by mail or courier (against receipt); and
- (b) delivered, sent or transmitted to the address for the recipient's communications as stated in the Contract Data. However:
 - (i) if the recipient gives notice of another address, communications shall thereafter be delivered accordingly; and;
 - (ii) if the recipient has not stated otherwise when requesting an approval or consent, it may be sent to the address from which the request was issued.

Approvals, certificates, consents and determinations shall not be unreasonably withheld or delayed. When a certificate is issued to a Party, the certifier shall send a copy to the other Party. When a notice is issued to a Party, by the other Party or the Engineer, a copy shall be sent to the Engineer or the other Party, as the case may be.

1.4 Law and Language

The Contract shall be governed by the laws of Democratic Socialist Republic of Sri Lanka and the language for all purposes for the Contract shall be English.

**1.5
Priority of Documents**

The following documents forming the Contract are to be taken as mutually explanatory of one another. For the purposes of interpretation, priority of the documents shall be in accordance with the following sequence:

- (a) the Contract Agreement (if any);
- (b) the Letter of Acceptance;
- (c) Memorandum of Understanding (if any);
- (d) the Form of Bid;
- (e) the Contract Data;
- (f) these Conditions of Contract;
- (g) the Specifications;
- (h) the Drawings; and
- (i) the Bills of Quantities, and any other schedules or documents forming part of the Contract.

If an ambiguity or discrepancy is found in the documents, the Engineer shall issue any necessary clarification or instruction.

**1.6
Contract Agreement**

The Parties shall enter into a Contract Agreement within 28 Days, unless they otherwise agreed, after the date on which the Contractor receives the Letter of Acceptance. The Contract Agreement shall be prepared and completed by the Employer. The Contractor shall pay the cost of stamp duties and similar charges (if any) imposed by law in connection with the execution of the Contract Agreement.

**1.7
Assignment**

Neither Party shall assign the whole or any part of the Contract or any benefit or interest in or under the Contract. However, either Party:

- (a) may assign the whole or any part with the prior agreement of the other Party, at the sole discretion of such other Party; and
- (b) may, as security in favour of a bank or financial institution, assign its right to any moneys due, or to become due, under the Contract.

**1.8
Care and Supply of Documents**

The Specification and Drawings shall be in the custody and care of the Employer. Unless otherwise stated in the Contract, two copies of the Contract and two copies of each subsequent Drawing shall be supplied to the Contractor, who may make or request further copies at the cost of the Contractor.

Each of the Contractor's Documents shall be in the custody and care of the Contractor, unless and until taken over by the Employer. Unless otherwise stated in the Contract, the Contractor shall supply to the Engineer six copies of each of the Contractor's Documents.

The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the Contract. The Employer's Personnel shall have the right of access to all these documents at all reasonable times.

If a Party becomes aware of an error or defect of a technical nature in a document, which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect.

**1.9
Delayed
Drawings or
Instructions**

The Contractor shall give notice to the Engineer whenever the Works are likely to be delayed or disrupted if any necessary drawing or instruction is not issued to the Contractor within a particular time, which shall be reasonable. The notice shall include details of the necessary drawing or instruction, details of why and by when it should be issued, and details of the nature and amount of the delay or disruption likely to be suffered if it is late.

If the Contractor suffers delay and/or incurs Cost as a result of a failure of the Engineer to issue the notified drawing or instruction within a time which is reasonable and is specified in the notice with supporting details, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*) to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 (*Extension of Time for Completion*); and
- (b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine these matters.

However, if and to the extent that the Engineer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

**1.10
Employer's use of
Contractor's
Documents**

As between the Parties, the Contractor shall retain the copyright and other intellectual property rights in the Contractor's Documents and other design documents made by (or on behalf of) the Contractor.

The Contractor shall be deemed (by signing the Contract) to give to the Employer a non-terminable transferable non-exclusive royalty-free license to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This license shall:

- (a) apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works;
- (b) entitle any person in proper possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works; and
- (c) in the case of Contractor's Documents which are in the form of computer programs and other software, permit their use on any computer on the Site and other places as envisaged by the Contract, including replacements of any computers supplied by the Contractor.

The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the Employer for purposes other than those permitted under this Sub-Clause.

**1.11
Contractor's use of
Employer's
Documents**

As between the Parties, the Employer shall retain the copyright and other intellectual property rights of the documents made by (or on behalf of) the Employer. The Contractor may, at his cost, copy, use, and obtain communication of these documents for the purposes of the Contract. They shall not, without the Employer's consent, be copied, used or communicated to a third party by the Contractor, except as necessary for the purposes of the Contract.

**1.12
Confidential Details**

The Contractor shall disclose all such confidential and other information as the Engineer may reasonably require in order to verifying the Contractor's compliance with the Contract.

**1.13
Compliance with
Laws**

The Contractor shall in performing the Contract, comply with applicable Laws. The Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licenses and approvals, as required by the Laws in relation to the execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Employer harmless against and from the consequences of any failure to do so.

**1.14
Joint and
Several Liability**

If the Contractor constitutes (under applicable Laws) a joint venture, consortium or other unincorporated grouping of two or more persons:

- (a) these persons shall be deemed to be jointly and severally liable to the Employer for the performance of the Contract;
- (b) these persons shall notify the Employer of their leader who shall have authority to bind the Contractor and each of these persons ; and
- (c) the Contractor shall not alter its composition or legal status without the prior consent of the Employer.

2.0 The Employer

**2.1
Right of Access
to the Site**

The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within 14 Days from Letter of Acceptance unless otherwise specified in Contract Data. The right and possession may not be exclusive to the Contractor. If, under the Contract, the Employer is required to give (to the Contractor) possession of any foundation, structure, plant or means of access, the Employer shall do so in the time and manner stated in the Contract. However, the Employer may withhold any such right or possession until the Performance Security has been received.

If the Contractor suffers delay and/or incurs Cost as a result of a failure by the Employer to give any such right or possession within such time, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*) to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 (*Extension of Time for Completion*); and

- (b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine these matters.

However, if and to the extent that the Employer's failure was caused by any error or delay by the Contractor, including an error in, or delay in the submission of, any of the Contractor's Documents, the Contractor shall not be entitled to such extension of time, Cost or profit.

2.2 Permits, Licenses or Approvals

The Employer shall (where he is in a position to do so) provide reasonable assistance to the Contractor at the request of the Contractor, in obtaining permits, licenses and approvals referred to in section 1.13.

2.3 Employer's Personnel

The Employer shall be responsible for ensuring that the Employer's Personnel and the Employer's other contractors on the Site:

- (a) co-operate with the Contractor's efforts under Sub-Clause 4.6 (*Co-operation*); and
- (b) take actions similar to those which the Contractor is required to take under sub-paragraphs (a), (b) and (c) of Sub-Clause 4.8 (*Safety Procedures*) and under Sub-Clause 4.13 (*Protection of the Environment*).

2.4 Employer's Claims

If the Employer considers himself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the Defects Notification Period, the Employer or the Engineer shall give notice and particulars to the Contractor.

The notice shall be given as soon as practicable after the Employer became aware of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Notification Period shall be given before the expiry of such period.

The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/or extension to which the Employer considers him to be entitled in connection with the Contract. The Engineer shall then proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine (i) the amount (if any) which the Employer is entitled to be paid by the Contractor; and/or (ii) the extension (if any) of the Defects Notification Period in accordance with Sub-Clause 11.3 (*Extension of Defects Notification Period*).

This amount may be included as a deduction in the Contract Price and Payment Certificates. The Employer shall only be entitled to set off against or make any deduction from an amount certified in a Payment Certificate, or to otherwise claim against the Contractor, in accordance with this Sub-Clause.

3.0 The Engineer

3.1 Engineer's Duties and Authority

The Employer shall appoint the Engineer who shall carry out the duties assigned to him in the Contract. The Engineer's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties.

The Engineer shall have no authority to amend the Contract.

The Engineer may exercise the authority attributable to the Engineer as specified in or necessarily to be implied from the Contract. If the Engineer is required to obtain the approval of the Employer before exercising a specified authority, the requirements shall be as stated in the Contract Data. The Employer undertakes not to impose further constraints on the Engineer's authority, except as agreed with the Contractor.

However, whenever the Engineer exercises a specified authority for which the Employer's approval is required, then (for the purposes of the Contract) the Employer shall be deemed to have given approval.

Except as otherwise stated in these Conditions:

- (a) the Engineer has no authority to relieve either Party of any duties, obligations or responsibilities under the Contract: and
- (b) any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, or similar act by the Engineer (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

3.2 Delegation by the Engineer

The Engineer may from time to time assign duties and delegate authority to assistants, and may also revoke such assignment or delegation. These assistants may include a resident engineer, and/or independent inspectors appointed to inspect and/or test items of Plant and / or Materials. The assignment, delegation or revocation shall be in writing and shall not take effect until copies have been received by both Parties. However, unless otherwise agreed by both Parties, the Engineer shall not delegate the authority to determine any matter in accordance with Sub-Clause 3.4 (*Determinations*).

Each assistant, to whom duties have been assigned or authority has been delegated, shall only be authorised to issue instructions to the Contractor to the extent defined by the delegation. Any approval, check, certificate, consent examination, inspection, instruction, notice, proposal, request, test, or similar act by an assistant, in accordance with the delegation, shall have the same effect as though the act had been an act of the Engineer. However:

- (a) any failure to disapprove any work, Plant or Materials shall not constitute approval, and shall therefore not prejudice the right of the Engineer to reject the work, Plant or Materials;

- (b) if the Contractor questions any determination or instruction of an assistant, the Contractor may refer the matter to the Engineer, who shall promptly confirm, reverse or vary the determination or instruction.

3.3 Instructions of the Engineer

The Engineer may issue to the Contractor (at any time) instructions, which may be necessary for the execution of the Works and the remedying of any defects, all in accordance with the Contract. The Contractor shall only take instructions from the Engineer, or from an assistant to whom the appropriate authority has been delegated under this Clause. If an instruction constitutes a Variation, Clause 13.0 (*Variations and Adjustments*) shall apply.

The Contractor shall comply with the instructions given by the Engineer or delegated assistant, on any matter related to the Contract. These instructions shall be given in writing.

3.4 Determinations

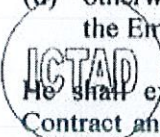
Whenever these Conditions provide that the Engineer shall proceed in accordance with this Sub-Clause 3.4 to agree or determine any matter, the Engineer shall consult with each Party in an endeavor to reach agreement. If agreement is not achieved, the Engineer shall make a fair determination in accordance with the Contract, taking due regard of all relevant circumstances.

The Engineer shall give notice to both Parties of each agreement or determination, with supporting particulars. Each Party shall give effect to each agreement or determination unless and until revised under Clause 19.0 (*Claims, Disputes and Arbitration*).

3.5 Engineer's Impartiality

Wherever, under the Contract, the Engineer is required to exercise his discretion by:

- (a) giving his decision, opinion or consent,
- (b) expressing his satisfaction or approval,
- (c) determining value, or
- (d) otherwise taking action which may affect the rights and obligations of the Employer or the Contractor

 He shall exercise such discretion impartially within the terms of the Contract and having regard to all the circumstances. Any such decision, opinion, consent, expression of satisfaction, or approval, determination of value or action may be opened up, reviewed or revised as provided in Clause 19.0 (*Claims, Disputes and Arbitration*).

4.0 The Contractor

4.1 Contractor's General Obligations

The Contractor shall design (to the extent specified in the Contract) execute and complete the Works in accordance with the Contract and with the Engineer's instructions, and shall remedy any defects in the Works.

The Contractor shall provide the Plant, all Contractor's Personnel, Goods, consumables and other things and services, whether of a temporary or permanent nature, required in and for execution, completion and remedying of defects.

The Contractor shall be responsible for the adequacy, stability and safety of all Site operations and of all methods of construction. Except to the extent specified in the Contract, the Contractor (i) shall be responsible for all Contractor's Documents, Temporary Works, and such design of each item of Plant and Materials as is required for the item to be in accordance with the Contract, and (ii) shall not otherwise be responsible for the design or specification of the Permanent Works.

The Contractor shall, whenever required by the Engineer, submit details of the arrangements and methods, which the Contractor proposes to adopt for the execution of the Works. No significant alteration to these arrangements and methods shall be made without this having previously been notified to the Engineer.

If the Contract specifies that the Contractor shall design any part of the Permanent Works, then unless otherwise stated in the Contract Data:

- (a) the Contractor shall submit to the Engineer the Contractor's Documents for this part in accordance with the procedures specified in the Contract;
- (b) these Contractor's Documents shall be in accordance with the Specification and Drawings, shall be written in the language for communications defined in Sub-Clause 1.4 (*Law and Language*), and shall include additional information required by the Engineer to add to the Drawings for co-ordination of each Party's designs;
- (c) the Contractor shall be responsible for this part and it shall, when the Works are completed, be fit for such purposes for which the part is intended as are specified in the Contract; and
- (d) prior to the commencement of the Tests on Completion, the Contractor shall submit to the Engineer the "as-built" documents and operation and maintenance manuals in accordance with the Specification and in sufficient detail for the Employer to operate, maintain, dismantle, reassemble, adjust and repair this part of the Works. Such part shall not be considered as completed for the purposes of taking-over under Sub-Clause 10.1 (*Taking Over of the Works and Sections*) until these documents and manuals have been submitted to the Engineer.

4.2

Performance Security

The Contractor shall obtain (at his cost) a Performance Security for his proper performance of the Contract, in the amount stated in the Contract Data. The Contractor shall deliver the Performance Security to the Employer within 14 Days after the receipt of the Letter of Acceptance. The Performance Security shall be in the form acceptable to the Employer as stipulated in Contract Data.

Without limitation to the provision of the preceding paragraph and subject to Section 13.0 whenever the Engineer determines an addition to the Contract Price as a result of a change in cost and/or Change in Law and/or as a result of a variation amounting to more than 25 (twenty five) percent of the Initial Contract Price, the Contractor, at the Engineer's written request, shall promptly increase the value of the Performance Security by an equal percentage and thereafter in thresholds of fifteen percent of the

Initial Contract Price. The Performance Security of a joint venture shall be in the name of the joint venture.

The Contractor shall ensure that the Performance Security is valid and enforceable until the Contractor has executed and completed the Works and remedied any defects. If the terms of the Performance Security specify its expiry date, and the Contractor has not become entitled to receive the Performance Certificate by the date 28 Days prior to the expiry date, the Contractor shall extend the validity of the Performance Security until the Works have been completed and any defects have been remedied.

The Employer shall return the Performance Security to the Contractor within 21 Days after receiving a copy of the Performance Certificate.

4.3 Contractor's Representative

The Contractor shall appoint the Contractor's Representative and shall give him all authority necessary to act on the Contractor's behalf under the Contract.

Unless the Contractor's Representative is named in the Contract, the Contractor shall, prior to the Commencement Date, submit to the Engineer for consent the name and particulars of the person the Contractor proposes to appoint as Contractor's Representative. If consent is withheld or subsequently revoked, or if the appointed person fails to act as Contractor's Representative, the Contractor shall similarly submit the name and particulars of another suitable person for such appointment.

The Contractor shall not, without the prior consent of the Engineer, revoke the appointment of the Contractor's Representative or appoint a replacement.

The Contractor's Representative shall, on behalf of the Contractor, receive instructions under Sub-Clause 3.3 (*Instructions of the Engineer*).

4.4 Subcontractors

The Contractor shall not subcontract the whole of the Works.

The Contractor shall be responsible for the acts or defaults of any Subcontractor, his agents or employees, as if they were the acts or defaults of the Contractor.

Unless otherwise stated in the Contract Data:

- (a) the Contractor shall not be required to obtain consent to suppliers of Materials, or to a subcontract for which the Subcontractor is named in the Contract;
- (b) the prior consent of the Engineer shall be obtained to other proposed Subcontractors; and
- (c) the Contractor shall give the Engineer not less than 28 Days' notice of the intended date of the commencement of each Subcontractor's work, and of the commencement of such work on the Site.

4.5 Assignment of Benefit of Subcontract

If a Subcontractor's obligations extend beyond the expiry date of the relevant Defects Notification Period and the Engineer, prior to this date, instructs the Contractor to assign the benefit of such obligations to the Employer, then the Contractor shall do so. Unless otherwise stated in the assignment, the Contractor shall have no liability to the Employer for the work carried out by the Subcontractor after the assignment takes effect.

4.6
Co-operation

The Contractor shall, as specified in the Contract or as instructed by the Engineer, allow appropriate opportunities for carrying out work to:

- (a) the Employer's Personnel;
- (b) any other contractors employed by the Employer; and
- (c) the personnel of any legally constituted public authorities.

who may be employed in the execution on or near the Site of any work not included in the Contract.

Any such instruction shall constitute a Variation, if and to the extent that it causes the Contractor to incur Unforeseeable cost by the date of submission of Bid. Services for these personnel and other contractors may include the use of Contractor's Equipment, Temporary Works or access arrangements, which are the responsibility of the Contractor.

The Contractor shall be responsible for his construction activities on the Site, and shall co-ordinate his own activities with those of other contractors to the extent (if any) specified in the Contract.

4.7
Setting Out

The Contractor shall set out the Works in relation to original points, lines and levels of reference specified in the Contract or notified by the Engineer. The Contractor shall be responsible for the correct positioning of all parts of the Works, and shall rectify any error in the positions, levels, dimensions or alignment of the Works.

The Employer shall be responsible for any errors in these specified or notified items of reference, but the Contractor shall use reasonable efforts to verify their accuracy before they are used.

If the Contractor suffers delay and/or incurs Cost from executing work which was necessitated by an error in these items of reference, and an experienced Contractor could not reasonably have discovered such error and avoided this delay and/or Cost, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub Clause 19.1 (*Contractor's*

Claims) to:
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- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 (*Extension of Time for Completion*); and
- (b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine: (i) whether and (if so) to what extent the error could not reasonably have been discovered; and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

4.8 Safety Procedures

The Contractor shall:

- (a) comply with all applicable safety regulations;
- (b) take care for the safety of all persons entitled to be on the Site;
- (c) use reasonable efforts to keep the Site and Works clear of unnecessary obstruction so as to avoid danger to these persons;
- (d) provide fencing, lighting, guarding and watching of the Works until completion and taking over under Clause 10.0 (Employer's Taking Over); and
- (e) provide any Temporary Works (including roadways, footways, guards and fences) which may be necessary, because of the execution of the Works, for the use and protection of the public and of owners and occupiers of adjacent land.

4.9 Site data

The Employer shall have made available to the Contractor for his information, prior to the Base Date, all relevant data in the Employer's possession on sub-surface and hydrological conditions at the Site, including environmental aspects. The Employer shall similarly make available to the Contractor all such data, which come into the Employer's possession after the Base Date. The Contractor shall be responsible for interpreting all such data.

To the extent, which was practicable (taking account of cost and time), the Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Bid or Works. To the same extent, the Contractor shall be deemed to have inspected and examined the Site, its surroundings, the above data and other available information, and to have been satisfied before submitting the Tender as to all relevant matters, including (without limitation):

- (a) the form and nature of the Site, including sub-surface conditions;
- (b) the hydrological and climatic conditions;
- (c) the extent and nature of the work and Goods necessary for the execution and completion of the Works and the remedying of any defects;
- (d) the Laws, procedures and labour practices of the Country; and
- (e) the Contractor's requirements for access, accommodation, facilities, personnel, power, transport, water and other services.

4.10 Sufficiency of the Initial Contract Price

The Contractor shall be deemed to:

- (a) have satisfied himself as to the correctness and sufficiency of the bid price; and
- (b) have based the bid price on the data, interpretations necessary information, inspections, examinations and satisfaction as to all relevant matters referred to in Sub-Clause 4.9 (*Site Data*).

Unless otherwise stated in the Contract, the bid price covers entire Contractor's obligations under the Contract (including those under Provisional Sums, if any) and all things necessary for the proper execution and completion of the Works and the remedying of any defects.

4.11
Unforeseeable
Physical Conditions

In this Sub-Clause, 'physical conditions' means natural physical conditions and man-made and other physical obstructions and pollutants, which the Contractor encounters at the Site when executing the Works, including sub-surface and hydrological conditions but excluding climatic conditions.

If the Contractor encounters adverse physical conditions, which he considers to have been Unforeseeable, the Contractor shall give notice to the Engineer as soon as practicable.

This notice shall describe the physical conditions, so that they can be inspected by the Engineer, and shall set out the reasons why the Contractor considers them to be Unforeseeable. The Contractor shall continue executing the Works, using such proper and reasonable measures as are appropriate for the physical conditions, and shall comply with any instructions, which the Engineer may give, if an instruction constitutes a Variation, Clause 13.0 (Variations and Adjustments) shall apply.

If and to the extent that the Contractor encounters physical conditions, which are Unforeseeable, gives such a notice, and suffers delay and/or incurs Cost due to these conditions, the Contractor shall be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*) to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 (*Extension of Time for Completion*); and
- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving such notice and inspecting and/or investigating these physical conditions, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine (i) whether and (if so) to what extent these conditions were Unforeseeable; and (ii) the matters described in sub-paragraphs (a) and (b) above related to this extent.

However, before additional Cost is finally agreed or determined under sub-paragraph (ii), the Engineer may also review whether other physical conditions in similar parts of the Works (if any) were more favorable than could reasonably have been foreseen when the Contractor submitted the Bid. If and to the extent that these more favorable conditions were encountered, the Engineer may proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine the reductions in Cost which were due to these conditions, which may be included (as deductions) in the Contract Price and Payment Certificates.

The Engineer may take account of any evidence of the physical conditions foreseen by the Contractor when submitting the Tender; which may be made available by the Contractor, but shall not be bound by any such evidence.

4.12
Contractor's
Equipment

The Contractor shall be responsible for all Contractor's Equipment. When brought on to the Site, Contractor's Equipment shall be deemed to be exclusively intended for the execution of the Works. The Contractor shall not remove from the Site any major items of Contractor's Equipment without the consent of the Engineer. However, consent shall not be required for vehicles transporting Goods or Contractor's Personnel off Site.

Contractor's Equipment which is owned by the Contractor (either directly or indirectly) shall be deemed to be the property of the Employer with effect from its arrival on the Site. This vesting of property shall not:

- (a) affect the responsibility or liability of the Employer;
- (b) prejudice the right of the Contractor to the sole use of the vested Contractor's Equipment for the purpose of the Works; or
- (c) affect the Contractor's responsibility to operate and maintain Contractor's Equipment.

The property in each item shall be deemed to revert in the Contractor when he is entitled either to remove it from the Site or to receive the Taking-Over Certificate for the Works, whichever occurs first.

4.13 Protection of the Environment

The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to limit damage and nuisance to people and property resulting from Pollution, noise and other results of his operations.

The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values indicated in the Specification, and shall not exceed the values prescribed by applicable Laws.

4.14 Progress Reports

Unless otherwise stated in the Contract Data monthly progress reports shall be prepared by the Contractor and submitted to the Engineer in two copies. The first report shall cover the period up to the end of the first calendar month following the Commencement Date. Reports shall be submitted monthly thereafter, each within 7 Days after the last day of the period to which it relates.

Reporting shall continue until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

Each report shall include:

- (a) charts and detailed descriptions of progress, including each stage of design (if any), Contractor's Documents, procurement, manufacture, delivery to Site, construction, erection and testing; and including these stages for work by each nominated Subcontractor (as defined in Clause 5.0 (*Nominated Subcontractors*));
- (b) photographs showing the status of manufacture and of progress on the Site;
- (c) where applicable, for the manufacture of each main item of Plant and Materials, the name of the manufacturer, manufacture location, percentage progress, and the actual or expected dates of:
 - (i) commencement of manufacture;
 - (ii) Contractor's inspections;
 - (iii) tests; and
 - (iv) shipment and arrival at the Site;

- (d) the details described in Sub-Clause 6.9 (*Records of Contractor's Personnel and Equipment*);
- (e) copies of quality assurance documents, test results and certificates of Materials;
- (f) list of notices given under Sub-Clause 2.4 (*Employer's Claims*) and notices given under Sub-Clause 19.1 (*Contractor's Claims*);
- (g) safety statistics, including details of any hazardous incidents and activities relating to environmental aspects and public relations; and
- (h) comparisons of actual and planned progress, with details of any events or circumstances which may jeopardise the completion in accordance with the Contract, and the measures being (or to be) adopted to overcome delays.

4.15 Contractor's Operations on Site

The Contractor shall confine his operations to the Site, and to any additional areas, which may be obtained by the Contractor and agreed by the Engineer as working areas. The Contractor shall take all necessary precautions to keep Contractor's Equipment and Contractor's Personnel within the Site and these additional areas, and to keep them off adjacent land.

During the execution of the Works, the Contractor shall keep the Site free from any unnecessary obstruction, and shall store or dispose of any Contractor's Equipment or surplus materials. The Contractor shall clear away and remove from the Site any wreckage, rubbish and Temporary Works, which are no longer, required.

Upon the issue of a Taking-Over Certificate, the Contractor shall clear away and remove, from that part of the Site and Works to which the Taking-Over Certificate refers, all Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works. The Contractor shall leave that part of the Site and the Works in a clean and safe condition. However, the Contractor may retain on Site, during the Defects Notification Period, such Goods as are required for the Contractor to fulfill obligations under the Contract.

4.16 Fossils

All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site shall be placed under the care and authority of the Employer. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings.

The Contractor shall, upon discovery of any such finding, promptly give notice to the Engineer, who shall issue instructions for dealing with it. If the Contractor suffers delay and/or incurs Cost from complying with the instructions, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*) to:

- (a) an extension of time for any such delay, if completion is or will be delayed under Sub-Clause 8.4 (*Extension of Time for Completion*); and

- (b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this further notice, the Engineer shall proceed in accordance with Sub Clause 3.4(*Determinations*) to agree or determine these matters.

4.17
Quality Assurance

The Contractor shall institute a quality assurance system to demonstrate compliance with the requirements of the Contract. The system shall be in accordance with the details stated in the Contract. The Engineer shall be entitled to audit any aspect of the system.

Details of all procedures and compliance documents shall be submitted to the Engineer for information before each design and execution stage is commenced. When any document of a technical nature is issued to the Engineer, evidence of the prior approval by the Contractor himself shall be apparent on the document itself.

Compliance with the quality assurance system shall not relieve the Contractor of any of his duties, obligations or responsibilities under the Contract.

4.18
Rights of Way and Facilities

The Contractor shall bear all costs and charges for special and/or temporary rights of-way which he may require, including those for access to the Site. The Contractor shall also obtain, at his risk and cost, any additional facilities outside the Site which he may require for the purposes of the Works.

4.19
Avoidance of Interference

The Contractor shall not interfere unnecessarily or improperly with:

- (a) the convenience of the public, or
- (b) the access to and use and occupation of all roads and footpaths, irrespective of whether they are public or in the possession of the Employer or of others

4.20
Access Route

The Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from any such unnecessary or improper interference.

The Contractor shall be deemed to have been satisfied as to the suitability and availability of access routes to the Site. The Contractor shall use reasonable efforts to prevent any road or bridge from being damaged by the Contractor's traffic or by the Contractor's Personnel. These efforts shall include the proper use of appropriate vehicles and routes.

Except as otherwise stated in these Conditions:

- (a) the Contractor shall (as between the Parties) be responsible for any maintenance which may be required for his use of access routes:
- (b) the Contractor shall provide all necessary signs or directions along access routes, and shall obtain any permission which may be required from the relevant authorities for his use of routes, signs and directions:

- (c) the Employer shall not be responsible for any claims which may arise from the use or otherwise of any access route.
- (d) the Employer does not guarantee the suitability or availability of particular access routes, and
- (e) costs due to non-suitability or non-availability, for the use required by the Contractor, of access routes shall be borne by the Contractor.

4.21

Transport of Goods

- (a) the Contractor shall give the Engineer not less than 7 Days notice of the date on which any Plant or a major item of other Goods will be delivered to the Site;
- (b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the Works; and
- (c) the Contractor shall indemnify and hold the Employer harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods, and shall negotiate and pay all claims arising from their transport.

4.22

Security of the Site

- (a) the Contractor shall be responsible for keeping unauthorized persons off the Site, and
- (b) authorized persons shall be limited to the Contractor's Personnel and the Employer's Personnel; and to any other personnel notified to the Contractor by the Employer or the Engineer, as authorized personnel of the Employer's other contractors on the Site.

5.0 Nominated Subcontractors

5.1

**Definition of
"nominated
Subcontractor"**

In the Contract, "nominated Subcontractor" means a Subcontractor:

- (a) who is stated in the Contract as being a nominated Subcontractor; or
- (b) whom the Engineer, under Clause 13.0 (*Variations and Adjustments*), instructs the Contractor to employ as a Subcontractor.

5.2

**Objection to
Nomination**

The Contractor shall not be under any obligation to employ a nominated Subcontractor against whom the Contractor raises reasonable objection by notice to the Engineer as soon as practicable, with supporting particulars. An objection shall be deemed reasonable if it arises from (among other things) any of the following matters, unless the Employer agrees to indemnify the Contractor against and from the consequences of the matter:

- (a) there are reasons to believe that the Subcontractor does not have sufficient competence, resources or financial strength;
- (b) the subcontract does not specify that the nominated Subcontractor shall indemnify the Contractor against and from any negligence or misuse of Goods by the nominated Subcontractor, his agents and employees; or
- (c) the subcontract does not specify that, for the subcontracted work (including design, if any), the nominated Subcontractor shall:

- (i) undertake to the Contractor such obligations and liabilities as will enable the Contractor to discharge his obligations and liabilities under the Contract; and
- (ii) indemnify the Contractor against and from all obligations and liabilities arising under or in connection with the Contract and from the consequences of any failure by the Subcontractor to perform these obligations or to fulfill these liabilities.

5.3
Payments to
nominated
Subcontractors

The Contractor shall pay to the nominated Subcontractor the amounts, which the Engineer certifies to be due in accordance with the subcontract. These amounts plus other charges shall be included in the Contract Price in accordance with subparagraph (b) of Sub-Clause 13.4 (*Provisional Sums*), except as stated in Sub-Clause 5.4 (*Evidence of Payments*).

5.4
Evidence of
Payments

Before issuing a Payment Certificate which includes an amount payable to a nominated Subcontractor, the Engineer may request the Contractor to supply reasonable evidence that the nominated Subcontractor has received all amounts due in accordance with previous Payment Certificates, less applicable deductions for retention or otherwise. Unless the Contractor:

- (a) submits this reasonable evidence to the Engineer; or
- (b) (i) satisfies the Engineer in writing that the Contractor is reasonably entitled to withhold or refuse to pay these amounts; and
- (ii) submits to the Engineer reasonable evidence that the nominated Subcontractor has been notified of the Contractor's entitlement, then the Employer may (at his sole discretion) pay, direct to the nominated Subcontractor, part or all of such amounts previously certified (less applicable deductions) as are due to the nominated Subcontractor and for which the Contractor has failed to submit the evidence described in sub-paragraphs (a) or (b) above. The Contractor shall then repay, to the Employer, the amount which the nominated Subcontractor was directly paid by the Employer.

6.0 Staff and Labour

6.1
Rates of Wages
and Conditions of
Labour

The Contractor shall pay rates of wages, and observe conditions of labour, which are not lower than those established for the trade or industry where the work is carried out. If no established rates or conditions are applicable, the Contractor shall pay rates of wages and observe conditions, which are not lower than the general level of wages and conditions observed locally by employers whose trade or industry is similar to that of the Contractor.

6.2
Persons in the Service
of Employer

The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Employer's Personnel.

6.3
Labour Laws

The Contractor shall comply with all the relevant labour Laws applicable to the Contractor's Personnel, including Laws relating to their employment, health, safety, welfare, immigration and emigration, and shall allow them all their legal rights.

The Contractor shall require his employees to obey all applicable Laws, including those concerning safety at work.

6.4
Working Hours

No work shall be carried out on the Site on locally recognized Days of rest, or outside the normal working hours, unless:

- (a) otherwise stated in the Contract;
- (b) the Engineer gives consent; or
- (c) the work is unavoidable, or necessary for the protection of life or property or for the safety of the Works, in which case the Contractor shall immediately advise the Engineer.

6.5
Facilities for Staff and Labour

The Contractor shall not permit any of the Contractor's Personnel to maintain any temporary or permanent living quarters within the structures forming part of the Permanent Works.

6.6
Health and Safety

The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. In collaboration with local health authorities, the Contractor shall ensure that first aid facilities are available at all times at the Site and at any accommodation for Contractor's and Employer's Personnel, and that suitable arrangements are made for all necessary welfare and hygiene requirements and for the prevention of epidemics.

The Contractor shall designate a separate person to deal with safety and protection against accidents. The Contractor shall send, to the Engineer, details of any accident as soon as practicable after its occurrence. The Contractor shall maintain records and make reports concerning health, safety and welfare of persons, and damage to property, as the Engineer may reasonably require.

6.7
Contractor's Superintendence

Throughout the execution of the Works and as long thereafter as is necessary to fulfill the Contractor's obligations, the Contractor shall provide all necessary superintendence to plan, arrange, direct, manage, inspect and test the work.

Superintendence shall be given by a sufficient number of persons having adequate knowledge of the language or communications {defined in Sub-Clause 1.4 (*Law and Language*)} and of the operations to be carried out (including the methods techniques required, the hazards likely to be encountered and methods of preventing accidents), for the satisfactory and safe execution of the Works.

6.8
Contractor's Personnel

The Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations. The Engineer may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works including the, Contractor's Representative if applicable, who:

- (a) persists in any misconduct or lack of care;
- (b) carries out duties incompetently or negligently;
- (c) fails to conform with any provisions of the Contract; or
- (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.

If appropriate, the Contractor shall then appoint (or cause to be appointed) a suitable replacement person.

**6.9
Records of
Contractor's
Personnel and
Equipment**

The Contractor shall submit, to the Engineer, details showing the number of each class of Contractor's Personnel and of each type of Contractor's Equipment on the Site.

Details shall be submitted each calendar month in a form approved by the Engineer, until the Contractor has completed all work which is known to be outstanding at the completion date stated in the Taking-Over Certificate for the Works.

**6.10
Disorderly Conduct**

The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the Contractor's Personnel, and to preserve peace and protection of persons and property on and near the Site.

7.0 Plant, Materials and Workmanship

**7.1
Samples**

The Contractor shall submit the following samples of Materials, and relevant information, to the Engineer for consent prior to using the Materials in or for the Works:

- (a) manufacturer's standard samples of Materials and samples specified in the Contract, all at the Contractor's cost; and
- (b) additional samples instructed by the Engineer as a Variation.

Each sample shall be labelled as to origin and intended use in the Works.

**7.2
Inspection**

The Employer's Personnel shall at all reasonable times:

- (a) have full access to all parts of the Site and to all places from which natural Materials are being obtained; and
- (b) during production, manufacture and construction (at the Site and elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.

The Contractor shall give the Employer's Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment. No such activity shall relieve the Contractor from any obligation or responsibility.

The Contractor shall give notice to the Engineer whenever any work is ready and before it is covered up, put out of sight, or packaged for storage or transport. The Engineer shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Engineer does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Engineer, uncover the work and thereafter reinstate and make good, all at the Contractor's cost.

**7.3
Testing**

This Sub-Clause shall apply to all tests specified in the Contract, other than the Tests after Completion (if any).

The Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The Contractor shall agree, with the Engineer, the time and place for the specified testing of any Plant, Materials and other parts of the Works.

The Engineer may, under Clause 13.0 (*Variations and Adjustments*) vary the location or details of specified tests, or instruct the Contractor to carry out additional tests. If these varied or additional tests show that the tested Plant, Materials or workmanship is not in accordance with the Contract, the cost of carrying out this Variation shall be borne by the Contractor, notwithstanding other provisions of the Contract.

The Engineer shall give the Contractor not less than 24 hours notice of the Engineer's intention to attend the tests. If the Engineer does not attend at the time and place agreed, the Contractor may proceed with the tests, unless otherwise instructed by the Engineer, and the tests shall then be deemed to have been made in the Engineer's presence.

If the Contractor suffers delay and or incurs Cost from complying with these instructions or as a result of a delay for which the Employer is responsible, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*)

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 (*Extension of Time for Completion*); and
- (b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine these matters.

The Contractor shall promptly forward to the Engineer duly certified reports of the tests. When the specified tests have been passed, the Engineer shall endorse the Contractor's test certificate, or issue a certificate to him, to that effect. If the Engineer has not attended the tests, he shall be deemed to have accepted the readings as accurate.

**7.4
Rejection**

If, as a result of an examination, inspection, measurement or testing, any Plant, Materials or workmanship is found to be defective or otherwise not in accordance with the Contract, the Engineer may reject the Plant, Materials or workmanship by giving notice to the Contractor, with reasons. The Contractor shall then promptly make good the defect and ensure that the rejected item complies with the Contract.

If the Engineer requires this Plant, Materials or workmanship to be retested, the tests shall be repeated under the same terms and conditions. If the rejection and retesting cause the Employer to incur additional costs, the Contractor shall subject to Sub-Clause 2.4 (*Employer's Claims*) pay these costs to the Employer.

**7.5
Remedial
Work**

Notwithstanding any previous test or certification, the Engineer may instruct the Contractor to:

- (a) remove from the Site and replace any Plant or Materials which is not in accordance with the Contract;
- (b) remove and re-execute any other work which is not in accordance with the Contract; and
- (c) execute any work which is urgently required for the safety of the Works, whether because of an accident, Unforeseeable event or otherwise.

The Contractor shall comply with the instruction within a reasonable time, which shall be the time (if any) specified in the instruction, or immediately if urgency is specified under sub-paragraph (c).

If the Contractor fails to comply with the instruction, the Employer shall be entitled to employ and pay other persons to carry out the work. Except to the extent that the Contractor would have been entitled to payment for the work, the Contractor shall subject to Sub-Clause 2.4 (*Employer's Claims*) pay to the Employer all costs arising from this failure.

**7.6
Ownership of Plant
and Materials**

Each item of Plant and Materials shall, to the extent consistent with the Laws of the Country, become the property of the Employer at whichever is the earlier of the following times, free from liens and other encumbrances:

- (a) when it is delivered to the Site;
- (b) when the Contractor is entitled to payment of the value of the Plant and Materials under Sub-Clause 8.10 (*Payment for Plant and Materials in Event of Suspension*).

**7.7
Royalties**

Unless otherwise stated in the Specification, the Contractor shall pay all royalties, rents and other payments for:

- (a) natural Materials obtained from outside the Site; and
- (b) the disposal of material from demolitions and excavations and of other surplus material (whether natural or man-made), except to the extent that disposal areas within the Site are specified in the Contract.

8.0 Commencement, Delays and Suspension**8.1
Commencement of
Works**

The Engineer shall give the Contractor not less than 7 Days' notice of the Commencement Date. Unless otherwise stated in the Contract Data, the Commencement Date shall be within 14 Days after the Contractor receives the Letter of Acceptance.

The Contractor shall commence the execution of the Works as soon as is reasonably practicable after the Commencement Date, and shall then proceed with the Works with due expedition and without delay.

**8.2
Time for Completion**

The Contractor shall complete the whole of the Works, and each Section (if any), within the Time for Completion for the Works or Section (as the case may be), including:

- (a) achieving the passing of the Tests on Completion; and
- (b) completing all work which is stated in the Contract as being required for the Works or Section to be considered to be completed for the purposes of taking-over under Sub-Clause 10.1 (*Taking Over of the Works and Sections*)

**8.3
Programme**

The Contractor shall submit a detailed time programme to the Engineer within 14 Days after receiving the notice under Sub-Clause 8.1 (*Commencement of Works*). The Contractor shall also submit a revised programme whenever the previous programme is inconsistent with actual progress or with the Contractor's obligations. Each programme shall include:

- (a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage of design (if any). Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing;
- (b) each of these stages for work by each nominated Subcontractor as defined in Clause 5.0 (*Nominated Subcontractors*);
- (c) the sequence and timing of inspections and tests specified in the Contract; and
- (d) a supporting report which includes:
 - (i) a general description of the methods which the Contractor intends to adopt, and of the major stages, in the execution of the Works; and
 - (ii) details showing the Contractor's reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor's Equipment, required on the Site for each major stage.

Unless the Engineer, within 14 Days after receiving a programme, gives notice to the Contractor stating the extent to which it does not comply with the Contract, the Contractor shall proceed in accordance with the programme, subject to his other obligations under the Contract. The Employer's Personnel shall be entitled to rely upon the programme when planning their activities.

The Contractor shall promptly give notice to the Engineer of specific probable future events or circumstances, which may adversely affect the work, increase the Contract Price or delay the execution of the Works. The Engineer may require the Contractor to submit an estimate of the anticipated effect of the future event or circumstances and/or a proposal under Sub-Clause 13.3 (*Variation Procedure*).

If, at any time, the Engineer gives notice to the Contractor that a programme fails (to the extent stated) to comply with the Contract or to be consistent with actual progress and the Contractor's stated intentions, the Contractor shall submit a revised programme to the Engineer in accordance with this Sub-Clause.

8.4 Extension of Time for Completion

The Contractor shall be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*) to an extension of the Time for Completion if and to the extent that completion for the purposes of Sub-Clause 10.1 (*Taking Over of the Works and Sections*) is or will be delayed by any of the following causes:

- (a) a Variation {(unless an adjustment to the Time for Completion has been agreed under Sub-Clause 13.3 (*Variation Procedure*))} or other substantial change in the quantity of an item of work included in the Contract;
- (b) a cause of delay giving an entitlement to extension of time under a Sub-Clause of these Conditions;
- (c) exceptionally adverse climatic conditions;
- (d) Unforeseeable shortages in the availability of personnel or Goods caused by epidemic or governmental actions; or
- (e) any delay, impediment or prevention caused by or attributable to the Employer, the Employer's Personnel, or the Employer's other contractors on the Site.

If the Contractor considers himself to be entitled to an extension of the Time for Completion, the Contractor shall give notice to the Engineer in accordance with Sub Clause 19.1 (*Contractor's Claims*) When determining each extension of time under Sub-Clause 19.1, the Engineer shall review previous determinations and may increase, but shall not decrease, the total extension of time.

8.5 Delays Caused by Authorities

If the following conditions apply, namely:

- (a) the Contractor has diligently followed the procedures laid down by the relevant legally constituted public authorities in the Country;
- (b) these authorities delay or disrupt the Contractors work; and
- (c) the delay or disruption was Unforeseeable.

Then this delay or disruption will be considered as a cause of delay under sub paragraph (b) of Sub-Clause 8.4 (*Extension of Time for Completion*).

8.6 Rate of Progress

If, at any time:

- (a) actual progress is too slow to complete within the Time for Completion; and/or
- (b) progress has fallen (or will fall) behind the current programme under Sub-Clause 8.3 (*Programme*)

other than as a result of a cause listed in Sub-Clause 8.4 (*Extension of Time for Completion*) then the Engineer may instruct the Contractor submit under Sub-Clause 8.3 (*Programme*), a revised programme and supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete within the Time for Completion.

Unless the Engineer notifies otherwise, the Contractor shall adopt these revised methods, which may require increases in the working hours and/or

in the numbers of Contractor's Personnel and/or Goods, at the risk and cost of the Contractor. If these revised methods cause the Employer to incur additional costs, the Contractor shall subject to Sub-Clause 2.4 (*Employer's Claims*) pay these costs to the Employer, in addition to liquidated damages (if any) under Sub-Clause 8.7 below.

**8.7
Liquidated Damages**

If the Contractor fails to comply with Sub-Clause 8.2 (*Time for Completion*) the Contractor shall subject to Sub-Clause 2.4 (*Employer's Claims*) pay liquidated damages to the Employer for this default. These liquidated damages shall be the sum stated in the Contract Data, which shall be paid for every day, which shall elapse between the relevant Time for Completion and the date stated in the Taking-Over Certificate. However, the total amount due under this Sub-Clause shall not exceed the maximum amount of liquidated damages (if any) stated in the Contract Data.

These liquidated damages shall be the only damages due from the Contractor for such default, other than in the event of termination on under Sub-Clause 15.2 (*Termination by Employer*) prior to completion of the works. These damages shall not relieve the Contractor from his obligation to complete the Works, or from any other duties, obligations or responsibilities which he may have under the Contract.

**8.8
Suspension of Work**

The Engineer may at any time instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or the Works against any deterioration, loss or damage.

The Engineer may also notify the cause for the suspension. If and to the extent that the cause is notified and is the responsibility of the Contractor, the following Sub-Clauses 8.9, 8.10 and 8.11 shall not apply.

**8.9
Consequences of
Suspension**

If the Contractor suffers delay and/or incurs Cost from complying with the Engineers instructions under Sub-Clause 8.8 (*Suspension of Work*) and/or from resuming the Suspension work, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*) to:

(a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 (*Extension of Time for Completion*); and

(b) payment of any such Cost, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine these matters.

The Contractor shall not be entitled to an extension of time for, or to payment of the Cost incurred in, making good the consequences of the Contractor's faulty design, workmanship or materials, or of the Contractor's failure to protect, store or secure in accordance with Sub-Clause 8.8 (*Suspension of Work*).

8.10**Payment for Plant and Materials in Event of Suspension**

The Contractor shall be entitled to payment of the value (as at the date of suspension) of Plant and/or Materials which have not been delivered to Site, if

- (a) the work on Plant or delivery of Plant and/or Materials has been suspended for more than 28 Days; and
- (b) the Contractor has marked the Plant and/or Materials as the Employers property in accordance with the Engineer's instructions.

8.11**Prolonged Suspension**

If the suspension under Sub-Clause 8.8 (*Suspension of Work*) has continued for more than 84 Days, the Contractor may request the Engineer's permission to proceed. If the Engineer does not give permission within 28 Days after being requested to do so, the Contractor may, by giving notice to the Engineer, treat the suspension as an omission under Clause 13.0 (*Variations and Adjustments*) of the affected part of the Works. If the suspension affects the whole of the Works, the Contractor may give notice of termination under Sub-Clause 16.2 (*Termination by Contractor*).

8.12**Resumption of Work**

After the permission or instruction to proceed is given, the Contractor and the Engineer shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension.

8.13**Management Meetings**

The Engineer or the Contractor's Representative may require the other to attend a management meeting in order to review the arrangements for future work. The Engineer shall record the business of such meetings and supply copies of the record to those attending the meeting and to the Employer.

9.0 Tests on Completion**9.1****Contractor's Obligations**

The Contractor shall carry out the Tests on Completion in accordance with this Clause and Sub-Clause 7.3 (*Testing*), after providing the documents in accordance with sub-paragraph (d) of Sub-Clause 4.1 (*Contractor's General Obligations*).

The Contractor shall give to the Engineer not less than 21 Days notice of the date after which the Contractor will be ready to carry out each of the Tests on Completion. Unless otherwise agreed, Tests on Completion shall be carried out within 14 Days after this date, on such day or Days as the Engineer shall instruct.

In considering the results of the Tests on Completion, the Engineer shall make allowances for the effect of any use of the Works by the Employer on the performance or other characteristics of the Works.

As soon as the Works, or a Section, have passed any Tests on Completion, the Contractor shall submit a certified report of the results of these Tests to the Engineer.

9.2**Delayed Tests**

If the Tests on Completion are being unduly delayed by the Employer, Sub-Clause 7.3 (*Testing*) (*fifth paragraph*) and/or Sub-Clause 10.3 (*Interference with Tests on Completion*), shall be applicable.

If the Tests on Completion are being unduly delayed by the Contractor, the Engineer may by notice require the Contractor to carry out the Tests within 21 Days after receiving the notice. The Contractor shall carry out the Tests on such day or Days within that period as the Contractor may fix and which he shall give notice to the Engineer.

If the Contractor fails to carry out the Tests on Completion within the period of 21 Days, the Employer's Personnel may proceed with the Tests at the risk and cost of the Contractor. The Tests on Completion shall then be deemed to have been carried out in the presence of the Contractor and the results of the Tests shall be accepted as accurate.

9.3 Retesting

If the Works, or a Section, fail to pass the Tests on Completion, Sub-Clause 7.4 (*Rejection*) shall apply, and the Engineer or the Contractor may require the failed Tests, and Tests on Completion on any related work, to be repeated under the same terms and conditions.

9.4 Failure to Pass Tests on Completion

If the Works, or a Section, fail to pass the Tests on Completion repeated under Sub Clause 9.3 (*Retesting*) the Engineer shall be entitled to:

- (a) order further repetition of Tests on Completion under Sub-Clause 9.3 (*Retesting*);
- (b) if the failure deprives the Employer of substantially the whole benefit of the Works or Section, reject the Works or Section (as the case may be), in which event the Employer shall have the same remedies as are provided in subparagraph (c) of Sub-Clause 11.4 (*Failure to Remedy Defects*); or
- (c) issue a Taking-Over Certificate, if the Employer so requests.

In the event of sub-paragraph (c), the Contractor shall proceed in accordance with all other obligations under the Contract, and the Contract Price shall be reduced by such amount as shall be appropriate to cover the reduced value to the Employer as a result of this failure. Unless the relevant reduction for this failure is stated (or its method of calculation is defined) in the Contract, the Employer may require the reduction to be (i) agreed by both Parties (in full satisfaction of this failure only) and paid before this Taking-Over Certificate is issued, or (ii) determined and paid under Sub-Clause 2.4 (*Employer's Claims*) and Sub-Clause 3.4 (*Determinations*)

10.0 Employer's Taking Over

10.1 Taking Over of the Works and Sections

Except as stated in Sub-Clause 9.4 (*Failure to Pass Tests on Completion*), the Works and Sections shall be taken over by the Employer when (i) the Works have been completed in accordance with the Contract, including the matters described in Sub-Clause 8.2 (*Time for Completion*) and except as allowed in sub-paragraph (a) below, and (ii) a Taking-Over Certificate for the works has been issued, or is deemed to have been issued in accordance with this Sub-Clause.

The Contractor may apply by notice to the Engineer for a Taking-Over Certificate not earlier than 14 Days before the Works will, in the Contractor's opinion, be complete and ready for taking over. If the Works

are divided into Sections, the Contractor may similarly apply for a Taking-Over Certificate for each Section.

The Engineer shall, within 28 Days after receiving the Contractor's application:

- (a) issue the Taking-Over Certificate to the Contractor, stating the date on which the Works or Section were completed in accordance with the Contract, except for any minor outstanding work and defects which will not substantially affect the use of the Works or Section for their intended purpose (either until or whilst this work is completed and these defects are remedied); or
- (b) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable the Taking-Over Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause.

If the Engineer fails either to issue the Taking-Over Certificate or to reject the Contractor's application within the period of 28 Days, and if the Works or Section (as the case may be) are substantially completed in accordance with the Contract, the Taking Over Certificate shall be deemed to have been issued on the last day of that period.

10.2 Taking Over of Parts of the Works

The Engineer may, at the sole discretion of the Employer, issue a Taking-Over Certificate for any part of the Permanent Works

The Employer shall not use any part of the Works other than as a temporary measure, which is either specified in the Contract or agreed by both Parties unless and until the Engineer has issued a Taking-Over Certificate for this part. However, if the Employer does use any part of the Works before the Taking-Over Certificate is issued:

- (a) the part which is used shall be deemed to have been taken over as from the date on which it is used;
- (b) the Contractor shall cease to be liable for the care of such part as from this date, when responsibility shall pass to the Employer; and
- (c) if requested by the Contractor, the Engineer shall issue a Taking-Over Certificate for this part.

After the Engineer has issued a Taking-Over Certificate for a part of the Works, the Contractor shall be given the earliest opportunity to take such steps as may be necessary to carry out any outstanding Tests on Completion. The Contractor shall carry out these Tests on Completion as soon as practicable before the expiry date of the relevant Defects Notification Period.

If the Contractor incurs Cost as a result of the Employer taking over and/or using a part of the Works, other than such use as is specified in the Contract or agreed by the Contractor, the Contractor shall (i) give notice to the Engineer and (ii) be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*) to payment of any such Cost plus reasonable profit, which shall be included in the Contract Price. After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine this Cost and profit.

If a Taking-Over Certificate has been issued for a part of the Works (other than a Section), the liquidated damages thereafter for completion of the remainder of the Works shall be reduced. Similarly, the liquidated damages for the remainder of the Section (if any) in which this part is included shall also be reduced. For any period of delay after the date stated in this Taking-Over Certificate, the proportional reduction in these liquidated damages shall be calculated as the proportion which the value of the part so certified bears to the value of the Works or Section (as the case may be) as a whole. The Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine these proportions. The provisions of this paragraph shall only apply to the daily rate of liquidated damages under Sub-Clause 8.7 (*Liquidated Damages*) and shall not affect the maximum amount of these damages.

10.3 Interference with Tests on Completion

If the Contractor is prevented, for more than 14 Days, from carrying out the Tests on Completion by a cause for which the Employer is responsible, the Employer shall be deemed to have taken over the Works or Section (as the case may be) on the date when the Tests on Completion would otherwise have been completed.

The Engineer shall then issue a Taking-Over Certificate accordingly, and the Contractor shall carry out the Tests on Completion as soon as practicable, before the expiry date of the Defects Notification Period. The Engineer shall require the Tests on Completion to be carried out by giving 14 Days' notice and in accordance with the relevant provisions of the Contract.

If the Contractor suffers delay and/or incurs Cost as a result of this delay in carrying out the Tests on Completion, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 19 (*Contractor's Claims*) to:

- (a) an extension of time for any such delay, if completion is or will be delayed under Sub-Clause 8.4 (*Extension of Time for Completion*); and
- (b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine these matters.

11.0 Defects Liability

11.1 Completion of Outstanding Work and Remedying Defects

In order that the Works and Contractor's Documents, and each Section, shall be in the condition required by the Contract (fair wear and tear excepted) by the expiry date of the relevant Defects Notification Period or as soon as practicable thereafter, the Contractor shall:

- (a) complete any work which is outstanding on the date stated in a Taking-Over Certificate, within such reasonable time as is instructed by the Engineer; and
- (b) execute all work required to remedy defects or damage, as may be notified by (or on behalf of) the Employer on or before the expiry date of the Defects Notification Period for the Works or Section (as the case may be).

If a defect appears or damage occurs, the Contractor shall be notified accordingly, by (or on behalf of) the Employer.

**11.2
Cost of Remedying
Defects**

All work referred to in sub-paragraph (b) of Sub-Clause 11.1 (*Completion of Outstanding Work and Remedying Defects*) shall be executed at the risk and cost of the Contractor, if and to the extent that the work is attributable to:

- (a) any design for which the Contractor is responsible;
- (b) Plant, Materials or workmanship not being in accordance with the Contract; or
- (c) failure by the Contractor to comply with any other obligation.

If and to the extent that such work is attributable to any other cause, the Contractor shall be notified promptly by (or on behalf of) the Employer, and Sub-Clause 13.3 (*Variation Procedure*) shall apply.

**11.3
Extension of Defects
Notification Period**

The Employer shall be entitled subject to Sub-Clause 2.4 (*Employer's Claims*) to an extension of the Defects Notification Period for the Works or a Section if and to the extent that the Works, Section or a major item of Plant (as the case may be, and after taking over) cannot be used for the purposes for which they are intended by reason of a defect or damage. However, a Defects Notification Period shall not be extended by more than one year.

If delivery and/or erection of Plant and/or Materials was suspended under Sub-Clause 8.8 (*Suspension of Work*) or Sub-Clause 16.1 (*Contractor's Entitlement to Suspend Work*), the Contractor's obligations under this Clause shall not apply to any defects or damage occurring more than two years after the Defects Notification Period for the Plant and/or Materials would otherwise have expired.

**11.4
Failure to Remedy
Defects**

If the Contractor fails to remedy any defect or damage within a reasonable time a date may be fixed by (or on behalf of) the Employer, on or by which the defect or damage is to be remedied. The Contractor shall be given reasonable notice of this date.

If the Contractor fails to remedy the defect or damage by this notified date and this remedial work was to be executed at the cost of the Contractor under Sub-Clause 11.2 (*Cost of Remedying Defects*), the Employer may (at his option):

- (a) carry out the work himself or by others, in a reasonable manner and at the Contractor's cost, but the Contractor shall have no responsibility for this work; and the Contractor shall subject to Sub-Clause 2.4 (*Employer's Claims*) pay to the Employer the costs reasonably incurred by the Employer in remedying the defect or damage;
- (b) require the Engineer to agree or determine a reasonable reduction in the Contract Price in accordance with Sub-Clause 3.4 (*Determinations*); or
- (c) if the defect or damage deprives the Employer of substantially the whole benefit of the Works or any major part of the Works,

terminate the Contract as a whole, or in respect of such major part which cannot be put to the intended use. Without prejudice to any other rights, under the Contract or otherwise, the Employer shall then be entitled to recover all sums paid for the Works or for such part (as the case may be), plus financing costs and the cost of dismantling the same, clearing the Site and returning Plant and Materials to the Contractor.

**11.5
Removal of Defective
Works**

If the defect or damage cannot be remedied expeditiously on the Site and the Employer gives consent, the Contractor may remove from the Site for the purposes of repair such items of Plant as are defective or damaged. This consent may require the Contractor to increase the amount of the Performance Security by the full replacement cost of these items, or to provide other appropriate security.

**11.6
Further Tests**

If the work of remedying of any defect or damage may affect the performance of the Works, the Engineer may require the repetition of any of the tests described in the Contract. The requirement shall be made by notice within 28 Days after the defect or damage is remedied.

These tests shall be carried out in accordance with the terms applicable to the previous tests, except that they shall be carried out at the risk and cost of the Party liable, under Sub-Clause 11.2 (*Cost of Remedying Defects*) for the cost of the remedial work.

**11.7
Contractor to Search**

The Contractor shall, if required by the Engineer search for the cause of any defect, under the direction of the Engineer. Unless the defect is to be remedied at the cost of the Contractor under Sub-Clause 11.2 (*Cost of Remedying Defects*) the Cost of the search plus reasonable profit shall be agreed or determined by the Engineer in accordance with Sub-Clause 3.4 (*Determinations*) and shall be included in the Contract Price.

**11.8
Performance
Certificate**

Performance of the Contractor's obligations shall not be considered to have been completed until the Engineer has issued the Performance Certificate to the Contractor, stating the date on which the Contractor completed his obligations under the Contract.

The Engineer shall issue the Performance Certificate within 28 Days after the latest of the expiry dates of the Defects Notification Periods, or as soon thereafter as the Contractor has supplied all the Contractor's Documents and completed and tested all the Works, including remedying any defects. A copy of the Performance Certificate shall be issued to the Employer.

Only the Performance Certificate shall be deemed to constitute acceptance of the Works.

**11.9
Unfulfilled
Obligations**

After the Performance Certificate has been issued, each Party shall remain liable for the fulfillment of any obligation, which remains unperformed at that time. For the purposes of determining the nature and extent of unperformed obligations, the Contract shall be deemed to remain in force.

**11.10
Clearance of Site**

Upon receiving the Performance Certificate, the Contractor shall remove any remaining Contractor's Equipment, surplus material, wreckage, rubbish and Temporary Works from the Site.

If all these items have not been removed within 28 Days after the Employer receives a copy of the Performance Certificate, the Employer may sell or otherwise dispose of any remaining items Employer shall be entitled to be paid the costs incurred in connection with, or attributable to, such sale or disposal and restoring the Site.

Any balance of the moneys from the sale shall be paid to the Contractor. If these moneys are less than the Employer's costs, the Contractor shall pay the outstanding balance to the Employer.

12.0 Measurement and Evaluation

12.1 Works to be Measured

The Works shall be measured, and valued for payment in accordance with this Clause Whenever the Engineer requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative who shall:

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

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

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

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

12.2 Method of Measurement

Except as otherwise stated in the Contract:

- (a) measurement shall be made of the net actual quantity of each item of the Permanent Works; and
- (b) the method of measurement shall be the Standard Method of Measurement stated in the Contract Data according to which the Bills of Quantities and other applicable schedules have been prepared.

12.3 Evaluation

Except as otherwise stated in the Contract, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine the Contract Price by evaluating each item of work, applying the measurement agreed or determined in accordance with the above Sub-Clauses 12.1 and 12.2 and the appropriate rate or price for the item.

For each item of work, the appropriate rate or price for the item shall be the rate or price specified for such item in the Contract or, if there is no

such item, the rate or price specified for similar work. However, a new rate or price shall be appropriate for an item of work if:

- (a) (i) the measured quantity of the item is changed by more than 25% from the quantity of this item in the Bills of Quantities or other Schedule; and
- (ii) this change in quantity multiplied by such specified rate for this item exceeds 1 % of the Initial Contract Price; or
- (b) (i) the work is instructed under Clause 13.0 (Variations and Adjustments);
- (ii) no rate or price is specified in the Contract for this item; and
- (iii) no specified rate or price is appropriate because the item of work is not of similar character, or is not executed under similar conditions, as any item in the Contract.

Each new rate or price shall be derived from any relevant rates or prices in the Contract, with reasonable adjustments to take account of the matters described in sub-paragraph (a) and/or (b), as applicable. If no rates or prices are relevant for the derivation of a new rate or price, it shall be derived from the reasonable Cost of executing the work, together with reasonable profit, taking account of any other relevant matters.

Until such time as an appropriate rate or price is agreed or determined, the Engineer shall determine a provisional rate or price for the purposes of Interim Payment Certificates.

12.4 Omissions

Whenever the omission of any work forms part (or all) of a Variation, the value of which has not been agreed, if:

- (a) the Contractor will incur (or has incurred) cost which, if the work had not been omitted, would have been deemed to be covered by a sum forming part of the Initial Contract Price;
- (b) the omission of the work will result (or has resulted) in this sum not forming part of the Contract Price; and
- (c) this cost is not deemed to be included in the evaluation of any substituted work:

then the Contractor shall give notice to the Engineer accordingly, with supporting particulars. Upon receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine this cost, which shall be included in the Contract Price.

13.0 Variations and Adjustments

13.1 Right to Vary

Variations may be initiated by the Engineer at any time prior to issuing the Taking-Over Certificate for the Works, either by an instruction or by a request for the Contractor to submit a proposal.

The Contractor shall execute and be bound by each Variation, unless the Contractor promptly gives notice to the Engineer stating (with supporting particulars) that the Contractor cannot readily obtain the Goods required

for the Variation. Upon receiving this notice, the Engineer shall cancel, confirm or vary the instruction.

Each Variation may include:

- (a) changes to the quantities of any item of work included in the Contract (however, such changes do not necessarily constitute a Variation);
- (b) changes to the quality and other characteristics of any item of work;
- (c) changes to the levels, positions and dimensions of any part of the Works;
- (d) omission of any work unless it is to be carried out by others;
- (e) any additional work, Plant, Materials or services necessary for the Permanent Works, including any associated Tests on Completion, boreholes and other testing and exploratory work; or
- (f) changes to the sequence or timing of the execution of the Works.

The Contractor shall not make any alteration and/or modification of the Permanent Works, unless and until the Engineer instructs or approves a Variation.

13.2 Value Engineering

The Contractor may, at any time, submit to the Engineer a written proposal which (in the Contractor's opinion) will, if adopted, (i) accelerate completion; (ii) reduce the cost to the Employer of executing, maintaining or operating the Works; (iii) improve the efficiency or value to the Employer of the completed Works; or (iv) otherwise be of benefit to the Employer.

The proposal shall be prepared at the cost of the Contractor and shall include the items listed in Sub-Clause 13.3 (*Variation Procedure*).

If a proposal, which is approved by the Engineer includes a change in the design of part of the Permanent Works, then unless otherwise agreed by both Parties:

- (a) the Contractor shall design this part;
- (b) sub-paragraphs (a) to (d) of Sub-Clause 4.1 (*Contractor's General Obligations*) shall apply; and
- (c) if this change results in a reduction in the contract value of this part, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine a fee, which shall be included in the Contract Price. This fee shall be half (50%) of the difference between the following amounts:
 - (i) such reduction in contract value, resulting from the change, excluding adjustments under Sub-Clause 13.6 (*Adjustments for Changes in Legislation*) and Sub-Clause 13.7 (*Adjustments for Changes in Cost*); and
 - (ii) the reduction (if any) in the value to the Employer of the varied works taking account of any reductions in quality, anticipated life or operational efficiencies.

However, if amount (i) is less than amount (ii) there shall not be a fee.

**13.3
Variation Procedure**

If the Engineer requests a proposal, prior to instructing a Variation, the Contractor shall respond in writing as soon as practicable, either by giving reasons why he cannot comply (if this is the case) or by submitting:

- (a) a description of the proposed work to be performed and a programme for its execution;
- (b) the Contractor's proposal for any necessary modifications to the programme according to Sub-Clause 8.3 (*Programme*) and to the Time for Completion; and
- (c) the Contractor's proposal for evaluation of the Variation.

The Engineer shall, as soon as practicable after receiving such proposal {under Sub-Clause 13.2 (*Value Engineering*) or otherwise}, respond with approval, disapproval or comments. The Contractor shall not delay any work whilst awaiting a response.

Each instruction to execute a Variation, with any requirements for the recording of Costs, shall be issued by the Engineer to the Contractor, who shall acknowledge receipt.

Each Variation shall be evaluated in accordance with Clause 12.0 (Measurement and Evaluation), unless the Engineer instructs or approves otherwise in accordance with this Clause.

**13.4
Provisional Sums**

Each Provisional Sum shall only be used, in whole or in part, in accordance with the Engineer's instructions, and the Contract Price shall be adjusted accordingly. The total sum paid to the Contractor shall include only such amounts, for the work, supplies or services to which the Provisional Sum relates, as the Engineer shall have instructed. For each Provisional Sum, the Engineer may instruct:

- (a) work to be executed (including Plant, Materials or services to be supplied) by the Contractor and valued under Sub-Clause 13.3 (*Variation Procedure*); and/or
- (b) Plant, Materials or services to be purchased by the Contractor, from a nominated Subcontractor {as defined in Clause 5.0 (Nominated Subcontractors)} or otherwise; and for which there shall be included in the Contract Price:
 - (i) the actual amounts paid (or due to be paid) by the Contractor; and
 - (ii) a sum for overhead charges and profit, calculated as a percentage of these actual amounts by applying the relevant percentage rate (if any) stated in the appropriate Schedule. If there is no such rate, the percentage rate stated in the Contract Data shall be applied.

The Contractor shall, when required by the Engineer, produce quotations, invoices, vouchers and accounts or receipts in substantiation.

**13.5
Dayworks**

For work of a minor or incidental nature, the Engineer may instruct that a Variation shall be executed on a Dayworks Schedule included in the Contract, and the following procedure shall apply. If a Dayworks Schedule

is not included in the Contract, this Sub-Clause shall not apply. Before ordering Goods for the work, the Contractor shall submit quotations to the Engineer. When applying for payment, the Contractor shall submit invoices, vouchers and accounts or receipts for any Goods.

Except for any items for which the Dayworks Schedule specifies that payment is not due, the Contractor shall deliver each day to the Engineer accurate statements in duplicate which shall include the following details of the resources used in executing the previous day's work:

- (a) the names, occupations and time of Contractor's Personnel;
- (b) the identification, type and time of Contractor's Equipment and Temporary Works; and
- (c) the quantities and types of Plant and Materials used.

One copy of each statement will if correct, or when agreed, be signed by the Engineer and returned to the Contractor. The Contractor shall then submit priced statements of these resources to the Engineer, prior to their inclusion in the next Statement under Sub-Clause 14.3 (*Application for Interim Payment Certificates*).

13.6 Adjustments for Changes in Legislation

The Contract Price shall be adjusted taking into account any increase or decrease in Cost resulting from Change in Law in Sri Lanka, during the period commencing 28 Days prior to the closing date of Bids and ending on the date of issuance of the Certification of Completion or termination pursuant to clause 15 and 16 and which affect the Contractor's performance of contractual obligations.

For purposes of this sub clause, Change in Law means the enactment of any new Law or a change to existing legislation and the repeal of , or modification of existing laws of the country, including any regulations made, and/or directives issued thereunder, or a change in the judicial interpretation and the application of any Law by a competent Court as compared to such interpretation or application by a Court prior to the date of this Agreement, and which relates to taxation or imposes rationing proscribing any activity or relates to duties and other import/export levies which in each case is beyond the control of the Contractor and materially affects the performance of the Contractor's responsibilities under the Contract.

If the Contractor suffers delay and or incurs additional cost attributable to a Change in Law during the period commencing 28 Days prior to the Closing date of Bids and ending on the date of issuance of the Certificate of Completion or termination pursuant to Section 15 and 16, the Contractor shall give notice to the Engineer and shall be entitled subject to sub clause 19.1: (Contractor's Claims:) to;

- (a) an extension of time for any such delay, if completion is or will be delayed under Sub-Clause 8.4 (*Extension of Time for Completion*); and
- (b) Payment of any such Cost, which shall be included in The Contract Price. Notwithstanding the foregoing, such additional or reduced cost shall not be separately paid or credited if the same shall already have been taken into account in the indexing of any inputs to the Price Adjustment Formula in accordance with the provisions of Clause 13.7.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 4.3 (*Determinations*) to agree or determine these matters.

13.7 Adjustments for changes in Cost

The amounts computed from the formula given under this sub-clause in respect of the rise or fall in the cost of labour, Materials, Plant and other inputs to the Works, shall be added to or deducted from the payment to the Contractor if the Contract Price is subjected to adjustments due to fluctuation of prices and stated in Contract Data.

- (a) The adjustment to the Contract Price in respect of Changes in Cost and Legislation shall be determined from following formula :

$$F = \frac{0.966 (V - V_{na})}{100} \sum \frac{P_x (I_{xc} - I_{xb})}{\text{All inputs } I_{xb}}$$

Where:

- F = Price adjustment for the period concerned
V = Current valuation of work done for the period.
V_{na} = Value of non adjustable element, or value of work not considered for price variation.
P_x = Input percentage of input named X.
I_{xc} = Current indices of input X.
I_{xb} = Base indices of input X.

No other adjustment of the Contract Price on account of fluctuations of inputs shall be made, notwithstanding the fact that the Contractor has to pay additional amount under special circumstances.

- (b) The "Input Percentage" means the percentage proportionate contribution of any input in terms of cost of the construction based on the prices prevailing on one month prior to submission of the Bid and listed under Clause numbered 13.7 in Contract Data.

- (c) The "Non adjustable elements" means,

- (i) The work done under the BOQ items that shall not be considered for valuation of price adjustment which are listed under Clause 13.7 in Contract Data.

(ii) Extra works or additional works carried out by the Contractor on orders of the Engineer and are valued under Clause 40 based on the prices prevailing at the time of execution.

- (iii) Works done under Dayworks rates.

- (iv) The "Current Valuation" means the gross value of work executed during the current valuation period and will include the 80% of the cost of materials the Contractor has delivered to site but were not consumed for the physical work done.

- (v) The "Indices" means the monthly indices published by Institute for Construction Training and Development for different Inputs.

- (vi) "Base Indices" means the indices for the input, prevailing one month prior to the latest date for submission of Bids.

- (vii) In the case of first interim bill, the current indices for the purpose of calculation of price adjustment shall be taken as the indices prevailing on first month after the commencement of the Contract. For any other interim claim or for the final claim the current indices shall be taken as the indices prevailing for the calendar month, one month after the previous valuation was done.

If the Contractor fails to complete the Works within the time for completion prescribed under Sub-Clause 8.2 (*Time for Completion*) or 8.4 (*Extension of Time for Completion*) the price adjustment for the work performed after the due date of completion as described above shall be made using the current indices prevailed at the due date for completion.

The weightings for each of the Inputs of cost given in this Clause shall be adjusted if, in the opinion of the Engineer, they have been rendered unreasonable, unbalanced or inapplicable as a result of varied or additional work already executed or instructed under Sub-Clause 3.3 (*Instructions of the Engineer*) or for any other reason.

14.0 Contract Price and Payment

14.1 The Contract Price

Unless otherwise stated in the Contract Data:

- (a) the Contract Price shall be agreed or determined under Sub-Clause 12.3 (*Evaluation*) and be subject to adjustments in accordance with the Contract;
- (b) the Contractor shall pay all taxes, duties and fees required to be paid by him under the Contract, and the Contract Price shall not be adjusted for any of these costs except as stated in Sub-Clause 13.6 (*Adjustments for Changes in Legislation*);
- (c) any quantities which may be set out in the Bills of Quantities or other Schedule are estimated quantities and are not to be taken as the actual and correct quantities:

(i) of the Works which the Contractor is required to execute; or

(ii) for
and

the purposes of Clause 12.0 (*Measurement and Evaluation*);

- (d) the Contractor shall submit to the Engineer, within 28 Days after the Commencement Date, a proposed breakdown of each lump sum price in the Schedules. The Engineer may take account of the breakdown when preparing Payment Certificates, but shall not be bound by it.

14.2 Advance Payment

The Employer shall make an advance payment excluding provisional sums and contingencies, as an interest-free loan for mobilization, when the Contractor submits a guarantee in accordance with this Sub-Clause. The total advance payment and the number and timing of installments (if more than one), shall be as stated in the Contract Data.

The Engineer shall issue an Interim Payment Certificate for the first installment after receiving a Statement {under Sub-Clause 14.3 (*Application for Interim Payment Certificates*)} and after the Employer

receives (i) the Performance Security in accordance with Sub-Clause 4.2 (*Performance Security*); and (ii) a guarantee in amounts equal to the advance payment. This guarantee shall be issued by an entity approved by the Employer.

The Contractor shall ensure that the guarantee is valid and enforceable until the advance payment has been repaid, but its amount may be progressively reduced by the amount repaid by the Contractor as indicated in the Payment Certificates. If the terms of the guarantee specify its expiry date, and the advance payment has not been repaid by the date 28 Days prior to the expiry date, the Contractor shall extend the validity of the guarantee until the advance payment has been repaid.

The advance payment shall be repaid through percentage deductions in Payment Certificates as follows:

- (a) deductions shall commence from the Interim Payment Certificate issued after the payment of the advance payment;
- (b) advance payment shall be repaid by deducting proportionate amounts from the Interim Certificates. Advance payment shall be repaid in full when the total certified value of Works reaches 90% of the Initial Contract Price less provisional sums.

If the advance payment has not been repaid prior to the issue of the Taking-Over Certificate for the Works or prior to termination under Clause 15.0 (*Termination by Employer*), Clause 16.0 (*Suspension and Termination by Contractor*) or Clause 20.0 (*Force Majeure*) (as the case may be), the whole of the balance then outstanding shall immediately become due and payable by the Contractor to the Employer.

14.3 Application for Interim Payment Certificates

The Contractor shall submit a Statement in three copies to the Engineer after the end of each month, in a form approved by the Engineer, showing in detail the amounts to which the Contractor considers himself to be entitled, together with supporting documents which shall include the report on the progress during this month in accordance with Sub-Clause 4.14 (*Progress Reports*).

The Statement shall include the following items, as applicable, which shall be expressed in the various currencies in which the Contract Price is payable, in the sequence listed:

- (a) the estimated contract value of the Works executed and the Contractor's Documents produced up to the end of the month [including Variations but excluding items described in sub-paragraphs (b) to (g) below];
- (b) any amounts to be added and deducted for changes in legislation and changes in cost, in accordance with Sub-Clause 13.6 (*Adjustments for Changes in Legislation*) and Sub-Clause 13.7 (*Adjustments for Changes in Cost*);
- (c) any amount to be deducted for retention, calculated by applying the percentage of retention stated in the Contract data to the total of the above amounts, until the amount so retained by the Employer reaches the limit of Retention Money (if any) stated in the Contract data;

- (d) any amounts to be added and deducted for the advance payment and repayments in accordance with Sub-Clause 14.2 (*Advance Payment*);
- (e) any amounts to be added and deducted for Plant and Materials in accordance with Sub-Clause 14.4 (*Plant and Materials intended for the Works*);
- (f) any other additions or deductions which may have become due under the Contract or otherwise, including those under Clause 19.0 (*Claims, Disputes and Arbitration*); and
- (g) the deduction of amounts certified in all previous Payment Certificates.

**14.4
Plant and Materials
intended for the
Works**

Interim Payment Certificates shall include, under sub-paragraph (e) of Sub-Clause 14.3 (*Application for Interim Payment Certificate*), an amount equivalent to 80% of the invoiced value of Plant and Materials which have been delivered to the Site for incorporation in the Permanent Works.

**14.5
Issue of Interim
Payment Certificates**

No amount will be certified or paid until the Employer has received and approved the Performance Security. Thereafter, the Engineer shall, within 21 Days after receiving a Statement and supporting documents, issue to the Employer an Interim Payment Certificate, which shall state the amount which the Engineer fairly determines to be due, with supporting particulars.

However, prior to issuing the Taking-Over Certificate for the Works, the Engineer shall not be bound to issue an Interim Payment Certificate in an amount which would (after retention and other deductions) be less than the minimum amount of Interim Payment Certificates (if any) stated in the Contract Data. In this event, the Engineer shall give notice to the Contractor accordingly.

An Interim Payment Certificate shall not be withheld for any other reason, although:

- (a) if any thing supplied or work done by the Contractor is not in accordance with the Contract, the cost of rectification or replacement may be withheld until rectification or replacement has been completed; and/or
- (b) if the Contractor was or is failing to perform any work or obligation in accordance with the Contract, and had been so notified by the Engineer, the value of this work or obligation may be withheld until the work or obligation has been performed.

The Engineer may in any Payment Certificate make any correction or modification that should properly be made to any previous Payment Certificate.

A Payment Certificate shall not be deemed to indicate the Engineer's acceptance, approval, consent or satisfaction.

**14.6
Payment**

The Employer shall pay to the Contractor:

- (a) the first installment of the advance payment within 14 Days after issuing the Letter of Acceptance and after receiving the documents

in accordance with Sub-Clause 4.2 (*Performance Security*) and Sub-Clause 14.2 (*Advance Payment*).

- (b) the amount certified in each Interim Payment Certificate within 14 Days after the Employer receives the Interim Certificate from the Engineer; and
- (c) the amount certified in the Final Payment Certificate within 56 Days after the Employer receives this Payment Certificate.

14.7 Delayed Payment

If the Contractor does not receive payment in accordance with Sub-Clause 14.6 (*Payment*) the Contractor shall be entitled to receive financing charges compounded monthly on the amount unpaid during the period of delay. This period shall be deemed to commence on the date for payment specified in Sub-Clause 14.6 (*Payment*) irrespective (in the case of its subparagraph (b)) of the date on which any Interim Payment Certificate is issued.

Interest shall be calculated from the date by which the payment should have been made up to the date when the late payment is made at the prevailing rate of interest of 1% over the lending rate of the Central Bank to Commercial Banks.

14.8 Payment of Retention

When the Taking-Over Certificate has been issued for the Works, one half of the total amount retained shall be repaid to the Contractor and the second half when the Defects Notification Period has passed and the Engineer has certified that all Defects notified by the Engineer to the Contractor before the end of this period have been corrected.

However, if any work remains to be executed under Clause 11.0 (*Defects Liability*) the Engineer shall be entitled to withhold certificate of the estimated cost of this work until it has been executed.

When calculating these proportions, no account shall be taken of any adjustments under Sub-Clause 13.6 (*Adjustments for Changes in Legislation*) and Sub-Clause 13.7 (*Adjustments for Changes in Cost*).

14.9 Statement at Completion

Within 84 Days after receiving the Taking-Over Certificate for the Works, the Contractor shall submit to the Engineer three copies of a Statement at completion with supporting documents, in accordance with Sub-Clause 14.3 (*Application for Interim Payment Certificates*) showing:

- (a) the value of all work done in accordance with the Contract up to date stated in the Taking Over Certificate for the Works;
- (b) any further sums which the Contractor considers to be due; and
- (c) any estimate of any other amounts which the Contractor considers will become due to him under the Contract Estimated amounts shall be shown separately in this Statement at completion.

The Engineer shall then certify in accordance with Sub-Clause 14.5 (*Issue of Interim Payment Certificates*).

14.10 Application for Final Payment Certificate

Within 56 Days after receiving the Performance Certificate, the Contractor shall submit, to the Engineer, six copies of a draft final statement with supporting documents showing in detail in a form approved by the Engineer:

- (a) the value of all work done in accordance with the Contract; and
- (b) any further sums which the Contractor considers to be due to him under the Contract or otherwise.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed. This agreed statement is referred to in these Conditions as the "Final Statement".

However if, following discussions between the Engineer and the Contractor and any changes to the draft final statement which are agreed, it becomes evident that a dispute exists, the Engineer shall deliver to the Employer (with a copy to the Contractor) an Interim Payment Certificate or the agreed parts of the draft final statement. Thereafter, if the dispute is finally resolved under Sub-Clause 19.3 (*Procedure for Disputes*), or Sub-Clause 19.6 (*Arbitration*) the Contractor shall then prepare and submit to the Employer (with a copy to the Engineer) a Final Statement.

14.11 Discharge

When submitting the Final Statement, the Contractor shall submit a written discharge, which confirms that the total of the Final Statement represents full and final settlement of all moneys due to the Contractor under or in connection with the Contract. This discharge may state that it becomes effective when the Contractor has received the Performance Security and the outstanding balance of this total, in which event the discharge shall be effective on such date.

14.12 Issue of Final Payment Certificate

Within 28 Days after receiving the Final Statement and written discharge in accordance with Sub-Clause 14.10 (*Application for Final Payment Certificate*) and Sub-Clause 14.11 (*Discharge*) the Engineer shall issue, to the Employer, the Final Payment Certificate, which shall state:

- (a) the amount which is finally due; and
- (b) after giving credit to the Employer to all amounts previously paid by the Employer and for all sums to which the Employer is entitled, the balance (if any) due from the Employer to the Contractor or from the Contractor to the Employer, as the case may be.

If the Contractor has not applied for a Final Payment Certificate in accordance with Sub-Clause 14.10 (*Application for Final Payment Certificate*) and Sub-Clause 14.11 (*Discharge*) the Engineer shall request the Contractor to do so. If the Contractor fails to submit an application within a period of 28 Days the Engineer shall issue the Final Payment Certificate for such amount as he determines to be due.

14.13 Cessation of Employer's Liability

The Employer shall not be liable to the Contractor for any matter or thing under or in connection with the Contract or execution of the Works, except to the extent that the Contractor shall have included an amount expressly for it:

- (a) in the Final Statement and also;
- (b) (except for matters or things arising after the issue of the Taking-Over Certificate for the Works) in the Statement at completion described in Sub-Clause 14.9 (*Statement at Completion*)

However, this Sub-Clause shall not limit the Employer's liability under his indemnification obligations, or the Employer's liability in any case of fraud, deliberate default or reckless misconduct by the Employer.

15.0 Termination by Employer

15.1 Notice to Correct

If the Contractor fails to carry out any obligation under the Contract, the Engineer may by notice require the Contractor to make good the failure and to remedy it within a specified reasonable time.

15.2 Termination by Employer

The Employer shall be entitled to terminate the Contract if the Contractor:

- (a) fails to comply with Sub-Clause 4.2 (*Performance Security*) or with a notice under Sub-Clause 15.1 (*Notice to Correct*);
- (b) abandons the Works or otherwise plainly demonstrates the intention not to continue performance of his obligations under the Contract;
- (c) without reasonable excuse fails:
 - (i) to proceed with the Works in accordance with Clause 8.0 (*Commencement, Delays and Suspension*); or
 - (ii) to comply with a notice issued under Sub-Clause 7.4 (*Rejection*) or Sub-Clause 7.5 (*Remedial Work*), within 28 Days after receiving it;
- (d) subcontracts the whole of the Works or part of the works without prior consent of the Engineer or assigns the Contract without the required agreement;
- (e) becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events; or
- (f) gives or offers to give (directly or indirectly) to any person any bribe, gift, gratuity, commission or other thing of value, as an inducement or reward:
 - (i) for doing or forbearing to do any action in relation to the Contract; or
 - (ii) for showing or forbearing to show favour or disfavour to any person in relation to the Contract,

or if any of the Contractor's Personnel, agents or Subcontractors gives or offers to give (directly or indirectly) to any person any such inducement or reward as is described in this sub-paragraph. However, lawful inducements and rewards to Contractor's Personnel shall not entitle termination.
- (g) The Contractor has engaged in corrupt or fraudulent practices, in competing for or in executing the Contract,

For the purpose of this Sub-Clause:

"corrupt practice" means the offering, giving, receiving or soliciting of any thing of value to influence the action of a public official in the procurement process or in Contract execution;

"fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a Contract to the detriment of the Employer, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Employer of the benefits of free and open competition.

In any of these events or circumstances, the Employer may, upon giving 14 Days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site. However, in the case of sub-paragraph (e) or (f), the Employer may by notice terminate the Contract immediately.

The Employer's election to terminate the Contract shall not prejudice any other rights of the Employer, under the Contract or otherwise.

The Contractor shall then leave the Site and deliver any required Goods, all Contractor's Documents, and other design documents made by or for him, to the Engineer. However, the Contractor shall use his best efforts to comply immediately with any reasonable instructions included in the notice (i) for the assignment of any subcontract; and (ii) for the protection of life or property or for the safety of the Works.

After termination, the Employer may complete the Works and/or arrange for any other entities to do so. The Employer and these entities may then use any Goods, Contractor's Documents and other design documents made by or on behalf of the Contractor.

The Employer shall then give notice that the Contractor's Equipment and Temporary Works will be released to the Contractor at or near the Site. The Contractor shall promptly arrange their removal, at the risk and cost of the Contractor. However, if by this time the Contractor has failed to make a payment due to the Employer, these items may be sold by the Employer in order to recover this payment. Any balance of the proceeds shall then be paid to the Contractor.

**15.3
Valuation at
Date of
Termination**

As soon as practicable after a notice of termination under Sub-Clause of Termination by Employer has taken effect the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine the value of the Works, Goods and Contractor's Documents, and any other sums due to the Contractor for work executed in accordance with the Contract.

**15.4
Payment after
Termination**

After a notice of termination under Sub-Clause 15.2 (*Termination by Employer*) has taken effect, the Employer may:

- (a) proceed in accordance with Sub-Clause 2.4 (*Employer's Claims*);
- (b) withhold further payments to the Contractor until the costs of execution, completion and remedying of any defects, damages for delay in completion (if any), and all other costs incurred by the Employer, have been established; and/or

- (c) recover from the Contractor any losses and damages incurred by the Employer and any extra costs of completing the Works, as determined by the Engineer after allowing for any sum due to the Contractor under Sub-Clause 15.3 (*Valuation at Date of Termination*) After recovering any such losses, damages and extra costs, the Employer shall pay, any balance to the Contractor.

**15.5
Employer's
Entitlement to
Termination**

The Employer shall be entitled to terminate the Contract, at any time for the Employer's convenience, by giving notice of such termination to the Contractor. The termination shall take effect 28 Days after the later of the dates on which the Contractor receives this notice or the Employer returns the Performance Security. The Employer shall not terminate the Contract under this Sub-Clause in order to execute the Works himself or to arrange for the Works to be executed by another contractor.

After this termination, the Contractor shall proceed in accordance with Sub-Clause 16.3 (*Cessation of Work and Removal of Contractor's Equipment*) and shall be paid in accordance with Sub-Clause 20.6 (*Optional Termination, Payment and Release*).

Provided however, the Employer shall not be precluded from executing the Contract himself or by another Contractor, after a period of one year has lapsed from the date on which the termination has taken effect pursuant to this Section and subject to the satisfaction of the Employer's payment obligations to the Contractor under the Contract.

16.0 Suspension and Termination by Contractor

**16.1
Contractor's
Entitlement to
Suspend Work**

If the Engineer fails to certify in accordance with Sub-Clause 14.5 (*Issue of Interim Payment Certificates*) or the Employer fails to comply with Sub-Clause 14.6 (*Payment*) the Contractor may, after giving not less than 56 Days' notice to the Employer, suspend work (or reduce the rate of work) unless and until the Contractor has received the Payment Certificate, reasonable evidence or payment, as the case may be and as described in the notice.

The Contractor's action shall not prejudice his entitlements to financing charges under Sub-Clause 14.7 (*Delayed Payment*) and to termination under Sub-Clause 16.2 (*Termination by Contractor*).

If the Contractor subsequently receives such Payment Certificate, evidence or payment (as described in the relevant Sub-Clause and in the above notice) before giving a notice of termination, the Contractor shall resume normal working as soon as is reasonably practicable.

If the Contractor suffers delay and or incurs Cost as a result of suspending work (or reducing the rate of work) in accordance with this Sub-Clause, the Contractor shall give notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*) to:

- (a) an extension of time for any such delay, if completion is or will be delayed under Sub-Clause 8.4 (*Extension of Time for Completion*); and
- (b) payment of any such Cost plus reasonable profit, which shall be included in the Contract Price.

After receiving this notice, the Engineer shall proceed in accordance with Sub Clause 3.4 (*Determinations*) to agree or determine these matters.

16.2**Termination by Contractor**

The Contractor shall be entitled to terminate the Contract if:

- (a) the Engineer fails, within 56 Days after receiving a Statement and supporting documents, to issue the relevant Payment Certificate;
- (b) the Contractor does not receive the amount due under an Interim Payment Certificate within 56 Days after the expiry of the time stated in Sub-Clause 14.6 (*Payment*) within which payment is to be made (except for deductions in accordance with Sub-Clause 2.4 (*Employer's Claims*);
- (c) the Employer substantially fails to perform his obligations under the Contract;
- (d) the Employer fails to comply with Sub-Clause 1.6 (*Contract Agreement*) or Sub-Clause 1.7 (*Assignment*);
- (e) a prolonged suspension affects the whole of the Works as described in Sub-Clause 8.11 (*Prolonged Suspension*); or
- (f) the Employer becomes bankrupt or insolvent, goes into liquidation, has a receiving or administration order made against him, compounds with his creditors, or carries on business under a receiver, trustee or manager for the benefit of his creditors, or if any act is done or event occurs which (under applicable Laws) has a similar effect to any of these acts or events.

In any of these events or circumstances, the Contractor may, upon giving 14 Days notice to the Employer, terminate the Contract. However, in the case of subparagraph (e) or (f), the Contractor may by notice terminate the Contract immediately.

The Contractor's election to terminate the Contract shall not prejudice any other rights of the Contractor, under the Contract or otherwise.

16.3**Cessation of Work and Removal of Contractor's Equipment**

After a notice of termination under Sub-Clause 15.5 (*Employer's Entitlement to Termination*) Sub-Clause 16.2 (*Termination by Contractor*) or Sub-Clause 20.6 (*Optional Termination, Payment and Release*) has taken effect, the Contractor shall promptly:

- (a) cease all further work, except for such work as may have been instructed by the Engineer for the protection of life or property or for the safety of the Works;
- (b) hand over Contractor's Documents, Plant, Materials and other work, for which the Contractor has received payment; and
- (c) remove all other Goods from the Site, except as necessary for safety, and leave the Site.

16.4**Payment on Termination**

After a notice of termination under Sub-Clause 16.2 (*Termination by Contractor*) has taken effect, the Employer shall promptly:

- (a) return the Performance Security to the Contractor;

- (b) pay the Contractor in accordance with Sub-Clause 20.6 (Optional *Termination, Payment and Release*); and
- (c) pay to the Contractor the amount of any, loss of profit or other loss or damage sustained by the Contractor as a result of this termination.

17.0 Risk and Responsibility

17.1 Indemnities

The Contractor shall indemnify and hold harmless the Employer, the Employer's Personnel, and their respective agents, against and from all claims, damages, losses and expenses (including legal fees and expenses) in respect of:

- (a) bodily injury, sickness, disease or death, of any person whatsoever arising out of or in the course of or by reason the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects, unless attributable to any negligence, willful act or breach of the Contract by the Employer, the Employer's Personnel, or any of their respective agents; and
- (b) damage to or loss of any property, real or personal (other than the Works), to the extent that such damage or loss:
 - (i) arises out of or in the course of or by reason of the Contractor's design (if any), the execution and completion of the Works and the remedying of any defects; and
 - (ii) is attributable to any negligence, willful act or breach of the Contract by the Contractor, the Contractor's Personnel, their respective agents, or anyone directly or indirectly employed by any of them.

17.2 Contractor's Care of the Works

The Contractor shall take full responsibility for the care of the Works and Goods from the Commencement Date until the Taking-Over Certificate is issued (or is deemed to be issued under Sub-Clause 10.1 (*Taking Over of the Works and Sections*)) for the Works, when responsibility for the care of the Works shall pass to the Employer. If a Taking-Over Certificate is issued (or is so deemed to be issued) for any Section or part of the Works, responsibility for the care of the Section or part shall then pass to the Employer.

After responsibility has accordingly passed to the Employer, the Contractor shall take responsibility for the care of any work, which is outstanding on the date stated in a Taking-Over Certificate, until this outstanding work has been completed.

If any loss or damage happens to the Works, Goods or Contractor's Documents during the period when the Contractor is responsible for their care, from any cause not listed in Sub-Clause 17.3 (*Employer's Risks*) the Contractor shall rectify the loss or damage at the Contractor's risk and cost, so that the Works, Goods and Contractor's Documents conform with the Contract.

The Contractor shall be liable for any loss or damage caused by any actions performed by the Contractor after a Taking-Over Certificate has been issued. The Contractor shall also be liable for any loss or damage which occurs after a Taking-Over Certificate has been issued and which arose from a previous event for which the Contractor was liable.

17.3 Employer's Risks

The risks referred to in Sub-Clause 17.4 below are:

- (a) war, hostilities (whether war be declared or not), invasion, act of foreign enemies;
- (b) rebellion, terrorism, revolution, insurrection, military or usurped power or civil war, within the Country;
- (c) riot, commotion or disorder within the Country by persons other than the Contractor's Personnel and other employees of the Contractor and Subcontractors;
- (d) munitions of war, explosive materials, ionizing, radiation or contamination by radio-activity, within the Country, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity;
- (e) pressure waves caused by aircraft or other aerial devices travelling at sonic or supersonic speeds;
- (f) use or occupation by the Employer of any part of the Permanent Works, except as may be specified in the Contract;
- (g) design of any part of the Works by the Employer's Personnel or by others for whom the Employer is responsible; and
- (h) any operation of the forces of nature which is Unforeseeable or against which an experienced Contractor could not reasonably have been expected to have taken adequate preventative precautions.

17.4 Consequences of Employer's Risks

If and to the extent that any of the risks listed in Sub-Clause 17.3 above results in loss or damage to the Works, Goods or Contractor's Documents, the Contractor shall promptly give notice to the Engineer and shall rectify this loss or damage to the extent required by the Engineer.

If the Contractor suffers delay and/or incurs Cost from rectifying this loss or damage, the Contractor shall give a further notice to the Engineer and shall be entitled subject to Sub-Clause 19.1 (*Contractor's Claims*) to:

- (a) an extension of time for any such data, if completion is or will be delayed, under Sub-Clause 8.4 (*Extension of Time for Completion*); and
- (b) payment of any such Cost, which shall be included in the Contract Price in the case of sub-paragraphs (f) and (g) of Sub-Clause 17.3 (*Employer's Risks*) reasonable profit on the Cost shall also be included.

After receiving this further notice, the Engineer shall proceed in accordance with Sub Clause 3.4 (*Determinations*) agree or determine these matters.

18.0 Insurance

18.1 Insurance for Works and Contractor's Equipment

Without limiting his obligations and responsibilities under the Contract, the Contractor within 14 Days from the Letter of Acceptance, shall insure up to the amounts given below, in the joint names of the Employer and the Contractor against all loss or damage from whatever cause arising, other than employer's risks, for which he is responsible under the terms of the Contract and in such manner that the Employer and Contractor are covered for the period stipulated in Sub-Clause 17.2 and are also covered during the period of Defects Notification for loss or damage arising from a cause, occurring prior to the commencement of the Defects Notification Period, and for any loss or damage occasioned by the Contractor in the course of any operations carried out by him for the purpose of complying with his obligations under Clause 11.0:

- (a) Works for an amount not less than 115% of Initial Contract Price; and
- (b) The Contractor's Equipment for the replacement value.

18.2 Third Party Insurance (including Employer's Property)

The Contractor within 14 Days from the Letter of Acceptance, shall insure against each Party's liability for any loss, damage, death or bodily injury which may occur to any physical property {except things insured under Sub-Clause 18.1 (*Insurance for Works and Contractor's Equipment*)} or to any person, which may arise out of the Contractor's performance of the Contract and occurring before the issue of the Performance Certificate.

This insurance shall be for a limit per occurrence of not less than the amount stated in Contract Data, with no limit on the number of occurrences.

The insurances specified in this Sub-Clause:

- (a) shall be in the joint names of the Parties; and
- (b) shall be extended to cover liability for all loss and damage to the Employer's property (except things insured under Sub-Clause 18.1 arising out of the Contractor's performance of the Contract);

18.3 Insurance for Contractor's Personnel

The Contractor within 14 Days from the Letter of Acceptance, shall effect and maintain insurance against liability for claims, damages, losses and expenses (including legal fees and expenses) arising from injury, sickness, disease or death of any person employed by the Contractor or any other of the Contractor's Personnel.

The Employer and the Engineer shall also be indemnified under the policy of insurance, except that this insurance may exclude losses and claims to the extent that they arise from any act or neglect of the Employer or of the Employer's Personnel.

The insurance shall be maintained in full force and effect during the whole time that these personnel are assisting in the execution of the Works. For a Subcontractor's employees, whether the insurance has been effected by the Subcontractor or not, the Contractor shall be responsible for compliance with this Clause.

18.4
Remedy on
Contractor's
Failure to Insure

If the Contractor shall fail to effect and keep in force the insurances referred to in Clause 18.1, 18.2 and 18.3 hereof, or any other insurance which he may be required to effect under the terms of the Contract, then and in any such case the Employer may effect and keep in force any such insurance and pay such premium or premiums as may be necessary for that purpose and from time to time deduct the amount together with the service charge of 5% of the amount so paid by the Employer as aforesaid from any monies due or which may become due to the Contractor, or recover the same as a debt due from the Contractor.

19.0 Claims, Disputes and Arbitration

19.1
Contractor's
Claims

If the Contractor considers himself to be entitled to any extension of the Time for Completion and/or any additional payment, under any Clause of these Conditions or otherwise in connection with the Contract, the Contractor shall give notice to the Engineer, describing the event or circumstance giving rise to the claim. The notice shall be given as soon as practicable, and not later than 28 Days after the Contractor became aware, or should have become aware, of the event or circumstance.

The Contractor shall also submit any other notices which are required by the Contract, and supporting particulars for the claim, all as relevant to such event or circumstance.

The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Engineer. Without admitting the Employers liability, the Engineer may, after receiving any notice under this Sub-Clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Engineer to inspect all these records, and shall (if instructed) submit copies to the Engineer.

Within 84 Days after the Contractor became aware (or should have become aware) of the event or circumstance giving rise to the claim, or within such other period as may be proposed by the Contractor and approved by the Engineer, the Contractor shall send to the Engineer a fully detailed claim which includes full supporting particulars of the basis of the claim and of the extension of time and/or additional payment claimed. If the event or circumstance giving rise to the claim has a continuing effect:

- (a) this fully detailed claim may be considered as interim;
- (b) the Contractor may send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Engineer may reasonably require; and
- (c) the Contractor shall send a final claim within 28 Days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Engineer.

Within 42 Days after receiving a claim or any further particulars supporting a previous claim, or within such other period as may be proposed by the Engineer and approved by the Contractor, the Engineer shall respond with approval, or with disapproval and detailed comments.

He may also request any necessary further particulars, but shall nevertheless give his response on the principles of the claim within such time.

Each Payment Certificate shall include such amounts for any claim as have been reasonably substantiated as due under the relevant provision of the Contract. Unless and until the particulars supplied are sufficient to substantiate the whole of the claim, the Contractor shall only be entitled to payment for such part of the claim as he has been able to substantiate.

The Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine (i) the extension (if any) of the Time for Completion (before or after its expiry) in accordance with Sub-Clause 8.4 (*Extension of Time for Completion*) and/or (ii) the additional payment (if any) to which the Contractor is entitled under the Contract.

The requirements of this Sub-Clause are in addition to those of any other Sub-Clause which may apply to a claim. If the Contractor fails to comply with this or another Sub-Clause in relation to any claim, any extension of time and/or additional payment shall take account of the extent (if any) to which the failure has prevented or prejudiced proper investigation of the claim, unless the claim is excluded under the second paragraph of this Sub-Clause.

**19.2
Dispute Resolution**

Any dispute of whatever nature arising out of or in relation to this agreement shall in the first instance be attempted to be resolved by way of adjudication in accordance with the adjudication procedure set forth in Clause 19.3.

**19.3
Procedure for
Adjudication**

Either Party may initiate the reference of a dispute to the Adjudicator by giving 07 Days notice to the other Party.

The Adjudicator shall be appointed by agreement between the Parties. In the event the Parties are unable to reach agreement on the appointment of the Adjudicator within fourteen (14) Days from the date of such request, either Party may make an application to the Institute for Construction Training and Development (ICTAD) to appoint an Adjudicator.

The Adjudicator shall be a professional with experience relevant to the Works and in the interpretation of contractual documents. Such Adjudicator shall have no interest financial or otherwise in the Employer, the Contractor or the Engineer nor any financial interest in the Contract, except in respect of his professional fees.

The Adjudicator's fee shall be agreed by both Parties and shall be borne by both Parties in equal amounts.

The Adjudicator shall give the determination in writing within 28 Days or such other period of receipt of a notification of a dispute. The Adjudicator shall determine procedures as he sees fit ensuring that each Party is given a reasonable opportunity to make representations including written submissions and/or hearing of witnesses in person.

With the prior concurrence of both Parties the Adjudicator may take advice and assistance from independent professional advisor/s or other person/s to enable him to reach a determination on the dispute. Such costs shall be borne by both Parties in equal amounts.

Each of the Parties shall upon and in accordance with a request by the Adjudicator supply him free of charge such information and documents as he shall require for the purposes of the reference to him. That information and those documents shall be kept confidential by him and by the Parties.

The Adjudicator shall not act as an Arbitrator. The decision of the Adjudicator shall be deemed final and binding on the Parties if neither Party refers the dispute to arbitration in accordance with Sub-Clause 19.5 within twenty eight (28) Days of the Adjudicator's determination.

**19.4
Replacement of
Adjudicator**

Should the Adjudicator resign or die or is removed by agreement of the Parties on the basis of his unsatisfactory performance, the Parties may jointly appoint another Adjudicator and such an appointment shall be made within fourteen (14) Days after the resignation or death or removal of the Adjudicator. If the Parties are unable to reach agreement on the appointment of a new Adjudicator then the Adjudicator shall be appointed by the Institute for Construction Training and Development (ICTAD) at the request of either Party within fourteen (14) Days of receipt of such request.

**19.5
Arbitration**

(a) Any dispute of whatever nature arising from, out of or in connection with this agreement, on the interpretation thereof, or the rights, duties, obligations or liabilities of any Party, or the operation, breach, termination, abandonment, foreclosure or invalidity thereof, shall be referred to by either Party to arbitration for final settlement, in accordance with the Arbitration Act No. 11 of 1995, or any amendment thereof,

(b) Pending the award in any arbitration proceedings hereunder,

(i) this Contract and the rights and obligations of the Parties shall remain in full force and effect and

(ii) each of the Parties shall continue to perform their respective obligations under this Contract. The termination of this Contract shall not result in the termination of any arbitration proceedings pending at the time of such termination nor otherwise affect the rights and obligations of the Parties under or with respect to such pending arbitration.

(c) Any award rendered by the arbitral tribunal shall determine the extent to which the cost of arbitration is to be borne by each Party. The arbitration centre charges (if any) and the compensation to the arbitrator shall be equally shared by the Parties initially.

Composition of the Arbitral Tribunal :

The arbitral tribunal shall consist of a sole arbitrator who shall be appointed in the manner provided in the Selection Procedure as given below.

Selection Procedure :

The Party desiring arbitration shall nominate three arbitrators out of which one to be selected by the other Party within 21 Days of the receipt of such nomination. If the other Party does not select one to serve as Arbitrator

within the stipulated period then the Arbitrator shall be appointed in accordance with the Arbitration Act No. 11 of 1995, or any amendments thereof.

Venue & Language :

The venue of arbitration shall be in Sri Lanka.

Unless otherwise agreed to by the Parties the proceedings shall be conducted and the award shall be rendered in the English language.

20.0 Force Majeure

20.1 Definition of Force Majeure

In this Clause, "Force Majeure means an exceptional event or circumstance

- (a) which is beyond a Party's control;
- (b) which such Party could not reasonably have provided against before entering into the Contract;
- (c) which, having arisen, such Party could not reasonably have avoided or overcome, and
- (d) which is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

- (i) war, hostilities (whether war be declared or not), invasion, act of foreign enemies.
- (ii) rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war;
- (iii) riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel and other employees of the Contractor and Sub-contractors,
- (iv) munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and
- (v) natural catastrophes such as earthquake hurricane, typhoon or volcanic activity.

20.2 Notice of Force Majeure

If a Party is or will be prevented from performing any of its obligations under the Contract by Force Majeure, then it shall give notice to the other Party of the event or circumstances constituting the Force Majeure and shall specify the obligations, the performance of which is or will be prevented. The notice shall be given within 14 Days after the Party became aware, or should have become aware, of the relevant event or circumstance constituting Force Majeure.

The Party shall, having given notice, be excused performance of such obligations for so long as such Force Majeure prevents it from performing them.

Notwithstanding any other provision of this Clause, Force Majeure shall not apply to obligations of either Party to make payments to the other Party under the Contract.

**20.3
Duty to Minimise
Delay**

Each Party shall at all times use all reasonable endeavours to minimise any delay in the performance of the Contract as a result of Force Majeure.

A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

**20.4
Consequence of Force
Majeure**

If the Contractor is prevented from performing any of his obligations under the Contract by Force Majeure of which notice has been given under Sub-Clause 20.2 (*Notice of Force Majeure*) and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor shall be entitled to such Costs subject to Sub-Clause 19.1 (*Contractor's Claims*) to:

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 8.4 (*Extension of Time for Completion*); and
- (b) if the event or circumstance is of the kind described in sub-paragraphs (i) to (iv) of Sub-Clause 20.1 (*Definition of Force Majeure*) and, in the case of sub-paragraphs (ii) to (iv), occurs in the Country, payment of any such Cost.

After receiving this notice, the Engineer shall proceed in accordance with Sub-Clause 3.4 (*Determinations*) to agree or determine these matters.

**20.5
Force Majeure
Affecting Sub-
Contractor**

If any Subcontractor is entitled under any contract or agreement relating to the Works to relief from force majeure on terms additional to or broader than those specified in this Clause, such additional or broader force majeure events or circumstances shall not excuse the Contractor's non-performance or entitle him to relief under this Clause.

**20.6
Optional
Termination,
Payment and
Release**

If the execution of substantially all the Works in progress is prevented for a continuous period of 84 Days by reason of Force Majeure of which notice has been given under Sub-Clause 20.2 (*Notice of Force Majeure*) or for multiple periods which total more than 140 Days due to the same notified Force Majeure, then either Party may give to the other Party a notice of termination of the Contract. In this event, the termination shall take effect 7 Days after the notice is given, and the Contractor shall proceed in accordance with Sub-Clause 16.3 (*Cessation of Work and Removal of Contractor's Equipment*).

Upon such termination, the Engineer shall determine the value of the work done and issue a Payment Certificate which shall include:

- (a) the amounts payable for any work carried out for which a price is stated in the Contract;
- (b) the Cost of Plant and Materials ordered for the Works which have been delivered to the Contractor, or of which the Contractor is liable to accept delivery: this Plant and Materials shall become the property of (and be at the risk of) the Employer when paid for by the Employer, and the Contractor shall place the same at the Employer's disposal;

- (c) any other Cost or liability which in the circumstances was reasonably incurred by the Contractor in the expectation of completing the Works;
- (d) the Cost of removal of Temporary Works and Contractor's Equipment from the Site and the return of these items to the Contractor's works in his country (or to any other destination at no greater cost); and
- (e) the Cost of repatriation of the Contractor's staff and labour employed wholly in connection with the Works at the date of termination.

20.7
Release from
Performance
under the Law

Notwithstanding any other provision of this Clause, if any event or circumstance outside the control of the Parties (including, but not limited to, Force Majeure) arises which makes it impossible or unlawful for either or both Parties to fulfill its or their contractual obligations or which, under the law governing the Contract, entitles the Parties to be released from further performance of the Contract, then upon notice by either Party to the other Party of such event or circumstance:

- (a) the Parties shall be discharged from further performance, without prejudice to the rights of either Party in respect of any previous breach of the Contract; and
- (b) the sum payable by the Employer to the Contractor shall be the same as would have been payable under Sub-Clause 20.6 (*Optional Termination, Payment and Release*) if the Contract had been terminated under Sub-Clause 20.6.



STANDARD FORMS [CONTRACT]

Section - 5

STANDARD FORMS (CONTRACT)

- Letter of Acceptance
- Agreement
- Performance Security
- Advance Payment Security
- Retention Money Guarantee

Notes on Standard Forms:

Bidders shall submit the completed Form of Bid Security in compliance with the requirements of the bidding documents.

Bidders should not complete the Form of Agreement at the time of preparation of bids. The successful Bidder will be required to sign the Form of Agreement, after the award of contract. Any corrections or modifications to the accepted bid resulting from arithmetic corrections, acceptable deviations, or quantity variations in accordance with the requirements of the bidding documents should be incorporated into the Agreement.

The Form of Performance Security, Form of Advance Payment Security and Form of Retention Money Guarantee should not be completed by the bidders at the time of preparation of bids. The successful Bidder will be required to provide these securities in compliance with the requirements herein or as acceptable to the Employer.

Notes on Form of Letter of Acceptance

The Letter of Acceptance will be the basis for formation of the Contract as described in Clause 34 of the Instructions to Bidders. This Form of Letter of Acceptance should be filled in and sent to the successful bidder only after evaluation of Bids and after obtaining approval from the relevant authority.

FORM OF LETTER OF ACCEPTANCE

[letter head paper of the Employer]

..... *[date]*

[LETTER HEADING PAPER OF THE PROCURING ENTITY]

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

This is to notify you that your bid dated *[insert date]* for the construction and remedying defects of the *[name of the Contract and identification number]* for the Contract price of *[name of currency⁴⁹]* *[amount in figures and words]* as corrected in accordance with Instructions to Bidders and/ or modified by a Memorandum of Understanding⁵⁰, is hereby accepted.

You are hereby instructed to proceed with the execution of the said Works in accordance with the Contract documents.

The Commencement Date shall be: *(fill the date as per Clause 8.1 of Conditions of Contract).*

The amount of Performance Security is : *(fill the amount as per Clause 4.2 of Conditions of Contract).*

The Performance Security shall be submitted on or before *(fill the date as per Clause 4.2 of Conditions of Contract).*

Authorized Signature : 

Name and title of Signatory :

⁴⁹ If multiple currencies are involved indicate amounts under each currency separated with the word 'and' between them

⁵⁰ Delete "corrected in accordance with ITB and/or " or "and/or modified by a Memorandum of Understanding", if not applicable

FORM OF AGREEMENT

This Agreement made the [day] of [month] 200..... [year], between [name and address of Employer] (hereinafter called and referred to as "the Employer"), of the one part, and [name and address of Contractor] (hereinafter called and referred to as "the Contractor"), of the other part:

Whereas the Employer desires that the Contractor execute [name and identification no of Contract] (hereinafter called and referred to as "the Works") and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and remedying of any defects therein.

The Employer and the Contractor agree as follows::

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract.
2. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execute and complete the Works and remedy any defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

In Witness whereof the parties hereto have caused this Agreement to be executed the day and year aforementioned in accordance with laws of Sri Lanka.

.....
Authorised signature of Contractor

.....
Authorised signature of Employer

COMMON SEAL

ICTAD

COMMON SEAL

In the presence of
Witnesses :

1. Name and NIC No.
Signature
Address
2. Name and NIC No.
Signature
Address

FORM OF PERFORMANCE SECURITY (Unconditional)

----- [Issuing Agency's Name, and Address of Issuing Branch or Office] -----

Beneficiary: ----- [Name and Address of Employer]

Date: -----

PERFORMANCE GUARANTEE No.: -----

We have been informed that ----- [name of Contractor] (hereinafter called "the Contractor") has entered into Contract No. ----- [reference number of the Contract] dated ----- with you, for the ----- [insert "construction"] of ----- [name of Contract and brief description of Works] (hereinafter called "the Contract").

Furthermore, we understand that, according to the Conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we ----- [name of Agency] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ----- [amount in figures] (-----) [amount in words], upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the day of, 20.. [insert date, 28 days beyond the Time for Completion] and any demand for payment under it must be received by us at this office on or before that date.

[signature(s)]



FORM OF ADVANCE PAYMENT SECURITY

----- [Name and address of Agency, and Address of Issuing Branch or Office] -----

Beneficiary: ----- [Name and Address of Employer]

Date: -----

ADVANCE PAYMENT GUARANTEE No.: -----

We have been informed that ----- [name of Contractor] (hereinafter called "the Contractor") has entered into Contract No. ----- [reference number of the contract] dated ----- with you, for the ----- construction of ----- [name of contract and brief description] (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum ----- [amount in figures] (-----) [amount in words] is to be made against an advance payment guarantee.

At the request of the Contractor, we ----- [name of issuing agency] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ----- [amount in figures] (-----) [amount in words]⁵¹ upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation in repayment of the Advance Payment under the Contract.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor.

This guarantee shall expire on [Insert the date, 28 days beyond the Time of Completion]

Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

[signature(s)]

ICTAD

⁵¹ The Guarantor shall insert an amount representing the amount of the advance payment and denominated either in the currency(ies) of the advance payment as specified in the Contract.

FORM OF RETENTION MONEY GUARANTEE

----- [Issuing Agency's Name, and Address of Issuing Branch or Office] -----

Beneficiary: ----- [Name and Address of Employer] -----

Date: -----

RETENTION MONEY GUARANTEE No.: -----

We have been informed that ----- [name of Contractor] (hereinafter called "the Contractor") has entered into Contract No. ----- [reference number of the contract] dated ----- with you, for the execution of ----- [name of contract and brief description of Works] (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, when the works have being taken over and the first half of the Retention Money has been certified for payment, payment of the second half of the Retention Money may be made against a Retention Money guarantee.

At the request of the Contractor, we ----- [name of agency] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ----- [amount in figures] (----- [amount in words]⁵²) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor has not attended to the defects in accordance with the Contract..

This guarantee shall expire, at the latest, ----- [insert 28 Days after the end of the Defects Liability Period]. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

[signature(s)]

ICTAD

⁵² The Guarantor shall insert an amount representing the amount of the second half of the Retention Money.

Volume 02

BIDDING DATA

Bidding Data

Instructions to Bidders Clause Reference

Entry

1.1 Employer's Name and Address

Name : Vice Chancellor

Address: Uva Wellassa University, Passara Road, Badulla

1.1 Scope of Works

The works consists of the construction of 2 storied building with MEP and landscaping works

Location of the site is within the premises of Uva Wellassa University, Badulla.

1.2 Time for Completion

The Time for Completion for the whole of works shall be **7 months**

2.1 Source of funds

The source of funds is GOSL consolidated fund

4.1 Qualification Information

The following information shall be provided in Section 9 - Schedules:

- ICTAD registration

Registration number	Required
Grade	CIDA C4 or above
Speciality	Buildings
Expiry date	Valid by the time of closing of bids
- VAT registration number Required
- Attach construction program
- Attach legal status (Sole proprietor, Partnership, Company etc.)
- Attach authentication for signatory
- Total monetary value of construction work performed for each of the last five years
- Experience in works of a similar nature and size for each of the last five years
- Construction equipment
- Staffing
- Attach Work plan and methods;

4.1 (c) Modify the list if required

4.2 (a) ICTAD registration required

The registration required:

Speciality : **Buildings**
 Grade : **C4 or above**

Average annual volume of construction work performed in last 5 years

average annual volume of construction work performed in last five years shall be at least **Rs 100Mn**

4.2 (d) Essential equipment

Proposals for the timely acquisition (own, lease, hire, etc.) of the following essential equipment shall be;

	Type	Capacity
1.	Backhoe loader/Excavator	40 hp or above
2.	Tipper	3Cu
3.	Boom Truck	Minimum 1 T
4.	Concrete mixer	1 bag /turn

4.2 (e) Qualifications and experience of the Contract Manager

Full time site deployment of a B.Sc Eng with 3 years experience or HNDE/NDT/NDES or equivalent qualifications with 8 Years experience

4.2 (f) Liquid assets and/or credit facilities required

The minimum amount of liquid assets and/or credit facilities, net of other contractual commitments and exclusive of any advance payments which may be made under the Contract, shall be not less than **Rs. 60Mn**

10.1 Clarification of Bidding Documents

Employer's address for clarification of bidding documents is:

Name of Officer: Deputy Registrar (Capital Works) / Works Engineer

Address: Uva Wellassa University, Passara Road, Badulla

Phone: 055 3050847

Facsimile: 055 2226633

13.1(A) (j) Documents comprising the Bid
13.1(B) (d)

Additional information is:

Bidders are herewith informed, that, the contract period is 7 months, and therein after the building will immediately be used for next Semester examinations, hence, Extension of Time of the Contract is not entertained.

14.4 Adjustments for change in cost

The Contract is **not** subjected to price adjustment

15.1 Currency of Bid

Bidders are allowed to bid in foreign currencies for following items (Bidders may be required by the Employer to clarify their foreign currency component included in the rates/prices are reasonable.)

For evaluation and comparison of Bids under Sub-Clause 30.2, rates and prices quoted in foreign currencies by the bidders will be converted to Sri Lanka Rupees using middle exchange rate published by Central Bank of Sri Lanka, on the date 28 Days prior to date of closing of Bids.

(Not Applicable for this contract)

<i>Price Schedule No.</i>	<i>Item No</i>	<i>Currency</i>

16.1 Period of Bid validity :

The Bid shall be valid up to **11th February 2026**

17.1 Amount of Bid security:

The amount of Bid Security is Sri Lanka Rupees:

Rs 1,520,000.00

17.2 Validity of Bid Security

The Bid Security shall be valid up to 11th March 2026

19.1 Pre-Bid meeting

Pre-Bid meeting will be held/ will not be held
Venue, time, and date of the pre-bid meeting.

Date: **30th of October 2025**

Time: **10.00AM**

Venue: **Maintenance Office, Uva Wellassa University, Badulla**

21.2 (a) Employer's Address for Bid submission

Employer's address for the purpose of bid submission is:

Office of the Registrar, Uva Wellassa University, Passara Road, Badulla.

21.2 (b) Identification number of Contract

Identification Number of the Contract is : **UWU/CW/NCB/2025/02**

22.1 Deadline for submission of Bids

Deadline for submission of Bids. **11th of November 2025**

25.1 Bid opening

Venue, time, and date of bid opening. : **Mini Board Room of the Senate Building, Uva Wellassa University, Passara Road, Badulla.**

31.1 Preference for Domestic Bidders

This clause is not applicable as per the latest procurement guidelines issued on 24th November 2024.

Domestic Contractors are eligible for a 10% margin of preference in the comparison of their Bids with those of bidders who do not qualify for the preference. To eligible for domestic preference the bidder shall:

- (a) be registered in Sri Lanka
- (b) have more than 50% ownership by nationals of Sri Lanka;

The following procedure will be used to apply the margin of preference:

Responsive bids will be classified into the following groups:

- (i) Group A: Bids offered by domestic bidders; and
- (ii) Group B: all other Bids.

For the purpose of evaluation and comparison of Bids only, an amount equal to 10 percent of the evaluated bid prices determined in accordance with Sub-Clause 30.2 will be added to all Bids classified in Group B.

32

This will not be applicable to this contract*If the Procurement is within the authority limit of a CAPC:*

After evaluation of Bids in accordance with the procedures described under Clauses 28, 29, 30 and 31, the Employer will inform to all the bidders in writing the selection of the successful bidder and the intention of contract award to such bidder. The unsuccessful bidders if they so wish, within one week of such notice may make representation to the Procurement Appeal Board at the address given below. Such representation shall be self-contained to enable the Appeal Board to arrive at a conclusion and a cash deposit to amount given below shall be made. The Appeal Board may request the bidder who had made representation to submit further evidence during the investigations. The cash deposit will be forfeited unless the Employer has changed the original contract award decision in favour of the bidder who has made such representation.

Address: The Secretary
Appeal Board
Presidential Secretariat
Colombo

Cash Deposit: Rupees 50,000/=

If the Procurement is within the authority limit of a MPC:

After evaluation of Bids in accordance with the procedures described under Clauses 28, 29, 30 and 31, the Employer will inform to all the bidders in writing the the selection of the successful bidder and the intention of contract award to such bidder. The unsuccessful bidders if they so wish, within one week of such notice may make representation to the Secretary to the Line Ministry at the address given below. Such representation shall be self-contained to enable the Secretary to arrive at a conclusion and a cash deposit to amount given below shall be made. The Employer may request the bidder who had made representation to submit further evidence during the investigation of such representation. The cash deposit will be forfeited unless the the Employer has changed the original contract award decision in favour of the bidder who has made such representation.

Address :

Cash Deposit : Rupees 25,000/=

35.1

Amount of Performance Security

The Standard Form of Performance Security acceptable to the Employer shall be a Guarantee from an Agency accepted and stated in the Procurement Guidelines.

The amount of Performance Security is **5%** of the Initial Contract Price.
The Performance Security Shall be valid until **Minimum 28 Days Beyond the scheduled date of completion.**

37

Fees and types of reimbursable expenses to be paid to the Adjudicator shall be on a case to case basis and shall be shared equally by the Contractor and the Employer.

For contracts with estimated cost equal or exceeding Rs. 500mn delete Clause 37 Adjudicator and insert following;

37 Dispute Adjudication Board (DAB)

37.1 Within 28 Days from the Commencement Date each of the Parties shall appoint one member to serve on the Dispute Adjudication Board (DAB). The Parties shall consult both these members and shall agree upon the third member, who shall be appointed to act as the chairman.

If either Party fails to nominate a member to the DAB or the Parties fail to agree upon the third member or the Parties fail to agree on the appointment of a replacement person to the DAB, then upon the request of either or both Parties the Institute for Construction Training and Development (ICTAD) shall appoint the relevant member to the DAB.

Note: The clause numbers referred are the clause numbers of Conditions of Contract. The Employer should insert relevant data for all the items marked with an asterisk (*) prior to the issue of the bidding documents. Where a number of Days are to be inserted, it is desirable for the number to be a multiple of seven, for consistency with the Conditions of Contract.

**Conditions of
Contract Clause
Number/s**

(*) 1.1.2.2 & 1.3	Employer's name and address	Name:	Vice Chancellor
		Address:	Uva Wellassa University, 2 nd Mile Post Passara Road,Badulla
1.3	Contractor's name and address	Name:	
		Address:	
(*) 1.1.2.4 & 1.3	Engineer's name and address	Name:	Works Engineer
		Address:	Uva Wellassa University, 2 nd Mile Post Passara Road,Badulla

1.1.2.9

Replace existing Clause 1.1.2.9 with following:

“Dispute Adjudication Board” (DAB) means three persons appointed under Sub-Clause 19.2 [Appointment of the Dispute Adjudication Board] or Sub-Clause 19.3 [Failure to Agree on the Composition of the Dispute Adjudication Board] of the Conditions of Contract.

(*) 1.1. 3.3	Time for Completion of the Works	Time for Completion is 7 Months
(*) 1.1.3.7	Defects Notification Period	Defects Notification Period is 365 Days
(*) 2. 1	Right to access to the Site	14 days from the Letter of Acceptance
(*) 3.1	Engineer's Duties and Authority	The Engineer shall obtain the specific approval of the Employer before taking action under the following Sub-Clauses of these Conditions: (a) Clause 13, where the final effect of the variations increase the Contract Price (b) Sub-Clause

(*) 4.2	Amount of Performance Security	5% of the Initial Contract Price, in the currencies and proportions in which the Contract Price is payable. The acceptable form is a Bank Bond issued by a bank accepted by CBSL
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(*) 8.7	Liquidated damages for the Works	0.05 % of the Initial Contract Price per Day
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(*) 8.7	Maximum amount of liquidated damages	5% of the Initial Contract Price
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12.2 (b)	Method of Measurement	The Method of Measurement shall be SLS 573: 1999
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(*) 13.4(b)	Percentage for adjustment of Provisional Sums	0%
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13.7	Weightings of Inputs	<table border="0"> <tr> <th style="text-align: left;">Indices No</th> <th style="text-align: left;">Input Name</th> <th style="text-align: left;">Input Percentage</th> </tr> <tr> <td>.....</td> <td>.....</td> <td>.....</td> </tr> <tr> <td>.....</td> <td>.....</td> <td>.....</td> </tr> <tr> <td>.....</td> <td>.....</td> <td>.....</td> </tr> <tr> <td colspan="2" style="text-align: right;">Total</td> <td>90%</td> </tr> </table>	Indices No	Input Name	Input Percentage										Total		90%
Indices No	Input Name	Input Percentage															
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Total		90%															

Non adjustable element shall be:

BOQ Item Numbers :

(*) 14.2	Total Advance Payment	20% of the Initial Contract Price excluding provisional sums and contingencies <i>which will be deducted from the progressive bills at 25% of the cumulative work done.</i>
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(*) 14.2	Number and timing of installments	Maximum 10 numbers of installments Contractor shall apply for IPA per month basis or an additional application may be claimed to align with the master program's cash flow.
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(*) 14.3(c)	Percentage of retention	<i>10% of cumulative work done in each progressive bills, until the 5% of the initial contract price is reached</i>
(*) 14.3(c)	Limit of Retention Money	5 % of the Initial Contract Price
(*) 14.5	Minimum amount of Interim Payment Certificates	5.0 Mn Rupees
(*)14.8	Alternative method for Payment of Retention	On reaching the limit of retention, stated in the Contract Data under Sub-Clause 14.3, the Contractor may substitute full retention money with an unconditional guarantee acceptable to the Employer to a value equal to the full retention money, and valid up to 28 Days beyond the end of Defect Notification Period. On receipt of such guarantee the Employer shall repay the full retention money. The guarantee will be released to the Contractor upon the certification of the Engineer that all Defects notified by the Engineer to the Contractor before the end of this period have been corrected.
(*) 18.2	Third Party Insurance	This Amount of insurance per occurrence is: Rupees 1,000,000.00

Clause 19.0 Claims, Disputes and Arbitration

*Delete existing sub-clause 19.2 (Dispute Resolution),
Delete existing sub-clause 19.3 (Procedure for
Adjudication),*

*Delete existing sub-clause 19.4 (Replacement of
Adjudicator),*

*Delete existing sub-clause 19.5 (Arbitration), and
insert the following new sub-clauses;*

19.2 Appointment of the Dispute Adjudication Board

*19.3 Failure to Agree on the Composition of the
Dispute Adjudication Board*

*19.4 Obtaining Dispute Adjudication Board's
Decision*

*19.5 Failure to Comply with Dispute Adjudication
Board's Decision*

*19.6 Expiry of Dispute Adjudication Board's
Appointment*

19.7 Arbitration

19.2 Appointment of the
Dispute
Adjudication
Board

Any dispute of whatever nature arising out of or in relation to this agreement shall in the first instance be referred to a Dispute Adjudication Board (DAB) for decision in accordance with Sub-Clause 19.4 [Obtaining Dispute Adjudication Board's Decision]. The Parties shall appoint a DAB within 28 Days from the Commencement Date.

The DAB shall comprise, three suitably qualified persons ("the members"), who shall be professionals experienced in the type of construction involved in the Works and with the interpretation of contractual documents, one of whom shall serve as chairman.

Within 28 Days from the Commencement Date each of the Parties shall appoint one member to serve on the Dispute Adjudication Board (DAB). The Parties shall consult both these members and shall agree upon the third member, who shall be appointed to act as the chairman.

The agreement between the Parties and each of the three members shall incorporate by reference the General Conditions of Dispute Adjudication Agreement contained in the Appendix to these Contract Data, with such amendments as are agreed between them.

The terms of the remuneration of the three members, including the remuneration of any expert whom the DAB consults, shall be mutually agreed upon by the Parties when agreeing the terms of appointment of the member or such expert (as the case may be). Each Party shall be responsible for paying one-half of this remuneration.

If a member declines to act or is unable to act as a result of death, disability, resignation or termination of appointment, a replacement shall be appointed in the same manner as the replaced person was required to have been nominated or agreed upon, as described in this Sub-Clause.

The appointment of any member may be terminated by mutual agreement of both Parties, but not by the Employer or the Contractor acting alone. Unless otherwise agreed by both Parties, the appointment of the DAB (including each member) shall expire when the discharge referred to in Sub-Clause 14.11 [Discharge] shall have become effective.

19.3 Failure to Agree on the Composition of the Dispute Adjudication Board

If any of the following conditions apply, namely:

- (a) either Party fails to nominate a member of a DAB by such date,
- (b) the Parties fail to agree upon the appointment of the third member (to act as chairman) of the DAB by such date, or
- (c) the Parties fail to agree upon the appointment of a replacement person within 42 Days after the date on which the one of the three members declines to act or is unable to act as a result of death, disability, resignation or termination of appointment,

Then Institute for Construction Training and Development (ICTAD) shall, upon the request of either or both of the Parties and after due consultation with both Parties, appoint this member of the DAB. This appointment shall be final and conclusive. Each Party shall be responsible for paying one-half of the expenses / disbursements incurred by ICTAD.

19.4 Obtaining Dispute Adjudication Board's Decision

If a dispute (of any kind whatsoever) arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works, including any dispute as to any certificate, determination, instruction, opinion or valuation of the Engineer, either Party may refer the dispute in writing to the DAB for its decision, with copies to the other Party and the Engineer. Such reference shall state that it is given under this Sub-Clause.

The DAB shall be deemed to have received such reference on the date when it is received by the chairman of the DAB.

Both Parties shall promptly make available to the DAB all such additional information, further access to the Site, and appropriate facilities, as the DAB may require for the purposes of making a decision on such dispute. The DAB shall be deemed to be not acting as arbitrator(s).

Within 84 Days after receiving such reference, or within such other period as may be proposed by the DAB and approved by both Parties, the DAB shall give its decision, which shall be reasoned and shall state that it is given under this Sub-Clause. The decision shall be binding on both Parties, who shall promptly give effect to it unless and until it shall be revised in an amicable settlement or an arbitral award as described below. Unless the Contract has already been abandoned, repudiated or terminated, the Contractor shall continue to proceed with the Works in accordance with the Contract.

If either Party is dissatisfied with the DAB's decision, then either Party may, within 28 Days after receiving the decision, give notice to the other Party of its dissatisfaction and intention to commence arbitration. If the DAB fails to give its decision within the period of 84 Days (or as otherwise approved) after receiving such reference, then either Party may, within 28 Days after this period has expired, give notice to the other Party of its dissatisfaction and intention to commence arbitration.

In either event, this notice of dissatisfaction shall state that it is given under this Sub-Clause, and shall set out the matter in dispute and the reason(s) for dissatisfaction. Except as stated in Sub-Clause 19.5 [Failure to Comply with Dispute Adjudication Board's Decision] and Sub-Clause 19.6 [Expiry of Dispute Adjudication Board's Appointment], neither Party shall be entitled to commence arbitration of a dispute unless a notice of dissatisfaction has been given in accordance with this Sub-Clause.

If the DAB has given its decision as to a matter in dispute to both Parties, and no notice of dissatisfaction has been given by either Party within 28 Days after it received the DAB's decision, then the decision shall become final and binding upon both Parties.

19.5	Failure to Comply with Dispute Adjudication Board's Decision	In the event that a Party fails to comply with a DAB decision which has become final and binding, then the other Party may, without prejudice to any other rights it may have, refer the failure itself to arbitration under Sub-Clause 19.7 [Arbitration]. Sub-Clause 19.4 [Obtaining Dispute Adjudication Board's Decision] shall not apply to this reference.
19.6	Expiry of Dispute Adjudication Board's Appointment	If a dispute arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works and there is no DAB in place, whether by reason of the expiry of the DAB's appointment or otherwise: (a) Sub-Clause 19.4 [Obtaining Dispute Adjudication Board's Decision] shall not apply, and (b) the dispute may be referred directly to arbitration under Sub-Clause 19.7 [Arbitration].
19.7	Arbitration	(a) Any dispute of whatever nature arising from, out of or in connection with this agreement, on the interpretation thereof, or the rights, duties, obligations or liabilities of any Party, or the operation, breach, termination, abandonment, foreclosure or invalidity thereof, shall be referred to by either Party to arbitration for final settlement, in accordance with the Arbitration Act No. 11 of 1995, or any amendment thereof, (b) Pending the award in any arbitration proceedings hereunder, (i) this Contract and the rights and obligations of the Parties shall remain in full force and effect and (ii) each of the Parties shall continue to perform their respective obligations under this Contract. The termination of this Contract shall not result in the termination of any arbitration proceedings pending at the time of such termination nor otherwise affect the rights and obligations of the Parties under or with respect to such pending arbitration. (c) Any award rendered by the arbitral tribunal shall determine the extent to which the cost of arbitration is to be borne by each Party. The arbitration centre charges and the compensation to the arbitrator shall be equally shared by the Parties initially.

Composition of the Arbitral Tribunal :

The arbitral tribunal shall consist of a sole arbitrator who shall be appointed in the manner provided in the Selection Procedure as given below.

Selection Procedure :

The Party desiring arbitration shall nominate three arbitrators out of which one to be selected by the other Party within 21 Days of the receipt of such nomination. If the other Party does not select one to serve as Arbitrator within the stipulated period then the Arbitrator shall be appointed in accordance with the Arbitration Act No. 11 of 1995, or any amendments thereof.

Venue & Language :

The venue of arbitration shall be in Sri Lanka.

Unless otherwise agreed to by the Parties the proceedings shall be conducted and the award shall be rendered in the English language.

CONTRACT DATA

APPENDIX TO CONTRACT DATA

A General Conditions of Dispute Adjudication Agreement

1. Definitions

Each "Dispute Adjudication Agreement" is a tripartite agreement by and between:

- (a) the "Employer";
- (b) the "Contractor"; and
- (c) the "Member" who is defined in the Dispute Adjudication Agreement as being one of the three persons who are jointly called the "DAB" (or "Dispute Adjudication Board") and, where this is the case, the other two persons are called the "Other Members."

The Employer and the Contractor have entered (or intend to enter) into a contract, which is called the "Contract" and is defined in the Dispute Adjudication Agreement, which incorporates this Appendix. In the Dispute Adjudication Agreement, words and expressions which are not otherwise defined shall have the meanings assigned to them in the Contract.

2. General Provisions

Unless otherwise stated in the Dispute Adjudication Agreement, it shall take effect on the latest of the following dates:

- (a) the Commencement Date defined in the Contract,
- (b) when the Employer, the Contractor and the Member have each signed the Dispute Adjudication Agreement, or
- (c) when the Employer, the Contractor and each of the Other Members have respectively each signed a Dispute Adjudication Agreement.

This employment of the Member is a personal appointment. At any time, the Member may give not less than 70 Days notice of resignation to the Employer and to the Contractor, and the Dispute Agreement shall terminate upon the expiry of this period.

3. Warranties

The Member warrants and agrees that he/she is and shall be impartial and independent of the Employer, the Contractor and the Engineer. The Member shall promptly disclose, to each of them and to the Other Members, any fact or circumstance which might appear inconsistent with his/her warranty and agreement of impartiality and independence.

When appointing the Member, the Employer and the Contractor relied upon the Member's representations that he/she is:

- (a) experienced in the work which the Contractor is to carry out under the Contract,
- (b) experienced in the interpretation of contract documentation, and
- (c) fluent in the language for communications defined in the Contract.

**4. General
Obligations of the
Member**

The Member shall:

- (a) have no interest financial or otherwise in the Employer, the Contractor or Engineer, nor any financial interest in the Contract except for payment under the Dispute Adjudication Agreement;
- (b) not previously have been employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except in such circumstances as were disclosed in writing to the Employer and the Contractor before they signed the Dispute Adjudication Agreement;
- (c) have disclosed in writing to the Employer, the Contractor and the Other Members, before entering into the Dispute Adjudication Agreement and to his/her best knowledge and recollection, any professional or personal relationships with any director, officer or employee of the Employer, the Contractor or the Engineer, and any previous involvement in the overall project of which the Contract forms part;
- (d) not, for the duration of the Dispute Adjudication Agreement, be employed as a consultant or otherwise by the Employer, the Contractor or the Engineer, except as may be agreed in writing by the Employer, the Contractor and the Other Members;
- (e) comply with the annexed procedural rules and with Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision) of the Conditions of Contract;
- (f) not give advice to the Employer, the Contractor, the Employer's Personnel or the Contractor's Personnel concerning the conduct of the Contract, other than in accordance with the annexed procedural rules;
- (g) not while a Member enter into discussions or make any agreement with the Employer, the Contractor or the Engineer regarding employment by any of them, whether as a consultant or otherwise, after ceasing to act under the Dispute Adjudication Agreement;
- (h) ensure his/her availability for all site visits and hearings as are necessary;
- (i) become conversant with the Contract and with the progress of the Works (and of any other parts of the project of which the Contract forms part) by studying all documents received which shall be maintained in a current working file;
- (j) treat the details of the Contract and all the DAB's activities and hearings as private and confidential, and not publish or disclose them without the prior written consent of the Employer, the Contractor and the Other Members; and
- (k) be available to give advice and opinions, on any matter relevant to the Contract when requested by both the Employer and the Contractor, subject to the agreement of the Other Members.

**5. General
Obligations of the
Employer and the
Contractor**

The Employer, the Contractor, the Employer's Personnel and the Contractor's Personnel shall not request advice from or consultation with the Member regarding the Contract, otherwise than in the normal course of the DAB's activities under the Contract and the Dispute Adjudication Agreement. The Employer and the Contractor shall be responsible for compliance with this provision, by the Employer's Personnel and the Contractor's Personnel respectively.

The Employer and the Contractor undertake to each other and to the Member that the Member shall not, except as otherwise agreed in writing by the Employer, the Contractor, the Member and the Other Members:

- (a) be appointed as an arbitrator in any arbitration under the Contract;
- (b) be called as a witness to give evidence concerning any dispute before arbitrator(s) appointed for any arbitration under the Contract; or
- (c) be liable for any claims for anything done or omitted in the discharge or purported discharge of the Member's functions, unless the act or omission is shown to have been in bad faith.

The Employer and the Contractor hereby jointly and severally indemnify and hold the Member harmless against and from claims from which he is relieved from liability under the preceding paragraph.

Whenever the Employer or the Contractor refers a dispute to the DAB under Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision) of the Conditions of Contract, which will require the Member to make a site visit and attend a hearing, the Employer or the Contractor shall provide appropriate security for a sum equivalent to the reasonable expenses to be incurred by the Member. No account shall be taken of any other payments due or paid to the Member.

6. Payment

The Member shall be paid as follows:

- (a) a retainer fee per calendar month, which shall be considered as payment in full for:
 - (i) being available on 28 Days notice for all site visits and hearings;
 - (ii) becoming and remaining conversant with all project developments and maintaining relevant files;
 - (iii) all office and overhead expenses including secretarial services, photocopying and office supplies incurred in connection with his duties; and
 - (iv) all services performed hereunder except those referred to in subparagraphs (b) and (c) of this Clause.

The retainer fee shall be paid with effect from the last day of the calendar month in which the Dispute Adjudication Agreement becomes effective; until the last day of the calendar month in which the Taking-Over Certificate is issued for the whole of the Works.

With effect from the first day of the calendar month following the month in which the Taking-Over Certificate is issued for the whole of the Works, the retainer fee shall be reduced by 50%. This reduced fee shall be paid until the first day of the calendar month in which the Member resigns or the Dispute Adjudication Agreement is otherwise terminated.

- (b) a daily fee which shall be considered as payment in full for:
 - (i) each day or part of a day up to a maximum of two Days travel time in each direction for the journey between the Member's home and the site, or another location of a meeting with the Other Members;
 - (ii) each working day on Site visits, hearings or preparing decisions; and
 - (iii) each day spent reading submissions in preparation for a hearing.
- (c) all reasonable expenses including necessary travel expenses (hotel and subsistence and other direct travel expenses) incurred in connection with the Member's duties, as well as the cost of telephone calls, courier charges, and faxes: a receipt shall be required for each item in excess of five percent of the daily fee referred to in sub-paragraph (b) of this Clause.

The retainer and daily fees shall be as specified in the Dispute Adjudication Agreement. Unless it specifies otherwise, these fees shall remain fixed for the entire duration of the Contract.

The Member shall submit invoices for payment of the monthly retainer quarterly in advance. Invoices for other expenses and for daily fees shall be submitted following the conclusion of a site visit or hearing. All invoices shall be accompanied by a brief description of activities performed during the relevant period and shall be addressed to the Contractor.

The Contractor shall pay each of the Member's invoices in full within 56 calendar days after receiving each invoice and shall apply to the Employer (in the Statements under the Contract) for reimbursement of one-half of the amounts of these invoices. The Employer shall then pay the Contractor in accordance with the Contract.

If the Contractor fails to pay to the Member the amount to which he/she is entitled under the Dispute Adjudication Agreement, the Employer shall pay the amount due to the Member and any other amount which may be required to maintain the operation of the DAB; and without prejudice to the Employer's rights or remedies. In addition to all other rights arising from this default, the Employer shall be entitled to reimbursement of all sums paid in excess of one-half of these payments, plus all costs of recovering these sums and financing charges calculated at the rate specified in Sub-Clause 14.7 of the Conditions of Contract.

If the Member does not receive payment of the amount due within 70 days after submitting a valid invoice, the Member may (i) suspend his/her services (without notice) until the payment is received, and/or (ii) resign his/her appointment by giving notice under Clause 7.

7. Termination

At any time: (i) the Employer and the Contractor may jointly terminate the Dispute Adjudication Agreement by giving 42 Days notice to the Member; or (ii) the Member may resign as provided for in Clause 2.

If the Member fails to comply with the Dispute Adjudication Agreement, the Employer and the Contractor may, without prejudice to their other

rights, terminate it by notice to the Member. The notice shall take effect when received by the Member.

If the Employer or the Contractor fails to comply with the Dispute Adjudication Agreement, the Member may, without prejudice to his other rights, terminate it by notice to the Employer and the Contractor. The notice shall take effect when received by them both.

Any such notice, resignation and termination shall be final and binding on the Employer, the Contractor and the Member. However, a notice by the Employer or the Contractor, but not by both, shall be of no effect.

8. Default of the Member

If the Member fails to comply with any of his obligations under Clause 4 (a) - (d) above, he shall not be entitled to any fees or expenses hereunder and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses received by the Member and the Other Members, for proceedings or decisions of the DAB which are rendered void or ineffective by the said failure to comply.

If the Member fails to comply with any of his obligations under Clause 4 (e) - (k) above, he shall not be entitled to any fees or expenses hereunder from the date and to the extent of the non-compliance and shall, without prejudice to their other rights, reimburse each of the Employer and the Contractor for any fees and expenses already received by the Member, for proceedings or decisions of the DAB which are rendered void or ineffective by the said failure to comply.

9. Disputes

Any dispute or claim arising out of or in connection with this Dispute Adjudication Agreement, or the breach, termination or invalidity thereof, shall be finally settled in accordance with Arbitration Act No 11, 1995 of Sri Lanka with a sole Arbitrator..

PROCEDURAL RULES

1. Unless otherwise agreed by the Employer and the Contractor, the DAB shall visit the site at intervals of not more than 70 days, including times of critical construction events, at the request of either the Employer or the Contractor. Unless otherwise agreed by the Employer, the Contractor and the DAB, the period between consecutive visits shall not be less than 35 days, except as required to convene a hearing as described below.
2. The timing of and agenda for each site visit shall be as agreed jointly by the DAB, the Employer and the Contractor, or in the absence of agreement, shall be decided by the DAB. The purpose of site visits is to enable the DAB to become and remain acquainted with the progress of the Works and of any actual or potential problems or claims, and, as far as reasonable, to endeavour to prevent potential problems or claims from becoming disputes.
3. Site visits shall be attended by the Employer, the Contractor and the Engineer and shall be co-ordinated by the Employer in co-operation with the Contractor. The Employer shall ensure the provision of appropriate conference facilities and secretarial and copying services. At the conclusion of each site visit and before leaving the site, the DAB shall prepare a report on its activities during the visit and shall send copies to the Employer and the Contractor.
4. The Employer and the Contractor shall furnish copy each to the members of the DAB all documents which the DAB may request, including Contract documents, progress reports, variation instructions, certificates and other documents pertinent to the performance of the Contract. All communications between the DAB and the Employer or the Contractor shall be copied to the other Party.
5. If any dispute is referred to the DAB in accordance with Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision) of the Conditions of Contract, the DAB shall proceed in accordance with Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision) and these Rules. Subject to the time allowed to give notice of a decision and other relevant factors, the DAB shall:
 - (a) act fairly and impartially as between the Employer and the Contractor, giving each of them a reasonable opportunity of putting his case and responding to the other's case, and
 - (b) adopt procedures suitable to the dispute, avoiding unnecessary delay or expense.
6. The DAB may conduct a hearing on the dispute, in which event it will decide on the date and place for the hearing and may request that written documentation and arguments from the Employer and the Contractor be presented to it prior to or at the hearing.
7. Except as otherwise agreed in writing by the Employer and the Contractor, the DAB shall have power to adopt an inquisitorial procedure, to refuse admission to hearings or audience at hearings to any persons other than representatives of the Employer, the Contractor and the Engineer, and to proceed in the absence of any party who the DAB is satisfied received notice of the hearing; but shall have discretion to decide whether and to what extent this power may be exercised.
8. The Employer and the Contractor empower the DAB, among other things, to:
 - (a) establish the procedure to be applied in deciding a dispute,
 - (b) decide upon the DAB's own jurisdiction, and as to the scope of any dispute referred to it,
 - (c) conduct any hearing as it thinks fit, not being bound by any rules or procedures other than those contained in the Contract and these Guidelines,

- (d) take the initiative in ascertaining the facts and matters required for a decision,
 - (e) make use of its own specialist knowledge, if any,
 - (f) decide upon the payment of financing charges in accordance with the Contract,
 - (g) decide upon any provisional relief such as interim or conservatory measures, and
 - (h) open up, review and revise any certificate, decision, determination, instruction, opinion or valuation of the Engineer, relevant to the dispute.
9. The DAB shall not express any opinions during any hearing concerning the merits of any arguments advanced by the Parties. Thereafter, the DAB shall make and give its decision in accordance with Sub-Clause 19.4 (Obtaining Dispute Adjudication Board's Decision), or as otherwise agreed by the Employer and the Contractor in writing. The DAB:
- (a) shall convene in private after a hearing, in order to have discussions and prepare its decision;
 - (b) shall endeavour to reach a unanimous decision: if this proves impossible the applicable decision shall be made by a majority of the Members, who may require the minority Member to prepare a written report for submission to the Employer and the Contractor; and
 - (c) Member fails to attend a meeting or hearing, or to fulfill any required function, the other two Members may nevertheless proceed to make a decision, unless:
 - (i) either the Employer or the Contractor does not agree that they do so, or
 - (ii) the absent Member is the chairman and he/she instructs the other Members to not make a decision.

DISPUTE ADJUDICATION AGREEMENT

[for each member of a three - person DAB]

Name and details of Contract
 Name and address of Employer
 Name and address of Contractor
 Name and address of Member

Whereas the Employer and the Contractor have entered into the Contract and desire jointly to appoint the Member to act as one of the three persons who are jointly called the Dispute Adjudication Board (DAB) [and desire the Member to act as chairman of the DAB]

The Employer, Contractor and Member jointly agree as follows:

1. The conditions of this Dispute Adjudication Agreement comprise the "General Conditions of Dispute Adjudication Agreement" which is appended to the General Conditions of the "Standard Bidding Document, Procurement of Works, Major Contracts - Second Edition, January 2007" and the following provisions. In these provisions, which include amendments and additions to the General Conditions of Dispute Adjudication Agreement, words and expressions shall have the same meanings as are assigned to them in the General Conditions of Dispute Adjudication Agreement.

2. [Details of amendments to the General Conditions of Dispute Adjudication Agreement, if any

For example:

In the procedural rules annexed to the General Conditions of Dispute Adjudication Agreement, Rule _____ is deleted and replaced by: "....."]

- 3 In accordance with Clause 6 of the General Conditions of Dispute Adjudication Agreement the Member shall be paid as follows:

A retainer fee of _____ per calendar month,
 plus a daily fee of _____ per day.

- 4 In consideration of these fees and other payments to be made by the Employer and the Contractor in accordance with Clause 6 of the General Conditions of Dispute Adjudication Agreement, the Member undertakes to serve, as described in this Dispute Adjudication Agreement, as one of the three persons who are jointly to act as the DAB.
- 5 The Employer and the Contractor jointly and severally undertake to pay the Member, in consideration of the carrying out of these services, in accordance with Clause 6 of the General Conditions of Dispute Adjudication Agreement.
- 6 This Dispute Adjudication Agreement shall be governed by the law of _____

SIGNED by: _____

SIGNED by: _____

SIGNED by: _____

for and on behalf of the employer
 in the presence of

for and on behalf of the Contractor
 in the presence of

the Member
 in the presence of

Witness: _____

Witness: _____

Witness : _____

Name: _____

Name: _____

Name : _____

Address: _____

Address: _____

Address : _____

Date: _____

Date: _____

Date: _____

Notes on Form of Letter of Acceptance

The Letter of Acceptance will be the basis for formation of the Contract as described in Clause 34 of the Instructions to Bidders. This Form of Letter of Acceptance should be filled in and sent to the successful bidder only after evaluation of Bids and after obtaining approval from the relevant authority.

FORM OF LETTER OF ACCEPTANCE

[Letter heading paper of the procuring entity]

..... *[date]*

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

This is to notify you that your bid dated ----- *[insert date]* for the construction and remedying defects of the ----- *[name of the Contract and identification number]* for the Contract price of ----- *[name of currency]* ----- *[amount in figures and words]* as corrected in accordance with Instructions to Bidders and/ or modified by a Memorandum of Understanding, is hereby accepted.

You are hereby instructed to proceed with the execution of the said Works in accordance with the Contract documents.

The Commencement Date shall be: *(fill the date as per Clause 8.1 of Conditions of Contract).*

The amount of Performance Security is : *(fill the amount as per Clause 4.2 of Conditions of Contract).*

The Performance Security shall be submitted on or before *(fill the date as per Clause 4.2 of Conditions of Contract).*

Authorized Signature :

Name and title of Signatory :

FORM OF AGREEMENT

This Agreement made the [day] of [month] 200..... [year], between [name and address of Employer] (hereinafter called and referred to as "the Employer"), of the one part, and [name and address of Contractor] (hereinafter called and referred to as "the Contractor"), of the other part:

Whereas the Employer desires that the Contractor execute [name and identification no of Contract] (hereinafter called and referred to as "the Works") and the Employer has accepted the Bid by the Contractor for the execution and completion of such Works and remedying of any defects therein.

The Employer and the Contractor agree as follows::

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Contract.
2. In consideration of the payments to be made by the Employer to the Contractor as indicated in this Agreement, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execute and complete the Works and remedy any defects therein, the Contract Price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

In Witness whereof the parties hereto have caused this Agreement to be executed the day and year aforementioned in accordance with laws of Sri Lanka.

.....
Authorised signature of Contractor

.....
Authorised signature of Employer

COMMON SEAL

COMMON SEAL

In the presence of
 Witnesses :

1. Name and NIC No.
 Signature
 Address
2. Name and NIC No.
 Signature
 Address

FORM OF PERFORMANCE SECURITY (Unconditional)

----- *[Issuing Agency's Name, and Address of Issuing Branch or Office]* -----

Beneficiary: ----- *[Name and Address of Employer]*

Date: -----

PERFORMANCE GUARANTEE No.: -----

We have been informed that ----- *[name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. ----- *[reference number of the Contract]* dated ----- with you, for the ----- *[insert "construction"]* of ----- *[name of Contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the Conditions of the Contract, a performance guarantee is required.

At the request of the Contractor, we ----- *[name of Agency]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ----- *[amount in figures]* (----- *[amount in words]*), upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation(s) under the Contract, without your needing to prove or to show grounds for your demand or the sum specified therein.

This guarantee shall expire, no later than the day of, 20.. *[insert date, 28 days beyond the Time for Completion]* and any demand for payment under it must be received by us at this office on or before that date.

[signature(s)]

FORM OF ADVANCE PAYMENT SECURITY

----- *[Name and address of Agency, and Address of Issuing Branch or Office]* -----

Beneficiary: ----- *[Name and Address of Employer]*

Date: -----

ADVANCE PAYMENT GUARANTEE No.: -----

We have been informed that ----- *[name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. ----- *[reference number of the contract]* dated ----- with you, for the ----- construction of ----- *[name of contract and brief description]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum ----- *[amount in figures]* (-----) *[amount in words]* is to be made against an advance payment guarantee.

At the request of the Contractor, we ----- *[name of issuing agency]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ----- *[amount in figures]* (-----) *[amount in words]* upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation in repayment of the Advance Payment under the Contract.

The maximum amount of this guarantee shall be progressively reduced by the amount of the advance payment repaid by the Contractor.

This guarantee shall expire on *[Insert the date, 28 days beyond the Time of Completion]*

Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

[signature(s)]

FORM OF RETENTION MONEY GUARANTEE

----- *[Issuing Agency's Name, and Address of Issuing Branch or Office]* -----

Beneficiary: ----- *[Name and Address of Employer]* -----

Date: -----

RETENTION MONEY GUARANTEE No.: -----

We have been informed that ----- *[name of Contractor]* (hereinafter called "the Contractor") has entered into Contract No. ----- *[reference number of the contract]* dated ----- with you, for the execution of ----- *[name of contract and brief description of Works]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, when the works have being taken over and the first half of the Retention Money has been certified for payment, payment of the second half of the Retention Money may be made against a Retention Money guarantee.

At the request of the Contractor, we ----- *[name of agency]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ----- *[amount in figures]* (----- *[amount in words]*) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Contractor is in breach of its obligation under the Contract because the Contractor has not attended to the defects in accordance with the Contract..

This guarantee shall expire, at the latest, ----- *[insert 28 Days after the end of the Defects Liability Period]*. Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

[signature(s)]

SPECIFICATIONS

SPECIFICATION

Following Specifications are required to be followed during the construction process.

1.SCA/4/I

2.SCA/4/II

3.SCA/3/2

CHAPTER 1 - MATERIALS

Materials

Materials used shall be the best of its kind and shall conform to the relevant latest Sri Lanka Standards, and where such a Standard is not available shall conform to the latest British Standard.

Water

All water used for mixing concrete, mortar or grout shall conform to SLS 522 and be obtained from a source approved by the officer-in-charge. The water shall be fresh, clean and free from acid, alkali, oil, organic impurities, lime in solution or other matter which is deleterious to concrete or steel. In general potable water shall be used.

As a guide, the following concentrations may be taken to represent the maximum permissible limits of deleterious materials in water.

- (a) Suspended matter - 2,000 mg/litre
- (b) Dissolved matter (max concentration)
 - 1. Sodium & Potassium Bicarbonate 1,000 mg/litre
 - 2. Sodium Chloride 20,000 mg/litre
 - 3. Sodium Sulphate 10,000 mg/litre
 - 4. Ca + Mg Bicarbonate as HCO_3 400 mg/litre
 - 5. Calcium Chloride 20,000 mg/litre
 - 6. Iron Salts - 40,000 mg/litre
 - 7. Sodium Iodate, Phosphate, Arsonate & Borate 500 mg/litre
 - 8. $\text{HCl} + \text{H}_2\text{SO}_4$ - 10,000 mg/litre
 - 9. NaOH - 5,000 mg/litre
- (c) pH value of water shall generally be not less than 6.

Sea water shall not be permitted for mixing or curing of concrete.

Water found satisfactory for mixing is also suitable for curing concrete; however, water used for curing shall not produce any objectionable stain or unsightly deposit on the concrete surface. The presence of tannic acid or Iron compounds is objectionable.

The Contractor shall make arrangements for and provide all the water necessary for concrete, mortar, curing or any other purpose on the work.

Cement

General

Cement shall be from an approved source and shall be one of the following types of cement as specified.

Type	In accordance with
Ordinary Portland Cement	SLS 107
Rapid Hardening Portland Cement	BS EN 197 (BS 12)
White Portland Cement	
Coloured Portland Cement	
Portland Blast Furnace Cement	BS 146
Low Heat Portland Cement	BS 1370

Type	In accordance with
Sulphate Resisting Portland Cement	BS 4027
Low Heat Portland Blast Furnace Cement	BS EN 197 (BS 4246)
Super Sulphated Cement	BS 4248
Ultra High Early Strength Portland Cement	The requirements for physical properties for Ordinary Portland Cement given in SLS 107 or BS En 197 (BS 12)
Water Repellent Portland Cement	
Hydro-phobic Portland Cement	
Portland Lime Stone Cement	SLS 1253
Blended Hydraulic Cement	SLS 1247
Masonry Cement	SLS 515

The initial setting time shall not be less than 45 minutes and the final setting time not more than 10 hours for Ordinary Portland Cement.

Note : Masonry cement conforming to SLS 515 shall not be used for structural concrete. It may only be used for non-structural concrete, masonry mortars and for plastering flooring. Special precaution shall be taken in storing and issuing of masonry cement to prevent confusing with cement to be used for structural concreting.

1.2.2 Supply

The cement shall be packed in bags (multiply paper, or cloth) alternatively it may be supplied at site in silos installed for the purpose.

1.2.3 Transport, Storage and Handling

The cement needed for concrete mortar and grout shall be purchased by the Contractor to suit the construction schedule. He shall make all necessary arrangements and be responsible for transporting, storing and handling it.

Cement shall be stored on the site in such manner as to facilitate identification or inspection of each consignment. The storage sheds shall be of weather proof construction and the floors shall be free from all possibilities of flooding. Chipping up or re-using of partially set cement shall not be allowed. The bags shall be stacked at least 100 to 200 mm clear above floor level over wooden planks and joints. A spacing of 600 mm should be kept between the exterior walls and the stacks. Cement bags shall be placed close together in the stack to reduce circulation of air to the minimum. To avoid lumping under pressure, cement bags shall not be stacked more than 10 bags high. Extra precaution shall be taken during monsoons or when cement is to be stored for unusually long periods; the stack shall be enclosed completely in thick polythene sheet, canvas sheets or any other suitable water proof sheeting, with the flap closing on the top of the stack. Care shall be taken to see that the water proof sheeting, with the flap closing on the top of the stack. Care shall be taken to see that the water proof covering is not damaged at any time during use. When removing cement bags for use the 'first in, first out' rule shall be applied.

In the case of large works, the storage capacity shall be adequate to ensure uninterrupted work in accordance with construction schedule. Storage of cement at the site of work shall be at the contractor's expense and risk.

1.2.4 Testing of Cement

The officer-in-charge may extract samples of consignments of cement as and when he desires for the purpose of testing. Testing shall conform to SLS 107 for Portland cement and to the relevant

Sri Lanka/British standards for other cements. If the sample fails the test, the particular consignment shall be rejected and shall be removed from the site within 24 hours of notice in writing to the contractor to do so. Any consignment of cement stored at site for more than 3 months shall be re-tested if so required by the officer-in-charge.

If the contractor provides the cement, he shall arrange for the cement to be delivered at the site in sufficient time for standard tests to be made before the cement is required for use, or provide certificates of tests from the supplier that will be acceptable to the officer-in-charge.

1.3 Lime

Lime shall be obtained from an approved source; it shall be one of the following types, as per SLS 552 depending on the raw material from which it was manufactured,

- Type 1 Dolomitic Lime
- Type 2 Coral lime* and sea shells
- Type 3 Burnt Miocene lime stone

Lime which has perished, or which has been damaged by damp, rain, or intermixture of dirt, or which has become partially air slaked shall on no account be used on the works and shall be removed from the site within 24 hours of notice to remove. Lime which gives a residue of more than 10 percent by weight when tested with hydrochloric acid shall be rejected.

The lime stored at the work site shall be protected from weather action, by being kept in a weather proof shed with impervious floor and sides.

1.3.1 Quick Lime

This shall be freshly burnt from good hard coral*, sea shells or limestone broken to a uniform size not exceeding 40 mm and carefully freed from earth and other impurities.

The lime shall be delivered at the site of the mortar mill quite fresh, i.e. within 15 days of the date on which it was drawn fresh from the kiln. In cases where compliance herewith is not possible due to seasonal closure of kilns, written permission of the officer-in-charge is necessary before stored slaked lime can be used.

1.3.2 Hydrated/Slaked Lime

All impurities, ashes or pieces improperly or carelessly burnt shall be screened or picked out before slaking. Quick lime shall be slaked with sufficient water; slaking shall be done neither earlier than three weeks nor later than one week before being put into the mill.

* Note: Government has banned the use of coral based lime in the building construction work in the public sector inclusive of the provincial councils.

The lime after slaking shall be screened through a sieve of such size as the officer-in-charge may direct and all stuff that does not pass through the sieve shall be rejected. For plastering second and third coat or for any fine work, unless otherwise specified, the lime shall pass through a 1.18 mm BS Test sieve: for all other work, unless otherwise specified the lime shall pass a 2.36 mm BS Test sieve wire screen.

1.3.3 Lime Putty

Lime putty shall be obtained by treating either quicklime or hydrated lime with sufficient water so as to produce a plastic, sound product.

It shall be sieved to be entirely free from coarse particles and shall be thoroughly matured for not less than 16 hours before use.

1.4 Fine Aggregate For Concrete

This shall conform to BS 882 : See Chapter 4.

1.5 Coarse Aggregate

Coarse aggregate for granolithic floor finishes shall be as specified in Chapter 4.

1.6 Building Sand

The sand may be naturally occurring like river sand, pit sand or off-shore sand*. It shall generally conform to BS 1198, BS 1199 and BS 1200. Sand produced from crushed rock to comply with the above standards may also be used. All sand types shall be hard, durable, clean and free from adherent coatings such as clay. It shall not contain harmful materials like pyrites, salts, coal or other organic impurities mica, shale or similar laminated materials, or flaky or elongated particles in such a form or in sufficient quantity to affect adversely the hardening, strength or durability of the mortar. In addition to the above, the sand when used for reinforced brick work shall not contain any material which may attack the reinforcement.

The quantity of clay, silt and dust shall not exceed the following unless there is satisfactory evidence to the contrary.

In natural sand - 3 % by mass when determined by the decantation method given in BS 812.

In Crushed stone sand - 15% by mass when determined by the sedimentation method given in BS 812.

* Refer Chapter 4 for off-shore sand.

1.6.1 Grading

Sand for brickwork/stone work/block work and external plastering shall pass completely through a sieve of 2.36 mm. Sand for second and third coats of plastering, pointing and fine work shall completely pass through a 1.18 mm test sieve.

1.7 Methods of Stacking

Materials normally measured in stacks are rough stone of all kinds broken stone and broken brick, gravel, sand, and lime. However for purpose of mixing of mortar, concrete etc. materials like sand, broken stone etc. shall be measured in properly constructed measuring boxes (or by weight as instructed by the officer-in-charge) to suit the specified proportions of those materials.

Piles shall be formed of regular shape and uniform cross section.

Materials shall not be stacked on uneven ground or in any manner which does not permit correct and ready measurement from external inspection of the piles.

Rough stone which is to be measured in the stack shall be packed so closely as to give the minimum quantity of voids possible, without actual dressing of the stones to fit the interstices.

1.8 Other Materials

Materials not dealt with in this chapter will be specified in the relevant Chapters.

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CHAPTER 2 - SITE PREPARATION, EXCAVATION AND EARTH WORK

2.1 Site Work

2.1.1 General

The area described or shown on the relevant site plan or bill of quantities shall be cleared of all obstructions, roots and growth, vegetation of every description, trees and saplings. Unless otherwise specified, 150 mm top soil shall be removed from that part of the site to be occupied by the proposed buildings and for a distance of 3 metres around it and the area levelled. The top soil shall be preserved in stock piles if so directed by the officer -in charge.

2.1.2 Existing Services

Particulars of over/under ground services shall be obtained from the Employer before commencing any work which may affect such services.

These services shall be maintained/diverted/plugged dismantled as specified or directed. In case the drain ends are required to be sealed off, contaminated earth shall be removed and disinfected as specified.

2.1.3 Demolition of Existing Structures

Where buildings are to be demolished this shall be down to ground level, or the bottom of posts, stanchions, etc. as specified. Special care shall be taken to cause the minimum damage to the materials in the process of dismantling. The value of the materials which in the opinion of the Officer-in -charge have been broken or damaged through carelessness on the part of the contractor will be recovered from the contractor. All serviceable materials shall be removed and stacked or disposed of as specified, and all debris shall be carted away by the contractor.

Refer also Chapter 15 - Demolition.

2.1.4 Felling and Removal of Trees

The trees shall be cut only after written permission of the officer-in-charge is obtained.

The roots of trees shall be removed completely and the hollows filled up with suitable earth in layers of 150 mm levelled and rammed so that the surface at these points conforms to the surrounding area.

Wood, branches of trees and other useful materials shall be handed over to the officer-in-charge. The felled trees shall be cut to such lengths as directed by the officer-in-charge, trunks and branches cleared of limbs and tops and stacked neatly, well away from the site of work. Other serviceable materials shall be stacked as directed and handed over to the officer-in-charge.

2.1.5 Disposal of Waste Materials

At the conclusion of the site work, the contractor shall tidy up and leave the site of the work in a clean and sanitary condition. All unserviceable material shall be removed from the area and disposed of as directed. Care shall be taken to see that the unsuitable waste materials are disposed of in such a manner that there is likelihood of these getting mixed up with materials meant for construction.

2.1.6 Waterways

All field drains and other water ways encountered during the excavation shall be temporarily diverted and reinstated, or otherwise taken care of, as directed by the officer-in -charge.

Filling of the location from which water courses have been diverted shall be commenced after clearing away all vegetable growths and soft deposits.

2.2 Excavations

Note: The contractor shall visit the site, inspect the trial holes or bores where available, and decide for himself the nature of the ground, subsoil to be excavated and the ground water levels. The furnishing of particulars of trial holes or bores for the information of the contractor does not absolve the contractor from his responsibilities nor does it guarantee that similar conditions apply on other parts of the site.

2.2.1 Establishment of Levels

2.2.1.1 Bench Marks

A masonry pillar of a suitable design (fig. 2/1) shall be erected at a prominent place in the site to serve as a bench mark for the execution of the work. This bench mark shall be so located that it remains undisturbed till all the works are completed. This shall be connected to a Standard Bench Mark if so directed by the officer-in -charge.

2.2.1.2 Levels

Before any excavation is commenced, the levels of the surface after removal of top soil shall be agreed by the officer-in-charge and the Contractor. Such agreement shall be recorded on a drawing showing levels at predetermined intervals, and shall be signed by the contractor and the officer-in-charge. The contractor shall provide all labour and instruments to obtain and record these levels.

2.2.2 Classification of Soils

Excavation in various types of material shall be classified under the following categories (refer Standard Methods of Measurement SLS 573) No distinction shall be made whether the material is dry or wet. The decision of the officer-in-charge with regard to the classification shall be final.

(a) Soft/Loose Soil

Generally and soil which yields to the ordinary application of pick and shovel, rake or other ordinary digging implements; for example vegetable or organic soils, turf, gravel, sand, silt, loam, clay, peat etc.

(b) Hard/Dense Soil

Generally any soil which requires the close application of picks jumpers or scarifiers to loosen same; for example, stiff clay, gravel and cobble stone.

Note : Cobble stone is the rock fragment usually rounded or semi rounded having maximum diameter in any direction between 80 mm and 300 mm.

(c) Mud -

A mixture of soil and water in a fluid or weak state.

(d) Soft disintegrated rock (not requiring blasting)

This shall include rock or boulders, which can be excavated by barring, wedging and

splitting manually or using pneumatic tools. It shall also include embedded boulders measuring not more than one metre in any one direction.

Note : The mere fact that the contractor resorts to blasting to loosen the material shall not mean that it will be classified as hard rock.

- (e) **Hard rock (requiring blasting)**
This shall include all rock occurring in large masses which cannot be removed except by blasting. Hard varieties of rock such as granite with or without veins and secondary minerals which in the opinion of the officer-in-charge requires blasting shall be considered as hard rock. Boulders of hard rock larger than one metre in any one direction lying in the overburden and requiring to be blasted for easy and efficient removal shall also be classified as hard rock. Refer Clause 2.2.3.
- (f) **Hard rock (blasting prohibited)**
For hard rock requiring blasting as described in (e) but where blasting is prohibited, the excavation has to be carried out by chiselling, wedging or any other agreed method. Refer Clause 2.2.3.
- (g) **Common Excavation**
This shall refer to excavation in all soils except rock requiring blasting with the use of excavating and earth moving machinery.

2.2.3 **Blasting**

Should rock be met with, in the course of excavation, it must be removed with wedges and levers. Blasting shall not be allowed without the written permission of the officer-in-charge, who must be fully informed by the contractor as to the steps taken by him to safeguard the surrounding property: the contractor shall take all responsibility for any damage or annoyance caused by way of blasting. Blasting operations shall be carried out as per the specifications set out under rock blasting in Section XIV of BSCP 2003.

In soft rock, if the contractor wishes to resort to blasting, he can do so only with the permission of the officer-in-charge, but at no extra cost.

2.2.4 **Antiquities and Useful Materials**

Any finds such as relics of antiquity, coins, fossils or other articles of value which may be discovered during the excavation work shall be the property of the Employer and shall be delivered to the officer-in-charge.

2.2.5 **Protection**

Trenches and foundation pits shall be provided with proper caution-signals and marked with red lights at night to avoid accidents.

The contractor shall take adequate protective measures to see that the excavation operations do not affect or damage adjoining structures, services etc.

2.2.6 **Reinstatement of Damages During Excavations**

All materials, structures, foundations, surfaces etc. affected or damaged during excavation shall be made good by the contractor at no extra cost to the Employer.

2.2.7 Anti-Termite Treatment

The treatment may be pre-constructional or post constructional. Where specified, the work shall be carried out according to standard techniques and practices using chemicals of approved make and concentrations, and as directed by the officer-in-charge.

2.2.8 Stability of Excavation

The methods of excavation shall in every case, be subject to the approval of the officer-in-charge and the contractor shall ensure the stability and safety of the excavation, adjacent structures, services and the works.

The sides of the excavation shall be timbered and shored by a proper method previously approved by the officer-in-charge.

The contractor shall have full responsibility for the stability of the excavations and safety of workmen. If any slip occurs, the contractor shall remove all the slipped material from the excavated pit without payment. If any damage to a built up structure occurs because of the slip the contractor shall make good without any payment.

2.2.9. Excavations For Foundations

Excavation for foundations shall be taken to the natural firm ground and to the depths indicated in the drawings. Specific instructions shall be obtained from the officer-in-charge if:

- (1) The natural bearing stratum occurs at a depth less/more than that indicated.
- (2) The nature of the bearing stratum vastly differs in its bearing characteristics.

In the case of sloping site, all work including foundation excavation, construction and backfilling shall be completed at the lower locations before the excavation at the higher location is commenced.

The bed of the excavation shall generally be made horizontal, and stepped in the case of sloping ground or when the bearing stratum requires such stepping.

Excavation for foundation in steeply sloping sites or sites on rock shall conform to drawings specially prepared for the purpose or approved by the officer-in-charge.
(Some guidance notes are given in Appendix 2A)

Excavations shall be made to the correct profiles and levels shown on the drawings, trimmed to exact shape, and all disturbed material and other debris removed. Excavated material shall not be placed closer than one metre from the outer edge of the excavation.

The bed of the excavation shall be consolidated by watering and ramming. Soft/defective spots shall be dug out and filled with lean concrete or other material as directed by the officer-in-charge. In case any excavation has been made below the level shown or required the contractor shall, at his own expense, fill up the excavation to proper level with lean concrete or other material as directed by the officer-in-charge.

Excavations are to be inspected by the officer-in-charge and the work approved before any further work or concrete or backfill is laid on them. Concrete or back fill shall be laid as soon as possible after inspection to prevent deterioration due to water or weather. The contractor shall take sufficient precautions against deterioration of excavated surfaces. If surfaces become unsuitable due to water or other causes, deteriorated surfaces shall be removed and replaced with concrete as directed by the officer-in-charge. The above shall be

at the contractor's expense if it is caused by negligence or for want of precautions on the part of the contractor.

2.2.10 Disposal of Surplus Materials

All surplus material shall be carried away from the site and dumped at dumping sites selected by the officer-in-charge up to the lead specified in the bill of quantities. The officer-in-charge may instruct the contractor to dump the excavated materials in regular heaps, bunds, blankets, ripraps with regular slopes as directed and levelled so as to provide natural drainage. As a rule, all softer material shall be laid along the centre of heaps, the harder and more weather resisting materials forming the casing on the sides and top.

2.2.11 Dewatering

The contractor shall provide, maintain and operate sufficient pumping equipment of the required capacity to keep the area of construction free of water from rain, drains, floods springs etc. during the construction period at no extra cost to the Employer.

2.2.12 Method of Dewatering

The contractor shall obtain the written permission of the officer-in-charge for the method he would use to keep the excavations free from water, the procedure adopted shall not result in the withdrawal of water/or soil from underneath the foundation of adjacent sites.

2.2.13 Planking and Strutting

Excavation with vertical sides shall be kept supported by planking and strutting which shall be 'close' or 'open' (Fig.2/2) depending on the nature of the soil and the depth of the trench. The support required shall generally conform to section 10 of BS CP 2003.

Guideline to the type and extent of support required is given in Appendix 2B.

Support for trench excavation along a public road shall be of adequate design and to the satisfaction of the Highway Authority.

2.2.13.1 Close Planking and Strutting

Close planking and strutting shall completely cover the sides of the trench, generally with short, upright members called 'poling boards'. These shall be 250 mm x 38 mm in section or as directed by the officer-in-charge. The board shall generally be placed in position vertically in pairs, one board on each side of the cutting.

These shall be kept apart by horizontal walings of strong wood at a minimum spacing of 1200 mm cross strutted as approved by the officer-in-charge. The length and girth of the struts shall depend upon the width of the trench. A typical sketch of close timbering is given in Fig. 2/2.

Where the soil is very soft and loose, the boards shall be placed horizontally against the sides of the excavation and supported by vertical 'walings' which shall be strutted to similar timber pieces on the opposite face of the trench.

The lowest boards supporting the sides, shall be taken into the ground for a minimum depth of 75 mm. No portion of the vertical side of the trench shall remain exposed.

The withdrawal of the timber members shall be done very carefully to prevent collapse of the trench. It shall be started at one end proceeded with systematically to the other end.

Concrete or masonry shall not be damaged while removing the planks. No claim from the contractor shall be entertained, for any timber which timber has been left permanently in position at the request of the officer-in-charge.

2.2.13.2 Open Planking and Strutting

In case of open planking and strutting, the entire side surface of the trench is not required to be covered. The vertical boards of 250 mm x 38 mm shall be spaced sufficiently apart to leave unsupported strips of about 500 mm average width. The detailed arrangement, sizes of the timber and the spacing shall be subject to the approval of the officer-in-charge. In all other respects, open planking and strutting shall comply with the clause 2.2.12.1 for close planking and strutting. A typical sketch of open planking and strutting is given in fig. 2/2.

2.3 Filling around Foundations in Pits, Trenches, Plinths Etc.

No filling in shall be done until the concrete foundations, brick footings etc. have been inspected and approved by the officer-in-charge.

All clods of earth shall be broken or removed. Material for backfilling shall generally be obtained from the spoil of excavations but the officer-in-charge shall have the option in case of shortage of good selected earth obtainable from excavation, to direct the contractor to get suitable filling materials from other sources.

As soon as the work in foundations has been accepted and measured, the spaces around the foundation structures in pits and trenches shall be cleared of all debris, brick bats, mortar droppings etc. it shall then be filled with earth in layers not exceeding 150 mm in thickness, each layer being watered, rammed and properly consolidated before the succeeding one is laid. The final surface shall be trimmed and levelled to proper profile.

When the area around the building is to be filled to a height more than 600 mm above the existing ground level the filling inside and outside the building shall be carried out simultaneously in order to relieve the earth pressure on foundation walls. The contractor shall be responsible for making good at his own expense any damage occurring to any part of the building, which in the opinion of the officer-in-charge is due to the neglect of this precaution.

On no account will sea sand be allowed for any filling.

2.4 Excavation and Banking (or Filling)

2.4.1 Cutting

The work shall be executed true to levels, slope shape and pattern indicated in the plan or as directed by the officer-in-charge. During excavation the natural drainage of the area shall be maintained by the contractor.

Cutting shall be done from top to bottom. Under no circumstances shall undermining be allowed.

All cutting shall be done to the required levels. In case it is taken deeper by the contractor, it shall be brought to the required levels by filling with earth duly consolidated and at contractor's cost. However, in the case of hard rock where blasting operations have been resorted to cutting shall be measured to the actual levels, provided the officer-in-charge is satisfied that the contractor has not gone any deeper than was unavoidable.

2.4.2 Filling/Banking

The earth from cutting shall, after approval by the officer-in-charge, be directly used for filling without claim for double handling. Filling shall be done in regular horizontal layers not exceeding 150 mm in depth. The surface of ground which is to receive filling, and having a gradient greater than 1 in 5 shall have horizontal benches cut to match the depths of compacted layers of filling. The earth shall be free from all roots, grass and rubbish and all lumps and clods exceeding 80 mm in any direction shall be broken. Each layer shall be consolidated after breaking all lumps and clods and by ramming. Watering shall be done as directed by the officer-in-charge. Where specified, the top surface of the finally finished area shall be neatly dressed to lines and levels.

The finished formation levels of filling shall be kept higher than the required levels by making an allowance for future settlement, this may be 10% of the depth of filling in the case of ordinary consolidated fills, and 5% where the consolidation is done by heavy machinery. No allowance need be made when the consolidation is done by heavy machinery under optimum moisture conditions.

2.5 Excavation in Trenches for Pipes, Cables etc. and Refilling

2.5.1 Cutting

Unless otherwise indicated on the drawings, trench excavation shall be by open cut. Bottom of trenches for laying of pipes, cables, etc shall be accurately graded so that the pipe or cable is uniformly supported along its length.

The excavation for underground services shall not cause instability to the foundations of the buildings. If the excavations encroach in to the stress dispersion zone bounded by the line drawn at an angle θ^* to the horizontal from the nearest lower edge of the building foundations (see fig. 2/3), specific approval of the officer-in-charge shall be obtained before commencing work.

* Note : Generally $\theta = 45^\circ$ for stable soils
 $\theta = 30^\circ$ for wet clays

2.5.2 Refilling Trenches for Pipes, Cables etc

Normally the excavated earth shall be used for refilling unless such earth contains deleterious salts. All clods of earth shall be broken or removed. Where the excavated material is mostly rock, the boulders shall be broken into pieces not larger than 150mm in any direction, mixed with fine material consisting of decomposed rock, lateritic soil or earth as available so as to fill up the voids as much as possible, and then the mixtures used for filling.

Filling in trenches for pipes and drains shall be commenced as soon as the joints of pipes and drains have been tested and passed. Where the trenches are excavated in soil, the filling shall be done with earth on the sides and top of pipes, in layers not exceeding 150 mm watered, rammed, and consolidated, taking care that no damage is caused to the pipe below. In case of excavation of trenches in rock, the filling up to a depth of 300 mm above the crown of pipe or barrel shall be done with fine material such as earth, lateritic soil or pulverised decomposed rock according to the availability at site. The remaining filling shall be done with boulders or rubble of size not exceeding 150 mm mixed with fine material as available to fill up the voids, watered, rammed and consolidated in layers not exceeding 300 mm. In the event of any of the excavated material being deemed unsuitable for filling by the officer-in-charge, the contractor shall provide approved filling material at his own cost.

2.6 Filling Under Floors

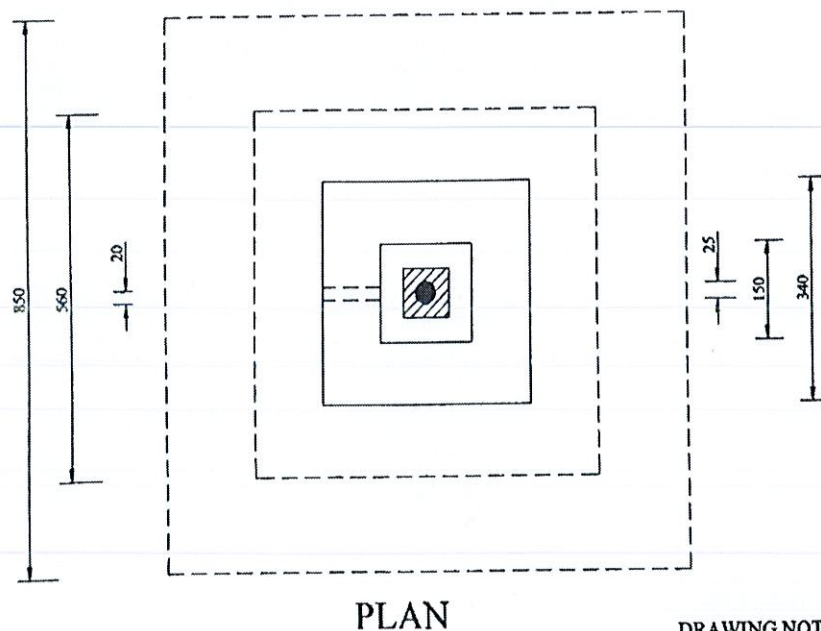
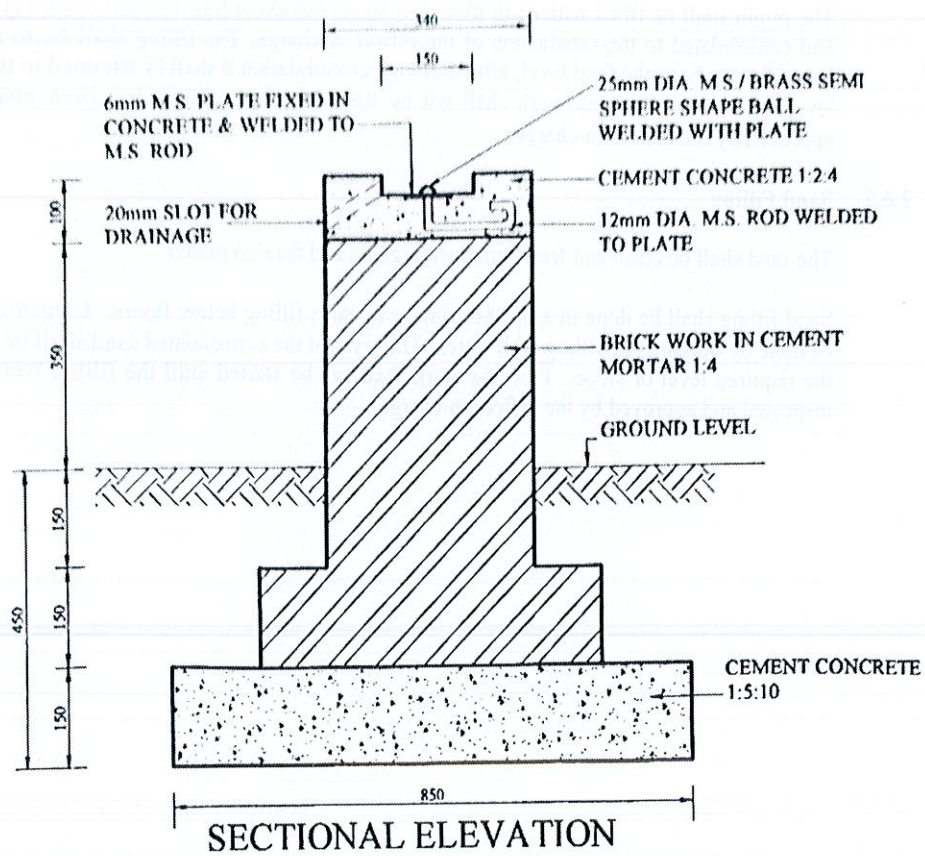
2.6.1 Earth Filling

The plinth shall be filled with earth placed in layers not exceeding 150 mm each layer watered and consolidated to the satisfaction of the officer-in-charge. The filling shall be to a height at least 75 mm above the final level; after thorough consolidation it shall be trimmed to the required levels and falls. Flooring work shall not be started until the filling has been inspected and approved by the officer-in-charge.

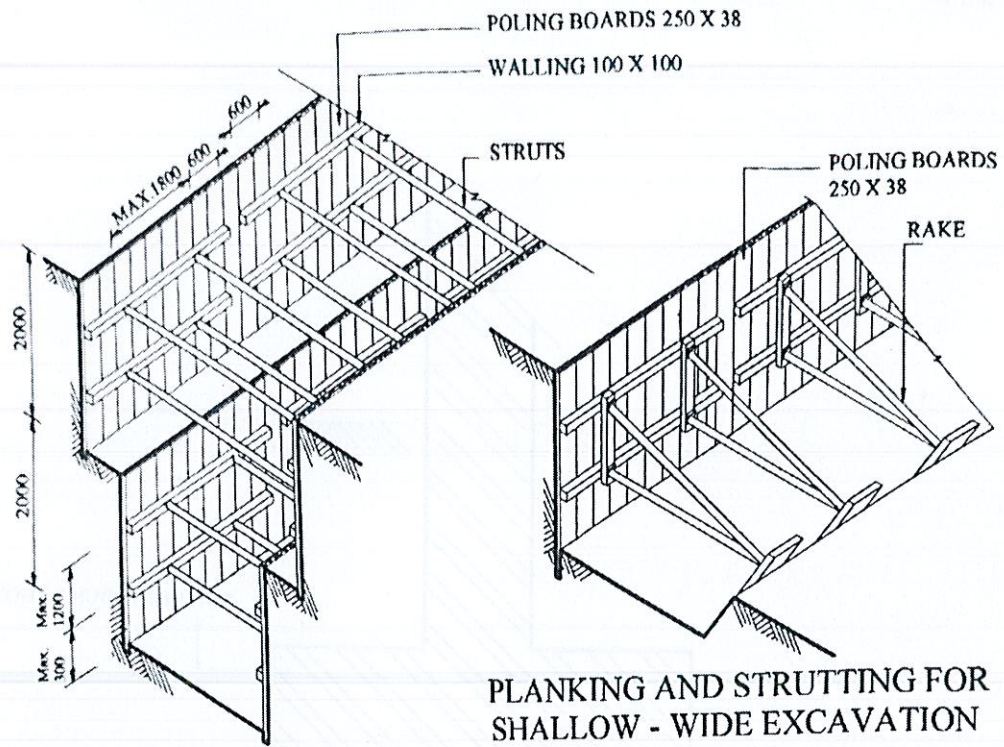
2.6.2 Sand Filling

The sand shall be clean and free from dust, organic and foreign matter.

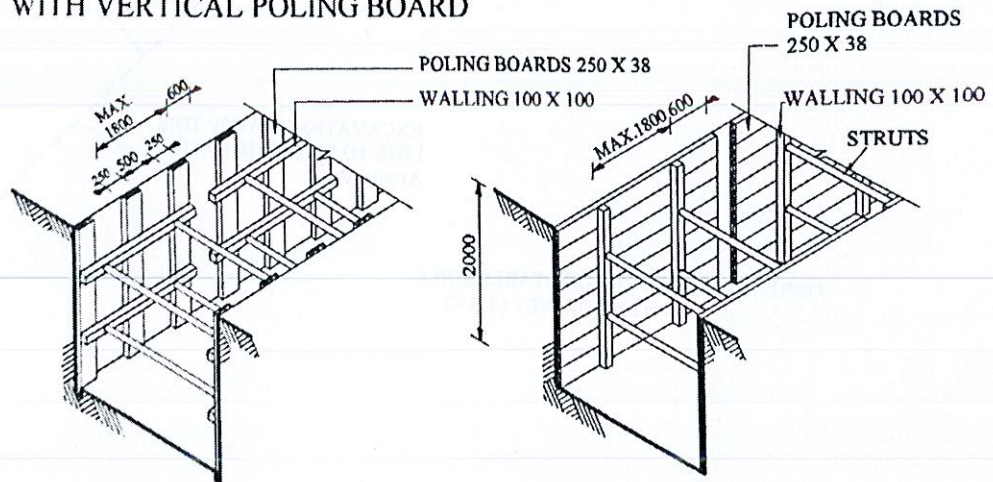
Sand filling shall be done in a manner similar to earth filling below floors. Consolidation shall be done by flooding the filling with water. The level of the consolidated sand shall be dressed to the required level or slope. Flooring work shall not be started until the filling work has been inspected and approved by the officer-in-charge.



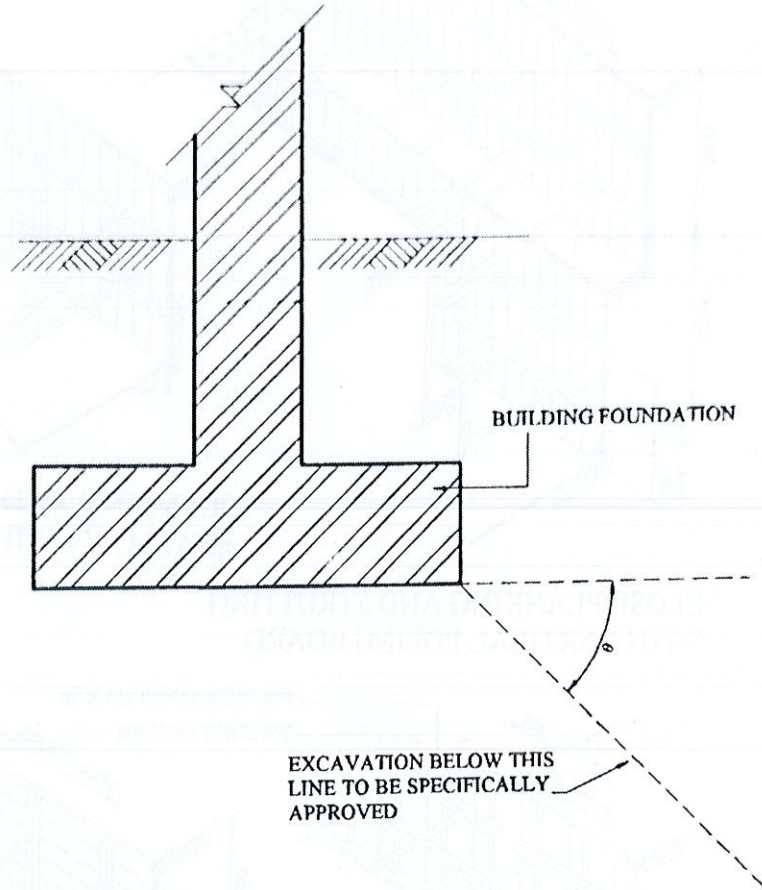
DRAWING NOT TO SCALE
 ALL DIMENSIONS ARE IN MM
**TYPE DESIGN FOR
 TEMPORARY SITE BENCH MARK**
FIG. 2/1



CLOSE PLANKING AND STRUTTING WITH VERTICAL POLING BOARD



DRAWING NOT TO SCALE
ALL DIMENSIONS ARE IN MM
CLOSE AND OPEN
PLANKING AND STRUTTING
FIG. 2/2



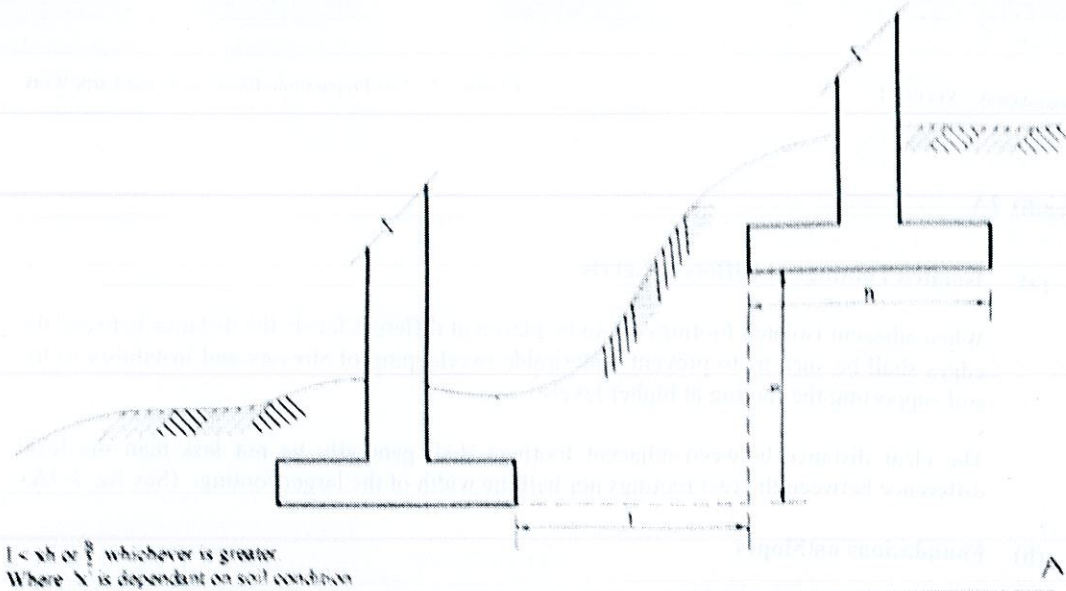
GENERALLY $\theta = 45^\circ$ FOR STABLE SOILS
 $\theta = 30^\circ$ FOR WET CLAYS

DRAWING NOT TO SCALE

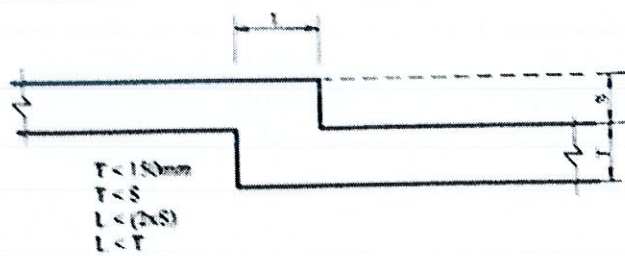
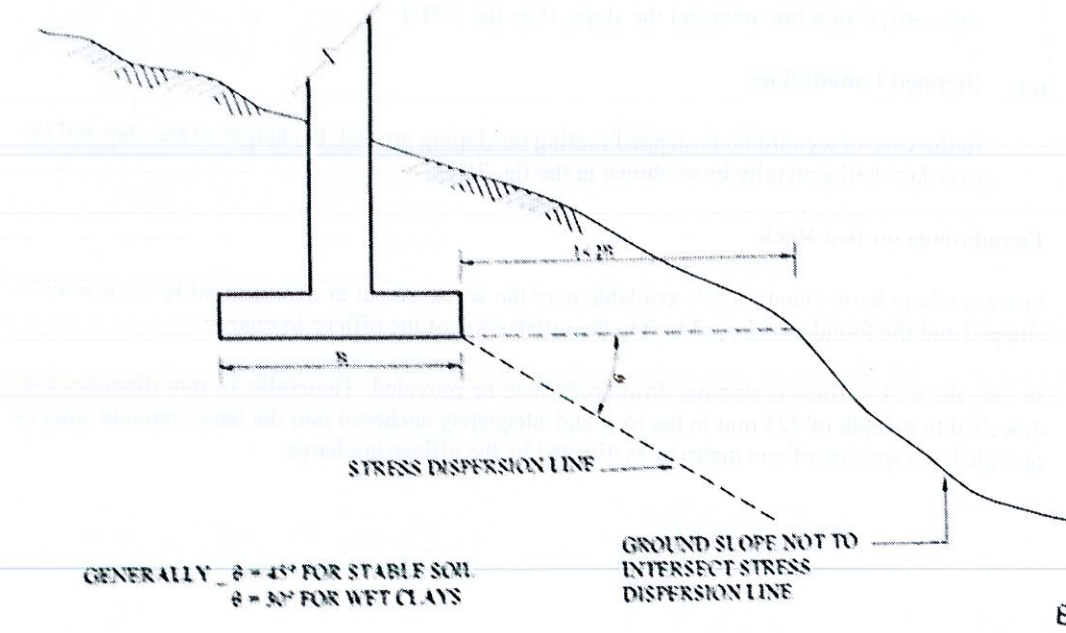
STRESS DISPERSION ZONE

FIG. 2/3

17



SLOPPING GROUND



DRAWING NOT TO SCALE
FOUNDATIONS FOR SLOPING SITES
FIG. 2/4

Appendix 2A**1.0 (a) Isolated Footings at Different Levels**

When adjacent isolated footings are to be placed at different levels the distance between the edges shall be such as to prevent undesirable overlapping of stresses and instability to the soil supporting the footing at higher levels.

The clear distance between adjacent footings shall generally be not less than the level difference between the two footings nor half the width of the larger footing. (See fig. 2/4A)

(b) Foundations on Slopes

In the case of sloping ground the edge of the footing shall generally not be placed at a horizontal distance from the slope less than twice the width of the footing, nor shall the stress dispersion line intersect the slope. (See fig. 2/4B)

(c) Stepped Foundations

In the case of a continuous stepped footing on sloping ground, the height of the step and the over lap shall generally be as shown in the fig. 2/4C.

2. Foundations on Bed Rock

In areas where hard sound rock is available over the whole site at or near ground level, it shall be chipped and the foundation keyed to it to the satisfaction of the officer-in-charge.

In case the rock surface is sloping, dowel rods shall be provided. Generally 16 mm diameter rods dowelled to a depth of 225 mm in the rock and adequately anchored into the base concrete shall be provided at a spacing of one metre or as directed by the officer-in-charge.

Appendix 2B**Support Required For Excavations With Vertical Sides****In Uniform Ground**

A indicates that no support is required

B indicates that open sheeting should be employed

C indicates that close sheeting or sheet piling should be employed

Type of Soil	Up to 5 ft (Shallow)	Depth of excavation 5 to 15 ft (medium)	Over 15 ft (deep)
Soft peat	C	C	C
Firm peat	A	C	C
Soft clays and silts	C	C	C
Firm and stiff clays	A*	A*	C
Loose gravels and sands	C	C	C
Slightly cemented gravels and sands	A	B	C
Compact gravels and sands with or without clay binder	A	B	C
All gravels and sands below water table	C	C	C
Fissured or heavily jointed rocks (shales, etc)	A*	A*	B
Sound rock	A	A	A

* Open or close sheeting or sheet piling may be required if site conditions are unfavourable.

Note : This table does not apply to complex ground conditions for which reference should be made to the text of BSCB 2003 : 1959

Note : Ref : Table 5 of BSCP 2003 : 1959

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CHAPTER 3 - MORTAR

3.1 Lime Mortar

The mortar shall consist of slaked lime and sand, each complying with the respective standards and mixed in the proportions specified.

Lime and sand shall be mixed dry three times on an approved platform of masonry, stone, or wood, then sprinkled with the necessary quantity of water and ground in a mortar mill. The sand and lime shall be mixed only in sufficient quantities for a day's requirements. The mortar shall be raked up continuously during the grinding process, particularly in the angles of the mill. Water may be added as required during grinding, care being taken not to add more water than will bring the mixed materials to the consistency of a stiff paste. The sides of the mill shall be maintained in good order. A satisfactory method of counting the revolutions shall be followed.

All mortar shall be used as soon as possible after grinding. As a rule it shall be used on the day on which it is made, but in no case shall mortar made 72 hours previously be permitted to be used or remain at the site of the work except mortar which is to be ground a second time for plastering work-see below. If hydrated lime is used, the ground mortar shall not be kept unused for more than 25 hours after grinding. In all cases, the mortar shall be kept damp and on no account be allowed to dry. It shall always be protected from the sun and rain. All mortar more than 72 hours old or mortar hardened or set before being used shall be removed from the work site within 24 hours of order to do so, and no second mixing will be permitted.

Mortar for plastering shall be ground a second time after storing in a damp condition for an interval of two days in the case of stone lime, and one week in the case of fat lime so as to ensure thorough slaking. The mortar shall then be used at once.

3.2 Cement Mortar

The mortar shall consist of Portland cement and sand, each complying with the respective standard and mixed in the proportions specified.

Item of work	Cement	Sand
Mortar for masonry	1	5 up to 8 as may be specified
Mortar for plastering	1	3 up to 4 as may be specified (3 for plastering of concrete surfaces)
Mortar for pointing	1	3

The Portland cement shall be measured by weight, a bag weighing 50 kg. being taken as 0.035 cu.m and the sand in suitable measuring boxes. Where gauge boxes are used for measurement of cement by volume the gauge box shall be 400mm x 350 mm 290 mm height while the gauge box for sand shall be 400 mm x 350 mm x 250 mm high. The sand shall be measured on the basis of its dry volume. In the case of damp sand, its quantity shall be increased suitable to allow for bulking to be determined by the method given in Appendix 4 C.

The mixing of mortar shall be done in mechanical mixers unless the officer-in-charge permits hand mixing taking into account the nature, magnitude and location of the work.

3.2.1 Machine Mixing

The cement and sand shall be fed into the mixer in the specified proportions and shall be mixed dry. Water shall then be added gradually and wet mixing continued for at least one minute.

Care shall be taken not to add more water than will bring the mortar to the consistency of a wet paste. Mixing shall be restricted to such quantities as could be utilized on the work within 30 minutes of mixing.

3.2.2 Hand Mixing

In the case of hand mixing, the measured quantity of sand shall be spread level on a clean dry platform and the cement spread over it. The cement and sand shall be mixed dry three times over. Water shall be added to the mixture only when the mortar is required for use and then only in sufficient quantity to bring the mortar to the consistency of a stiff past.

Cement mortar shall be used up on the works within two hours after mixing. Mortar remaining unused for more than two hours shall be rejected and removed from the work site.

3.3 Lime - Cement - Sand Mortar (i.e. Composite Mortar)

3.3.1 Proportioning

Cement lime putty/dry hydrated lime and sand shall be taken in the proportions specified. Commonly used proportions for internal plastering are 1 cement : 1 lime : 5 sand. In general lime should not be used in external plastering where weather proofing qualities are desired.

3.3.2 Mixing

Lime putty and sand shall be mixed and ground in the manner described in 3.1. In case where factory made dry hydrated lime powder is used prior grinding of lime and sand is not necessary, and mixing may be done in one operation in a mechanical mixer. Only a quantity of this mixture which could be used within two hours of its mixing with cement shall be taken out and mixed thorough with the specified quantity of cement in a mechanical mixer.

3.3.2.1 Hand Mixing

Hand mixing shall be permitted by the officer-in-charge after taking into account the nature, magnitude and location of the work, practicability of the use of mortar mill, mechanical mixer etc. or where items involving small quantities are to be done. Cement and sand shall be mixed dry on clean water tight masonry or wooden platforms or in troughs. Lime putty shall be mixed with water to the consistency of milk of lime, which shall be added to the mixture of cement and sand, and the mixture shall be kneaded back and forth for about 10 minutes with addition of milk of lime to obtain mortar of workable consistency.

3.3.3 Precautions

Mortar shall be used within 2 hours after mixing. Mortar unused for more than 2 hours shall be rejected and removed from the work site.

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CHAPTER 4 - CONCRETE

4.0 Concrete

The concrete shall possess the strength, durability, impermeability and resistance to abrasion required for the proposed structure. It shall be free of such defects as cracking, honey combing, spalling of the surface, undue shrinkage etc. The concrete shall be good quality and shall be produced with careful control over the batching of materials, water cement ratio etc. Necessary care and attention shall be given to the design and preparation of formwork.

Concrete shall be produced as specified and shall meet the following requirements of each class.

Non structural concrete may be a Volume Batched Mix, satisfying the following:

- (i) Proportion of the Constituents by volume
- (ii) Maximum size of aggregate
for eg. 1:3:6 (50 mm)

Structural Concrete may be specified as one of the types

- (a) Volume Batched Mix satisfying the following:
 - (i) Proportion of the Constituents by Volume
 - (ii) Nominal Maximum size of aggregate
 - (iii) Grade required
for eg. 1:2:4 (20 mm) of Grade 20.

Testing and acceptance shall be as per Clause 5.4.9.2

- (b) Prescribed Mix satisfying the following:
 - (i) The mix required from BS5328, Part 2, Table 5.
 - (ii) Grade required
 - (iii) Nominal Maximum size of aggregate

The composition of the mix shall conform to BS 5328 Part 2, Table 5 (See Appendix 4 D) with the required field modifications.

Testing and acceptance shall be as per Clause 5.4.9.2.

- (c) Designed Mix satisfying the following
 - (i) Grade specified
 - (ii) Maximum size of aggregate
 - (iii) Minimum cement content in kg of cement per cubic metre, and other requirements if any to ensure durability.

Testing and acceptance shall be as per BS 5328 Part 3, Clause 3.4.2 or Part 4, Clause 3.16 where the contractor intends to use ready mixes concrete all relevant particulars detailed in SLS 1144 shall be furnished for the approval of the officer-in-charge.

4.1 Materials

4.1.1 Water

Water shall conform to the specifications in Chapter 1.

4.1.2 Cement

All cement shall be from an approved source and shall comply with the latest revision of the standards noted below;

Type	In accordance with
Ordinary Portland Cement	SLS 107
Rapid Hardening Portland Cement	} BS EN 197 (BS 12)
White Portland Cement	
Coloured Portland Cement	
Portland Blast Furnace Cement	BS 146
Low Heat Portland Cement	BS 1370
Sulphate Resisting Portland Cement	BS 4027
Low Heat Portland Blast Furnace Cement	BS EN 197 (BS 4246)
Super Sulphated Cement	BS 4248
Ultra High Early Strength Portland Cement	} The requirements for physical properties for ordinary Portland Cement given in SLS 107 or BS EN 197 (BS 12)
Water repellent Portland Cement	
Hydro-phobic Portland Cement	
Portland Lime Stone Cement	SLS 1253
Blended Hydraulic Cement	SLS 1247

Note: (i) Where cements other than those complying with requirements of SLS 107, BS EN 197 (BS 12) are used, account shall be taken of their properties and any particular conditions of use.

(ii) Where Portland Blast furnace cement complying with BS 146 is used, the slower rate of hardening shall be given due consideration and adequate curing shall be ensured.

(iii) Super sulphated cements shall not be mixed with any other type of cement.

For storage and other details see Clause 1.2.

4.1.3 Aggregates

Aggregates shall be hard and not contain materials such as coal, pyrites, lumps of clay etc. that are likely to decompose or change in volume when exposed to the weather, or affect the reinforcement (where provided). Aggregates with low absorption value shall be used for all concrete that is exposed to the weather or in contact with liquids.

The aggregates shall be free from soft, friable, thin elongated or laminated pieces, coatings of dust, and from clay, alkali, organic or any foreign matter. The contractor shall wash thoroughly all aggregate or any portion of it delivered to the works if so directed by the officer-in-charge.

4.1.3.1 Dense Aggregate

These shall consist of one of the following:

Coarse & Fine Aggregates from Natural Sources (Complying with the requirements of BS 882 Part 2)

Coarse Aggregate

The coarse aggregate shall be crushed stone that is mainly retained on a 5 mm BS 410 test sieve or equivalent, and containing only so much finer material as is permitted. The stone shall be

from an approved quarry and shall be clean, sharp, undecomposed granitic or other approved metamorphic or igneous rock having clean, hard dense and durable fragments.

Note As the quality of limestone available is variable, harder types may be used only if they conform to the tests prescribed in Clause 6.1.3.5.

Fine Aggregate

Fine aggregate i.e. that mainly passing a 5 mm BS 410 test sieve (or equivalent) and containing only so much coarse material as is permitted shall be:

- (a) Natural sand: obtained from the natural disintegration of rock, i.e. it shall be clean, sharp, river or pit sand free of earth, silt, clay, loam, carbon, alkali, mica, organic matter and other deleterious substances.
- (b) Crushed stone sand: the use of this shall be permitted only for designed mixes. Crushed stone sand shall be manufactured from hard tough durable uncoated rock.

Use of Off-shore Sand

Off shore sand may be used in construction works subjected to:

- (a) Compliance with the requirements of BS 882.
- (b) The Chloride Ion content of off shore sand shall be not more than 0.02% (expressed as percentage by mass of Chloride Ion of sand) and the allowable shell sizes in the sand shall be not more than 5mm.

For specific uses such as pre-stressed concrete and other applications please refer relevant British Standards.

The following conditions shall be met when off shore sand is used for construction purposes.

- (i) The sand shall be procured from a stock pile maintained by a responsible organization which has an acceptable quality assurance system in place to ensure that the sand conforms to item (b) above.
- (ii) Sand extracted from the beach or from river mouth shall not be used as building sand.

4.1.3.2 Special Aggregates

Broken Brick or Tile

Mass concrete with brick or tile aggregates may be specified when a high resistance to fire is required but not a high degree of impermeability nor resistance to abrasion. Where specifically allowed in the plans, the brick or tile aggregate shall be of good quality and approved by the officer-in-charge. The brick shall be free from adhering mortar, plaster or dust and shall not contain soluble sulphates in excess of 0.5 %.

Heavy Aggregate

Steel shots, magnetite and barytes shall be used as specified in high density concrete required for screening radio active sources where space is limited or for providing high sound insulation between rooms.

Light Weight Aggregate

Where light weight aggregate concrete is specified, natural aggregate such as pumice or artificial lightweight aggregate such as furnace clinker expanded clay, foamed slag, etc. of a quality approved by the officer-in-charge and complying with the requirements of B.S 3797 shall be used.

4.1.3.3 Storing of Aggregates

All aggregates shall be stored in scrupulously clean conditions as the presence of soil, clay or organic material can seriously impair the strength concrete or inhibit setting. Aggregate storage piles shall be built on hard paved self draining surfaces in suitable hoppers or bins so as to avoid the inclusion of any foreign matter, soil, clay etc. The aggregates of different sizes shall be kept separate from each other. It is essential that the storage floors be sloped to facilitate drainage. Coarse aggregates shall be delivered to the mixers with the least amount of free moisture and the least amount of variation in free moisture as practicable.

Before commencing any run of concreting, it is essential that an adequate supply of aggregates is stored at the site. Reliance shall not be placed on promised delivery during mixing.

4.1.3.4 Testing of Aggregates

Where necessary the suitability of the aggregate relevant to a particular structure shall be established well in advance by obtaining samples from sources and carrying out tests for determination of one or more of the following properties;

- (a) Particle size and shape
- (b) Clay, silt and fine dust
- (c) Specific gravity
- (d) Water absorption
- (e) Bulk density, voids & bulking
- (f) Moisture content
- (g) Organic impurities

The tests shall conform to the relevant clauses of BS 812.

The quantity of material passing the 75 μ m sieve, when determined in accordance with Clause 7.2.1 and BS 812, section 10.3.1 : 1985 shall not exceed the following limits

in crushed rock aggregates	4% by weight
in Natural sand	4% "
in Crushed rock sand	16% "

The aggregate impact value shall be as follows:

- (i) for normal structures shall be not more than 45%
- (ii) for wearing surfaces shall be not more than 30%
- (iii) for heavy duty concrete floor finishes shall not be more than 25%

The 10% fines value shall exceed the following limits:

- (i) for normal structures shall be not less than 50 kN
- (ii) for wearing surfaces shall be not less than 100 kN
- (iii) for heavy duty concrete floor finishes shall not be less than 150 kN.

4.1.3.5 Grading and Sizes

Coarse Aggregate

The maximum size of the aggregate to be adopted shall be as specified and will depend on the dimensions of the member being cast and the spacing of the reinforcement. As a general guide the largest particle of aggregate shall not be larger than a quarter of the least dimension of the member in which it is used, and be at least 5 mm, smaller than the least clear spacing between single bars. Generally it is an advantage to have the maximum size as larger as possible.

The continuous grading limits for coarse aggregate shown in percentage by weight are given below:

Grading Limits for Coarse Aggregates
Vide BS 882 1992

Table 4.1

Sieve Size (BS410)	PERCENTAGE BY WEIGHT PASSING BS SIEVES							
	Nominal size of graded aggregate			Nominal size of single size aggregate				
	40mm to 5 mm	20 mm to 4mm	14mm to 5mm	40mm	20mm	14mm	10mm	*5 mm
50.0	100	-	-	100	-	-	-	
37.5	95-100	100	-	85-100	100	-	-	
20.0	35-70	90-100	100	0-25	85-100	100	-	
14.0	25-55	40-80	90-100	-	0-70	85-	100	
10.0	10-40	30-60	50-85	0-5	0-25	100	85-	100
5.0	0-5	0-10	0-10	-	0-5	0-50	100	45-100
2.36	-	-	-		-	0-10	0-25	0-30
						-	0-5	

* Used mainly for pre-cast products.

Fine Aggregate

The grading of fine aggregate, when determined by a test according to BS 812 shall be within the several limits given in Table 4.2

Additionally not more than one in ten consecutive samples shall have a grading outside the limits for any one of the grading C, M or F given in Table 4.2. For heavy duty concrete floor finishes, the fine aggregate shall comply with C or M given in Table 4.2.

The fine aggregate shall be described as fine aggregate of the grading zone into which it falls e.g. BS 882, Grading Zone C

Note It is intended that individual zones should not be specified in contract documents relating to concrete - the concrete mixes should be modified to make the best use of the materials readily available

Where fine aggregate does not fall within Table 4.2 limits, an agreed grading envelope may be used, provided the materials can produce the concrete of required quality.

Table 4.2 Fine Aggregate (Ref Table 4 of BS 882 : 1992)

Sieve Size (BS 410)	Percentage By Weight Passing Bs Sieve			
	Overall limits	Grading Zone C	Grading Zone M	Grading Zone F
mm				
10.0	100	-	-	-
5.0	89-100	-	-	-
2.36	60-100	60-100	65-100	80-100
1.18	30-100	30-90	45-100	70-100
(Micron) μm				
600	15-100	15-54	25-80	55-100
300	5-70	5-40	5-48	5-70
150	0-15*	-	-	-

* For crushed stone sands, the permissible limit is increased to 20% , except for heavy duty floors.

4.1.3.5 Mixing of Single Sizes to obtain Graded Materials

When coarse aggregate brought to site is single sized (ungraded) it shall be mixed with single size aggregate of different size, in the proportion indicated in Table 4.3 to make it graded.

Table 4.3

S/No	Cement Concrete Mixture	Nominal size of graded aggregate required (mm)	Part of single size aggregate of sizes mm				
			50	40	20	12.5	10
1	1:6:12	40	-	9	3	-	-
2	1:5:10	40	-	7 1/2	2 1/2	-	-
3	1:4:8	40	-	6	2	-	-
4	1:3:6	40	-	4 1/2	1 1/2	-	-
5	1:3:6	20	-	-	4 1/2	-	1 1/2
6	1:2:4	40	-	3	1	-	-
7	1:2:4	20	-	-	3	-	1
8	1:2:4	12.5	-	-	-	3	1
9	1:1 1/2:3	20	-	-	2	-	1

The proportions indicated are by volume. These may be varied marginally by the officer-in-charge when considered necessary after making a sieve analysis of the aggregates brought to the site. No adjustment in rates shall be allowed for any variations in the proportions so ordered by the officer-in-charge.

4.1.4 Admixtures

Additives, plasticisers or other workability agents shall not be used without the written approval of the officer-in-charge.

4.2 Lime Concrete

Lime concrete shall be prepared by mixing graded stone or brick aggregate of nominal size as specified, with wet ground lime mortar. Mortar for lime concrete generally consists of lime and sand in the proportion of 1:2 by volume.

4.2.1 Proportioning

The proportioning of wet mortar and aggregate shall be by volume. Generally the internal size of gauge boxes for measuring the materials shall be 400 x 350 x 250 mm (viz. 0.035 m³ approx.) While measuring the aggregate, shaking, ramming or heaping shall not be done.

4.2.2 Mixing

The mixing shall be done by hand or in a mechanical mixer as specified. Brick aggregate shall be well soaked with water for a minimum period of 2 hours.

4.2.2.1 Machine Mixing

The mixing drum shall be free of hardened mortar adhering to its inner surface. Before commencing the mixing, the drum shall be flushed clean with water. A measured quantity of aggregate and wet ground mortar for one batch shall be poured in to the drum of the mixer, while it is revolving. The quantity of materials loaded in the drum shall not exceed the rated capacity of the mixer. The required quantity of water shall be added slowly and the wet mixing of a batch shall be continued for at least two minutes in the drum till a uniform mix of required consistency is obtained. The consistency of the concrete shall be such that the mortar does not tend to separate from the coarse aggregate. The entire concrete of a batch shall be discharged before the materials for the new batch are poured into the drum.

4.2.2.2 Hand Mixing

Hand mixing when allowed shall be done on a clean and water tight platform (of masonry, wood, or G.I Sheets) of sufficient size to provide ample mixing space. The specified wet lime mortar shall be laid on the top of the aggregate. The whole shall then be turned over and over, with addition of the necessary quantity of water by means of a sprinkler till a uniform mix of required consistency is obtained. The consistency of the concrete shall be such that the mortar shall not tend to separate from the coarse aggregate.

4.2.3 Laying

Lime concrete shall be laid (and not thrown) in layers while it is quite fresh. Each layer shall be thoroughly rammed and consolidated before the succeeding layer is placed. Consolidated thickness of each layer shall not exceed 150mm. Joints where necessary shall be staggered in different layers unless otherwise specified. Ramming shall be done by heavy iron rammers of 4.5 to 5.5 kg. The area of the rammer shall not be more than 0.03 m² each. Ramming shall be

continued till a skin of mortar covers the surface completely. Compaction shall be done immediately on laying. Green work shall be protected from rain by suitable coverings.

4.2.4 Curing

After the concrete has begun to harden - i.e. about 24 hours after its laying, the curing shall be done by keeping the concrete damp with moist gunny bags, wet straw, sand or any method except water under pressure, approved by the officer-in-charge. Curing shall be done for a minimum of 7 days, after which period masonry and flooring work over the lime-concrete foundation or base concrete may be started.

4.3 Cement Concrete

This shall be prepared by mixing graded stone of specified nominal size with fine aggregate and cement in specified proportions and the required quantity of water to give the consistency needed for proper placement and compaction.

The grading and quality of the aggregates will be as given in Clause 4.1.3.5.
Sampling testing and acceptance criteria shall be as set forth in Clause 5.4.9.

4.3.1 Proportioning

4.3.1.1 Proportioning by Volume

Fine & Coarse Aggregates may be measured by volume unless otherwise specified. Boxes of suitable size shall be used for measuring the sand and aggregate. The internal dimensions of the boxes recommended are 400 x 350 x 250 mm (which is 0.035m^3 and corresponds to the volume of 1 bag of cement weighing 50 kg). While measuring the aggregate, shaking, ramming or heaping shall not be done. The proportioning of sand shall be on the basis of its dry volume and in case of damp sand, allowance for bulking shall be made as given in Appendix 4C.

Cement shall be gauged by weight. The unit of measurement for cement shall be a bag of 50 kg. and this shall be taken as 0.035m^3 ; but in case the volume of cement is permitted to be gauged in a measuring box the internal dimensions of the box for cement only shall be 400 mm x 350 mm x 290 mm to account for bulking.

The composition shall be as follows:-

Table 4.4

Specified mix	Equivalent Grade where Specified	Quantities per 50 kg bag of cement		
		Fine Aggregate	Coarse Aggregate	Approx. Water content in litres
1:1:2	30	0.035m^3 1 box	0.07m^3 2 boxes	20
1: $1\frac{1}{2}$: 3	25	0.053m^3 $1\frac{1}{2}$ boxes	0.105m^3 3 boxes	22.5
1: 2: 4	20	0.07m^3 2 boxes	0.14m^3 4 boxes	25
1: 3: 6	10	0.105m^3 3 boxes	0.210m^3 6 boxes	35
1: 4: 8		0.14m^3 4 boxes	0.28m^3 8 boxes	40

Note : 1 The internal dimension of boxes for measuring aggregate shall be 400 mm x 350 mm x 250 mm height.

If gauging boxes are allowed to be used for cement the corresponding box shall be 400 mm x 350 mm x 290 mm internal dimensions to account for bulking.

Note: 2 Quantities required per cubic metre of concrete are given in Appendix 4A.

4.3.1.2 Proportioning by Weight

Prescribed Mix

The officer-in-charge shall be informed of the nature and source of each material to be used and subsequently notified whenever a change is made. No admixtures shall be used unless specified.

The cement contents for these prescribed mixes are given in BS 5328, Part 2, Table 5 with the total weights of dry aggregate to produce approximately one cubic metre of concrete. Depending upon the specific gravity of the aggregate slight adjustments may be required to the quantity of aggregates to produce this volume of concrete having the required workability, strength and cement content. BS 5328, Part 2, Table 5 also gives the approximate proportions of fine aggregate to be used although small adjustments may be required on the site depending on the properties of the local materials. For grades 7, 10 and 15 a range of fine aggregate proportions is given, the lower percentage being applicable to finer material such as zone 3 sand and the higher percentage being applicable to coarser material such as zone 1 sand. Where single sized coarse aggregates are used, the proportions shall be chosen to produce a combined grading within the limits of BS 882 for graded coarse aggregate of the appropriate size.

Where weigh - batches are not available and if the necessary site control can be ensured, aggregates can be measured by volume after conducting the necessary field density tests. Cement shall be batched by weight (or in whole bags).

Designed Mix

This shall be permitted if specifically allowed in the Bill of Quantities, when the necessary weigh batches are available and the required quality control assured.

The procedure indicated in BS 5328 shall be followed.

4.3.2 Mixing

It shall be done in a mechanical mixer. Hand-mixing shall be done only with the prior permission of the officer-in-charge.

4.3.2.1 Machine Mixing

The mixer drum shall be free of hardened mortar adhering to its inner surface. Before mixing commence the drum shall be primed by washing with rich cement grout. A measured quantity of dry coarse aggregate shall be first placed in the hopper. This shall be followed with the measured quantity of fine aggregate and then cement. The skip shall be raised and the dry materials slipped into the drum. The dry materials shall be mixed for at least four turns of the drum after which the correct quantity of water shall be added gradually while the drum is in motion, to ensure even distribution of the materials. The total quantity of water for mixing shall be introduced before 25% of the mixing time has elapsed and shall be regulated to achieve the specified water cement ratio. The complete contents of the mixer shall be emptied before recharging.

When the mixer is closed down for the day or for any period, exceeding 20 minutes, the drum shall be flushed clean.

Mixing Time

The materials shall be mixed for a period of not less than 2 minutes and until a uniform colour and consistency are obtained. The time shall be counted from the moment all the materials have been put into the drum.

4.3.2.2 Hand Mixing

When permitted for Volume Batched mixes, this shall be done on a smooth, clean and water-tight platform of suitable size and in the following manner:

- (a) The measured quantity of sand shall be spread evenly.
- (b) The cement shall be dumped on the sand and then distributed evenly.
- (c) The sand and cement shall be mixed intimately with shovels, turning the mixture over and over again, until it is of even colour throughout and free from streaks.
- (d) The measured quantity of coarse aggregate shall be spread out and the sand cement mixture shall be on top.
- (e) This shall be mixed at least three times dry, by shovelling and turning over from centre to side then back to the centre and again to the sides.
- (f) A depression shall be made in the middle of the mixed pile to receive the water.
- (g) Three quarters of the total quantity of water required shall be added while the material is turned in towards the centre with shovels. The remaining water shall be added by a water-can fitted with a rose-head, while slowly turning the whole mixture over and over again at least three times until a uniform colour and consistency is obtained throughout the pile.
- (h) The mixing platform shall be washed at the end of the day.

4.3.3 Consistency

The concrete shall be of such consistency as will suit the method of placement and compaction. The quantity of water shall be regulated by carrying out regular slump tests as prescribed in Appendix 4.B. for each mix using one bag of 50 kg cement it shall not exceed that indicated in Table 4.4.

In the case of vibrated concrete, the water content may be suitably reduce to avoid segregation.

The following slumps shall be adopted for different kinds of works.

Table 4.5

Work	Slump in mm Vibrators used	Vibrators not used
Mass concrete in foundation footings, retaining walls and pavement.	10- 25	50 - 75
Thin sections of flooring less than 75 mm thickness	25 - 40	75 - 100
Reinforced cement concrete work	Refer chapter 5	Refer chapter 5
Under water concreting	-	100 - 180 (Actual slump to be decided by officer-in-charge)

Concrete of the higher slumps range of 75 mm and above shall be produced by using additional cement slurry and not merely water, so that the water cement ratio and compressive strength are kept reasonably constant. Generally about 10% more of cement will become necessary.

4.3.4 Laying

Sufficient notice of not less than 24 hours shall be given to the officer-in-charge prior to commencing concreting so as to enable inspection of forms, reinforcement etc. The position of all construction joints and programme of concreting shall be decided in advance. Necessary stop-boards shall be provided at construction joints.

4.3.4.1 Compaction

The entire concrete used in the work shall be laid gently (not thrown) in layers not exceeding 150 mm. It should be deposited nearly as practicable in its final position and without segregation in one continuous operation up to the movement or construction joints.

It shall be adequately compacted by means of vibrators till air bubbles cease to appear on the upper surface and a dense concrete is obtained. The vibrator will be operated in a near vertical position, and the duration of vibration limited to that necessary to produce satisfactory consolidation without causing objectionable segregation.

The officer-in-charge may however at his discretion, permit hand compaction for certain items depending upon the thickness of the members and feasibility for vibrating the same. Hand compaction shall be done with the help of tamping rods so that the concrete is thoroughly compacted and completely worked into the corners of the formwork.

The layers of concrete shall be so placed that the bottom layer does not finally set before the top layer is placed. Compaction shall be completed before the initial setting starts i.e within 30 minutes of addition of water to the dry mixture. Retempering of concrete shall not be permitted.

4.3.4.2 Temperature

During cold weather, concreting shall not be done when the temperature falls below 4.5°C. The concrete placed shall be protected against frost by suitable covering. Concrete damaged by frost shall be removed and the work redone. During hot weather, precautions shall be taken to see that the temperature of wet concrete does not exceed 38°C.

4.3.4.3 Under Water Concreting

Concrete shall not be deposited under water if it is practicable to de-water the area and place concrete in the regular manner. Where founds necessary to deposit any concrete under water, the method, equipment, materials and mix shall first be approved by the officer-in-charge.

The concrete shall be deposited under water by one of the approved methods such as Tremie Method, Drop Bottom bucket, bags etc.

If it is necessary to raise the water after placing the concrete, the level shall be brought up slowly without creating any waves or commotion tending to wash away cement or to disturb the fresh concrete in anyway. Detailed procedures recommended in BS 8004 may be followed.

4.3.4.4 Continuation of Work

When the placing of concrete is suspended, necessary removal of laitance and roughening the surface for jointing future work shall be done before the concrete sets. When the work is resumed

the previous work must be thoroughly cleaned, roughened, watered and a grout of neat cement slurry of the proportion 1 kg of cement per 2 litres of water applied uniformly; The grout should not be allowed to dry prior to the placement of the fresh concrete.

4.3.5 Curing and Protection

Green work shall be protected from rain by suitable covering. The work should also be suitably protected from damage during construction.

After the concrete has begun to harden i.e about 1 to 2 hours after its laying, it shall be protected with moist gunny bags, or any other material approved by the officer-in-charge against quick drying. After 24 hours of laying of concrete, the surface shall be cured by flooding with water of minimum 25 mm depth, or by covering with wet absorbent materials. The curing shall be done for a minimum period of 7 days. In special cases, curing may have to be prolonged as required by the officer-in-charge.

Over the foundation concrete, the masonry work may be started after 48 hours of its laying, but the curing of cement concrete shall be continued along with the masonry work for a minimum period of 7 days.

Where cement concrete is used as sub-grade for flooring, the flooring may be commenced before the curing period of sub-grade is over but the curing of sub-grade shall be continued along with the top layer of flooring for a minimum period of 7 days.

The water used for curing shall not produce any objectionable stains or unsightly deposit on the concrete surface. In special circumstances and locations, curing by other means such as sealing material, insulating blankets etc. may be adopted with the specific prior approval of the officer-in-charge.

4.3.6 Form Work

If centering and shuttering are required to be done for this work, it shall be done in accordance with the specifications for formwork under Reinforced Cement Concrete work.

4.3.7 Test and Acceptance

See Clause 5.4

4.4. No Fines Concrete

Note :- No fines concrete consists of cement and coarse aggregate only. The absence of fine material results in a mass having uniformly distributed voids in it. The material is almost invariably cast in-situ and can be used for partitions and load bearing internal walls; if used for load bearing external walls it shall be rendered externally to prevent wind pressure forcing water through the voids.

The aggregate shall be crushed rock or approved light weight aggregate. Mix proportions may be in the range of 1:5 to 1:10 or as specified. The water content shall be such as to produce a continuous film of cement grout of paste consistency over the aggregate.

Unless otherwise specified, the following proportions of water, cement and aggregates shall be adopted.

For hard dense aggregates	- 0.45 : 1:10 (10 mm to 20 mm)
For light weight aggregates	- 0.60 : 1:6 (10 mm to 20 mm)

The material shall be poured as soon as possible after mixing and shall not be rammed or mechanically vibrated, though it can be lightly rodded. Pouring shall be as continuous as possible to an even height since diagonal joints are a source of weakness.

4.5 Plum Concrete

'Plum Concrete' shall be of hard dense rock of approved sizes used with concrete of specified mix.

A layer of concrete not less than 50 mm thick shall be placed, the first layer of plums placed upon this and the plums allowed to sink under their own weight. The concrete shall be of such consistency that the plums do not disappear completely from sight.

The thickness of each succeeding layer of concrete shall not be less than twice the maximum dimensions of plums permitted. The distance between any two plums and the face shall not be less than the maximum dimension of the plums not less than 150 mm.

Appendix 4 A

Quantities of Ingredients per cubic metre of concrete for Volume Batched mixes

Nominal Mix	Equivalent Grade	Cement (kg)	Fine Aggregate (dry sand m ³)	Coarse Aggregate (m ³)	Appropriate water cement ratio
1 : 1 : 2	30	552	0.38	0.76	0.40
1 : 1 1/2 : 3	25	405	0.41	0.82	0.45
1 : 2 : 4	20	320	0.44	0.88	0.50
1 : 3 : 6	-	227	0.46	0.92	0.70
1 : 4 : 8	-	173	0.48	0.96	0.80

Appendix 4 B - Slump Test for Concrete

Apparatus : The mould shall consist of metal frustum of cone having the following internal dimensions -

Bottom diameter	-	200 mm
Top diameter	-	100 mm
Height	-	300 mm

The mould shall be of a metal other than brass and aluminium of at least 1.6 mm (or 16 BG) thickness. The top and bottom shall be open and at right angles to the axis of the cone. The mould shall have a smooth internal surface. It shall be provided with suitable foot pieces and handles to facilitate lifting it from the moulded concrete test specimen in a vertical direction as required by the test. A mould provided with a suitable guide attachment may be used.

The tamping rod shall be of steel or other suitable material, 16 mm in diameter, 600 mm long and rounded at one end.

Procedure: The internal surface of the mould shall be thoroughly cleaned and free from superfluous moisture and any set concrete before commencing the test. The mould shall be placed on a smooth, horizontal, rigid and non absorbent surface, such as a levelled metal plate. The operator shall hold the mould firmly in place while it is being filled with the test specimen of concrete. The mould shall be filled in four layers, each approximately one quarter of the height of the mould. Each layer shall be tamped with twenty-five strokes of the rounded end of the tamping rod. The strokes shall be distributed in a uniform manner over the cross section of the mould and for the second and subsequent layers shall penetrate into the under lying layer. The bottom layer shall be tamped through out its depth. After the top layer has been rodded the concrete shall be struck off level with trowel or the tamping rod, so that the mould is exactly filled. Any mortar which shall leak out between the mould shall be removed from the concrete immediately after filling or raising it slowly and carefully in a vertical direction. The moulded concrete shall then be allowed to subside and the slump shall be measured immediately by determining the difference between the height of the mould and that of the highest point of specimen.

The above operations shall be carried out at a place free from vibration or shock, and within a period of two minutes after sampling.

Result : The slump shall be recorded in terms of millimetres of subsidence of the specimen during the test. Any slump specimen which collapses or shears off laterally, gives incorrect result. If this occurs, the test shall be repeated with another sample.

The slump test shall not be used for very dry mixes as the results obtained are not accurate.

Appendix 4. C

Bulking of Fine Aggregate/Sand (Field Methods)

Two methods are suggested for determining the bulking of sand/fine aggregate. The procedure may be suitably varied, if necessary. Both depend on the fact that the volume of inundated sand/fine aggregate is the same if the sand/fine aggregate were dry. Method 1: Put sufficient quantity of sand loosely into a container until it is about two third full. Level off the top of the sand and pushing a steel rule vertically down through the sand at the middle to the bottom, measure the height. Suppose this is 'X' cm.

Empty the sand out of the container into another container without loss. Half fill the first container with water. Put back about half the sand and rod it with a steel rod, about 6 mm in diameter, so that its volume is reduced to a minimum. Then add the remainder and level the top surface of the inundated sand. Measure its depth at the middle with the steel rule. Suppose this is 'Y' cm.

The percentage of bulking of the sand due to moisture shall be calculated from the formula.

$$\text{Percentage bulking} = \left\{ \frac{X}{Y} - 1 \right\} \times 100$$

Method 2 : In a 250 ml measuring cylinder, pour the damp sand (consolidated by shaking) until it reaches the 200 ml mark.

Then fill the cylinder with water and stir the sand well (the water shall be sufficient to submerge the sand completely). It will be seen that the sand surface is now below its original level. Suppose the surface is at the mark of 'Y' m the percentage of bulking of sand due to moisture shall be calculated from the formula.

$$\text{Percentage bulking} = \left\{ \frac{200}{Y} - 1 \right\} \times 100$$

Appendix 4 D - Extracted from Table 5, BS 5328 : Part 2 : 1991

Mix proportions for standard mixes					
Standard mix and grade	Constituent	Nominal maximum size of aggregate			
		40 mm		20 mm	
		slump 75 mm	slump 125 mm	slump 75 mm	Slump 125 mm
ST1 (7.5)	Cement (kg)	180	200	210	230
	Total aggregate (kg)	1950	1850	1900	1800
ST2 (10)	Cement (kg)	210	230	240	260
	Total aggregate (kg)	1900	1850	1850	1800
ST3 (15)	Cement (kg)	250	270	280	310
	Total aggregate (kg)	1850	1800	1800	1750
ST4 (20)	Cement (kg)	300	320	320	350
	Total aggregate (kg)	1850	1750	1800	1750
ST5 (25)	Cement (kg)	340	360	360	390
	Total aggregate (kg)	1800	1750	1750	1700
ST1 ST2 ST3	Fine aggregate (percentage by mass of total aggregate)	30 to 45	30 to 45	35 to 50	35 to 50
ST4 ST5	Fine aggregate (percentage by mass of total aggregate) Grading limits C Grading limits M Grading limits F	30 to 40 25 to 35 25 to 30		35 to 45 30 to 40 25 to 35	

- Note 1 The cement contents together with the total masses of saturated surface dry aggregates and added water will produce approximately one cubic metre of concrete. The values given are based on typical values of the relative densities of cement and aggregates. For some aggregates having higher or lower relative densities adjustments may be required to the quantity of aggregates to produce this volume of concrete having the required workability and cement content.
- Note 2 The values given for aggregate content, may be adjusted to allow also for the characteristics of the aggregates.
- Note 3 The aggregates for mixes ST1, ST2 and ST3 may be batched by volume.
- Note 4 When standard mixes are specified with workabilities less than 75 mm slump, the mix proportions are to be taken from the appropriate 75 mm slump column.

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CHAPTER 5 - REINFORCED CEMENT CONCRETE

5.0 Reinforced Cement Concrete

Reinforced cement concrete work may be cast-in-situ or pre-cast, and shall comprise the following which may be paid separately or collectively as per description of the item of work

- (a) Form work
- (b) Reinforcement
- (c) Concreting

5.1 Materials

This shall be structural concrete conforming to the requirements of Chapter 4.

5.1.2 Steel Reinforcement

The reinforcement shall be :

- | | | | | |
|-------|--|---|-----|------|
| (i) | Hot rolled mild steel round bars for concrete reinforcement | - | SLS | 26 |
| (ii) | Hot rolled high yield steel bars for concrete reinforcement | - | BS | 4449 |
| (iii) | Ribbed steel bars for the reinforcement of concrete | - | SLS | 375 |
| (iv) | Hard drawn mild steel wire for the reinforcement of concrete | - | BS | 4482 |
| (v) | Steel fabric for reinforcement of concrete | - | SLS | 95 |

Where Lanka Tor steel is not used, a certificate of origin and compliance with the requirements of related SLS/BSS shall be produced. Else the steel shall be tested in the Sri Lanka Steel Corporation laboratory or other approved laboratory and results produced to the satisfaction of the officer-in-charge.

The cost of testing etc. shall be borne by the Contractor.

Ribbed and/or Deformed steel bars shall not be assumed to be high yield steel without testing.

5.1.2.1 Properties of Reinforcing Steel

The chemical and other properties of these steels are tabulated in Table 5.1

All reinforcement when placed shall be free from dirt, oil, mud, grease, rust, loose mill scale on any other foreign matter which can adversely affect the concrete or reinforcement chemically or reduce the bond.

5.1.2.2 Stacking and Storage

Steel reinforcement shall be stored clear of the ground in a way as to prevent distortion and corrosion. Bars of different classifications shall be clearly marked/tagged and those of different

sizes and lengths shall be stored separately to facilitate issues in such sizes and lengths as to minimize wastage in cutting from standard lengths.

5.2 Formwork

Formwork shall include all temporary or permanent forms/moulds required for casting the concrete in-situ and all the temporary construction required for support.

The formwork shall be designed and constructed with adequate waling struts, braces, ties and clamps so as to produce finished concrete work to the required shape and dimensions within the limits of specified tolerances if any and with the specified surface finishes vide Clause 5.4.8. The formwork shall be sufficiently rigid and tight to prevent loss of grout or mortar from the concrete and shall take due account of the method of placing and compacting.

TABLE 5.1 PROPERTIES OF CONCRETE REINFORCING STEELS

Properties	Hot-rolled mild steel round bars SLS 26/1993	Hot-rolled high yield steel bars B.S 4449/2005	Ribbed Steel bars for the Reinforcement of Concrete SLS 375/2004	Hard drawn mild steel wire BS 4482/1985	Steel fabric SLS 95/1970
General	Rounds	Deformed	Deformed (deformations designed to increase bond with concrete by at least 80% as compared to plain bars)	May be plain, indented or otherwise deformed	Fabric welded from cold drawn mild steel wires
Chemical composition as shown ladle analysis (a) S not greater than (b) P not greater than (c) C not greater than	0.06 0.06 -	0.05 0.05 0.25	0.05 0.05 0.25	0.06 0.06 0.25	0.05 0.05 -
Tensile properties (a) Specified characteristic strength	All sizes 240 N/mm ² (PB 240) or 300 N/mm ² (PB 300)	500 N/mm ²	460 N/mm ² (RB 460)	All sizes 460 N/mm ²	480 N/mm ²
(b) Tensile strength	10% greater than yield stress 20% (PB 240)	10% greater than actual yield stress as shown in the tensile test.	5% greater than actual 0.2% proof stress or yield stress measured in the tensile test.	510 N/mm ² and 5% greater than yield stress.	570 N/mm ²
(c) Min elongation on 5.65/So where So is the original area of specimen.	20% (PB 240) or 16% (PB 300)	12%	12%		6.9% over a gauge length of 11.3 So.

Note: Deformed steel bars shall not be assumed to be high yield steel without testing.

The formwork shall withstand the worst combination of the following loads.

- (i) Total weight of formwork, reinforcement and concrete
- (ii) Construction loads including dynamic effects of placing, compacting and construction traffic
- (iii) Wind loads

Formwork shall be so constructed as to be easily dismantled and removed in sections in the desired sequence from the cast concrete, without shock, disturbance or damage. Where necessary the formwork shall be so arranged that the soffit form properly supported on props only, can be retained in position for such period as may be required by the maturing conditions or specification. Screw jacks or hard board wedges shall be provided where required to make up for any settlement in the formwork either before or during the placing of concrete.

Care shall be taken to see that no piece is keyed into the concrete.

Details of formwork shall be properly worked out, and approval obtained from the officer-in-charge well in time for important works. The completed formwork shall be inspected and passed by the officer-in-charge before the reinforcement is placed in position, but the responsibility for the adequacy of the formwork remains with the contractor.

Propping and centering shall be sufficiently rigid and stable. The permissible stresses in bending, the buckling load of props, the permissible deflection of shuttering etc. should not be exceeded. Suitable horizontal as well as diagonal braces shall be provided to resist the lateral forces due to dumping of concrete movement of construction equipment and action of the wind and to provide lateral stability.

5.2.1 Materials for Formwork

Temporary formwork shall be of timber, plywood, steel or any other material as specified.

Permanent formwork shall consist of filler blocks like clay/concrete hollow blocks, coffer units trough units etc. as specified.

5.2.1.1 Timber

The timber used for formwork shall be light weight and easily workable with nails without splitting. It shall be stiff and strong enough to avoid undue deflection when loaded; be stable and not liable to warp when exposed to sun and rain, or wetted during concreting. It shall not be so soft as to get damaged easily on the contact faces under normal condition of erecting forms, fixing steel and pouring concrete. The timber shall be free from loose knots, projecting nails, splits or other defects that may affect the surface of the concrete. It shall not be so dry as to absorb water from concrete and swell and bulge, nor so green or wet as to shrink after erection. Species of timber which are not appreciably affected by contact with water shall be used. The sizes of timber generally used for formwork are given below.

Use	Size
Floor boarding	25 mm or 32 mm thick
Wall boarding and sides of beams and columns	25 mm to 50 mm thick
Beam soffits	38 mm to 50 mm thick
Joists, ledges	100 mm x 50 mm to 250 mm x 75 mm generally 100 mm x 50 mm
Raw jungle poles	Not less than 100 mm diameter at mid-length and 80 mm at thin end.
Posts	75 mm x 100 mm to 100 mm x 100 mm
Column yokes	50 mm x 50 mm to 75 mm x 75 mm
Diagonal braces	150 mm x 32 mm to 150 mm x 50 mm

5.2.1.2 Plywood

Phendic - resin bounded plywood shall be used as it is completely water proof and does not laminate as does ordinary plywood. Plywood panels shall be formed with 100 x 25 mm dressed timber and nailed with short, thin nails at 150 to 225 mm centres.

6 or 10 mm thick plywood shall be given a solid backing nailed at 100 to 150 mm spacing along the four edges and with at least one nail every 0.1 square metre throughout the surface. The edges of sheets shall be tacked to the same backing board to ensure the production of a smooth joint.

10 and 16 mm thick plywood shall be nailed to a skeleton backing of dressed timber before fixing to the studding. 19 mm thick plywood shall be nailed direct to studs at a maximum recommended spacing of 450 mm. For spacing greater than 450 mm skeleton backing of appropriate design shall be used.

5.2.1.3 Steel

The contractor shall use with the approval of the officer-in-charge any proprietary systems of steel formwork generally consisting of panels made up of steel sheet on light steel angle framing in sizes that can be easily handled. Special panels shall be used where curved formwork is necessary.

Special telescopic units which can be easily removed shall be provided as a simple type of joist for suspended slab formwork. Other proprietary fittings such as beam and column clamps and adjustable props designed to facilitate erection may also be used subject to the approval of the officer-in-charge in regard to their suitability for the particular work.

5.2.2. Formwork Ties

Wire ties shall generally not be recommended for fixing wall formwork as they are likely to cause rust stains or patches at the point where they are cut back. Such stains may be avoided by using bolts which should be either fitted with sleeves or well greased to enable them to be withdrawn easily from the concrete when formwork is removed. Any proprietary devices when used for supporting formwork shall have the approval of the officer-in-charge.

No metal part of any device for securing forms shall remain within the specified concrete cover.

All ties anchored against timber shall pass through a plate washer at least 50 mm x 50 mm and of sufficient thickness to transfer the load without visible deflection or penetration into the timber.

5.2.3 Top Forms

Formwork shall be provided to the top surface of concrete where the slope or nature of the work requires it.

5.2.4 Propping and Centering

Props used for centering shall be of steel, timber post round poles or any other material approved by officer-in charge. Bamboo props or supports shall be permitted for heights or lengths not exceeding 3 metres provided they are adequately braced. In no case shall round poles be of diameter less than 100 mm measured at mid length and 80 mm at thin end. Maximum permissible spacing shall be 1.2 metres centre to centre. Poles shall rest squarely on wooden sole plates of 40 mm thickness and a minimum bearing area of 0.1 sq. metre laid on the ground. Double wedges shall be provided between the sole plates and the wooden props so as to facilitate tightening and easing of shutting without jarring the concrete.

The details of propping and centering stated above shall be applicable for spans of 4.5 metres and height up to 3.5 metres. In case any of these limits is exceeded the formwork shall be properly designed. In case the height of centering exceeds 3.5 metres, the props shall be provided in multistages and stabilized with suitable diagonals and rakes.

Proprietary systems of props shall be erected as per manufacturer's details.

5.2.4.1 Multi-storied Structures

In the case of structures with two or more floors, the normal props as per 5.2.4 shall be provided for supporting the floor to be cast on the topmost floor already cast. If necessary supports below this floor shall be provided preferably to come in line with the props of the upper floor. Planks shall be provided at the top ends of these props so as to give an even distribution of load. Formwork and concreting of the upper floor slab shall not generally be done until the concrete of the lower floor has set for at least 14 days.

In case of balconies and cantilever beams coming one above the other, the members being cast shall be supported by props on two floors below the floor where initial supporting has been done. Poles shall rest squarely on wooden sole plates of 40 mm thickness and with minimum bearing area of 0.1 square metre.

5.2.4.2 Precautions

Before the concreting is started, all the props and wedges shall be checked to see that they are intact, and suitable action taken in case they are loose. While the concreting is in progress, at least one carpenter/fitter shall be readily available at the site. The carpenter shall keep a constant watch on the props and take immediate remedial measures, if any of these get loosened. Care shall be taken that props and wedges do not get loose for this minimum period specified in Table 5.2.

5.2.5 Shuttering

The shuttering shall have a smooth and even surface and be appropriate to the concrete finish required. See also Clause 5.4.8. For exposed concrete faces, timber for shuttering shall be wrought

on all faces in contact with concrete. Wooden formwork with metal sheet, plywood or other approved lining or steel plates stiffened by steel angles shall also be permitted. Undressed timber may be used for formwork for hidden faces and external faces below ground level.

When metal forms are used, all bolts and nuts shall be countersunk and well ground to provide a smooth plane surface.

The chamfers, bevelled edges and mouldings shall be made in the formwork itself.

Provision for fan clamps and other fittings connected with services shall be made in the shuttering as directed by the officer-in-charge.

As far as practicable, clamps shall be used to hold the forms together. Where the use of nails is unavoidable the minimum possible number of nails shall be used and these shall be left projecting so that they can be easily withdrawn. Use of double headed nails shall be preferred.

Holes or openings shall be provided at suitable locations for cleaning up before placing concrete.

5.2.5.1 Surface Treatment for Shuttering

The surfaces of timber shuttering that would come in contact with concrete shall be thoroughly wetted and coated with raw linseed oil, mould oil of approved manufacture or any other approved material (such as polythene- polyethylene sheets), to prevent adhesion of concrete to formwork. Inside surfaces of forms shall be thoroughly cleaned before application of any of the materials mentioned above. Approved released agents shall be applied strictly in accordance with the manufacturer's instructions and shall not be allowed to come in contact with any reinforcement.

Re-use of the shuttering shall be permitted only after the surface has been thoroughly cleaned, and repaired if necessary.

5.2.6 Camber

Suitable camber shall be provided for the horizontal members of structures especially those of long spans, to counteract the effect of deflection. The formwork shall be so assembled as to provide for such camber. The camber for beams and slabs shall generally be 0.1% and 0.2% of the span depending upon the span and stiffness of the member in question. Cambers are not normally applied to short or very stiff cantilevers.

5.2.7 Special Formwork

Formwork locations like tall structures etc. use of special types of formwork like moving or sliding forms shall be permitted. The details of such formwork along with the sequence of working shall be approved by officer-in-charge before erection.

5.2.8 Approval of Formwork

The contractor shall give the officer-in-charge due notice before placing any concrete in the forms to permit him to inspect and accept the formwork as to its strength, alignment and general fitness; however, such inspection shall not relieve the contractor of his responsibility for safety of men, machinery, materials and the results obtained.

5.2.9 Removal of Formwork

The formwork shall be so removed as not to cause any damage to concrete due to shock or vibration.

Formwork shall normally be stripped in the following order:

- (i) Shutters to vertical faces eg. side of columns, beams and walls
- (ii) Shutters forming soffits to roof and floor slabs, horizontal and inclined canopies etc.
- (iii) Shutters forming soffits of beams and girders.

The removal of the formwork for larger structures shall be planned and a definite scheme of operation worked out to the satisfaction of the officer-in-charge.

Re-propping of beams shall not be permitted except with the approval of the officer-in-charge.

5.2.9.1 Time of Removal

In no circumstances shall forms be struck until the concrete reaches a strength of at least twice the stress to which the concrete may be subjected at the time of strike. Where possible, the formwork shall be left for as long as possible, as it would assist curing. Forms shall be eased out carefully in order to prevent the load being transferred suddenly to the partly hardened concrete. The period that shall elapse after the concrete has been laid, before easing and removal of centring and shuttering is undertaken shall be as given in Table 5.3. The officer-in-charge may however extend the periods noted where necessary by giving written instructions to the contractor.

Table 5.3
The minimum period for removing formwork

Part of Structure	Period for Ordinary Portland Cement without admixtures
Sides of foundations, columns, beams and walls	24 hours
Under sides of slabs of up to 4.5 metre span	7 days
Under sides of slabs of above 4.5 metres span and under sides of beams and arches up to 6 metres span	14 days
Under sides of beams and arches over 6 metres span and up to 9 metres span	21 days
Cantilever slabs and beams	21 days
Domes, shells and other structures of special nature.	As per written instructions of officer-in-charge.

5.3 Steel Reinforcement

The reinforcement shall be :

- | | | | |
|-------|--|---|---------|
| (i) | Hot rolled mild steel round bars for concrete reinforcement | - | SLS 26 |
| (ii) | Hot rolled high yield steel bars for concrete reinforcement | - | BS 4449 |
| (iii) | Ribbed Steel bars for the reinforcement of concrete | - | SLS 375 |
| (iv) | Hard drawn mild steel wire for the reinforcement of concrete | - | BS 4482 |
| (v) | Steel fabric for reinforcement of concrete | - | SLS 95 |

Where Lanka Tor steel is not used, a certificate of origin and compliance with the requirements of related SLS/BSS shall be produced. Else, the steel shall be tested in the Sri Lanka Steel Corporation Laboratory or other approved Laboratory and results produced to the satisfaction of the officer-in-charge.

The cost of testing etc. shall be borne by the Contractor.

5.3.1 Bending Lapping and Welding

5.3.1.1 Cutting and Bending

Reinforcement shall be cut and/or bend in accordance with BS 4466. Bars shall be bent cold, correctly and accurately on an approved type of bending apparatus, to the size and shape shown on the detailed drawings or as directed by the officer-in-charge.

Where hot bending in the opinion of the officer-in-charge is necessary, only hot rolled high yield or mild steel shall be allowed to be bent at a cherry red heat and allowed to cool gradually. In the case of cold worked bars, prolonged or excessive heating may reduce its properties and hot bending shall therefore be avoided.

5.3.1.2 Laps

Preferably, bars of full length shall be used. Lapping of bars where necessary, shall be done as directed by the officer-in-charge. The lapping bars shall not touch each other and shall be kept apart by 25 mm or $1 \frac{1}{4}$ times the maximum size of the coarse aggregate whichever is greater, (but not exceeding 4 x diameter of bar). But where this cannot be done, the lapping bars shall be bound together at intervals not exceeding twice the diameter of such bars, with two strands of annealed steel wire of 0.90 mm to 1.6 mm thickness twisted tight. The laps shall be staggered for different bars and located at points along the span where neither shear nor bending moment is a maximum. Laps in secondary reinforcement shall be 30 times the diameter of the bar unless otherwise shown. Length of laps shall be as given in Appendix 5.A unless otherwise specified.

5.3.1.3 Welding

Welding may be used for (i) fixing in position between crossing or lapping reinforcement (ii) transfer of load between reinforcement. Welding on site shall be avoided if possible but where suitable safeguards and techniques are employed and provided that the types of steel (including high yield steels to SLS 375 & BS 4449) have the required welding properties, it may be

undertakes with the approval of the officer-in-charge. Welding of reinforcement shall conform to standard codes of practices and to the approval of the officer-in-charge.

Generally however all welding shall be carried out under controlled conditions in the factory or work-shop.

5.3.1.4 Re-Bending

Where it is necessary to bend reinforcement projecting from already cast concrete, care shall be taken to ensure that the radius of bend is not less than that specified in B.S 4446. Where it is necessary to re-shape steel previously bent, this should only be done with the officer-in-charge's approval and each bar should be inspected for signs of fracture.

5.3.2 Fixing in Position

5.3.2.1 Tying of Bars

Reinforcement bars shall be placed in position as shown in the drawings. The bars crossing one another shall be tied together at every intersection with two strands of annealed steel wire 0.90 to 1.6 mm thickness twisted tight to make the skeleton of the steel work rigid so that the reinforcement does not get displaced during the deposition of concrete. The ends of the binding wire shall be bent back, clear of forms and into the body of the concrete.

Note : If spacing of bars is less than 300 mm in each direction, alternate intersection may be tied. Crossing bars should not be tack welded for assembly of reinforcement unless permitted by the officer-in-charge.

5.3.2.2 Spacers and cover Blocks

The bars shall be kept in position by using spacers, chairs etc. Spacers shall be of such materials and designs as will be durable, not lead to corrosion of reinforcement nor cause spalling of the concrete cover.

The following methods shall be followed.

- (a) In the case of beam and slab construction, pre-cast cover blocks in cement mortar 1 : 1 ½ about 40 mm x 40 mm section and of thickness equal to the specified cover shall be placed between the bars and shuttering, so as to secure and maintain the requisite cover of concrete over reinforcement.
- (b) In the case of cantilevered and doubly reinforced beams or slabs the vertical distance between the horizontal bars shall be maintained by introducing chair spacers or support bars of steel at 1.0 metre or at shorter spacing to avoid sagging.
- (c) In the case of columns and walls, the vertical bars shall be kept in position by means of removable timber templates with slots accurately cut in them or with circular blocks of cement mortar 1 : 1 ½ suitably tied to the reinforcement.
- (d) In case of other R.C.C structure such as arches, domes etc. cover blocks, spacers and templates shall be used as directed by the officer-in-charge. Projecting reinforcement shall be protected from the weather by grout washing, or special covers or wrapping, and/or subsequently cleaned until completely embedded in concrete.

Concreting shall not commence until the reinforcement has been inspected and approved by the officer-in-charge. The position of reinforcement should be checked before and during concreting, particular attention being paid to the position of top reinforcements especially in cantilever sections.

5.3.2.3 Cover

The cover of concrete to the reinforcement shall be as described in the drawings and shall be provided and maintained within a tolerance of 3 mm under or over (except where specified as a minimum)

The following table shall be adopted for general guidance.

Table 5.4 - Nominal cover to all Reinforcement (Including links) to meet durability requirements

Exposure Classification	Examples of Exposure	Nominal Cover				
		mm	mm	mm	mm	mm
Mild	Indoor and Sheltered	25	20	20*	20*	20*
Moderate	Outdoor exposed	40	35	30	25	20
Severe	Wet and Dry; Foundation	50	45	40	30	25
Very Severe	Sea Spray	-	50	45	40	35
Extreme	Abrasive	-	-	-	60	50
Maximum free water/cement ratio		0.65	0.60	0.55	0.50	0.45
Minimum cement content (kg.m ³)		275	300	325	350	400
		(300)	(325)	(350)	(400)	(450)
Lowest grade of concrete (See note 5)		25	30	35	40	45

Note 1 This table applies to normal -weight aggregate OPC concrete of 20mm nominal maximum aggregate size and river sand fine aggregate. In no case should the cover be less than the maximum aggregate size or diameter of main reinforcement.

Note 2 Cover values marked with asterisks (*) can be reduced to 15 mm provided the nominal maximum aggregate size does not exceed 15 mm subject to the conditions in Note 1. The minimum allowable cover is 15 mm.

Note 3 The cover may be reduced by 5mm in slabs and shells, subject to the conditions in Note 1 and 2.

Note 4 The minimum cement content values in parentheses should be maintained if no water reducing admixtures are used.

Note 5 The grade requirement can be reduced by 5 if a checking regime establishes that the maximum free water/cement ratio and minimum cement content requirements are met.

Note 6 The above cover values can be reduced by 5 mm subject to the conditions in Note 1 and 2 provided a 1:3 cement : sand rendering of 10 mm 15 mm or 20 mm or equivalent is applied to concrete made to water/cement ratios of 0.65, 0.6 and 0.55 respectively.

Note 7 Cover in foundation should be treated as for 'severe' exposure conditions without any reductions in cover allowed as per Notes 3 and 6. The cover values in parentheses for the 'severe' exposure condition can be used only for foundations.

5.4 Concreting

The concrete shall be made as specified in Chapter 4 and the proportions of ingredients shall be as specified. Concrete shall be mixed by a mechanical mixer except when the officer-in-charge permits otherwise.

5.4.1 Consistency

The concrete shall be of such consistency that it will flow sluggishly into the forms and around the reinforcement without any segregation of coarse aggregate from the mortar. The consistency shall depend on whether the concrete is vibrated or hand-tamped. It may be determined by slumps of concrete for the different types of works, and shall be as given in Table 5.5 below, unless otherwise specified.

Table 5.5 Slump for Concrete

Work	Slump (in mm)	
	Vibrators used	Vibrators not used
Mass concrete in R.C.C. foundation, footings and retaining walls.	10-25	50-75
Beams, slabs and columns	25-40	75 - 100
Thin R.C.C. sections or sections with congested steel	40-50	125-150

Note: Volume Batched Concrete of the higher slump range of 75 mm and above, shall be produced by using additional cement slurry (and not merely water) keeping the water-cement ratio and the compressive strength of concrete reasonably constant.

The amount of water used in the concrete shall be regulated by volume or by weight as required to secure concrete of the proper consistency. Adjustment shall be made for any variation in the moisture content due to water absorbed by the aggregates and/or free water in aggregates. Addition of water to compensate for stiffening of the concrete shall not be permitted.

5.4.2 Placing of Concrete

The officer-in-charge shall be kept advised sufficiently in advance as to when placement of concrete will commence. The concrete shall be transported from the mixer with the least possible delay in liquid tight containers or barrows and by methods which prevent the segregation or loss of ingredients. Slump loss in transit shall not exceed 25 mm. Compensation for excessive slump loss by allowing wetter consistency at the mixer resulting in higher water cement ratios, shall not be permitted. All concrete conveyors, barrows and chutes shall be primed by washing with rich cement grout before use. These shall be thoroughly washed and cleaned immediately after stopping concreting.

A record shall be kept of the time and date of all concrete pours and the subsequent removal of formwork.

5.4.2.1 Concreting shall be commenced only after the officer-in-charge has inspected the formwork and reinforcement as placed and passed the same.

Shuttering shall be cleaned of all shavings, saw dust, pieces of wood, or other foreign material by the use of air and water pressure hoses. All accumulation of water or debris shall be flushed out through the holes or opening provided for the purpose. These holes shall be neatly plugged before concreting.

5.4.2.2 In the case of concreting of slabs and beams, wooden plank or cat-walks supported directly on the centering by means of wooden blocks or lugs shall be provided to take the concrete to the place of deposition without disturbing the reinforcement in any way. Traffic shall not be allowed over the reinforcement or freshly placed concrete.

5.4.2.3 The concrete shall be deposited in its final position in such a manner as to preclude segregation of ingredients. In deep trenches and footings, concrete shall be placed through chutes as directed by the officer-in-charge. In the case of columns and walls, the shuttering shall be so adjusted that the vertical drop of concrete is not more than 1.5 metres at a time. The progress of concreting in the vertical direction shall be restricted to one metre per minute.

The mix shall be such that there will be no excess water on the top surface on completion of compaction. In the case of deep lifts, the water content of batches at the top may have to be reduced to compensate for water gain from lower levels.

5.4.2.4 During cold weather, concreting shall not be done when the temperature falls below 4.5°C . The concrete placed shall be protected against frost by suitable covering. Concrete damaged by frost shall be removed and work redone.

5.4.2.5 The time between mixing and placing of concrete shall not exceed 30 minutes so that the initial setting process is not interfered with.

5.4.3 Compaction

Concrete shall be compacted into a dense mass immediately after placing by means of mechanical vibrators designed for continuous operation. The officer-in-charge may however relax this condition at his discretion for certain items, depending on the scope of the work, on the thickness of the members and feasibility of vibrating the same, and permit hand compaction instead.

Hand compaction shall be done with the help of tamping rods. Concrete shall be thoroughly compacted and completely worked around the reinforcement, embedded fixtures, duct formers and into corners of the formwork.

Compaction shall be completed before the initial setting starts, i.e. within 30 minutes of addition of water to the dry mixture.

Concrete shall be deposited continuously in layers of such thickness that no concrete is deposited on concrete which had hardened sufficiently to cause the formation of seams and planes of weaknesses within the section. If a section cannot be placed continuously, construction joints shall be located at points provided for in the plans or approved by the officer-in-charge. If a delay exceeding one hour occurs in placing, no fresh concrete shall be placed on that already deposited until the officer-in-charge's approval is obtained. The surface of the hard concrete is then to be prepared as specified in 5.4.4.

5.4.3.1 Use of Vibrators

The contractor shall inform the officer-in-charge of the number and type of vibrators to be used. Stand by vibrators shall always be provided before commencement of work. External vibrators shall not be used without the approval of the officer-in-charge.

The vibrators shall maintain the whole of concrete under treatment in an adequate state of agitation, such that de-aeration and effective compaction are attained. The rate of the supply of concrete from the mixers shall be commensurate with this. The vibration shall continue, throughout the whole duration of the placing of concrete, the vibrators being adjusted so that the centre of vibration approximates to the centre of the mass compacted at the time of placing.

The full depth of fresh concrete shall be compacted without damaging adjacent partly hardened concrete.

Concrete shall be considered as properly compacted when the air bubbles cease to appear on the upper surface and mortar fills the spaces between the coarse aggregate and begins to cream up to form an even surface.

When this condition has been attained, the vibrator shall be stopped if using vibrating tables or external vibrators, while needle vibrators shall be withdrawn slowly so as to prevent formation of loose pockets. In case both internal and external vibrators are being used, the internal vibrators shall first be withdrawn slowly after which the external vibrators shall be stopped so that no loose pocket is left in the body of the concrete. The specific instructions of the makers of the particular type of vibrator used shall be strictly complied with. Over vibration shall be avoided.

Shaking of reinforcement for the purpose of compaction should not be resorted to. Likewise, all precautions shall be taken to prevent displacement of the reinforcement during the placing and compaction of concrete.

5.4.4 Construction Joints

Concreting shall be carried out continuously up to construction joints, the position and details of which shall be decided in advance and approved by the officer-in-charge (Typical construction joints are shown in Fig. No. 5/1). Such joints shall be kept to the minimum and shall not be located in valleys. The joints shall be located taking into account the shear and other stresses. They shall be straight and at right angles to the direction of main reinforcement. Immediately prior to re-commencement of concrete on a joint, the surface of the concrete against which new concrete will be cast shall be freed from laitance and shall be roughened to the extent that the largest aggregate is exposed but not disturbed. Care shall be taken that the joint surface is cleaned immediately before the fresh concrete is placed against it. A coat of neat cement slurry at the rate of 2.75 kg of cement per sq metre shall then be applied on the roughened surface before fresh concrete is laid.

Particular care shall be taken in the placing of the new concrete close to the joint. This concrete shall be well compacted and if possible a vibrator shall be used.

Where the officer-in-charge considers that special preparation is necessary, e.g. for an in-situ structural connection preparation shall be carried out preferably when the concrete has set but not hardened, by spraying with a fine spray of water or brushing with a stiff brush to remove the outer mortar and expose the larger aggregate without its being disturbed.

Where this treatment is impracticable sand blasting or a needle gun shall be used to remove the surface skin and laitance. Hacking of hardened surfaces shall be avoided.

5.4.4.1 Columns

In the case of columns, the joints shall be horizontal and located 100 to 150 mm below the bottom of the beam running into the column. The portion of the column above this joint shall be concrete with the beam. If a kicker (i.e. a starter stub) is used, it should be at least 70 mm high and carefully constructed. It is preferable for the kicker to be incorporated with the previously placed concrete. Where possible, the formwork should be designed to facilitate the preparation of the joint surface, as the optimum time for treatment is usually two to four hours after placing.

5.4.4.2 Slabs and Beams

When stopping the concrete on a vertical plane in slabs and beams, an approved stop-board (see Fig. 5/1) shall be placed with necessary slots for reinforcement bars. The construction joints shall be keyed by providing a triangular or trapezoidal fillet nailed on the stop-board. Inclined or feather joints shall not be permitted. Any concrete flowing through the joints of stop-boards shall be removed soon after the initial set.

5.4.5 Movements Joints

Movement joints shall generally be straight and conform to approved plans. The joints shall be formed with rigid formwork and stop ends suitably designed to cast the structurally separate components or parts. Filling of these joints with resilient joint fillers and the provision of copper or brass plates shall be as specified or directed.

A note on movement joints given in appendix 5B.

5.4.5.1 Contraction Joints

An interval of not less than 48 hours shall be allowed between casting of adjacent bays separated by formed contraction joints or construction joints.

5.4.5.2.1 Expansion Joints

Concrete shall not be placed on both sides of the joints at the same time unless otherwise approved.

5.4.6 Curing and Protection

5.4.6.1 Curing

After the concrete has begun to harden i.e. about 1 to 2 hours after its laying, it shall be protected from quick drying with moist gunny bags, sand or any other suitable material approved by the officer-in-charge. After 24 hours of laying of concrete, the surface shall be cured by flooding with water of minimum 25 mm depth, or by covering with wet absorbent material, e.g. damp hessian or jute, coconut or straw matting, or a layer of sand about 50 mm thick. The curing shall be done for a minimum period of 7 days.

5.4.6.2 Protection

It shall be the responsibility of the contractor to prevent damage to the fresh concrete surfaces from rain indentation and physical damage. Immature concrete shall be protected from physical shock or movement and thermal shock particularly from cold weather. Exposed concrete surface shall be protected from rust marks and other disfigurement.

5.4.7 Finishing

5.4.7.1 Immediately on removal of forms, the reinforced concrete work shall be examined by the officer-in-charge, before any defects are made good.

- (a) Work that has sagged or contains honey-combing to an extent detrimental to structural safety or architectural concept shall be rejected.
- (b) Surface defects of a minor nature accepted by the officer-in-charge shall be rectified as given below. Surface defects which require repair when forms are removed usually consist of bulges due to movement of forms, ridges at form joints, honey-combed areas, damage resulting from the stripping of forms and bolt holes.

- (i) Bulges and ridges shall be removed by careful chipping or tooling and the surface shall then be rubbed with a grinding stone.
- (ii) Honey-combed and other defective areas shall be chipped out, the edges being cut as straight as possible and perpendicularly to the surface, or preferably slightly undercut to provide a key at the edge of the patch.

Shallow patches shall first be treated with a coat of thin grout composed of one part of cement and one part of sand and then filled with mortar similar to that used in the concrete. The mortar shall be placed in layers not more than 10 mm thick and each layer shall be given a scratch finish to secure bond with the succeeding layer. The last layer shall be finished to match the surrounding concrete by floating, rubbing or tooling on formed surface by pressing the form material against the patch while the mortar is still plastic.

Holes left by bolts shall be filled with mortar carefully packed into place in small amounts. The mortar shall be mixed as dry as possible, with just enough water so that it will be tightly compacted when forced into place.

Tiered holes extending right through the concrete may be filled with mortar using a pressure gun (similar to the gun used for greasing motor cars).

Normally, patches appear darker than the surrounding concrete, possibly owing to the presence on their surface of less cement laitance. Where uniform surface colour is important, this defect shall be remedied by adding 10 to 20 percent of white portland cement to the patching mortar, the exact quantity being determined by trial.

Care shall be taken to cure the material in the patches as taken with the whole structure. Curing shall be started as soon as possible after the patch is finished to prevent early drying. Damp hessian may be used but in some locations it may be difficult to hold it in place. A membrane curing compound will be most convenient in these cases.

5.4.7.2 Surface Preparation for Plastering

The surface which is to receive plaster or where it is to be joined with a brick masonry wall, shall be properly roughened immediately after the shuttering is removed, taking care to remove the laitance completely without disturbing the concrete. The roughening shall be done by hacking. Before the surface is plastered, it shall be cleaned and wetted so as to give good bond between concrete and plaster.

The reinforced concrete work shall be done to such tolerances that the thickness of plaster required for finishing the surface does not exceed 10 mm.

5.4.7.3 Surface Preparation for Floor Finishes

The surface of a reinforced concrete slab on which a screed or other finish is to be laid shall be roughened with brushes while the concrete is green. This shall be done carefully without disturbing the concrete.

5.4.7.4 Preparation for Roof Slabs

In case of roof slabs the top surface shall be finished even and smooth with a wooden trowel, before the concrete begins to set. When required, a brushed finish shall be obtained by brushing the surface with a stiff broom or wire brush while still green. This provides a slightly coarse surface.

5.4.8 Surface Finishes

This sub clause on finishes to in-situ concrete covers formed finishes, worked finishes on plastic concrete and worked finishes on hardened concrete.

The contractor shall provide form work appropriate to the required formed finish and to the dimensional tolerance if any specified.

Control samples shall be provided for the specified finish and approval of the appearance of each sample obtained from the officer-in-charge in advance of construction.

The surface of plastic concrete shall not be wetted to assist surface working to obtain the specified finishes.

All adjacent work shall be protected from damage when finishes are worked on plastic or hardened concrete particularly when working with power driven floating, trowelling or grinding.

5.4.8.1 Formed Finishes

Formed finishes shall consist of one of the following;

- (1) Basic finish
- (2) Plain finish
- (3) Fine finish
- (4) Special finish

5.4.8.1.1 Basic Finishes

A basic finish shall be appropriate for areas which are not exposed in the finished work e.g. foundations, backs of retaining walls, areas to be subsequently clad, plastered or rendered. There are no special requirements for this finish except those for dimensional tolerances. The concrete shall be fully compacted and shall be sound.

5.4.8.1.2 Plain Finish

A plain finish shall be appropriate for plain concrete surfaces exposed in the finished work. e.g. Car parks subways, circulation areas and areas to be subsequently painted.

The general requirements for plain finish shall be as follows:

- (1) The surface shall have an even finish by use of a sheet material e.g. plywood.
- (2) Panels shall be arranged in a regular pattern as a feature of the surface.
- (3) The concrete surface shall be free from voids, honey combing and other large defects. Blow holes shall not be more than 10 mm diameter.
- (4) The concrete surface shall be free from discolouration due to contamination or grout leakage but variation in colour resulting from the use of an impermeable form lining may be permitted.

The tolerances for the concrete surfaces shall be as follows;

- (a) Abrupt irregularities not more than 5 mm.
- (b) Gradual irregularities expressed as maximum permissible deviation from a metre straight edge shall be not more than 5 mm.

- (c) The arises to columns, walls etc. Shall be chamfered or rounded as specified in the drawings or as directed by the officer-in-charge.

Plain finish shall be left as struck unless otherwise specified. Making good of small defects will normally be permitted but only after inspection by the officer-in-charge. Blowholes shall be filled with mortar to an approved sample.

5.4.8.1.3 Fine Finish

Fine finish shall be adopted for areas of high aesthetic importance and generally only for internal work. The contractor shall provide the control sample of fine finish in an approved location in advance of construction.

The general requirement for fine finish shall be as follows;

- (i) A smooth even finish shall be produced with an impervious sheet material eg. plastic faced plywood.
- (ii) Panels shall be made as large as practicable and arranged in an approved regular pattern as a feature of the surface.
- (iii) Blow-holes less than 5 mm will be permitted but otherwise the surface shall be free from voids, honey combing and other defects.
- (iv) Variation in colour resulting from the use of impermeable form lining will be permitted but the surface shall be free from discolouration due to contamination or grout leakage.
- (v) Cover spacers shall not be used without the approval of the officer-in-charge.

Tolerances for the fine finished surfaces shall be as follows;

- (a) Abrupt irregularities in the surface shall not be more than 3 mm.
- (b) Gradual irregularities expressed as maximum permissible deviation from a one metre straight edge shall not be more than 3 mm
- (c) Arises of columns, walls etc shall be chamfered/rounded as detailed in the drawing or as specified by the officer-in-charge.

Formwork ties shall not be used except with the permission of the officer-in-charge.

Making good of fine finished concrete will not be permitted and the surface shall be left as struck.

Blow holes shall be filled with mortar to an approved sample.

5.4.8.1.4 Special Finish

Special finishes to concrete surfaces like rough board finish, ribbed finish, coffered/Toughed etc. shall be provided by the Contractor to the specific requirements and tolerances indicated in the drawings.

5.4.8.2 Worked Finishes : Plastic Concrete

Worked finishes (normally to horizontal surfaces) shall be produced by working the concrete when still in the plastic condition.

The worked finishes on plastic concrete shall be one of the following,

- (a) Tamped Finish
- (b) Scored Finish
- (c) Floated Finish
- (d) Trowelled Finish

5.4.8.2.1 Tamped Finish

The surface of plastic concrete shall be tamped with the edge of a board or beam of adequate size and weight to give an even texture of parallel ribs. The concrete surface shall thus be given an overall ribbed affect. It shall be noted that the tamping shall be started with very little bleeding water present on the surface.

5.4.8.2.2 Scored Finish

This type of finish which gives an overall roughened surface to the concrete and shall be obtained by scoring (scratching) the concrete surface at the appropriate time with a stiff brush, metal comb, trowel or a length of mesh reinforcement.

5.4.8.2.3 Floated Finish

The surface shall be floated with a wooden float to give an even, slightly coarse texture with no ridges or steps. Alternatively skip float or power float may be used to give the required finish. Floating has to be timed properly to achieve the best results.

5.4.8.2.4 Trowelled Finish

After obtaining an initial finish using a wooden float/power float a fine smooth finish shall be given to concrete surfaces by hand trowelling or power trowelling. Power trowelling shall be adopted for large unbroken areas with few ducts, recesses etc. The timing of power trowelling in relation to the ambient condition of concrete shall be such that the concrete shall be sufficiently stiff to take the weight of the machine and the operator, yet sufficiently workable for the trowelling to be effective. Vacuum dewatering may be adopted to overcome this timing problem, if so directed.

5.4.8.3 Worked Finishes : Hardened Concrete

Hardened concrete shall be given the following surface finishes as specified.

- (a) Abrasive blasted Finish
- (b) Tooled Finish
- (c) Power ground floor Finish

Finishes on hardened concrete noted above shall be worked over a formed finish or worked finish on plastic concrete.

5.4.8.3.1 Abrasive Blasted Finish

Abrasive blasted finish shall be carried out over a plain/fine/floated finish. These shall conform to approved samples and shall be carried out within 7 days of striking of formwork. The surface shall be blasted with an approved abrasive to even texture and to the depth of exposure specified. The minimum depth of exposure shall be 1 mm for light plastered finishes. Abrasive blasting shall be stopped short of arises with regular margin of 40 mm or as otherwise directed.

5.4.8.3.2 Tooled Finish

Tooled finishes shall be obtained over an initial plain finish surface or a ribbed finish surface by using a snub nose tool/Disc head bush hammer/combed chisel or other approved tools. Tooling shall be carried out only on a concrete which is at least 21 days old and has a compressive strength of not less than 20 N/mm^2 when tooling is carried out. Tooling shall be stopped short of arises with a regular margin of 40 mm or as otherwise directed.

5.4.8.3.3 Power Ground Floor Finish

Power grinding shall be used to produce a hard wearing surface suitable for the direct application of thin sheet or tile covering. Grinding shall be used as a finishing technique and shall not be used to correct gross irregularities in the surface. The objective shall be to remove the thin, weak surface layer of concrete (about 1 mm thick) to produce a surface which is less prone to dusting and wear, more coarse and slip resistant.

A sample shall be provided by the Contractor in an approved location. Power grinding shall be carried out on a floated finish obtained with specified tolerances. (The normal gradual irregularities of the surface shall be not more than 2 mm on a 1 metre straight edge.) Power grinding shall normally be done dry and within 7 days of concreting. After grinding, all dust shall be swept away and the surface thoroughly washed down. To reduce dusting, a surface hardening solution may be applied to the specification of the manufacturer, if so directed by the officer-in-charge.

5.4.9 Sampling and Compliance Criteria For Strength of Concrete

5.4.9.1 General

Sampling and testing of concrete shall be as per B.S. 1881.

The characteristic strength of concrete on which the structural design is based is that 28 day cube strength below which not more than 5% of the test results may be expected to fall.

Compliance with the specified characteristic strength should generally be judged by tests made on cubes at an age of 28 days. In order to get an idea of the quality of the concrete sooner, compressive strength test at 7 days may be used to test compliance with the specified characteristic strength.

For this purpose the 7 days strength may be taken to be 75% of the 28 day cube strength. The rate of sampling shall generally be as given below unless otherwise decided by the officer-in-charge.

One sample shall be taken from any one batch selected randomly to represent an average volume of not more than 20 cubic metres, 20 batches or 1/4 of the total quantity of concrete under consideration for testing whichever is the lesser volume, but not at a rate less than 1 sample per day per grade.

5.4.9.2 Testing Plan and Compliance Criteria

Two test specimens from a sample shall form a single result. The specimens shall be cured as follows:

- (a) for 28 days
- (b) by any other regime of curing agreed between the producer and the purchaser (eg. 7 days normal curing or accelerated curing at an elevated temperature) that is capable of predicting the strength of 28 days.

To assess compliance as regards compressive strength, the first result alone cannot be used to judge compliance with the specified characteristic strength.

Compliance with the characteristic strength is based on groups of four consecutive test results. Compliance with the specified characteristic strength may be assumed if the average strength determined from any group of four consecutive test results and if each individual test result complies with the appropriate limits in columns A and B of Table 5.6 respectively.

When there are less than four results, i.e. at the start of a job or on small jobs, the average of the first 2 or first 3 results, and the individual results should comply with the appropriate limits in columns A and B of Table 5.6 respectively.

For a test result to be valid, the difference between the strengths of two specimens prepared from the same sample shall not exceed 15% of the mean strength.

Table 5.6 - Compressive Strength Compliance Requirements

Specified Grade	Test Results	A	Specified Grade	Test Results	B
		Average of first 2 of first 3, or of 4 consecutive test results exceeds the specified characteristic strength by at least			Any individual test result is not less than the specified characteristic strength minus
C 20 and above	first 2	1 N/mm ²	C 30 and above	first 2	3 N/mm ²
	first 3	2 N/mm ²		first 3	3 N/mm ²
	Consecutive 4	3 N/mm ²		Consecutive 4	3 N/mm ²
Below C 20	first 2	0 N/mm ²	Below C 30	first 2	2 N/mm ²
	first 3	1 N/mm ²		first 3	2 N/mm ²
	Consecutive 4	2 N/mm ²		Consecutive 4	2 N/mm ²

Note 1 If the work is of minor nature or when the total volume of concrete is small, the following alternative scheme may be used, i.e.

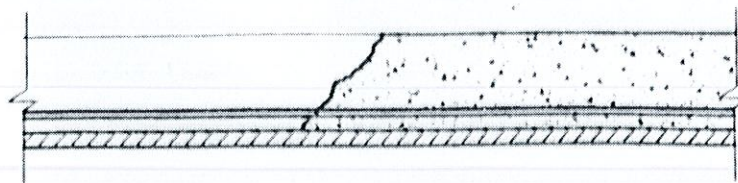
- the average value of 3 cubes made from the same sample shall equal or exceed the characteristic strength, and
- the lowest individual strength of any cube shall not be lower than 0.85 of the characteristic strength, and
- the allowable range (maximum minus minimum value) of the strength of the 3 cubes made from the same sample shall not exceed 20% of the average value of the 3 cubes

Note 2 The quantity of concrete represented by a group of 4 consecutive test results shall include the batches from which the first and last samples were taken together with all intervening batches. Similarly the first 2 or 3 results shall be taken as representing all the intervening batches. For the individual test results requirements given in column B of Table 5.6 only the particular batch from which the sample was taken shall be at risk.

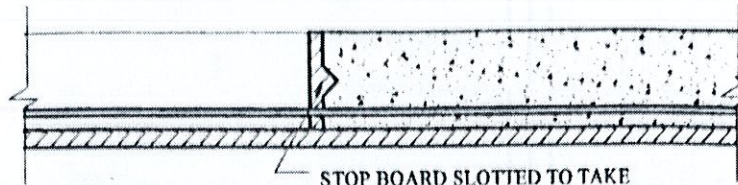
5.4.9.3 Compliance Criteria for Prescribed and Volume Batched Mixes

The testing plan and compliance criteria can be as for designed mixes above, based on the equivalent grades specified for the prescribed and volume batched mixes. If compliance is based on strength in the manner, the cement content and water/cement ratio requirement can be seemed to have been satisfied.

On the other hand, compliance can be assessed, without strength testing, by either observation of the batching or examination of the autographic records of the batch weights used. Such an individual assessment of the mix proportions shall be within $\pm 5\%$ of the values specified, and the mean of any 4 consecutive assessments of cement content shall not be less than the specified value. Account shall be taken of the adjustments permitted in Note 2 of Appendix 4 D.

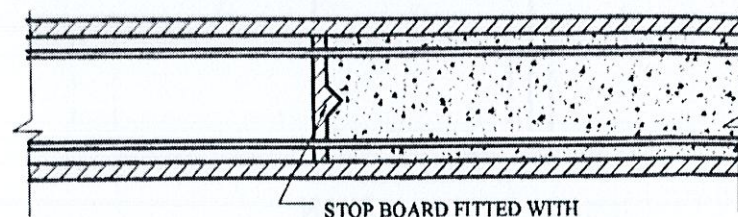


PROHIBITED JOINT IN SLAB



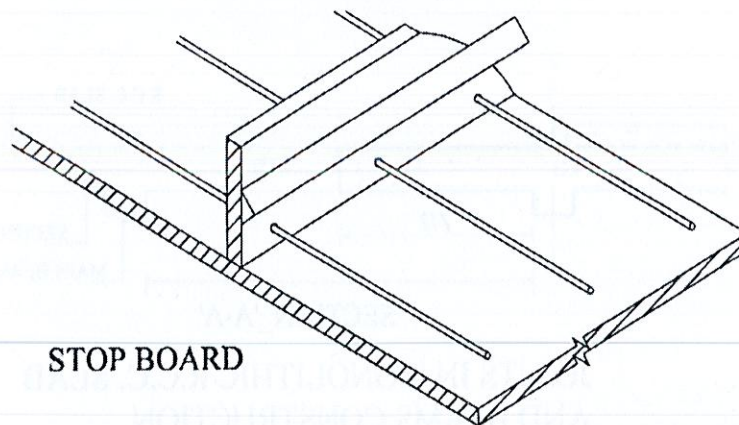
JOINT IN SLAB

STOP BOARD SLOTTED TO TAKE
HORIZONTAL REINFORCEMENT

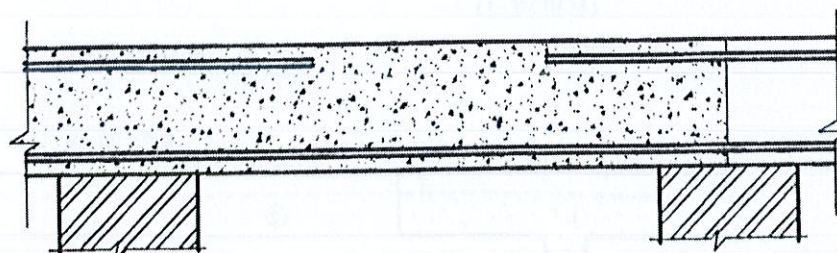


STOP BOARD FITTED WITH
CHAMFER PIECE AND SLOTTED
TO TAKE HORIZONTAL BARS

KEYED JOINTS IN WALLS

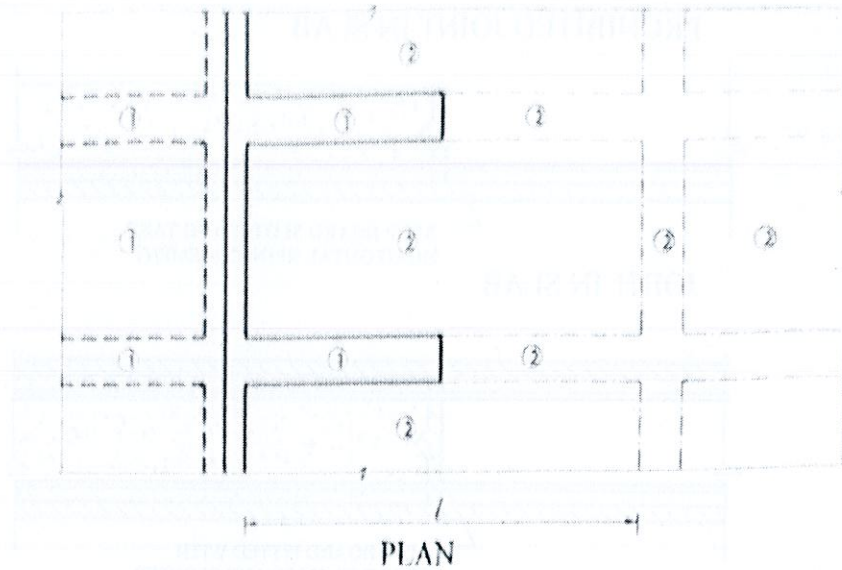


STOP BOARD



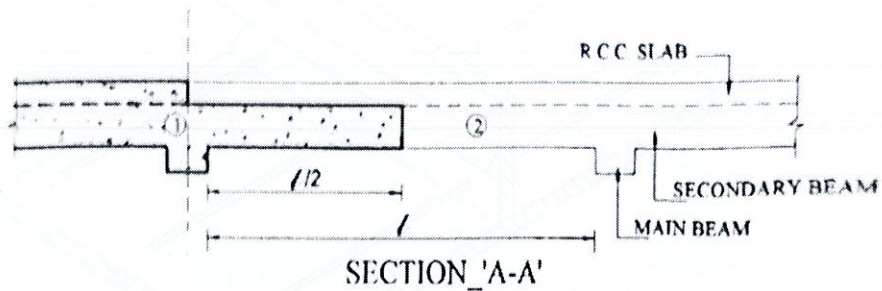
JOINT IN BEAM OR SLAB

DRAWING NOT TO SCALE
CONSTRUCTION JOINTS
FIG. 5/1

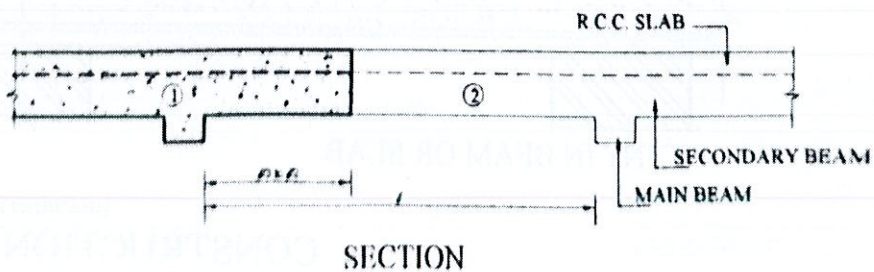


① FIRST POUR

② SECOND POUR

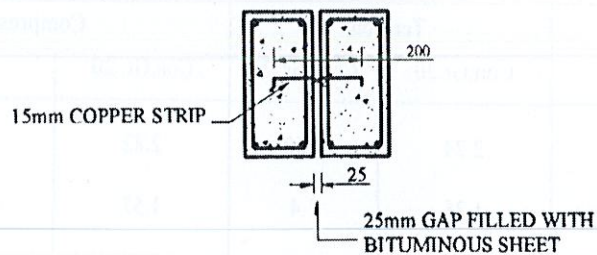
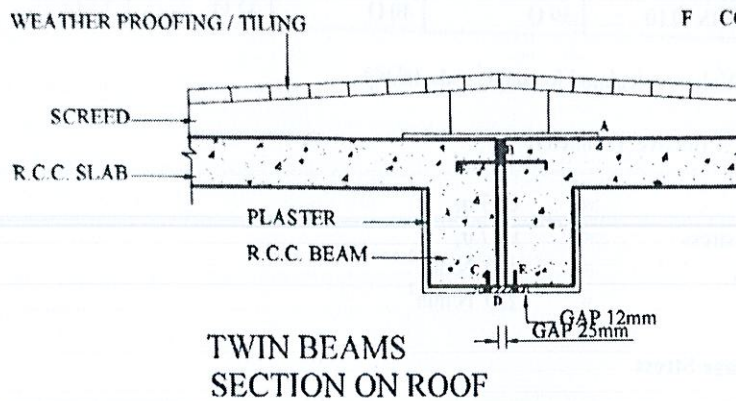
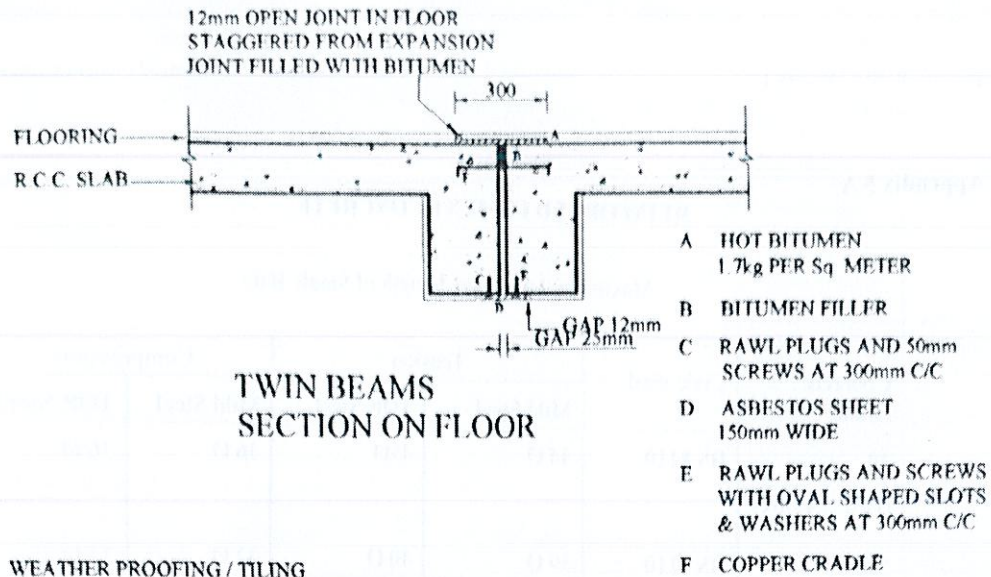


JOINTS IN MONOLITHIC R.C.C. SLAB
AND BEAMS CONSTRUCTION
(SCHEME - 1)

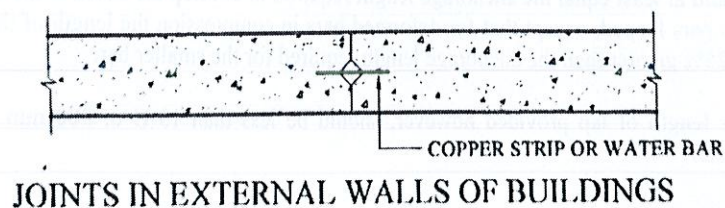


(SCHEME - 2)

DRAWING NOT TO SCALE
CONSTRUCTION JOINTS
FIG. 5/2



TWIN COLUMN



JOINTS IN EXTERNAL WALLS OF BUILDINGS

DRAWING NOT TO SCALE
ALL DIMENSIONS ARE IN MM

EXPANSION AND CONSTRUCTION JOINTS

FIG. 5/3

Appendix 5 A

REINFORCED CEMENT CONCRETE

Maximum Anchorage Length of Single Bars					
Concrete Grade	Code used	Tension		Compression	
		Mild Steel	TOR Steel	Mild Steel	TOR Steel
20 (i.e 1:2:4 mix)	BS 8110	44 Ø	45 Ø	36 Ø	36 Ø
25	BS 8110	39 Ø	40 Ø	32 Ø	32 Ø

Notes: BS 8110 Values calculated for single rods, taking

Area of Rod = ; Effective Perimeter = 4

The tensile stress = $0.87 \sigma_y$
 The compressive stress = $0.87 \sigma_y$
 For TOR Steel σ_y = 460 N/mm^2
 For Mild steel σ_y = 250 N/mm^2

Average Anchorage Stress

σ_y	Tension		Compression	
	Con.Gr.20	Con. Gr. 25	Con.Gr. 20	Con.Gr. 25
460 N/mm^2	2.24	2.50	2.82	3.15
250 N/mm^2	1.25	1.4	1.57	1.75

Note: Lapping (as per clause 3.11.6.5 BSCP 110) When bars are lapped, the length of the lap should at least equal the anchorage length required to develop the stress in the smaller of the two bars lapped, except that for deformed bars in compression the length of the lap should be 25% greater than the anchorage length required for the smaller bar.

The length of lap provided however, should be less than 15 Ø or 300 mm whichever is greater.

Appendix 5 B

Movement Joints - shall be as specified or directed.

In general movement joints in the structure should pass through the whole structures in one plane. Movement joints may be of the following types

- (a) Contraction Joint - This has a deliberate discontinuity but no initial gap between the concrete on both sides of the joints as it is intended to permit contraction of the concrete.

In a complete contraction joint - both concrete and reinforcement are interrupted.

In a partial contraction joint - only the concrete is interrupted while the reinforcement runs through.

- (b) Expansion Joint - A joint with complete discontinuity in both reinforcement and concrete intended to accommodate either expansion or contraction of the structure. Generally a wide gap between the adjoining parts of the structure is provided.

- (c) Sliding joint - a joint with complete discontinuity in both reinforcement and concrete at which special provision is made to facilitate relative movement in the plane of the joint.

- (d) Hinged joint - a joint specially designed and constructed to permit relative rotation of the members at the joint.

- (e) Settlement joint - a joint permitting adjacent members or structures to settle or deflect relative to each other.

A joint may be designed to fulfil more than one of the above requirements.

CHAPTER 6 - BRICK WORK AND BLOCK WORK

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CHAPTER 06 - BRICK WORK AND BLOCK WORK

6.0 Definitions

Bat : A portion of a brick either especially manufactures or formed on site by cutting a whole brick across its length. (See Fig. 6/1)

Bond : A disposition of units in a wall usually designed to ensure that the cross joints in each course are not less than one quarter of the length of a unit from those in adjacent courses.

Bricks

A masonry unit not exceeding 337.5 mm (13½") in length, 225 mm (9") in thickness or 112.5 mm (4½") in height. (The height is taken to be the vertical dimension perpendicular to the base when the unit is used in its normal aspect. The height of a brick shall not less than 38 mm (1½"). If less than this dimension, it shall be classified as a tile.

Blocks

A masonry unit which when used in its normal aspect exceeds the length or width or height specified for bricks.

Solid Blocks

In which small holes passing through or nearly through the brick do not exceed 25% of its volume or in which frogs (depressions in the bed faces of a brick) do not exceed 20% of its volume.

Hollow Blocks

In which holes passing through the unit exceed 25% of its volume.

Coordinating size: The size of a coordinating space allotted to a masonry unit including allowances for joints and tolerances.

Work size : The size of a masonry unit specified for its manufacture, to which its actual size should conform within specified permissible tolerances.

Compressive Strength : The average value of the crushing strengths of ten masonry units tested in accordance with SLS. 39.

Common : Suitable for general building work but having no special claim to give an attractive appearance.

Facing : Specially made or selected to give an attractive appearance when used without rendering or plastering or other surface treatment for the wall.

Brick work & Block work

As assemblage of units (brick or blocks) bonded together with mortar to form a wall including piers or columns.

Closer

A portion of a unit used to maintain bond, either specially manufactured or formed on site by cutting a whole unit along its length. (Fig. 6.1)

Corbel

A unit cantilevered from the face of a wall to form a bearing

Cornice

A projection, generally continuous, from the facade of a building or part of a building or wall

Course

A layer (e.g. a course of brickwork or block work) which includes a layer of mortar as well as a layer of units

Over Sailing Course

Brick course projecting from a wall for the sake of appearance only as distinct from corbels which are load carrying

Damp-proof Course

A layer, or layers, of materials laid or inserted in a structures to prevent the passage of water

Efflorescence

An encrustment of salt left by evaporation

Flashing

A sheet of impervious material fixed to a structure and dressed to cover an intersection or joint where water would otherwise penetrate

Footings

A projecting course or courses formed below the base of a wall to distribute the load

Frog

A purpose-made indentation in either or both of the two largest faces of a brick

Header

A unit with its end showing on the face of the wall

Indenting

The omission of units to form recesses into which future work can be bonded

Jamb

That part of a wall at the side of an opening (see reveal)

Joint

A junction between walling units

Bed joint - The mortar layer upon which walling units are set

Cross joint - A joint, other than a bed joint, normal to the face of a wall

Wall joint - A joint parallel to the face of a wall.

Masonry Unit

A block, a brick or a fixing unit.

Pad stone (Template)

A strong block bedded on a wall to distribute a concentrated load, sometimes known as a template.

Parapet

Top section of a wall where it conceals the gutter of the roof.

Partition wall

Any internal wall primarily intended for sub-division of space.

Pier

A thickened section forming an integral part of the wall, placed at intervals along the wall primarily to increase the stiffness of the wall or to carry a vertical concentrated load. (Fig. 6/3)

Pilaster

Attached pier.

Pillar or Column

A detached masonry support, rectangular, circular, or elliptical in shape. (Fig. 6/2)

Plinth

A projecting base of an external wall which gives additional stability.

Pointing

The refilling and finishing of joints from which mortar has been raked out.

Quoin

An external corner.

Reveal

The visible part of each side of a recess or opening in a wall (see 'jamb')

Scaffolding

A temporary erection of bamboo, timber, or steel work, used in the construction, alteration, demolition or repairs of a building to support or to allow the hoisting or lowering of workmen, their tools and materials.

Sill

Work forming the lower boundary of door or window opening.

Stretcher

A unit laid with its length in the direction of the wall.

String Course

A distinctive course or band in a wall, usually horizontal and sometimes projecting and moulded.

Template

A pattern, usually of sheet material, used as a guide for setting out particular work.

Toothing

Units left projecting to bond with future work.

Weathering

This term is used to describe both :-

- (i) the cover applied to, or the geometrical form of, a part of a structure to enable it to show rain water. (See also fig. 6/2)
- or
- (ii) the effect of climatic and atmospheric conditions on the external surfaces of material.

6.1 Materials**6.1.1 Common Burnt Clay Bricks****General**

Common burnt clay bricks shall conform to S.L.S. 39/1978 as amended in amendment No. 1/1981.

Bricks shall be hand or machine moulded. They shall be regular in shape with good clean arises, free from lumps of unslaked lime stones, etc.

Their surface shall be free from striations, laminations, pittings, cracks etc. They shall be uniform in colour and must be well burnt so as to give a clear ringing sound when struck. When broken, the fracture shall give a close grained uniform texture and colour and shall be free from black core or any sign of being imperfectly burnt.

The dimensions of bricks shall be 220 mm x 105 mm x 65 mm (8.7" x 4.1" x 2.6").

The general and specific requirements are tabulated below in Table 6.1

Table 6.1

Description	Type I	Type II	
		Grade I	Grade II
Method of manufacture	Wire-cut, machine made	Hand-made	Hand-made
Average compressive strength not less than	10 N/mm ² (1450 p.s.i.) storeyed	4.8 N/mm ² (700 p.s.i.)	2.8 N/mm ² (410 p.s.i.)
Use in locations (unless otherwise specified)	Load bearing multi storeyed	Two-storeyed construction	Single storey construction
Maximum water absorption	18%	28%	28%
Efflorescence	Slight	Moderate	Moderate
Nominal dimension of individual bricks	220 mm x 105 mm x 65 mm (8.7"x4.1"x2.6")		
Overall dimension of 24 Bricks	L 5280 ± 75 mm (207.93 ± 3.0 in) B 2520 ± 40 mm (99.2 ± 1.6 in) D 1560 ± 40 mm (61.4 ± 1.6 in)		
Other features	The bed faces shall be provided with grooves, frogs (depressions) or holes to ensure adequate bonding.		

6.1.1.1 Sampling and testing of bricks

The bricks shall be sampled and tested for dimensions, general requirements, compressive strength, water absorption and efflorescence as per SLS 39. Acceptance criteria shall be as set out in the same standard. The testing methods are given in Appendix 6A.

6.1.2 Pre-cast blocks/bricks

General

These shall be composed of cement mortar/cement concrete in specified proportions, or the proportions needed to achieve the specified compressive strength. These shall generally conform with B.S. 6073 Part I and Part 2.

6.1.2.1 Materials

Cement - shall be Ordinary Portland Cement conforming to SLS 107.

Aggregates - shall be natural aggregates conforming to B.S. 882 except that the fine and/or coarse aggregates need not be graded.

Admixtures - Use of admixtures shall be not permitted without the prior approval of officer-in-charge.

6.1.2.2 Sizes and shape

The blocks/bricks shall be true to shape with good, clean arises. The minimum thickness of the external shell of hollow and cellular blocks shall be not less than 15 mm or 1.75 times the nominal maximum size of the aggregate whichever is the greater.

The maximum size of bricks shall be 337.5 mm x 225 mm x 112.5 mm. The size of bricks shall generally conform to the work sizes in B.S. 6073 Part 2, Table 2 given below :

Work sizes of Bricks;

290 x 90 x 90 mm

215 x 103 x 65 mm

190 x 90 x 90 mm

190 x 90 x 65 mm

The size of blocks shall generally conform to the work sizes in BS 6073 Part 2 Table 1 given below :

Table 6.2 - Work sizes of blocks (ref. Table No. 1 of BS. 6073: Part 2: 1981)

Thickness mm		60	75	90	100	115	125	140	150	175	190	200	215	220	225	250
Length mm	Height mm															
390	190	x	x	x	x	x		x	x		x	x				
440	140	x	x	x	x			x	x		x	x			x	
440	190	x	x	x	x			x	x		x		x	x		
440	215	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
440	290	x	x	x	x			x	x		x	x	x			
590	140		x	x	x			x	x		x	x	x			
590	190		x	x	x			x	x		x	x	x			
590	215		x	x	x		x	x	x	x		x	x		x	x

6.1.2.3 Strength requirements

Bricks/Blocks of thickness 75 mm or more when tested for compressive strength shall comply with the followings :

- the average crushing strength of 10 bricks shall be not less than 7.0 N/mm²
- the average crushing strength of 10 blocks shall be not less than 2.8 N/mm²
- the coefficient of variation for the sample shall not exceed 20%
Blocks less than 75 mm shall be tested for transverse strength in accordance with the code and the average transverse strength of 5 blocks shall be not less than 0.65 N/mm²

6.1.2.4 Manufacture

Cement mortar used for manufacture of bricks shall be 1:6 or other proportion needed to achieve the specified compressive strength and the mortar shall be of stiff consistency.

Cement concrete for blocks/bricks shall be 1:3:6 (14 mm) or other proportions needed to achieve the strengths specified. Concrete shall be of the required consistency to suit the moulds and the methods of compaction.

The units shall be manufactured by machines of approved make. In the absence of machines, they shall be cast in properly designed rigid steel moulds or wood moulds lined with galvanised steel sheets. The mould surfaces shall be cleaned and smeared with a suitable oil after each

casting. Hand tamping shall be with 16 mm diameter steel rods and shall be continuous after filling the first 25 mm. The units as cast, shall be dense and solid as they come from the block making machines or moulds. The units showing cavities of any kind must be broken up immediately however, the concrete may be re-used the time since mixing has not exceeded 30 minutes. Under no circumstances shall the units be plastered at any stage to cover up defects.

Units which are too smooth to provide a key for the final plaster coating may be bristle brushed to provide a slightly rough surface after they have hardened for 6 hours.

Curing shall be carried on for 14 days. The units shall be cured for the first seven days by immersion in water commencing not earlier than 16 hours after casting they shall thereafter be kept wet by stack curing for a further period of seven days, the units being stacked to a height of not more than 1.2 metres. In the case of hollow blocks the cavities shall be filled with sand and water shall be supplied as required to ensure their being wet throughout the day and night.

On sunny and windy days, the top and side faces of stacks shall be protected with cadjans or hessian canvas which shall be removed at frequent intervals for watering.

The units shall be built into the work not earlier than 4 weeks from casting.

The units which have been allowed to dry out earlier than prescribed or which are found to be faulty in shape or finish, or show voids in their surfaces shall be rejected.

Each unit will have the date of casting marked it to ensure adequate curing.

6.1.2.5 Sampling and testing of blocks

This shall be as per clause 13 of BS 6073 Part 1.

The units shall be made in batches, and from each batch of 1,000 not more than 15 units will be selected at random for testing the compressive strength and drying shrinkage.

In the case of blocks less than 75 mm thick, 10 blocks shall be selected for testing the transverse strength and drying shrinkage. The further preparation of the selected units for testing as described in the British Standard is to be done at the site, by the contractor who shall in the presence of the officer-in-charge, pack the units in approved packing cases with suitable packing material to ensure the units remaining damp during transit and deliver them at the approved testing station at his own expense. The cost of the actual test shall be borne by the owner. In the event of the units tested failing to meet the specified strength requirements, they shall be (at the discretion of the officer-in-charge) relegated to some lesser category or condemned. In the former case they shall be suitably marked to avoid confusion and in the latter case they shall be removed from the site without delay.

6.2 Brickwork (Clay Brick)

6.2.1 Mortars for Brickwork

These shall conform to Chapter 3.

Mortar for brickwork shall be generally as given below in Table 6.3 unless other wise specified.

Table 6.3

Type of Mortar	Mortar Designation	Mix by volume Masonry				Location
		Cement	Masonry Cement	Lime	Sand	
Cement-sand	iv	1	-	-	8	All walls above ground level except 4½" brick work
cement-lime sand	iv	1	-	2	9	-do-
Masonry cement sand	iv	-	1	-	5	-do-
Cement-sand *	iii	1	-	-	5	in 4½" brick and in walls below ground level where specified.
cement-lime sand	iii	1	-	1	5	-do-
Masonry cement	iii	-	1	-	4	-do-
Cement-sand * -	ii	1	-	-	3	-do-
cement-lime sand	ii	1	-	1/2	4	-do-
masonry cement	ii	-	1	-	2 1/2	-do-
cement -sand *	i	1	-	-	3	-do-

Note: (1) * Plasticizer of approve manufacture shall be used if directed by the officer-in-charge.

- (2) The gauge box for cement shall be 400 mm x 350 mm x 290 mm or 300 mm x 300 mm x 350 mm
The corresponding gauge box for lime and sand shall be 400 mm x 350 mm x 250 mm or 300 mm x 300 mm x 300 mm respectively.

6.2.2 Handling of Bricks and Preparation

Bricks shall not be handled in baskets, thrown from a height or in other manner that would destroy the sharpness of the edges. In no case shall bricks of different dimensions be used in the same-work except when specially permitted by the officer-in charge.

In exposed brick work, selected bricks of the specified class shall be used for the face work.

The bricks shall be wetted with water (immersed in water) before use on works. Bricks required for masonry with mud or fat lime need not be wetted. The tops of walls left off shall be wetted before the work is recommenced.

6.2.3 Laying and Jointing

Bricks shall be laid in English bond unless other wise specified. (Fig. 6/4). Half or cut bricks shall not be used except where necessary to complete the bond; Closers in such cases shall be cut to the required size and used near the ends of walls. In all load bearing walls the bricks shall be laid with frogs upwards and the frogs shall be filled with mortar.

A layer of mortar shall be spread on full width over a suitable length of the lower course. Each brick shall be properly bedded and set home (in position) by gentle tapping with the handle of a trowel or wooden mallet inside faces of the set bricks shall be buttered with mortar and the next brick to be laid shall be pressed against it. All bricks in every course shall be grouted full with mortar using the trowel for chasing in for this purpose.

The thickness of mortar joint shall not exceed 10 mm.

6.2.4 Raising of Walls

The quoins shall be set out and built up in advance of the main body of the brick walling.

The walls shall be carried up uniformly in all cases where the nature of the work admits it. No part shall be left more than one metre below the rest of the work. The work shall not be built higher than 1.5 m in one day. The courses shall be kept perfectly horizontal and every fourth course shall be checked for level and plumb. Courses shall be break joints. At the end of the day's work and where it is not possible to raise the adjoining portion uniformly and in gable walls, the work shall be raked back according to the bond, at an angle not steeper than 45°. All Perpendes, Quoins etc. shall be kept strictly true and square and the whole properly bonded together and brought to final levels at each floor. Over hand laying shall not be used without approval. Panel walls or non load bearing walls shall not butt against the concrete beams or slabs.

The lateral stability of walls which are free standing during construction, shall be ensured by adequate shoring and scaffolding until the roof or floor providing the necessary stability is constructed.

6.2.5 Curing and Protection

Brick work shall be protected from rain by suitable covering when the mortar is green. Brickwork in cement/composite/lime mortar (except fat lime mortar) shall be kept constantly moist on all faces for minimum period of seven days. In the case of masonry with fat lime mortar, curing shall commence two days after laying and shall continue at least for seven days thereafter.

6.2.6 Fixtures etc.

All iron fixtures like hold fasts, pipes, etc. which are required to be built in to the wall shall be embedded in their correct positions in cement mortar or cement concrete as specified.

6.2.7 Raking of Joints for Plaster

When the face work is to be plastered or joints alone pointed upon, the joints shall be raked to a minimum depth of 12 mm by a raking tool during the progress of work or when the mortar is still green. When plastering or pointing is not required to be done, the joints shall be struck flush and finished at the time of laying. The face and top of courses of the brick work shall be cleaned thoroughly of all mortar droppings on the same day.

6.2.8 Brick on Edge Coping

The top course of all plinths, the top of walls below reinforced concrete parapets, steps etc. shall be brick on edge with extra fine vertical joints not exceeding 3 mm in thickness. Bricks forming the corners of all such courses are to be properly radiated and keyed in to position.

6.2.9 Treatment at Ends of Beams etc.

The ends of steel beams and roof trusses shall rest in recesses having 15 mm space for free circulation of air and provided with perforated zinc sheeting.

6.2.10 Corbelling

Corbelling shall be effected by a one fourth brick projection (in every course) for ordinary work and a one eighth brick projection where greater strength is required.

6.2.11 Damp-Proof Course

This shall conform to Clause 16.1

6.2.12 Scaffolding

For all exposed brick work, double scaffolding having two sets of vertical supports shall be provided. The supports shall be sound and strong and tied together with horizontal pieces over which scaffolding planks shall rest. Alternatively steel scaffolding may be resorted to, in which case the arrangements shall be approved by the officer-in-charge.

For all other brick work in buildings single scaffolding shall be provided. In such cases, the inner end of the horizontal scaffolding pole shall rest in a hole provided only in the header course for this purpose. Only one header for each pole shall be left out. Such holes for scaffolding shall however, not be allowed in pillars/columns less than one metre in width, or immediately near the skew back of Arches. The holes left in masonry work for scaffolding purposes shall be completely packed and made good before plastering.

Note :- In the case of special type of brick work, scaffolding shall be got approved by the officer-in-charge in advance.

6.2.13 Half Brick Masonry

The work shall be done in the same manner as specified in 6.2.4 except that all courses shall be laid as stretchers. The proportion of cement mortar shall generally be one part of cement to 5 parts of sand.

6.2.14 Reinforced Brickwork

In special cases such as long unsupported partition walls where reinforcement is considered necessary, 2 numbers of 6 mm diameter rods shall be provided at every alternate course unless otherwise specified. The rods shall be straight and free from rust and loose flakes. They shall be placed over cement mortar beds of 1:3 composition. 10 mm thickness of mortar shall first be laid, the rods laid and then covered with a bed of 10 mm mortar immediately. The rods shall be fully embedded in the mortar. At the ends, the rods shall be bent up for half the thickness of the course.

6.2.15 Honey-Comb Brickwork

Standard or specified bricks shall be used for this class of work and they shall be laid on cement mortar 1:3 or as otherwise specified.

The thickness of brick honey-comb shall be half brick or one brick as specified. Openings shall be equal and alternate in every course and the bearing width, on each side shall be 20 mm minimum. The bond used shall be heading through out in one brick thick honey-comb, and stretchers throughout in half brick thick honey-comb work. The bricks shall be thoroughly bedded in mortar and jointed and the edges struck flush and finished smooth as the work proceeds.

6.2.16 Brickwork in Arches

Bricks for Arch work shall be specially selected and shall be free from defects of any sort.

The bricks shall be laid in concentric half brick rings with break joints (i.e. staggered joints). The arch work shall be carried out from both ends simultaneously and keyed in the centre. The bricks shall be buttered with mortar and well pressed in to their positions so as to squeeze out a

part of the mortar and leave the joints thin and compact. All joints shall be full of mortar and the thickness of joints shall neither be less than 5 mm nor more than 15 mm in all arches; the voussoir joints shall be normal to the curve at these points.

Bricks forming skew back joints shall be specially moulded or cut so as to radiate thinly, and defects in this particular case shall not be remedied by the extravagant use of mortar nor shall any parthing by chips be allowed.

Joints in any two consecutive rings shall not come in the same radial plane.

The arch work shall be quickly and evenly done and kept moist so that no portion of the arch hardens or sets before the whole arch is completed.

6.2.16.1 Centering for Arches

In all centres the upper bearing surface shall be very correctly formed to the curve of the intrados of the arch. The centering shall be strong enough to bear the dead load and live load coming upon it during construction without any appreciable deflections. For spans longer than 2 metres, timber centres shall be used and shall be provided with hard wood wedges for slackening. For larger span arches special plans for centering shall be prepared and prior approval of the officer-in-charge obtained.

In all centres the arrangement shall be such that the slackening can be effected without any vibration being transmitted to the arch, and in the case of a series of arches that the centres can all be slackened simultaneously.

The time after which this slackening has to be done shall be carefully decided.

When lime mortar is used, centres will ordinarily be slackened within 24 hours of the completion of the arch. Care however, shall be taken to see that the centering is not eased while the mortar in the last joint is so soft that it will be squeezed out, but at the same time centres will be slackened while the mortar in the joints is still moist so as to allow the arch to compress itself and bring all the joints to fair bearing.

In the case of a segmental arch, care shall be taken to see that the skew backs are secure, and they shall be given a week's time to set.

In the case of semicircular, elliptical or other arches springing from a horizontal joint, the adjacent wall shall be built up to two thirds of the height of the arch before slackening centres.

6.2.17 Joining Old Work with New Work

New work shall be bonded carefully to existing work by cutting pockets into existing walls; the pockets shall not be less than 10 mm deep, with a width equal to the full thickness of the new work. The spacing and height of each pocket shall be as follows; for joining of

Brick to Brick - 4 courses high and at 8 course centres.	
Brick to Block,	} Every alternate block course.
Block to Brick	
Block to Block	

The new walling shall be bonded well into the pockets with all voids filled solid with mortar.

6.3 Masonry With Cast Block/Brick

Unless otherwise specified, the blocks shall be built in cement mortar 1:5, with joints not exceeding 10 mm in thickness. The blocks shall not be wetted before use.

Concrete Block work and brickwork shall be reinforced for construction in cyclone-prone areas. Refer Design of Buildings for High Winds - M/L.G.H & C.

Where concrete is to be laid over hollow block masonry, this shall be done over a specially cast hollow block course with the top of the cavities filled with concrete to a depth of at least 25 mm.

Where the space between the block course and reinforced or plain concrete above that course is less than the height of a block, the same shall be filled with cement concrete 1:3:6 (20 mm) or as specified.

The cavities between the reveal of any opening and the block work shall be filled up with cement concrete 1:3:6 (20 mm) for the length of a block.

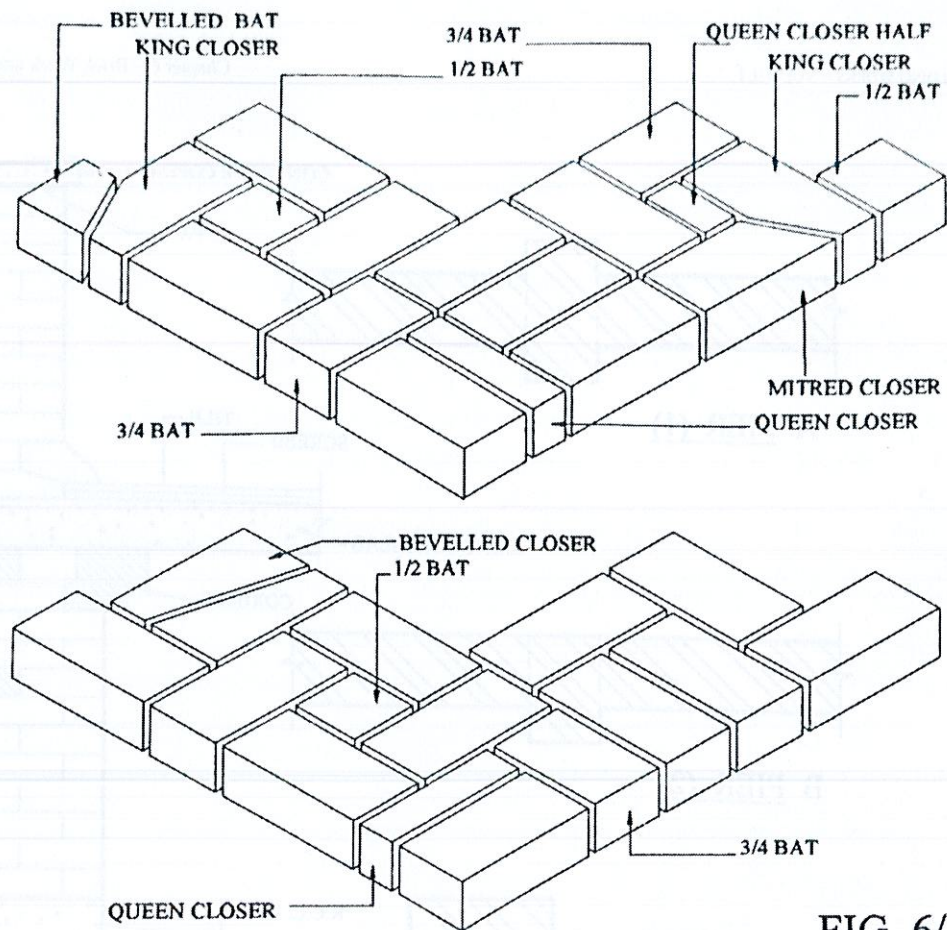
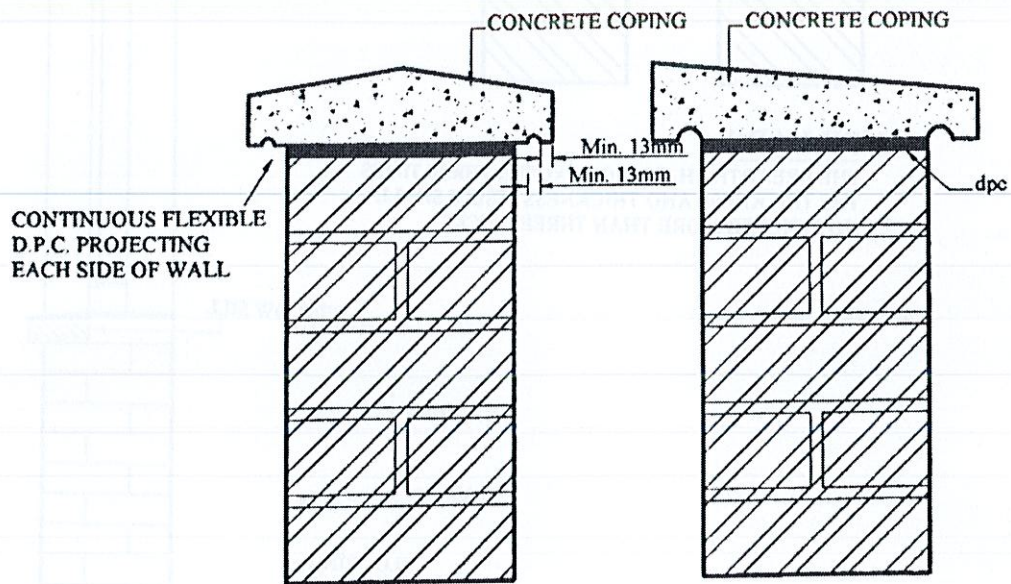
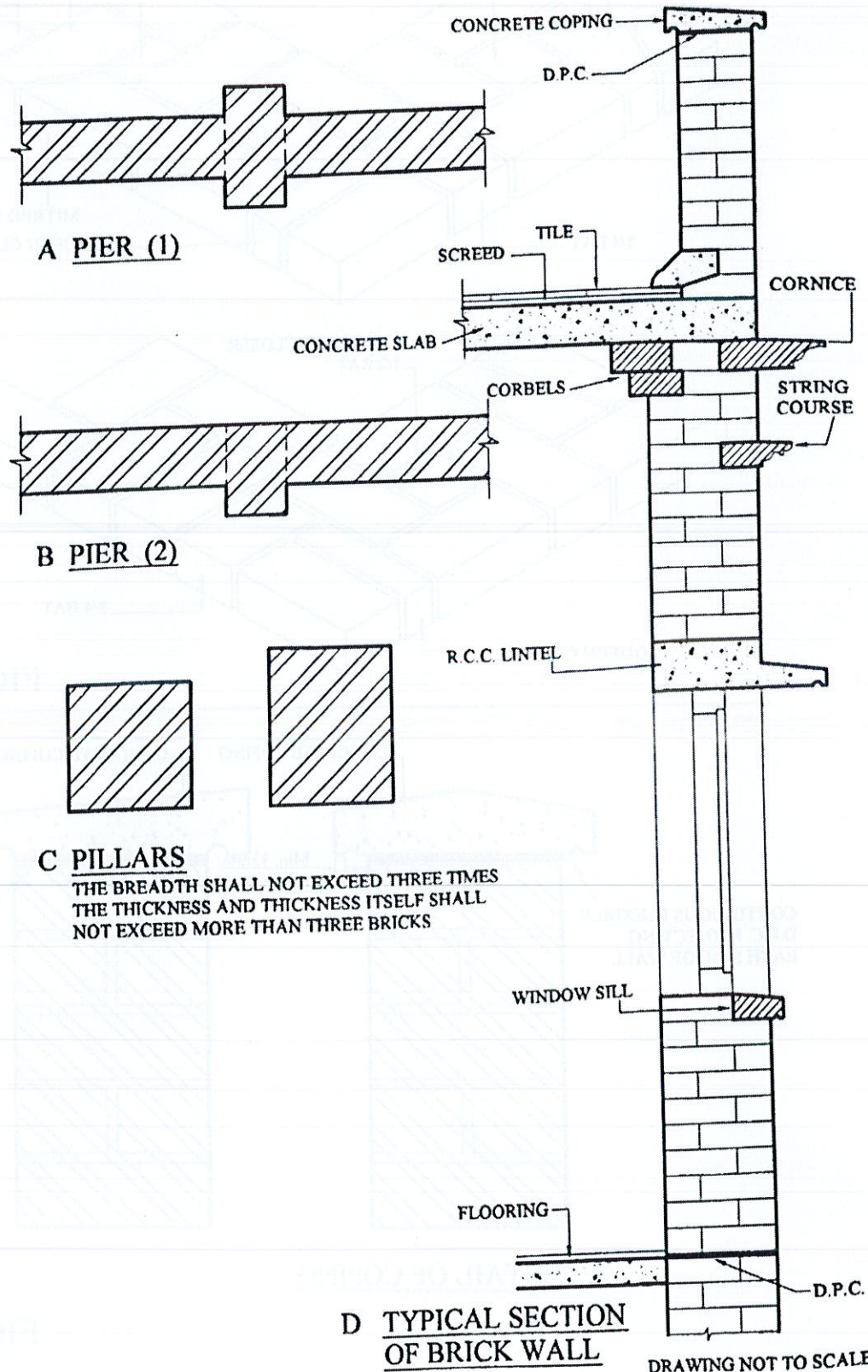


FIG. 6/1



DETAIL OF COPING

FIG. 6/2

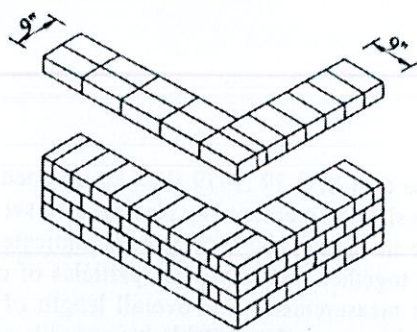


C PILLARS

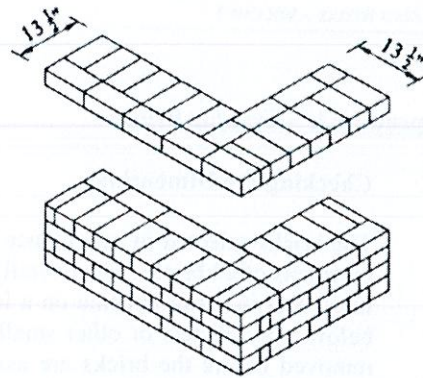
THE BREADTH SHALL NOT EXCEED THREE TIMES
THE THICKNESS AND THICKNESS ITSELF SHALL
NOT EXCEED MORE THAN THREE BRICKS

D TYPICAL SECTION OF BRICK WALL

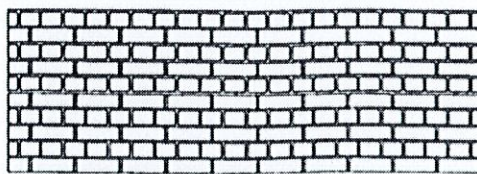
DRAWING NOT TO SCALE
BRICK WORK
FIG. 6/3



9" THICK WALL



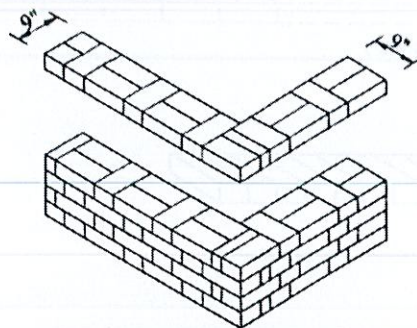
13 1/2" THICK WALL



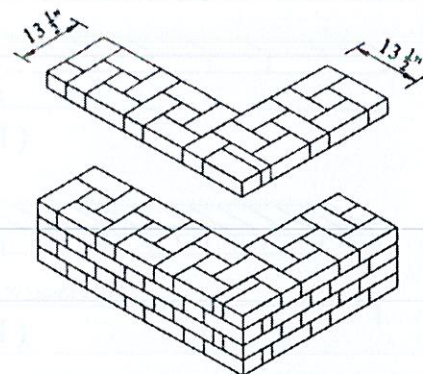
ELEVATION

ENGLISH BOND

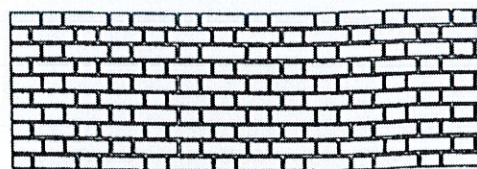
FIG. 6/4



9" THICK WALL



13 1/2" THICK WALL



ELEVATION

FLEMISH BOND

FIG. 6/5

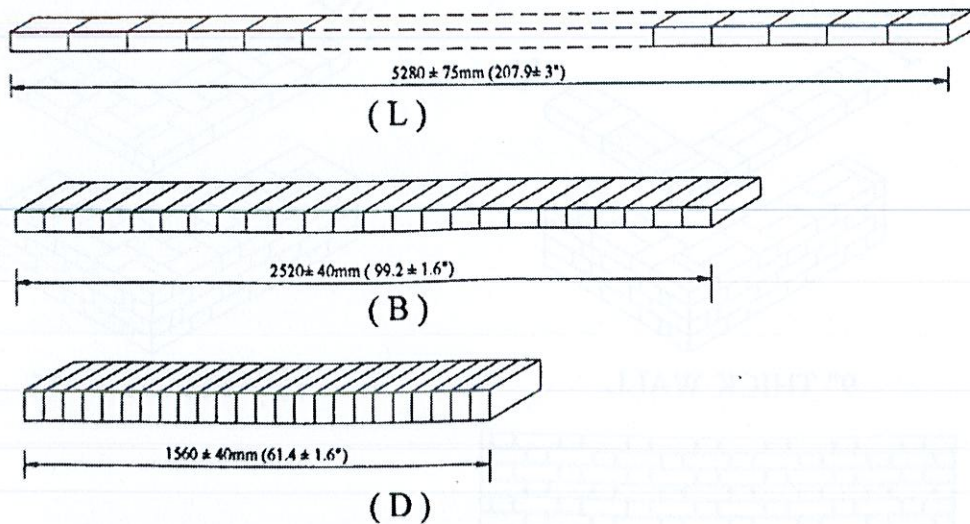
Appendix 6A - Test for Bricks**1. Checking the Dimensions**

The bricks selected in accordance with Clause 6 of SLS 39 :1979 shall be grouped into one or more sets of 24 bricks. The overall dimensions shall be measured by placing each set of 24 bricks in contact in a straight line on a level surface in each of the arrangements indicated in Figure below. Any blisters or other small projection together with any loose particles of clay shall be removed before the bricks are assembled for measurement. The overall length of each set of assembled bricks shall be measured with a steel tape, or other suitable inextensible measure long enough to measure the whole row at once. Measurement by repeated application of a short rule or measure shall not be permitted. If the measured dimensions of each set of 24 bricks falls within the limits specified below the bricks shall be considered to have passed this test.

$$L = 5280 \pm 75 \text{ mm } (207.9 \pm 3'')$$

$$B = 2520 \pm 40 \text{ mm } (99.2 \pm 1.6'')$$

$$D = 1560 \pm 40 \text{ mm } (61.4 \pm 1.6'')$$



**ARRANGEMENT OF BRICKS FOR
MEASUREMENTS OF DIMENSIONS**

2. Determination of Compressive Strength

Each brick to be tested shall be rubbed down as necessary to obtain a smooth plane surface on each face to receive the load. The bricks shall be immersed in water at room temperature for 72 hours. The bricks shall be removed and allowed to drain at room temperature, wiped free of surplus moisture and subjected to the test within 90 minutes of immersion. They shall be placed between two 3 - ply plywood sheets 4 mm thick, and carefully centred between the platens of the machine.

One of the platens of the testing machine shall have a ball seating in the form of a portion of a sphere the centre of which coincides with the centre of the face of the plate. The load shall be applied in the direction of the thickness of the brick at a rate of 14 Mpa (2.0×10^3 lbf/in) per minute until failure occurs. The compressive strength shall be calculated by dividing the maximum load on failure by the area of the face on which the load is applied and shall be expressed in Mpa (lbf/in²). If the arithmetic mean of the compressive strengths of the bricks tested does not fall below the relevant value specified in Clause 6.1.2.3 the bricks shall be considered to have passed this test.

Note : For the purpose of this test the brick shall be deemed to have failed when there is a momentary decrease in the rate of advance of the indicator of the testing machine, combined with fracture of the brick.

3. Determination of Water Absorption

The bricks shall be dried to constant mass in a well ventilated oven at 100°C. They shall then be cooled to approximately room temperature and weighed.

Note : In a ventilated room bricks properly separated require about four hours for cooling unless an electric fan passes air over them continuously, in which case about two hours may suffice.

The dry bricks shall be totally immersed without preliminary partial immersion, in clean water at room temperature for 24 hours. As far as possible, the water shall have free access to all surfaces of the bricks. Each brick shall then be removed, the surface water wiped off with a damp cloth, and the brick weighed in a balance sensitive to about 0.1 per cent of the weight of the brick. The weighing of each brick shall be completed within three minutes after its removal from the water.

The percentage of water absorption by mass shall be calculated as

$$\text{The percentage of water absorption} = \frac{M_2 - M_1}{M_1} \times 100$$

where M_1 = mass of the dry brick and
 M_2 = mass of the brick after 24 hours immersion in cold water.

4. Test for Efflorescence

Place the ends of the bricks in a shallow flat bottom dish having an area of approximately 0.10 m² (160 in²), containing distilled water, the depth of immersion in water being 25 mm (1.0 in). Place the whole arrangement in a well ventilated room until all the water in the dish evaporates. When the water has been absorbed and bricks appear to be dry, place a similar quantity of water in the dish and allow it to evaporate as before. Examine the bricks for efflorescence when the bricks are dry and report the results.

The liability to efflorescence shall be reported as 'nil', 'slight', 'moderate' heavy or 'serious' in accordance with the following definitions.

- (a) Nil - When there is no perceptible deposit of efflorescence.
- (b) Slight - When not more than 10 per cent of the area of the brick is covered with a thin deposit of salts.
- (c) Moderate - When there is a heavier deposit than 'slight' and covering up to 50 percent of the area of the brick surface but unaccompanied by powdering or flaking of the surface.
- (d) Heavy - When there is a heavy deposit of salts covering 50 percent or more of the brick surface but unaccompanied by powdering or flaking of the surface.
- (e) Serious - When there is a heavy deposit of salts accompanied by powdering and/or flaking of surfaces and tending to increase with repeated wettings of the specimen.

FORM OF BID

FORM OF BID

FORM OF BID

Name of Contract: **CONSTRUCTION OF EXAMINATION HALL COMPLEX FOR THE FACULTY OF MEDICINE UVA WELLASSA UNIVERSITY**

To: Vice Chancellor, Uva Wellassa University, Badulla

Sir,

1. Having examined the Standard Bidding Document - Procurement of Works – Major Contracts [ICTAD/SBD/02 - Second Edition, January 2007], Specifications, Drawings and Bills of Quantities and Addenda for the execution of the above-named Works, we the undersigned, offer to execute and complete such Works and remedy any defect therein in conformity with the aforesaid Conditions of Contract, Specifications, Drawings, Bills of Quantities and addenda for the sum of Sri Lankan Rupees (LKR) or such other sums as may be ascertained in accordance with the said Conditions.
2. We acknowledge that the Contract Data forms part of our Bid.
3. We undertake, if our Bid is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Contract Data.
4. We agree to abide by this Bid until the date specified in ITB Clause 16 [insert date], and it shall remain binding upon us and may be accepted at any time before that date.
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.
6. We understand that you are not bound to accept the lowest or any bid you may receive.
7. We certify/confirm that we comply with the eligibility requirements as per ITB Clause 3 of the bidding documents.

Dated this day of 20.....

Signature in the capacity of

duly authorized to sign bids for and on behalf of
[in block capitals or typed]

Address:

Witness:

BILLS OF QUANTITIES

**CONSTRUCTION OF EXAMINATION HALL COMPLEX OF THE FACULTY OF MEDICINE - UVA
WELLESSA UNIVERSITY**

SUMMERY

NO	DESCRIPTION	AMOUNT
	GROUND FLOOR	
A	PRELIMINARIES	3,835,000.00
B	EXCAVATION AND EARTH WORK	
C	CONCRETE	
D	FORM WORK	
E	REINFORCEMENT	
F	MASONARY WORK	
G	ALUMINIUM WORK	
H	PLASTERING	
J	PAINTING	
K	FLOORING	
L	ELECTRICAL WORKS	
M	MOULDINGS	200,000.00
N	DATA NETWORK	
P	FIRE DETECTION AND PROTECTION	
Q	WATER PROOFING	
R	PLUMBING WORK	
S	SANITARY FITTINGS	

Grand Total of Ground Floor

	FIRST FLOOR	
A	PRELIMINARIES	
B	EXCAVATION AND EARTH WORK	
C	CONCRETE	
D	FORM WORK	
E	REINFORCEMENT	
F	MASONARY WORK	
G	ALUMINIUM WORK	
H	PLASTERING	
J	PAINTING	
K	FLOORING	
L	ELECTRICAL WORKS	
M	WATER PROOFING	
N	PA SYSTEM	
P	PLUMBING WORK	
Q	SANITARY FITTINGS	
R	DATA NETWORK	
S	FIRE DETECTION AND PROTECTION	
T	METAL WORK	
U	ROOF AND ROOF PLUMBING	
V	CEILING WORK	
W	LIGHTENING PROTECTION SYSTEM	1,300,000.00
X	CCTV SURVIELLENCE AND MONITORING	800,000.00
	Grand Total of first floor	

	EXTERNAL WORK	
A	ACCESS PATH AND STAIRWAYS	
B	METAL WORK	
C	DRAINAGE SYSTEM AND SURFACE IMPROVEMENTS	3,200,000.00
D	LANDSCAPING WORKS	
E	IMPROVEMENT OF LAND AND CANEL	50,000.00
	Grand Total of External Work	

GRANT TOTAL	*
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* - Carried forward to Form of Bid

**CONSTRUCTION OF EXAMINATION HALL COMPLEX OF THE FACULTY OF MEDICINE - UVA
WELASSA UNIVERSITY**

BILL OF QUANTITIES - GROUND FLOOR

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
A	PRELIMINARIES				
	Note : Following items to be priced as appropriate.				
	Insurance and Securities				
A-1	Allow sum for Providing a Performance Security. (Maximum payable amount is Rs 200,000.00)	Ps	1.00	200,000.00	200,000.00
A-2	Allow sum for providing an Advance Payment Security. (Maximum payable amount is Rs 200,000.00)	Ps	1.00	200,000.00	200,000.00
A-3	Allow sum for contractor's all risk insurance for Works, Machinery & Equipment, Plant, Materials, third party persons & property and Employer's personnel & property at site as per the Contract. (Maximum payable amount is Rs 100,000.00)	Ps	1.00	100,000.00	100,000.00
A-4	Allow sum for insurance against accidents and injury to Contractor's personnel as per the Contract. (Maximum payable amount is Rs 75,000.00)	Ps	1.00	75,000.00	75,000.00
A-5	Full Time deployment of a Site Manager at the site with the qualification of B.Sc in Eng (Civil) with 3 years experience or with HNDE or equivalent qualifications with 8 Years of experience . Prospective personnel's CV shall be approved by the Engineer before deployment	Ps	1.00	1,050,000.00	1,050,000.00
A-6	Full Time deployment of a Technical Officer at the site with the qualification of NDT/HNDE/NDES or equivalent qualifications or NCT/NDCT with 3 years experience. Prospective personnel's CV shall be approved by the Engineer before deployment	Ps	1.00	560,000.00	560,000.00

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
A-7	Part Time deployment of a Technical Officer(MEP and Network) at the site with the qualification of NDT/HNDE/NDES or equivalent qualifications or NCT/NDCT with 3 years experience. Prospective personnel's CV shall be approved by the Engineer before deployment	Ps	1.00	140,000.00	140,000.00
A-8	Submission of 2 sets A2 size printed "As Built" drawings (1- color), 1- black and white) with soft CAD copies of LAN, MEP and LV layouts. Deduction of Rs 1.0 million will be imposed for the failuire of submission of As Built drawings	Ls	1.00	500,000.00	500,000.00
A-9	Allow for payment for Engineer's side structural Engineer for review the structural drawings	Ls	1.00	40,000.00	40,000.00
A-10	Allow sum for constructing, maintaining, dismantling and removal on completion of the contractors work facilities, billute, santitory facilities, any preparatory work for available temporary building for Contractor's site office, sotres, electricity and water connections (water and electricity will be provided by the Employer and the cost will be deducted from the contractor's billls), other facilities for Employer and Engineer for the construction management and supervision of the work such as safety wares, officewares, transport, measurng devices, TS, TL etc.,	Ps	1.00	750,000.00	750,000.00
	Quality, Standards and Progress				- - -
A-11	Allow lump sum for all cost in connection with testing materials/works, preparing samples for testing, making arrangements for testing of Materials, Goods etc, as stipulated in the specification, obtaining test reports and submitting the same to the Engineer.	Ps	1.00	50,000.00	50,000.00
	Health, Safety and Environment				- - -
A-12	Allow lump sum for providing and maintaining first aid box and regular supply of medicine, linen etc.	Ps	1.00	10,000.00	10,000.00

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
A-13	Allow lump sum for providing all necessary safety measures to workmen at site conforming to the latest industrial safety regulations and as directed by the Engineer.	Ps	1.00	40,000.00	40,000.00
A-14	Allow lump sum for making adequate provision against air and noise pollution of surrounding areas. Hoarding and dust screens shall be provided to control dust escaping to surrounding areas.	Ps	1.00	100,000.00	100,000.00
A-15	Allow lump sum for providing and maintaining a name board to the specifications and / or as directed by the Engineer.	Ps	1.00	20,000.00	20,000.00
TOTAL CARRIED TO SUMMARY					3,835,000.00
	GROUND FLOOR				
B	EXCAVATION AND EARTH WORK				
	Site Preparation				
B-01	Site clearing including removing all debris, small trees up to 0.5 m girth, vegetations including top soil up to 150 mm depth and dispose to suitable locations.	m ²	405.00		
	Excavation				
	Earth excavation in any material except rock requiring blasting, part return fill rammed and well consolidated. All excavations to be protected from rain/storm water runoff falling into the same by suitable means. Unsuitable material shall dispose to approved locations				
	Levelling the land				
B-02	Demolishing Brickwork in cement sand mortar, including stacking bricks and clearing debris as directed.(Transport for dumping withihn the premisses is included)	m ³	16.00		
B-03	Demolishing 75mm thick Cement Concrete Floor and clearing away the debris as directed.(Transport for dumping withihn the premisses is included)	m ³	56.00		
B-04	Removing damaged asbestos corrugated sheets and weathered timber frame , stacking salvage materials and clearing debris as directed.(Transport for dumping withihn the premisses is included)	m ²	426.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
B-05	Removing decayed and damaged door or window, size up to 3.7 sq.m. from existing walls and offsite the debris.	Nr	6.00		
B-06	Demolishing Rubble Masonry Work with cement sand mortar, stacking rubble and clearing debris.(Transport for dumping withihn the premisses is included)	m ³	4.00		
B-07	For footings	m ³	145.00		
B-08	Excavation for foundation trench and for tie beams	m ³	32.00		
	Earth Filling				
	Earth filling and compaction up to required level. Work shall be carried out as per specification.	note			
B09	Earth filling under floor with approved quality material and compacting in layers as directed by the Engineer. (Soil excavation and transport will be paid seperately)	m ³	165.00		
B10	Excavation for backfilling and transport withihn the premises as directed, in any soil except rock requiring blasting and depositing the excavated soil within the site, as directed. (Bank volume).	m ³	165.00		
	Gravel filling				
B-11	Filling under coloum foundation by spreading, watering and compacting with approved quality earth in 75mm layers by manually as directed (earth available at site) - Compacted volume.	m ³	125.00		
B-12	Allow provisional sum for unforceen work under ground	Ps	1.00	100,000.00	100,000.00
	Anti termite Treatment				
B-13	Anti termite treatment for ground floor area of the building according to the manufacturers specificfications by a specialist pest control service provider approved by the engineer. 10 year warranty for material and workmanship from the date of handing over the work shall be provided including transport	m ²	625.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
	TOTAL CARRIED TO SUMMARY				
C	CONCRETE				
	The Contractor shall refer the followings prior to pricing the items in this trade. a. All relevant drawings b. Specifications c. Pricing preambles d. Location All concrete shall be made dense with a vibrator. Rate shall include for plant for mixing , handling, hoisting, depositing, compacting ,vibrating and curing making good after removal of form work and for any tests when necessary. OPC cement complied with relevent Sri Lanka standards and approved by Engineer shall be used. Rate shall include for mixing, placing, compacting with porker vibrator, levelling and curing. Plain in-situ Grade15 Concrete	note 			

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
C-08	Grade 20 concrete 225x225 mm size R.C.C. lintels. Rate shall include for form work, concrete work(Reinforcement will be paid separately).	m	3.00		
C-09	Grade 20 concrete 225x150mm size R.C.C. lintels. Rate shall include for form work, concrete work(Reinforcement will be paid separately).	m	2.00		
C-09a	112x150mm Lintels in 1:2:4(20mm) cement concrete including formwork (Reinforcement will be paid separately).	m	16.50		
	Sill beams & Stiffeners				
C-10	Grade 20 concrete 225x75 mm size R.C.C. Window sill beams. Rate shall include for form work, concrete work (Reinforcement will be paid separately).	m	78.00		
C-11	Grade 25 concrete 225x115 mm size R.C.C. stiffener columns. Rate shall include for form work, concrete work (Reinforcement will be paid separately).	m	130.00		
	Pavement with Drain				
C-12	300 mm wide concrete drains with 900mm wide ramp in 1:3:6(25mm) concrete with 225mm to 300mm average depth, 75mm thick base and side walls inclusive of 20mm thick cement rendering in 1:3 cement sand mix. Rate shall include necessary expansion joints, formwork and excavation. (reinforcement will be paid seperately	m	120.00		
C-13	Steps in to the buildings in Reinforced in-situ Grade 25 concrete (R/F paid seperately) Rate shall include necessary expansion joints, formwork and excavation.	m ³	3.20		
C-14	Mixing, placing, vibrating and curing Grade 25 concrete in stair cases (Machine mixing). To main stair case	m ³	5.90		
C-15	Mixing, placing, vibrating and curing Grade 25 concrete in stair cases (Machine mixing). To fire stair case	m ³	4.40		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
C-16	Mixing, placing, vibrating and curing Grade 25 concrete in beams (Machine mixing).	m ³	57.00		
C-17	Mixing, placing, vibrating and curing Grade 25 concrete in slabs (Machine mixing).	m ³	65.00		
C-18	Mixing, placing, vibrating and curing Grade 25 concrete in vanity tops (Machine mixing).	m ³	0.45		
TOTAL CARRIED TO SUMMARY					
D	FORM WORK				
	Form work shall be provided with adequate struts, braces, ties, clamps and the like so as to maintain the demensions, lines and levels shown in the drawings during the entire operation of placing and compacting the concrete and to prevent any sagging under the weight of wet concrete including any other supper imposed loads which would be subjected to during construction.	note			
	15mm/18mm thk coated plywood shall be used as appropriate upon the approval of the Engineer				
	Up to 1st floor slab				
D-01	Under footing base	m ²	24.00		
D-02	For strip foundations	m ²	55.00		
D-03	Column footings	m ²	92.00		
D-04	Column shafts	m ²	280.00		
D-05	Plinth beams	m ²	200.00		
D-06	Ground slab	m ²	3.00		
D-07	Ramp	m ²	2.70		
D-08	Main staircase	m ²	44.00		
D-09	Fire staircase	m ²	34.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
D-10	Supplying, fabricating, fixing and removing formwork using 18mm thick plywood sheets for Beams.	m ²	395.00		
D-11	Supplying, fabricating, fixing and removing formwork using 18 mm thick plywood sheets for Slabs.	m ²	465.00		
D-12	Supplying, fabricating, fixing and removing formwork using 18 mm thick plywood sheets for Vanity tops.	m ²	6.20		
	TOTAL CARRIED TO SUMMARY				
E	REINFORCEMENT				
	Steel bar reinforcement cut, bend, place and tie in position as reinforcement to RCC work. Tor Steel characteristic strength 460 N/mm2 and Mild Steel characteristic strength 250 N/mm2 to be used as reinforcement to RCC works.	note			
	Rates shall be included for cutting, bending, fabricating, placing in position, holding and temporary fixing supports. Ex:chairs, benches, stools, spaces, ties, hangers and binding wires.	note			
	Supplying, cutting, bending, laying and binding (with 16 BWG binding wires) Tor Steel Reinforcement to slabs, beams, lintels, columns, stair cases, etc.				
	Up to 1st floor level				
E-01	Column footing	kg	3,170.00		
E-02	Column shaft	kg	4,000.00		
E-03	Plinth beams	kg	2,740.00		
E-04	Floor concrete	kg	2,350.00		
E-05	Ramp	kg	2,350.00		
E-06	Lintols, sills, stiffner columns and stiffner beams	kg	285.00		
E-07	Steps	kg	80.00		
E-08	drain along pavement	kg	950.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
E-09	Main staircase	kg	525.00		
E-10	Fire staircase	kg	400.00		
E-11	Beams	kg	5,925.00		
E-12	Slabs and canopy	kg	10,200.00		
E-13	Vanity tops	kg	65.00		
	Stirrups Supplying, cutting, bending, laying and binding (with 16 BWG binding wires) Mild Steel Reinforcement to slabs, beams, lintels, columns, stair cases, etc.				
E-14	Tor Steel	kg	7,420.00		
	TOTAL CARRIED TO SUMMARY				
F	MASONRY WORK				
	The Contractor shall refer Drawings, Specifications, Pricing preambles, and other relevant documents prior to pricing of this section of work.				
	Rates for masonry works shall include for plumbing angles, forming rebates revels, square, cutting and racking of joints for plastering.	Note			
	Rate shall include for all necessary types of scaffolding whether specified separately or not.	Note			
	External surfaces of brick work shall complete to a levelled & even surface to receive cladding frame work without any plastering work to walls.	Note			
	Random Rubble masonry work				
F-01	Random rubble masonry work in cement sand mortar 1:5 in wall foundations.	m ³	50.00		
	D.P.C				
F-02	Damp proof course in cement and sand 1:3, 3/4" thick finished with two coats of D.P.C. Bituminous emulsion blinded with river sand.	m ²	240.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
	Brick walls				
F-03	225 mm thick brick work in cement and sand 1:5	m ³	42.00		
F-04	112mm thick brick work in 1:5 cement and sand mortar (Size of the brick should be L=220mm, W=105mm, H≤65mm).	m ²	193.00		
F-05	Brick work in 1:5 cement and sand mortar in brick piers (Size of the brick should be L=220mm, W=105mm, H≤65mm).	m ³	1.20		
F-06	Supplying and laying 600mmx600mm Matt Ceramic Tiles LAID ON SLANTED BRICK PIERED WALLS similar to existng finishes with diagnal cutting by diamond wheel, grouted the grooves to simialr color exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). <i>Price range Rs.1,613.00-Rs.2,303.00</i>	m ²	10.00		
	TOTAL CARRIED TO SUMMARY				
G	ALUMINIUM WORK				
	The contractor shall refer Drawings, Specifications, Pricing preambles, and other relevant documents prior to pricing of this section of work.	Note			
	All Aluminium sections shall present clear, straight and sharply defined lines. They shall be free from defects impairing strength, appearance and durability.	Note			
	All aluminium extrusions should have the following properties and the brand should be approved by the Engineer Alloy : AA 6063 Minimum Tensile Strength : 150 MPa Minimum Elongation : 7% Surface Treatments (a) Powder coated Coating Thickness : 60~80 micron Colour : To be approved by the Architect/ Engineer (b) Anodizing - Natural/ Bronze Coating Thickness : 10~15 micron	Note			

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
	The contractor shall submit samples of materials and shop drawings for prior approval	Note			
	Doors & Windows				
G-01	Supplying, fabricating and fixing 100mm (1.6 +/- 0.1)mm thick aluminum double swing door using approved quality powder coated aluminum extrusions with 5mm thick fixed glass on top, mid rail and bottom with 5mm thick fixed glass as per drawings including door lock, butthingses, gaskets, wool felt, beadings, flush bolt, threaded bar with nut roller, door handles, etc. (Door closer not included)	m ²	16.00		
G-02	Supplying, fabricating and fixing 100mm (1.6 +/- 0.1)mm thick aluminum single swing door using approved quality powder coated aluminum extrusions with 5mm thick fixed glass on top, mid rail and bottom 4mm thick cladding (double side) as per detailed drawing including door lock, butthingses , gaskets, wool felt, beadings, flush bolt, threaded bar with nut roller, C Type 300mm stainless steel door handle, etc. (Door closer not included)	m ²	19.00		
G-03	Supplying, fabricating and fixing 100mm (1.6 +/- 0.1)mm thick aluminum fully louvers single swing door using approved quality powder coated aluminum extrusions with mid rail door lock, butthingses gaskets, wool felt, beadings, flush bolt, threaded bar with nut roller, door handle, etc.	m ²	4.20		
G-04	Supplying, fabricating and fixing 100mm (1.6 +/- 0.1)mm thick aluminum double swing door for differently able washroom using approved quality powder coated aluminum extrusions with 5mm thick fixed glass and 4mm thick double side cladding board including door lock, 2 nos floor hinges, gaskets, wool felt, beadings, flush bolt, threaded bar with nut roller, door handles, etc.	m ²	2.60		
	Aluminium partition				
G-05	Supplying, fabricating and fixing Shop front (1.2mm thick) aluminum frame with louvers using approved quality powder coated aluminum extrusions as per detailed drawing	m ²	12.80		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
G-06	Supplying, fabricating and fixing Shop front (1.2mm thick) aluminum frame with fixed glazed using approved quality powder coated aluminum extrusions with 5mm thick fixed glass	m ²	68.50		
G-07	Supplying and fixing approved quality door closer	nr	12.00		
G-08	Supplying, fabricating and fixing 4mm thick Aluminum composite cladding panel with open joint tray panel system using 50 x50mm Aluminum "I" angle , 25 x 25 x 1.2mm Aluminum box bar. Rate include for self tapping screw , pop rivet, wool felt and other necessary accessories.	m ²	17.00		
G-09	Supplying, fabricating and fixing fully glazed sensor operated sliding double door with the thickness of 8mm -10mm glass panes with fully glassed fixed panel of similar type to main entrance panel . Rate include for necessary extrusions, self tapping screw , pop rivet, wool felt and other necessary accessories. size of door opeing isapprox 1.8m(W)x 2.1m(H) with the whole panel size is approx 3.7m(W)x 3.0m(H). Warrenty of 2 years foer the fixtures with services provisions shall be given by the contractor.	item	1.00		
G-10	Supplying, fabricating and fixing 41mm (1.2mm thick) aluminum casement window with top louvers using approved quality powder coated aluminum extrusions and 5mm thick glass including casement lock, screws, gaskets, hinges, weather strip, beadings,etc	m ²	92.00		
G-11	Supplying, fabricating and fixing 41mm (1.2mm thick) aluminum casement up and open window with top louvers using approved quality powder coated aluminum extrusions and 5mm thick glass including casement lock, screws, gaskets, hinges, weather strip, beadings,etc For fanlights	m ²	5.50		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
	TOTAL CARRIED TO SUMMARY				
H	PLASTERING				
	The Contractor is advised to refer the Drawings, Specification, pricing preambles and the finishes schedule prior to pricing of this section of work.	Note			
	Rates shall include for temporary rules, screeds, ground etc., all normal cutting arises, raking out knots of brck work, hacking knots of concrete, rounded angles and the like, bedding, pointing, forming joints making good between different surfaces, around pipes, sanitary fittings and other fixtures and cleaning down upon completion.	Note			
	Extra over provision for narrow widths such as door/ window reveals have not been measured separately for all types of finishes. Rates shall include for narrow widths unless otherwise included in the BOQ.	Note			
	Rates shall include for builders work in connection	Note			
	Ensure that all floor finishes are laid to falls as ind	Note			
	Rates for plaster work shall include for reinforcing joints between different types of construction material (e.g.brick work and concrete work) with 150mm wide galvanized steel mesh as directed by the Engineer.	Note			
	Rates shall include for covering and protection of finishes from weather and construction operation.	Note			
	Wall Plastering				
H-01	16mm thick smooth plaster for walls and internal columns in 1:1:5 cement lime sand mix finished smooth with lime putty. Walls sides and top of the windows and walls will be considered in the reveals plastering rate	m ²	580.00		
H-02	16mm thick semi rough plaster for walls cement and sand (1:5) plaster finished rough On brick(Externally). Walls sides and top of the windows and walls will be considered in the reveals plastering rates	m ²	200.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
H-03	Preparing door or window reveals (Two side) in 12mm thick 1:3 cement sand mortar as directed. Internal side of reveals needs to apply putty and smoothed for the aluminium frame. Aluminium work for 225mm thick wall . Internal side of reveals needs to apply putty and smoothed for the aluminium frame.	m	245.00		
H-04	Preparing door or window reveals (One side only) in 12mm thick 1:3 cement sand mortar as directed. Aluminium work for 115mm thick wall . Reveals needs to apply putty and smoothed for the aluminium frame.	m	65.00		
H-05	10mm thick rough plaster for concrete columns , beams, external, slabs, sides of slabs of external face in 1:3 cement sand mix finished semi rough.	m ²	280.00		
H-06	20mm thick plinth plaster in 1:3 cement sand mix finished smooth with cement floating	m ²	60.00		
H-07	10mm thick smooth soffit plaster for concrete slabs and beams in 1:3 cement sand mix finished smooth with lime putty	m ²	730.00		
H-08	10mm thick semi rough plaster for concrete columns / beams in 1:3 cement sand mix finished using trowel	m ²	120.00		
	TOTAL CARRIED TO SUMMARY				
J	PAINTING				
	Rate shall include for preparation of surfaces, cleaning down, smoothing, knotting, stopping, patching up cracks, etc., protection of floors and fittings, removing and replacing door and window fittings, if required, and cleaning upon completion.	Note			
	Rate shall include for painting of reveals etc.	Note			
	Rates shall include for protection of floors, fittings and cleaning upon completion.	Note			
	Paint brand should be CIC or equivalent and the approval for brand and colour should be obtained by the Engineer	Note			
J-01	Apply two coat of wall potty on internal plaster to get smooth finish	m ²	1,490.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
J-02	Applying one coat of approved quality wall primer and two coats of approved quality emulsion paint to new walls.	m ²	1,490.00		
J-03	Applying one coat of approved quality wall primer and two coats of approved quality weather shield paint to new walls.	m ²	515.00		
J-04	Applying two coats of approved quality floor paint after preparing surface as directed.	m ²	180.00		
	TOTAL CARRIED TO SUMMARY				
K	FLOORING				
	Locally manufactured Homogeneous floor tiles of approved quality (Rocell or equivalent), colour and variety with all specials in specified areas as per the BOQ straight joints in both ways including all shapes, corner and angles set in 12mm thick cement and sand (1:3) screed bedding with neat cement floating level and to slopes < 15° from horizontal and all joints shall be pointed with coloured tile grout to match with tiles.				
K-01	Supplying and laying 600mmx600mm Homogeneous Floor Tiles with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar, Tile laying by tile adhesive and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). Price range Rs.1,548.00-Rs.2,302.00	m ²	395.00		
K-02	Supplying and laying 100mm high Homogeneous Floor Tile Skirting with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar, Tile laying by tile mortar and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). Price range Rs.1,548.00 - Rs.2,302.00	m	195.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
K-03	Supplying and laying 600mmx600mm Matt Homogeneous Floor Tiles with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar and , Tile laying by tile adhesive, pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). <i>Price range Rs.1,548.00-Rs.2,302.00</i>	m ²	126.00		100,000.00
K-04	Supplying and laying 100mm high Matt Homogeneous Floor Tile Skirting with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). <i>Price range Rs.1,548.00 - Rs.2,302.00</i>	m	27.00		
K-05	Supplying and laying 300mmx600mm glazed wall tiles for work top, including 12mm thick tile bedding in 1:3 cement sand mortar and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). <i>Price range Rs.741.00 - Rs.860.00</i>	m ²	105.00		
K-06	Allow for vanity top fininshes, with necessary walls, facia etc.,	Ps	1.00	100,000.00	
K-07	Supplying and laying 600mmx300mm Matt Homogeneous Floor Tiles for main stair case , including 12mm thick tile bedding in 1:3 cement sand mortar, laying with tile adhesive and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). <i>Price range Rs.627.00-Rs. 1,094.00</i>	m ²	25.50		
K-08	Supplying and laying 100mm high Homogeneous Floor Tile Skirting for main stair case ,with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar,Tile laying by tile mortar and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). <i>Price range Rs.1,548.00 - Rs.2,302.00</i>	m	18.50		
K-09	Supplying and laying 600mmx300mm Matt Homogeneous Floor Tiles for fire stair case , including 12mm thick tile bedding in 1:3 cement sand mortar, laying with tile adhesive and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). <i>Price range Rs.627.00-Rs. 1,094.00</i>	m ²	20.50		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
K-10	Supplying and laying 100mm high Matt Homogeneous Floor Tile Skirting for fire stair case ,with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). Price range Rs.1,548.00 - Rs.2,302.00	m	18.00		
	TOTAL CARRIED TO SUMMARY				
L	ELECTRICAL WORKS				
L-01	Allow for main panel and SDBs, cables	PS	1.00	2,900,000.00	2,900,000.00
L-01A	Supplying and fixing of approved quality 4 Row 56 way Wall mounted Steel Distribution Board to working Order. Enclosure box size not less than 350mm x 650mm x 115mm and material should be Alu Zinc coated metal sheet with powder coated Texture (RAL7032) Surface finished. ICE 60529 (IP54) Standard (Quality & Surface Type should be approved by the engineer)	Nr	3.00		
L-02	Supplying and fixing 1800mm long 50mm dia. (1.8 mm) GI earth pipe covered by pits (internal size 450x450) depth up to 600mm with 75mm thick base in 1:3:6(25) con. 115mm Tk. Brick walls and rendering in 1:3 ct. sand mix including forming channel and 50mm tk. removable con. cover in 1:2:4(20) con. reinforced with R6@75mm c/c both way and plastered all exposed surfaces with 1:3 ct. sand mix as per drawing (Must be set to at least 10 ohms Resistance)	Nr	4.00		
L-03	Supply and installation of 12mm x 1200mm earth electrode with clamp and all other accessories in working order.(Repair works only)	Nr	4.00		
L-04	Supplying and fixing approved quality 48W soffit mounted L.E.D Panel lampl (Sunk or Surface mounted) wired through a 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, etc. L.E.D Lamp Life Span should be 25000 hrs. ~30000 hrs. and with 2 Year Manufactured Warranty for Complete Product. Without any Complaints of ROHS. Short circuit protection should be include (Quality should be approved by the engineer)	Nr	36.00		

EOQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
L-05	Supplying and fixing approved quality 12W Ceiling mounted L.E.D Panel lamp (Sunk or Surface mounted) wired through a 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, etc. L.E.D Lamp Life Span should be 25000 hrs. ~30000 hrs. and with 2 Year Manufactured Warranty for Complete Product. Without any Complaints of ROHS. Short circuit protection should be include (Quality should be approved by the engineer) for washrooms	Nr	3.00		
L-06	Supplying and fixing approved quality 6W wall mounted L.E.D decorative lamp/600mm lenght T5/T8) wired through a 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, etc. L.E.D Lamp Life Span should be 25000 hrs. ~30000 hrs. and with 2 Year Manufactured Warranty for Complete Product. Without any Complaints of ROHS. (Quality should be approved by the engineer) for washroom mirrors	Nr	11.00		
L-07	Supplying and fixing approved quality Weather proofed lamp Fitting (Out Door) with point wired through 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wire and 7/0.67 mm Cu/PVC (2.5sq.mm) earth wires in fully concealed PVC conduits with all specials. Surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, complete lamp fitting, etc. (Quality should be approved by the engineer) bulb will be paid separately. Prime cost of Fitting = R.s.1,900.00 For External walls	Nr	24.00		
L-08	Supplying and fixing approved quality Wall bracket lamp Fitting (In door) with point wired through a 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, etc. (Quality should be approved by the engineer) bulb will be paid separately. Prime cost of Fitting = R.s.1,900.00 . For staircase landing	Nr	4.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
L-09	Supplying and fixing approved quality 9W LED Bulb (B22/E27) Bulb should be 25000 hrs. ~ 30000hrs life span and efficacy 90 lm/w ~ 120 lm/w Heat sink, noise filter & short circuit protection should be integrated. complete product should be branded with minimum 2 year manufactured warranty period & Without any Complaints of ROHS. (Quality should be approved by engineer) For staircase landing and for outdoor fittings	Nr	28.00		
L-10	Supplying and fixing approved quality Square Pin type - G/13 Amp socket outlet (for the ring circuit or radial circuit) wired through 7/0.67mm Cu\PVC\PVC(T) - 2.5sq.mm wire and 1x7/0.67mm Cu\PVC (2.5sq.mm) earth wire in fully concealed PVC conduits or casing with all specials. supply cables & concealing materials all are including for stander lenth. (Quality should be approved by the engineer)	Nr	80.00		
L-11	Supplying and fixing approved quality 1400mm sweep ceiling fan Category 01 - For Heavy duty Uses Supplying and fixing approved quality 1400mm sweep ceiling fan with fan regulator & On/Off by 01 Gang Switch wired through 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires and 1x7/0.67mm Cu\PVC (2.5sq.mm) earth wire in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Ceiling fan Should be following Specification. Power Consumption (60W-80W) SLS 814 Compliance 02 Year Manufactured Warranty Power cut-off Safety Switch Safety Wired for Fan Motor from Rod Hum free Condenser Type Controller (Quality should be approved by the engineer) Prime cost of Fan = Rs.22,800.00 - Rs.24,500.00	Nr	18.00		
L-12	Supplying and fixing approved quality 63 Amp/ 4 Pole three phase main switch (M.C.B. type/10kA B.C) to working order (Quality should be approved by the engineer) Product Should Be European or Equivalent. Prime Cost of Product -Rs 5,500.00 - Rs.5,900.00	Nr	1.00		
L-13	Supplying and fixing approved quality 63Amp/30mA three phase RCCB (Trip switch) to working order (Quality should be approved by the engineer) Prime Cost of Product -Rs 13,000.00 - Rs. 13,300.00	Nr	1.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
L-14	Supplying and fixing approved quality 7/0.67mm Cu\PVC (2.5sq.mm) earth wire as directed (concealing materials will be paid separately)	m	300.00		
L-15	Supplying and fixing approved quality 1 /1.13mm Cu\PVC\PVC(1sq.mm) wire as directed.(Concealing materials will be paid separately)	m	250.00		
L-16	Supplying and fixing approved quality 1"(25mm) PVC Conduit pipe with all specials. Rate shall include clips nails etc. (only the additional cost)	m	300.00		
L-17	Supplying and fixing approved quality 1"(25mm x 16mm) PVC casing with capping as directed. Rate shall include clips nails etc.(only the additional cost)	m	50.00		
L-18	Supplying and fixing approved quality 300x300mm Exhaust fan with Square Pin type - G /13 Amp socket outlet & ON/OFF by the 2pole 20A switch with indicator wired through 7/0.67mm Cu\PVC\PVC(T)-2.5sq.mm wire and 1x7/0.67mm Cu\PVC (2.5sq.mm) earth wire in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. (For heavy duty uses) Exhaust fan Should be following Specification 02 Year Manufactured Warranty Front Side louver protection Back Side Automatic Shutter (Quality should be approved by the engineer) <i>Prime cost of Fan(Min) = Rs.21,500.00</i>	Nr	2.00		
L-19	Allow for services improvements in MEP and builders work	PS	1.00	300,000.00	300,000.00
	TOTAL CARRIED TO SUMMARY				
M	MOULDING WORK				
M-01	Allow for moulding work and metal slates.	PS	1.00	200,000.00	200,000.00
	TOTAL CARRIED TO SUMMARY				200,000.00
N	DATA NETWORK				
	1.Scope of Work				

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
	All the installation works in the Bill of Quantities (BOQ) perform the work according to the Building Standards. The contractor shall be responsible for supply and install of BOQ items and testing, commissioning and maintaining of fully functional Local Area Network (LAN) as specified herein, indicated on the drawings issued during the installations or/and as instructed by Engineer. Please refer to the attached Schedule for detail of work				
	The bidder should visit the site and carry out necessary inspection and measurement as are necessary before submitting the bidding document. The distance given are only for bidding purposes. Bidders shall be responsible to assess actual lengths of cables and path etc before bidding.				
	2. Warranty and Support 1. All cabling works (passive) shall have 20 years' systems warranty issued by the manufacturer. Contractor shall supervise and guide staff in maintaining to obtaining 20 years' system warranty.				
	2. Manufacturer Authorization letters shall submit for the active and passive equipment.				
	3. Data sheets for active and passive equipment shall be provided.				
	4. Network enclosure and other items should clean within the free maintenance period.				

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
	The Bidders are request to follow Bill of Quantities in order to price the solution included in this Bidding Document and schedule Main Items of the Requirement Following items included in this BOQ are based on the basic requirements and bidders are requested to include any other/additional items or provisions in the prices according to the supplied products.				
	Local Area Network (LAN)				
	Supply, Installation & Configuration of Following Ethernet Switches				
N-01	Layer 2 Switch with Ports 10/100/1000 with 24 ports or above	Nr	1.00		
N-02	Layer 2 POE support Switch (At least 12 poe) with Ports 10/100/1000 with 24 ports or above	Nr	1.00		
N-03	1G Multi-Mode LC SFP Transceiver– It should compatible with item No 1.2	Nr	1.00		
N-04	1G Multi-Mode LC SFP Transceiver– it should compatible with Fortiswitch 108E- FPOE	Nr	1.00		
N-05	Supply and Installation of Following UPS 650 VA Line Interactive UPS	Nr	1.00		
N-06	Supply and Installation of Following UTP Patch Panels 24-Ports CAT6 UTP Fully Loaded Patch Panel	Nr	1.00		
N-07	Supply and Installation of Cable Management Panels 1U 12" Rack mountable Cable Management Panel	Nr	2.00		
	Supply and Installation of data points				

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
N-08	Supply and laying CAT 6e cable for 22 data points including necessary casings. Price shall include for necessary casings Ts, joints, corner beadings, flexible hose, clips, nails, scaffolding arrangements. Work shall complete without disturbing the tide appearance of area including relevant civil works as per attached drawing	Lot	1.00		
n-09	Supply and Installation of Faceplates, sub boxes Keystone 3M or equivalent	Nr	22.00		
N-10	Copper Testing and issuing a Test Report	Nr	1.00		
	Supply and Installation of Following UTP Patch Leads				
N-11	Supply and installation/handing over of 3.0m patch leads from face plates to PC 3M or equivalent	Nr	22.00		
N-12	Supply and installation of 0.5m patch leads from data switches to patch panels. 3M or equivalent	Nr	20.00		
	Supply and installation of Fiber Cable system				
	Supplying and laying 6 Core Optical Fiber Cable 50/125µm multi-Mode,				
N-13	Uplink from existing switch to the data rack with CAT 6/6e. Price shall include for necessary civil works, casings Ts, joints, corner beadings, flexible hose, clips, nails, scaffolding arrangements. Work shall complete without disturbing the tide appearance of area including relevant civil works as per attached drawing	m	15.00		
N-14	LC Fiber Optic Patch panel 12	Nr	1.00		
N-15	Splicing with Pigtail as required.	Lot	1.00		
N-16	LC-LC MM OM3 Fiber Patch Code	Nr	2.00		
N-17	LC Duplex Multimode Fiber Coupler	Nr	4.00		
N-18	Fiber Testing and Commissioning	Lot	1.00		
N-19	12U Network Rack with 4way Power Bar	Nr	1.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
N-20	Supply, and lay 6 core optical fibre Cable 50/125µm multi-Mode, from sports centre to the new building. Civil and builders wrks will be paid seperately	m	130.00		
N-21	Allow for optical fibre connection and related improvements in data network and civil works etc.,	PS	1.00	2,000,000.00	2,000,000.00
	Total				
	SUB TOTAL				
P	FIRE DETECTION AND PROTECTION				
P-01	Supply and installation of Exit Sign board (type - non battery back up)	Nr	2.00		
P-02	Supply and installation of fire extinguishers of following type (type - battery back up) Co ₂ -2kg	Nr	2.00		
P-03	Dry powder 6kg	Nr	2.00		
P-04	Water 9 litrea	Nr	2.00		
	SUB TOTAL				
Q	WATER PROOFING WORK				
Q01	Application of liquid polymer cement water proofing agent for flat roofs, concrete or masonry tanks, wet areas of toilets and bathrooms. The water proofing material and the method of water proofing should be approved by the engineer.	m ²	155.00		
	TOTAL CARRIED TO SUMMARY				
R	PLUMBING WORK				
	These plumbing rates shall be used for building construction and repair works only. All PVC pipes and fittings shall be of best quality of an approved manufacture. All pipes shall be measured in linear meters and rates shall include pipe fittings and extras where stated, solder, rivets, screws, nails, clips, brackets, straps, holder bats, made bends, if any etc., all laps, straight cutting and wastages, solvent cement and incidental materials and labour on joining pipes, chasing in brickwork, concrete surface and making good.				
R1	Supplying and fixing 20mm (1/2") bib tap - Chromium plated. Prime Cost Rs.2,520.00	nr	7.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
R2	Supplying and fixing 20mm (1/2") angle valve - Chromium plated	nr	4.00		
R3	Supplying and fixing 20mm (1/2") gate valve - Brass	nr	7.00		
R4	Supplying and laying 32mm (1") (PNT11) or Equivalent PVC pipes with all specials rate included pressure testing etc.	m	115.00		
R5	Supplying and laying 25mm (3/4") (PNT11) or Equivalent PVC pipes with all specials rate included pressure testing etc.	m	9.00		
R6	Supplying and laying 20mm (1/2") (PNT14) or Equivalent PVC pipes with all specials rate included pressure testing etc.	m	83.00		
R7	Supplying and laying 40mm (1 1/4") (PNT7) or Equivalent PVC pipes with all specials rate included pressure testing etc.	m	45.00		
R8	Supplying and laying 110mm (4") (PNT7) or Equivalent PVC pipes with all specials rate included pressure testing etc.	m	90.00		
R9	Supplying and laying 50mm (1 1/2") (PNT11) or Equivalent PVC pipes with all specials rate included pressure testing etc.	m	30.00		
R10	Supplying and fixing 32mm (1") gate valve - PVC	Nr	30.00		
R11	Allow for builders work	PS	1.00	60,000.00	60,000.00
	SUB TOTAL				
S	SANITARY FITTINGS				
	All sanitary fixtures shall be of best quality of an approved manufacture. Rates of sanitary appliances shall include for fixing to brickwork or to concrete work with all necessary brackets, plugs, screws, etc as shown in construction drawings or as directed by the engineer.				

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
S1	Supplying and fixing Lanka Ceramic Ltd. manufactured or equivalent approved quality 550mmx400mm pedestal type Ceramic wash basin (Ordinary)with 20mm (1/2") heavy quality chromium plated pillar tap,20mm(1/2") angle valve - chromium plated ,waste plug, water supply and waste water connection as directed (Quality of wash basin should be approved by the engineer) Prime cost of 550mmx400mm pedestal type Ceramic pedestal type wash basin -price range Rs. 21,500.00 - Rs.21,600.00	nr	1.00		
S2	Supplying and fixing Lanka Ceramic Ltd. manufactured or equivalent approved quality 550mmx400mm pedestal type Ceramic wash basin (Ordinary)with 20mm (1/2") heavy quality chromium plated pillar tap,20mm(1/2") angle valve - chromium plated ,waste plug, water supply and waste water connection as directed (Quality of wash basin should be approved by the engineer) Prime cost of 550mmx400mm pedestal type Ceramic pedestal type wash basin -price range Rs. 21,500.00 - Rs.21,600.00	nr	3.00		
S-03	Supplying and fixing approved quality approx 615mm x 485mm x225mm Ceramic wash basin with 20mm (1/2") heavy quality chromium plated elbow tap,20mm(1/2") angle valve - chromium plated, waste plug, water supply and waste water connection as directed. Minimum 10 year warranty on ceramic ware to be available with manufacturers. Prime cost of wash basin Rs.30,435.00 for vanity	nr	7.00		
S4	Supplying and fixing ceramic closed couple water closet (Commode) with seat cover,trap,20mm (1/2") chromium plated angle valve, flexible horse etc. to working order. Minimum 10 year warranty on ceramic ware to be available with manufacturers. (Ideal Standard, American Standard, or equivalent quality complying to British Standard approved by the engineer) prime cost of ceramic closed couple water closet American &British-Rs.48,260.00 - Rs.38,085.00	nr	8.00		
S5	Supplying and fixing approved quality 40mm Bottle Trap as directed (Quality should be approved by the engineer)	nr	15.00		
S6	Supplying and fixing approved quality Chromium plated Bidet shower with 20mm(1/2") angle valve - chromium plated as directed. Prime cost of Bidet shower Rs.3,805.00 and approved by the engineer	nr	8.00		

BoQ Nr	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
S7	Supplying and fixing approved quality 450x600mm (rectangular or oval shaped) bathroom mirror as directed (Quality should be approved by the engineer)	nr	10.00		
S8	Supplying and fixing approved quality Chromium Plated Soap Tray as directed (Quality should be approved by the engineer)	nr	15.00		
S9	Supplying and fixing approved quality Chromium Plated 600mm Towel Rail as directed (Quality should be approved by the engineer)	nr	6.00		
S10	Supplying and fixing approved quality Chromium Plated 100 mm dia. Shower Rose and bar with conceal valve (Normal) as directed (Quality should be approved by the engineer)	nr	4.00		
S11	Supplying and fixing Lanka Ceramic Ltd. manufactured or equivalent approved quality Bowl type urinal with trap,20mm (1/2") gate valve - brass, and inlet and outlet connections as directed (Quality should be approved by the engineer) <i>Prime cost of Bowl type urinal - Rs.7,415.00 - Rs. 8,050.00</i>	nr	4.00		
S12	Allow for builders work and other neccessary accessories	PS	1.00	55,000.00	55,000.00
	SUB TOTAL				

CONSTRUCTION OF EXAMINATION HALL COMPLEX OF THE FACULTY OF MEDICINE - UVA

BILL OF QUANTITIES - FIRST FLOOR

ITEM	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
C	CONCRETE				
	The Contractor shall refer the followings prior to pricing the items in this trade.				
	a. All relevant drawings				
	b. Specifications				
	c. Pricing preambles				
	d. Location				
	All concrete shall be made dense with a vibrator. Rate shall include for plant for mixing , handling, hoisting, depositing, compacting ,vibrating and curing making good after removal of form work and for any tests when necessary.	note			
	OPC cement complied with relevent Sri Lanka standards and approved by Engineer shall be used.	note			
	Rate shall include for mixing, placing, compacting with porker vibrator, levelling and curing.	note			
	Reinforced in-situ Grade 25 concrete (R/F paid seperately)				
	foundation level to roof level				
C-01	Column shaft	m ³	11.60		
	Lintels				
C-02	Grade 20 concrete 225x225 mm size R.C.C. lintels. Rate shall include for form work, concrete work(Reinforcement will be paid separately).	m	2.50		
C-03	Grade 20 concrete 225x150mm size R.C.C. lintels. Rate shall include for form work, concrete work(Reinforcement will be paid separately).	m	10.00		
	Sill beams & Stiffeners				
C-04	Grade 20 concrete 225x75 mm size R.C.C. Window sill beams. Rate shall include for form work, concrete work (Reinforcement will be paid separately).	m	88.00		

C-05	Grade 25 concrete 225x115 mm size R.C.C. stiffener columns. Rate shall include for form work, concrete work (Reinforcement will be paid separately).	m	82.00		
C-05	Mixing, placing, vibrating and curing Grade 25 concrete in beams (Machine mixing).	m ³	8.50		
C-07	Mixing, placing, vibrating and curing Grade 25 concrete in Cobel (Machine mixing).	m ³	0.60		
	TOTAL CARRIED TO SUMMARY				
D	FORM WORK				
	Form work shall be provided with adequate struts, braces, ties, clamps and the like so as to maintain the demensions, lines and levels shown in the drawings during the entire operation of placing and compacting the concrete and to prevent any sagging under the weight of wet concrete including any other supper imposed loads which would be subjected to during construction.	note			
	Up to roof beam				
D-01	Column shaft	m ²	155.00		
D-02	Supplying, fabricating, fixing and removing formwork using 18mm thick plywood sheets for Beams .	m ²	105.00		
D-03	Supplying, fabricating, fixing and removing formwork using 18 mm thick plywood sheets for cobels .	m ²	3.30		
	TOTAL CARRIED TO SUMMARY				
E	REINFORCEMENT				
	Steel bar reinforcement cut, bend, place and tie in position as reinforcement to RCC work.Tor Steel characteristic strength 460 N/mm2 and Mild Steel characteristic strength 250 N/mm2 to be used as reinforcement to RCC works.	note			
	Rates shall be included for cutting, bending, fabricating, placing in position, holding and temporary fixing supports. Ex:chairs, benches, stools, spaces, ties, hangers and binding wires.	note			

	Supplying, cutting, bending, laying and binding (with 16 BWG binding wires) Tor Steel Reinforcement to slabs, beams, lintels, columns, stair cases, etc.				
	Up to second floor level				
E-01	Column shaft	kg	850.00		
E-02	lintols	kg	20.00		
E-03	Window sills	kg	120.00		
E-03a	Stiffner columns	kg	105.00		
E-04	Roof beams	kg	1,225.00		
E-05	Cobel	kg	90.00		
	Stirrups				
E-06	For clumn shafts	kg	750.00		
E-07	For lintols, stiffner columns and sills	kg	25.00		
E-08	For roof beams	kg	830.00		
	TOTAL CARRIED TO SUMMARY				
F	MASONRY WORK				
	The Contractor shall refer Drawings, Specifications, Pricing preambles, and other relevant documents prior to pricing of this section of work.				
	Rates for masonry works shall include for plumbir	Note			
	Rate shall include for all necessary types of scaffolding whether specified separately or not.	Note			
	External surfaces of brick work shall complete to a levelled & even surface to receive cladding frame work without any plastering work to walls.	Note			
	Brick walls				
F-01	225 mm thick brick work in cement and sand 1:5	m ³	49.00		
F-02	112mm thick brick work in 1:5 cement and sand mortar (Size of the brick should be L=220mm, W=105mm, H≤65mm).	m ²	110.00		
	TOTAL CARRIED TO SUMMARY				
G	ALUMINIUM WORK				

	The contractor shall refer Drawings, Specifications, Pricing preambles, and other relevant documents prior to pricing of this section of work.	Note			
	All Aluminium sections shall present clear, straight and sharply defined lines. They shall be free from defects impairing strength, appearance and durability.	Note			
	All aluminium extrusions should have the following properties and the brand should be approved by the Engineer Alloy : AA 6063 Minimum Tensile Strength : 150 MPa Minimum Elongation : 7% Surface Treatments (a) Powder coated Coating Thickness : 60~80 micron Colour : To be approved by the Architect/ Engineer (b) Anodizing - Natural/ Bronze Coating Thickness : 10~15 micron	Note			
	The contractor shall submit samples of materials and shop drawings for prior approval	Note			
	Doors & Windows				
G-01	Supplying, fabricating and fixing 100mm (1.6 +/- 0.1)mm thick aluminum double swing door using approved quality powder coated aluminum extrusions with 5mm thick fixed glass on top, mid rail and bottom with 5mm thick fixed glass as per drawings including door lock, butthings, gaskets, wool felt, beadings, flush bolt, threaded bar with nut roller, door handles, etc. (Door closer not included)	m ²	20.00		
G-02	Allow for improvements in strenthening of the aluminium members and builders work	Ps	1.00	75,000.00	75,000.00
G-03	Supplying, fabricating and fixing Shop front (1.2mm thick) aluminum frame with fixed glazed using approved quality powder coated aluminum extrusions with 5mm thick fixed glass as per detailed drawing At the upper entrance door	m ²	6.30		

G-04	Supplying, fabricating and fixing Shop front (1.2mm thick) aluminum frame with louvers using approved quality powder coated aluminum extrusions as per drawings. Hight of louvre pane is approx 950mm	m ²	9.40		
G-05	Supplying and fixing approved quality door closer	nr	6.00		
G-06	Supplying, fabricating and fixing 41mm (1.2mm thick) aluminum casement window with top louvers using approved quality powder coated aluminum extrusions and 5mm thick glass including casement lock, screws, gaskets, hinges, weather strip, beadings,etc	m ²	131.00		
	TOTAL CARRIED TO SUMMARY				
H	PLASTERING				
	The Contractor is advised to refer the Drawings, Specification, pricing preambles and the finishes schedule prior to pricing of this section of work.	Note			
	Rates shall include for temporary rules, screeds, ground etc., all normal cutting arises, raking out knots of brck work, hacking knots of concrete, rounded angles and the like, bedding, pointing, forming joints making good between different surfaces, around pipes, sanitary fittings and other fixtures and cleaning down upon completion.	Note			
	Extra over provision for narrow widths such as door/ window reveals have not been measured separately for all types of finishes. Rates shall include for narrow widths unless otherwise included in the BOQ.	Note			
	Rates shall include for builders work in connection	Note			
	Ensure that all floor finishes are laid to falls as ind	Note			
	Rates for plaster work shall include for reinforcing joints between different types of construction material (e.g.brick work and concrete work) with 150mm wide galvanized steel mesh as directed by the Engineer.	Note			
	Rates shall include for covering and protection of finishes from weather and construction operation.	Note			

	Wall Plastering				
H-01	16mm thick smooth plaster for walls and internal columns in 1:1:5 cement lime sand mix finished smooth with lime putty. Walls sides and top of the windows and walls will be considered in the reveals plastering rate	m ²	390.00		
H-02	16mm thick semi rough plaster for walls cement and sand (1:5) plaster finished rough On brick(Externally). Walls sides and top of the windows and walls will be considered in the reveals plastering rates	m ²	225.00		
H-03	Preparing door or window reveals (Two side) in 12mm thick 1:3 cement sand mortar as directed. Internal side of reveals needs to apply putty and smoothed for the aluminium frame. Aluminium work for 225mm thick wall . Internal side of reveals needs to apply putty and smoothed for the aluminium frame.	m	285.00		
H-04	Preparing door or window reveals (One side only) in 12mm thick 1:3 cement sand mortar as directed. Aluminium work for 115mm thick wall . Reveals needs to apply putty and smoothed for the aluminium frame.	m	43.00		
H-05	10mm thick rough plaster for concrete columns , beams, external, slabs, sides of slabs of external face in 1:3 cement sand mix finished semi rough.	m ²	85.00		
H-06	10mm thick smooth soffit plaster for concrete slabs and beams in 1:3 cement sand mix finished smooth with lime putty	m ²	75.00		
H-07	10mm thick semi rough plaster for concrete columns / beams in 1:3 cement sand mix finished using trowel	m ²	60.00		
	TOTAL CARRIED TO SUMMARY				
J	PAINTING				
	Rate shall include for preparation of surfaces, cleaning down, smoothing, knotting, stopping, patching up cracks, etc., protection of floors and fittings, removing and replacing door and window fittings, if required, and cleaning upon completion.	Note			
	Rate shall include for painting of reveals etc.	Note			

	Rates shall include for protection of floors, fittings and cleaning upon completion.	Note			
	Paint brand should be CIC or equivalent and the approval for brand and colour should be obtained by the Engineer	Note			
J-01	Apply two coat of wall potty on internal plaster to get smooth finish	m ²	570.00		
J-02	Applying one coat of approved quality wall primer and two coats of approved quality emulsion paint to new walls.	m ²	570.00		
J-03	Applying one coat of approved quality wall primer and two coats of approved quality weather shield paint to new walls.	m ²	350.00		
	TOTAL CARRIED TO SUMMARY				
K	FLOORING				
	Locally manufactured Homogeneous floor tiles of approved quality (Rocell or equivalent), colour and variety with all specials in specified areas as per the BOQ straight joints in both ways including all shapes, corner and angles set in 12mm thick cement and sand (1:3) screed bedding with neat cement floating level and to slopes < 15° from horizontal and all joints shall be pointed with coloured tile grout to match with tiles.				
K-01	Supplying and laying 600mmx600mm Homogeneous Floor Tiles with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar, Tile laying by tile adhesive and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). Price range Rs.1,548.00-Rs.2,302.00	m ²	435.00		
K-02	Supplying and laying 100mm high Homogeneous Floor Tile Skirting with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar,Tile laying by tile mortar and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). Price range Rs.1,548.00 - Rs.2,302.00	m	142.00		

K-03	Supplying and laying 600mmx600mm Matt Homogeneous Floor Tiles with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar and , Tile laying by tile adhesive, pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). Price range Rs.1,548.00- Rs.2,302.00	m ²	14.00		
K-04	Supplying and laying 100mm high Matt Homogeneous Floor Tile Skirting with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). Price range Rs.1,548.00 - Rs.2,302.00	m	12.50		
K-05	Allow for staircase grooving and nosing etc, and floor grating at upper entrance	Ps	1.00	100,000.00	100,000.00
	TOTAL CARRIED TO SUMMARY				
L	ELECTRICAL WORKS				
L-01	Allow for SDBs and cables	PS	1.00	800,000.00	800,000.00
L-01A	Supplying and fixing of approved quality 4 Row 56 way Wall mounted Steel Distribution Board to working Order. Enclosure box size not less than 350mm x 650mm x 115mm and material should be Alu Zinc coated metal sheet with powder coated Texture (RAL7032) Surface finished. ICE 60529 (IP54) Standard (Quality & Surface Type should be approved by the engineer)	Nr	3.00		
L-02	Supplying and fixing 1800mm long 50mm dia. (1.8 mm) GI earth pipe covered by pits (internal size 450x450) depth up to 600mm with 75mm thick base in 1:3:6(25) con. 115mm Tk. Brick walls and rendering in 1:3 ct. sand mix including forming channel and 50mm tk. removable con. cover in 1:2:4(20) con. reinforced with R6@75mm c/c both way and plastered all exposed surfaces with 1:3 ct. sand mix as per drawing (Must be set to at least 10 ohms Resistance)	Nr	1.00		
L-03	Supply and installation of 12mm x 1200mm earth electrode with clamp and all other accessories in working order.(Repair works only)	Nr	1.00		

L-04	Supplying and fixing approved quality 48W soffit mounted L.E.D Panel lamp (Sunk or Surface mounted) wired through a 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, etc. L.E.D Lamp Life Span should be 25000 hrs. ~30000 hrs. and with 2 Year Manufactured Warranty for Complete Product. Without any Complaints of ROHS. Short circuit protection should be include (Quality should be approved by the engineer)	Nr	44.00		
L-05	Supplying and fixing approved quality 12W Ceiling mounted L.E.D Panel lamp (Sunk or Surface mounted) wired through a 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, etc. L.E.D Lamp Life Span should be 25000 hrs. ~30000 hrs. and with 2 Year Manufactured Warranty for Complete Product. Without any Complaints of ROHS. Short circuit protection should be include (Quality should be approved by the engineer) for rooms	Nr	3.00		
L-06	Supplying and fixing approved quality 6W wall mounted L.E.D decorative lamp/600mm lenght T5/T8) wired through a 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, etc. L.E.D Lamp Life Span should be 25000 hrs. ~30000 hrs. and with 2 Year Manufactured Warranty for Complete Product. Without any Complaints of ROHS. (Quality should be approved by the engineer) for washroom mirrors	Nr	1.00		
L-07	Supplying and fixing approved quality Weather proofed lamp Fitting (Out Door) with point wired through 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wire and 7/0.67 mm Cu/PVC (2.5sq.mm) earth wires in fully concealed PVC conduits with all specials. Surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, complete lamp fitting, etc. (Quality should be approved by the engineer) bulb will be paid separately. Prime cost of Fitting = R.s.1,900.00 For External walls	Nr	24.00		

L-08	Supplying and fixing approved quality Wall bracket lamp Fitting (In door) with point wired through a 10 Amp switch using 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Rate shall include switch, sun box, etc. (Quality should be approved by the engineer) bulb will be paid separately. <i>Prime cost of Fitting = R.s.1,900.00 . For staircase landing</i>	Nr	2.00		
L-09	Supplying and fixing approved quality 9W LED Bulb (B22/E27) Bulb should be 25000 hrs. ~ 30000hrs life span and efficacy 90 lm/w ~ 120 lm/w Heat sink, noise filter & short circuit protection should be integrated. complete product should be branded with minimum 2 year manufactured warranty period & Without any Complaints of ROHS. (Quality should be approved by engineer) For staircase landing and for outdoor fittings	Nr	26.00		
L-10	Supplying and fixing approved quality Square Pin type - G/13 Amp socket outlet (for the ring circuit or radial circuit) wired through 7/0.67mm Cu\PVC\PVC(T) - 2.5sq.mm wire and 1x7/0.67mm Cu\PVC (2.5sq.mm) earth wire in fully concealed PVC conduits or casing with all specials. supply cables & concealing materials all are including for standerd lenth. (Quality should be approved by the engineer)	Nr	80.00		
L-11	Supplying and fixing approved quality 1400mm sweep ceiling fan Category 01 - For Heavy duty Uses Supplying and fixing approved quality 1400mm sweep ceiling fan with fan regulator & On/Off by 01 Gang Switch wired through 2x1/1.13mm Cu\PVC\PVC (1sq.mm) wires and 1x7/0.67mm Cu\PVC (2.5sq.mm) earth wire in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. Ceiling fan Should be following Specification. Power Consumption (60W-80W) SLS 814 Compliance 02 Year Manufactured Warranty Power cut-off Safety Switch Safety Wired for Fan Motor from Rod Hum free Condenser Type Controller (Quality should be approved by the engineer) <i>Prime cost of Fan = Rs.22,800.00 - Rs.24,500.00</i>	Nr	24.00		
L-12	Supplying and fixing approved quality 63 Amp/ 4 Pole three phase main switch (M.C.B. type/10kA B.C) to working order (Quality should be approved by the engineer) Product Should Be European or Equivalent. <i>Prime Cost of Product -Rs 5,500.00 - Rs.5,900.00</i>	Nr	1.00		

L-13	Supplying and fixing approved quality 63Amp/30mA three phase RCCB (Trip switch) to working order (Quality should be approved by the engineer) <i>Prime Cost of Product -Rs 13,000.00 - Rs. 13,300.00</i>	Nr	1.00		
L-14	Supplying and fixing approved quality 7/0.67mm Cu\PVC (2.5sq.mm) earth wire as directed (concealing materials will be paid separately)	m	300.00		
L-15	Supplying and fixing approved quality 1 /1.13mm Cu\PVC\PVC(1sq.mm) wire as directed.(Concealing materials will be paid separately)	m	250.00		
L-16	Supplying and fixing approved quality 1"(25mm) PVC Conduit pipe with all specials. Rate shall include clips nails etc. (only the additional cost)	m	300.00		
L-17	Supplying and fixing approved quality 1"(25mm x 16mm) PVC casing with capping as directed. Rate shall include clips nails etc.(only the additional cost)	m	50.00		
L-18	Supplying and fixing approved quality 300x300mm Exhaust fan with Square Pin type - G /13 Amp socket outlet & ON/OFF by the 2pole 20A switch with indicator wired through 7/0.67mm Cu\PVC\PVC(T)-2.5sq.mm wire and 1x7/0.67mm Cu\PVC (2.5sq.mm) earth wire in fully concealed PVC conduits with all specials. surface plastic casing can be use for special situations with approved by the Engineer. Additional chargers NOT allow for PVC casings. (For heavy duty uses) Exhaust fan Should be following Specification 02 Year Manufactured Warranty Front Side louver protection Back Side Automatic Shutter (Quality should be approved by the engineer) <i>Prime cost of Fan(Min) = Rs.21,500.00</i>	Nr	1.00		
L-19	Allow for services improvements in MEP and builders work	PS	1.00	300,000.00	300,000.00
	TOTAL CARRIED TO SUMMARY				
M	WATER PROOFING				
M-01	Application of liquid polymer cement water proofing agent for flat roofs, concrete or masonry tanks, wet areas of toilets and bathrooms. The water proofing material and the method of water proofing should be approved by the engineer.	m ²	15.00		
	TOTAL CARRIED TO SUMMARY				
N	PA SYSTEM				

N-01	Supply, installation of accoustic standard speakers/sub woofers with a minimum sound pressure level of 65-75 dB for both exam halls with ceiling/soffit mounted FOR BOTH FLOORS	Nr	10.00		
N-02	Supply, laying of XLR or equivalent audio cable from amplifiers to speakers embedded to walls and slabs etc., . Rate shall included for uPVC conduits/casings etc.,	item	1.00		
N-03	Supplier and installation of Clip on lavalier of approved qualty by the Engineer	Nr	2.00		
N-04	Supplier and installation of Wireless microphonewith bluetooth connectivity with rechargeable batteries of approved quality by the Engineer	Nr	2.00		
N-05	Allow for portable amplifier and related pheripherals to complete the system	Ps	1.00	100,000.00	100,000.00
N-06	Testing commissioning of the whole system	Item	1.00		
	TOTAL CARRIED TO SUMMARY				
P	PLUMBING WORK				
	These plumbing rates shall be used for building construction and repair works only. All PVC pipes and fittings shall be of best quality of an approved manufacture. All pipes shall be measured in linear meters and rates shall include pipe fittings and extras where stated, solder, rivets, screws, nails, clips, brackets, straps, holder bats, made bends, if any etc., all laps, straight cutting and wastages, solvent cement and incidental materials and labour on joining pipes, chasing in brickwork, concrete surface and making good.				
P-01	Supplying and fixing 20mm (1/2") angle valve - Chromium plated	nr	1.00		
P-02	Supplying and fixing 20mm (1/2") gate valve - Brass	nr	1.00		
P-03	Supplying and laying 20mm (1/2") (PNT14) or Equivalent PVC pipes with all specials rate included pressure testing etc.	m	30.00		
P-04	Supplying and laying 40mm (1 1/4") (PNT7) or Equivalent PVC pipes with all specials rate included pressure testing etc.	m	10.00		
P-05	Allow for builders work	PS	1.00	15,000.00	15,000.00
	SUB TOTAL				
Q	SANITARY FITTINGS				

	All sanitary fixtures shall be of best quality of an approved manufacture. Rates of sanitary appliances shall include for fixing to brickwork or to concrete work with all necessary brackets, plugs, screws, etc as shown in construction drawings or as directed by the engineer.				
Q-01	Supplying and fixing Lanka Ceramic Ltd. manufactured or equivalent approved quality 550mmx400mm pedestal type Ceramic wash basin (Ordinary) with 20mm (1/2") heavy quality chromium plated pillar tap, 20mm (1/2") angle valve - chromium plated, waste plug, water supply and waste water connection as directed (Quality of wash basin should be approved by the engineer) Prime cost of 550mmx400mm pedestal type Ceramic pedestal type wash basin - price range Rs. 21,500.00 - Rs.21,600.00	nr	1.00		
Q-02	Supplying and fixing approved quality 40mm Bottle Trap as directed (Quality should be approved by the engineer)	nr	1.00		
Q-03	Supplying and fixing approved quality 450x600mm (rectangular or oval shaped) bathroom mirror as directed (Quality should be approved by the engineer)	nr	1.00		
Q-04	Supplying and fixing approved quality Chromium Plated Soap Tray as directed (Quality should be approved by the engineer)	nr	1.00		
Q-05	Allow for builders work and other necessary accessories	PS	1.00	15,000.00	15,000.00
	SUB TOTAL				
T	DATA NETWORK				
	1. Scope of Work				
	All the installation works in the Bill of Quantities (BOQ) perform the work according to the Building Standards. The contractor shall be responsible for supply and install of BOQ items and testing, commissioning and maintaining of fully functional Local Area Network (LAN) as specified herein, indicated on the drawings issued during the installations or/and as instructed by Engineer. Please refer to the attached Schedule for detail of work				

	The bidder should visit the site and carry out necessary inspection and measurement as are necessary before submitting the bidding document. The distance given are only for bidding purposes. Bidders shall be responsible to assess actual lengths of cables and path etc before bidding.				
	2. Warranty and Support 1. All cabling works (passive) shall have 20 years' systems warranty issued by the manufacturer. Contractor shall supervise and guide staff in maintaining to obtaining 20 years' system warranty. 2. Manufacturer Authorization letters shall submit for the active and passive equipment. 3. Data sheets for active and passive equipment shall be provided. 4. Network enclosure and other items should clean within the free maintenance period.				
	The Bidders are request to follow Bill of Quantities in order to price the solution included in this Bidding Document and schedule Main Items of the Requirement Following items included in this BOQ are based on the basic requirements and bidders are requested to include any other/additional items or provisions in the prices according to the supplied products.				
R	Local Area Network (LAN)				
	Supply, Installation & Configuration of Following Ethernet Switches				
R-01	Layer 2 Switch with Ports 10/100/1000 with 8 ports or above	Nr	1.00		
R-02	Layer 2 POE support Switch (At least 12 poe) with Ports 10/100/1000 with 24 ports or above	Nr	1.00		
R-03	1G Multi-Mode LC SFP Transceiver– It should compatible with item No 1.2	Nr	1.00		

R-04	1G Multi-Mode LC SFP Transceiver– it should compatible with Fortiswitch 108E- FPOE	Nr	1.00		
	Supply and Installation of Following UPS				
R-05	650 VA Line Interactive UPS	Nr	1.00		
R-06	Supply and Installation of Following UTP Patch Panels				
R-07	24-Ports CAT6 UTP Fully Loaded Patch Panel	Nr	1.00		
	Supply and Installation of Cable Management Panels				
R-08	1U 12" Rack mountable Cable Management Panel	Nr	2.00		
	Supply and Installation of data points				
R-09	Supply and laying CAT 6e cable for 22 data points including necessary casings. Price shall include for necessary casings Ts, joints, corner beadings, flexible hose, clips, nails, scaffolding arrangements. Work shall complete without disturbing the tide appearance of area including relevant civil works as per attached drawing	Lot	1.00		
R-10	Supply and Installation of Faceplates, sub boxes Keystone 3M or equivalent	Nr	22.00		
R-11	Copper Testing and issuing a Test Report	Nr	1.00		
	Supply and Installation of Following UTP Patch Leads				
R-12	Supply and installation/handing over of 3.0m patch leads from face plates to PC 3M or equivalent	Nr	22.00		
R-13	Supply and installation of 0.5m patch leads from data switches to patch panels. 3M or equivalent	Nr	22.00		
R-14	Testing and Commissioning the entire floor network	Lot	1.00		
R-15	Allow for related improvements in LAN network and related builders and civil works	Ps	1.00	300,000.00	300,000.00
	Total				
	SUB TOTAL				
V	FIRE DETECTION AND PROTECTION				

S-01	Supply and installation of Exit Sign board (type - non battery back up)	Nr	2.00		
	Supply and installation of fire extinguishers of following type (type - battery back up)				
S-02	CO ₂ -2kg	Nr	2.00		
S-03	Dry powder 6kg	Nr	2.00		
S-04	Water 9 litrea	Nr	2.00		
	SUB TOTAL				
T	METAL WORK				
T-01	Supply, fabrigate and installation of GI hand rail as per the detailed drawing with 1.6mm 50mm diameter pipe with 1.6mm 40mm diameter GI uprights approx at approx 1200mm centres with approx 100mm clearance above wall and plugged into half wall with concrete pockets. Rate shall include for weldings, and applying with one coat of primer and two coats of anticorrosive paint with black mat texture	m	7.40		
T-02	Supply, fabrigate and installation of GI guard rail sas per the detailed drawing with 50mmx75mmx2.0mm horizontal members at approx 900mm intervals, uprights at approx 900mm with 50mmx75mmx2.0mm, diagnal members with 50mmx50mmx2.0mm GI section welded to each members, anchored to wall and columns with necessary anchor bolts and base plates, with approx 100mm clearance between floor level and lower horizontal member, with one coat of primer and two coats of anticorrosive paint with black mat texture. For main stair case	m	9.70		

T-03	Supply, fabricate and installation of GI guard rail as per the detailed drawing with 50mmx75mmx2.0mm horizontal members at approx 900mm intervals, uprights at approx 900mm with 50mmx75mmx2.0mm, diagonal members with 50mmx50mmx2.0mm GI section welded to each members, anchored to wall and columns with necessary anchor bolts and base plates, with approx 100mm clearance between floor level and lower horizontal member, with one coat of primer and two coats of anticorrosive paint with black mat texture. For fire stair case	m	11.20		
T-04	Supply, fabricate and installation of GI guard rail as per the detailed drawing with 50mmx75mmx2.0mm horizontal members at approx 900mm intervals, uprights at approx 900mm with 50mmx75mmx2.0mm, diagonal members with 50mmx50mmx2.0mm GI section welded to each members, anchored to wall and columns with necessary anchor bolts and base plates, with approx 100mm clearance between floor level and lower horizontal member, with one coat of primer and two coats of anticorrosive paint with black mat texture. For first floor lobby	m	6.80		
	SUB TOTAL				
U	ROOF AND ROOF PLUMBING				
U-01	Supplying, fabricating and fixing Steel Roof member using 100mmx200mmx7mm thk universal I sections supported with 12mm thk gusset plate 250mm x 250mm with 18mm bolts 6 nrs , 550mm min long HD bolts to columns. Ridge to connect with 10mm thk MS plate with 8 nos of 18mm nut and bolts as per the detail drawing. Structural welding need to be done to all joints and connections in addition to plate connections by anchors. Apply 2 coats of anticorrosive paint to all steel work. Rate shall include necessary cleats for fixing purling and rag bolts, necessary bolts and nuts, pressure plates and truss plates as directed by the engineer.	m	95.00		

U-01a	Supplying, fabricating and fixing Steel Roof member using 75mmx150mmx7mm thk universal I sections supported with 12mm thk gusset plate 250mm x 250mm with 18mm bolts 6 nrs , 550mm min long HD bolts to columns. Ridge to connect with 10mm thk MS plate with 8 nos of 18mm nut and bolts with 150mmx75mm honge at mid span with a length up to 1800mm as per the detail drawing. Structural welding need to be done to all joints and connections in addition to plate connections by anchors. Apply 2 coats of anticorrosive paint to all steel work. Rate shall include necessary cleats for fixing purling and rag bolts, neccessary bolts and nuts, pressure plates and truss plates as directed by the engineer.	m	225.00		
U-02	Supplying and roofing with 0.47mm thick colour coated Zink Aluminum metal roofing sheets on 100x50x2mm galvanized lip panel at maximum spacing of 900mm center to center frame work with all specials (Brand, Profile and Colour of the sheets should be approved by the engineer).	m ²	1,085.00		
U-03	Allow for additional stabilization of roof structure and for horizontal I section	PS	1.00	850,000.00	850,000.00
U-04	Supplying and fixing 0.47mm thick Zink Aluminum ridge capping of girth 470mm to match the colour of the roof. Rate shall include all necessary fasteners, etc.	m	115.00		
U-05	Supplying and fixing 0.47 mm thick Zink Aluminum rainwater eave gutters of girth 450~700mm as directed. Rate shall include lap lengths, gutter brackets, endplates, expansion joints, etc	m	130.00		
U-06	Supplying and fixing 100x100mm Zink Aluminum colour coated down pipes as directed. Rate shall include all necessary nozzles, offsets, bends, clips, etc	m	155.00		
U-07	Allow for additional roof and roof plumbing services improvements etc.,	PS	1.00	100,000.00	100,000.00

U-08	Supplying and fixing 0.47mm thick Zink Aluminum valance sheet with all necessary essentials for awidth of 225mm- 300mm	m	130.00		
U-09	Supplying and laying approved quality double side 3 -4mm thick Aluminum Foil and 3"x3" mesh(Gauge 17) with necessary fasteners, etc.as directed (Quality of foil and mesh should be approved by the engineer).	m ²	1085.00		
	TOTAL CARRIED TO SUMMARY				
V	CEILING WORK				
V	Supply & Installation of PVC Panelled Ceiling (Quality and colour shall be approved by the Engineer) With necessary GI grid structure to complete. (Type, guage of grid shall be approved by the Engineer). Average hieght of ceiling is from 3600mm to approx 6000mm from the finished floor level for internal ceiling with flat and inclined surface as directed by the Engineer. External eave ceiling will be from ground level	m ²	1,060.00		
	SUB TOTAL				
W	LIGHTENING PROTECTION SYSTEM				
W-01	Supply & Installation of 25mmx 3mm copperplate grid lightening protection system. (Quality and methodology shall be approved by the Engineer)	Ps	1.00	1,300,000.00	1,300,000.00
	SUB TOTAL				1,300,000.00
X	CCTV SURVIELLENCE AND MONITORING				

X-01	Supply & Installation of CCTV monitorin and surviellence system	Ps	1.00	800,000.00	800,000.00
	SUB TOTAL				800,000.00

CONSTRUCTION OF EXAMINATION HALL COMPLEX OF THE FACULTY OF MEDICINE - UVA

BILL OF QUANTITIES - EXTERNAL WORK

ITEM	DISCRIPTION	UNIT	QTY	RATE (Rs)	AMOUNT(Rs)
A	STAIRWAYS AND ACCESS PATH				
	Note : Following items to be priced as appropriate.				
A-1	Demolishing Brickwork in lime sand mortar , including stacking bricks and clearing debris as directed.	m ³	0.10		
A-2	Demolishing 75mm thick Cement Concrete Floor and clearing away the debris as directed.(Transport will be paid separatly only for carrying out side the premisses)	m ²	0.35		
A-3	Uprooting tree roots girth size of above 300mm dia and off site	nr	4.00		
	GROUND FLOOR				
	Excavation				
	Earth excavation in any material except rock requiring blasting, part return fill rammed and well consolidated. All excavations to be protected from rain/storm water runoff falling into the same by suitable means. Unsuitable material shall dispose to approved locations				
	Levelling the land				
B-01	For footings	m ³	17.00		
B-02	Excavation for foundation trench and for tie beams	m ³	4.50		
	The Contractor shall refer the followings prior to pricing the items in this trade. a. All relevant drawings b. Specifications c. Pricing preambles d. Location				
	All concrete shall be made dense with a vibrator. Rate shall include for plant for mixing , handling, hoisting, depositing, compacting ,vibrating and curing making good after removal of form work and for any tests when necessary.	note			

	OPC cement complied with relevant Sri Lanka standards and approved by Engineer shall be used.	note			
	Rate shall include for mixing, placing, compacting with poker vibrator, levelling and curing.	note			
	Plain in-situ Grade 15 Concrete				
C-01	Under footing base	m ³	0.90		
C-02	Under foundation Strips	m ³	0.75		
	Reinforced in-situ Grade 25 concrete (R/F paid separately) foundation level to 1st floor slab level				
C-03	Column footings	m ³	2.70		
C-04	Column shaft	m ³	5.50		
C-05	Plinth beams	m ³	4.50		
C-06	Steps in to the buildings in Reinforced in-situ Grade 25 concrete (R/F paid separately) Rate shall include necessary expansion joints, formwork and excavation.	m ³	1.25		
C-07	Mixing, placing, vibrating and curing Grade 25 concrete in beams (Machine mixing).	m ³	6.70		
C-08	Mixing, placing, vibrating and curing Grade 25 concrete in slabs (Machine mixing).	m ³	9.50		
	TOTAL CARRIED TO SUMMARY				
	Up to Access bridge Form work shall be provided with adequate struts, braces, ties, clamps and the like so as to maintain the dimensions, lines and levels shown in the drawings during the entire operation of placing and compacting the concrete and to prevent any sagging under the weight of wet concrete including any other super imposed loads which would be subjected to during construction.	note			

	15mm/18mm thk coated plywood shall be used as appropriate upon the approval of the Engineer				
	Up to 1st floor slab				
D-01	Under footing base	m ²	4.00		
D-02	For strip foundations	m ²	6.30		
D-03	Column footings	m ²	16.00		
D-04	Column shafts	m ²	97.00		
D-05	Plinth beams	m ²	40.00		
D-06	Steps	m ²	11.20		
D-7	Supplying, fabricating, fixing and removing formwork using 18mm thick plywood sheets for Beams.	m ²	40.00		
D-8	Supplying, fabricating, fixing and removing formwork using 18 mm thick plywood sheets for Slabs.	m ²	7.50		
	TOTAL CARRIED TO SUMMARY				
E	REINFORCEMENT				
	Steel bar reinforcement cut, bend, place and tie in position as reinforcement to RCC work. Tor Steel characteristic strength 460 N/mm2 and Mild Steel characteristic strength 250 N/mm2 to be used as reinforcement to RCC works.	note			
	Rates shall be included for cutting, bending, fabricating, placing in position, holding and temporary fixing supports. Ex: chairs, benches, stools, spaces, ties, hangers and binding wires.	note			
	Supplying, cutting, bending, laying and binding (with 16 BWG binding wires) Tor Steel Reinforcement to slabs, beams, lintels, columns, stair cases, etc.				
	Up to 1st floor level				
E-01	Column footing	kg	220.00		
E-02	Column shaft	kg	470.00		
E-03	Plinth beams,	kg	340.00		

E-04	beams	kg	440.00		
E-05	slabs	kg	770.00		
	Supplying, cutting, bending, laying and binding (with 16 BWG binding wires) Tor Steel Reinforcement to slabs, beams, lintels, columns, stair cases, etc.				
E-05	Mild Steel	kg	950.00		
H	PLASTERING				
	The Contractor is advised to refer the Drawings, Specification, pricing preambles and the finishes schedule prior to pricing of this section of work.	Note			
	Rates shall include for temporary rules, screeds, ground etc., all normal cutting arises, raking out knots of brck work, hacking knots of concrete, rounded angles and the like, bedding, pointing, forming joints making good between different surfaces, around pipes, sanitary fittings and other fixtures and cleaning down upon completion.	Note			
	Extra over provision for narrow widths such as door/ window reveals have not been measured separately for all types of finishes. Rates shall include for narrow widths unless otherwise included in the BOQ.	Note			
	Rates shall include for builders work in connection	Note			
	Ensure that all floor finishes are laid to falls as ind	Note			
	Rates for plaster work shall include for reinforcing joints between different types of construction material (e.g.brick work and concrete work) with 150mm wide galvanized steel mesh as directed by the Engineer.	Note			
	Rates shall include for covering and protection of finishes from weather and construction operation.	Note			
	Wall Plastering				
H-01	10mm thick smooth soffit plaster for concrete slabs. Beams, columns sides if staircase etc., in 1:3 cement sand mix finished in rough surface	m ²	222.00		

	Rate shall include for preparation of surfaces, cleaning down, smoothing, knotting, stopping, patching up cracks, etc., protection of floors and fittings, removing and replacing door and window fittings, if required, and cleaning upon completion.	Note			
	Rate shall include for painting of reveals etc.	Note			
	Rates shall include for protection of floors, fittings and cleaning upon completion.	Note			
	Paint brand should be CIC or equivalent and the approval for brand and colour should be obtained by the Engineer	Note			
J-01	Applying one coat of approved quality wall primer and two coats of approved quality weather shield paint to new walls .	m ²	222.00		
K	FLOORING				
	Locally manufactured Homogeneous floor tiles of approved quality (Rocell or equivalent), colour and variety with all specials in specified areas as per the BOQ straight joints in both ways including all shapes, corner and angles set in 12mm thick cement and sand (1:3) screed bedding with neat cement floating level and to slopes < 15° from horizontal and all joints shall be pointed with coloured tile grout to match with tiles.				
K-03	Supplying and laying 600mmx600mm Matt Homogeneous Floor Tiles with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar and , Tile laying by tile adhesive, pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). <i>Price range Rs.1,548.00-Rs.2,302.00</i>	m ²	70.00		
K-04	Supplying and laying 100mm high Matt Homogeneous Floor Tile Skirting with exceptional quality, including 12mm thick tile bedding in 1:3 cement sand mortar and pointing with tile grout similar to the colour of tiles.(Colour, pattern and the quality should be approved by the engineer). <i>Price range Rs.1,548.00 - Rs.2,302.00</i>	m	70.00		
L	TOTAL OF UPPER FLOOR ACCESS				
L	METAL WORK				
	Guard rails at upper floor entrance				

L-01	Supply , fabricate, install of metal guard rail to a hight of 1000mm with 50mm 2.0mm galvanized iron uprights at apprx 1200mm intervals from the concrete surface including necessary anchoring mechanism with base plate, welded, embedded into the concrete , 3 horizontal memers with 40mm 1.6mm diameter galvanized iron bars , top rail with 63mm 2.0mm galvanized iron bars as per the detailed drawing. Corners and edges should be finished smooth, shamfered, and the surface finish shall be applied 2 coats of anti corrosive paint with black mat color. Approval of the materia shall be obtained before commencement of the work.	m ²	64.00		
SUB TOTAL OF METALWORK					
M	DRAINAGE SYSTEM AND IMPROVEMENTS TO SURFACE				
M-01	Allow for additional improvements in the washroom facilities and disposal system	PS	1.00	800,000.00	800,000.00
M-01	Allow for additional improvements in the external finishes of the building, External services, drainage sytem, and improvement of road surface	PS	1.00	2,400,000.00	2,400,000.00
SUB TOTAL OF DRAINAGE SYSTEM AND IMPROVEMENTS TO SURFACE					3,200,000.00
N	LANDSCAPING WORK				
N-01	Random rubble masonry work in cement sand mortar 1:5 in wall foundations.	m3	25.00		
Total					
P	IMPROVEMENT OF LAND AND CANEL				
P-01	Allow for upgrading the canel and land next to the building	ps	1.00	50,000.00	50,000.00
					50,000.00

SCHEDULES

SCHEDULE OF MATERIAL AND STANDARDS

Bidders must tick "√" or "x" in the relevant cages. Propose if anything else

Work	Requirement by the client	Yes	No	Bidder's proposal (if any)
Back filling of soil	By gravel fill of approved quality			
	means of compaction by vibratory roller (1Ton)			
Anti Termite Treatment	Shall be performed by a specialized pest control service provider			
	10-year Warranty by the service provider			
Concrete work STDS – SCA/4/1 ES 5328 SLS1144	Screed concrete : byManual / Concrete mixer			
	Concrete of grade 20 or higher:: By Reedy mixed / Concrete mixer			
	Type of cement – SLS 107			
	Coarse Aggregate : SCA/4/1/4.1.3			
	Fine Aggregates : BS 410			
	Batching : Weight/Volume batching is accepted			
Rebar	Hot Rolled Mild Steel round bars : Conforms with SLS 26			
	Hot rolled High Yeild Steel bars : Conforms with BS 4449			
	Bar Schedules need to submit and obtain the approval before cutting and fabrication			
	Melbn, Langawa or other approved quality subject to approval of technical specifications and testing if required.			
Brick work	Bricks to comply with : SLS 39			
	Crushing strength : Above 5 N/mm ²			

	Brickwork as per SCA/4/1/6.2.1			
Random Rubble Work	Material as per ; SCA/4/1/7.2.1			
	Laying as per : SCA/4/1/7.2.1 Weathered stones not allowable			
Metal Work	Fillet welding (continuous type) at perpendicular joints			
	SCA/4/1/ table 9.1			
	Quality of Work : BS 449 part 2			
	Melwa/Langwa/Pakistan or approved quality with thickness as specified in the boq and drawings etc.,			
	Color and texture - Black matt 2 coats of anticorrosive paint			
Plaster work	Plaster finish to comply with : SCA/4/1/11.0			
	All the soffit plastering including the balcony area need to be done after applying one coat of wall filler			
	External wall texture : need uniformity throughout the building			
	Texture of reveals and thresholds shall be uniform with wall plaster			
Ceiling work	External side- at corridor :Asbestos Ceilings :- SLS 9			
	PVC ceiling ; Material – PE+/ Back Don/ I panel or similar of approved quality			
	Ceiling grid structure –acceptable guage thickness by the manufacturer of approved quality			
	Support from roof; By GI profiles of approved type supported at maximum of 1200mm spacing in both axis.			
	Not allowed for binding wired support and slanted support			
Roof covering	Bluescope/Metroof/Roof Mart or equivalent subject to conformity of technical requirements			

	High Tensile Zink Aluminium Coated profile			
	Az value -195 or above			
	Minimum Yeild stress – 550MPa			
	SCA/4/1/12.4			
	Roof color- Green			
Roof structure	Roof structure – With Galvanized Iron, lipped C channels 2.0mm thk			
	Roofing structure – Melwa Langwa, Roofmart, etc, from roof covering manufacturer subject to conformity of specification			
Tile work	Rocell or equivalent			
	Floor tiles – abrasion resistance and similar color and texture of the Anatomy laboratory			
	All the tiles of 600mmx600mm shall be laid with tile adhesive recommended by the manufacturer of the tiles or suitable adhesive.			
	Wall tiling – BS5385			
Aluminium Work	Extrusions- ALumex or equivalent			
	Powder coated White gloss			
	Door handles, hinges, sliding door locks etc,. with Chormium plated or equivalent			
	Glaze work : comply with BS 952			
	5mm thk clear glass with workmanship complies with BS CP 152			
Sanitary Fittings	American Std// Grohe/Rocell or equivalent			
	Minimum 10 year warranty for ceramic wares			
	Chromium plated accessories.			

	Standards : BS 6465, BS 5503 for water closets, SLS 377 for wsh basins, BS 5520 for urinals			
Plumbing work	Z Ion/National/ Anton or equivalent			
	PNT values – As specified in the BoQs			
	Inspection and testing of pipe connections :- 12.3 of BS 5572			
	BS 3505 for pressure pipes, Bs 4576 for Storm water pipes, BS 4514 for soil and waste water pipes			
Electrical fittings	Ceiling Fans : KDK or equivalent			
	Bulbs- Philips or equivalent			
	Plug tops and switches – Kevilton or equivalent			
	Wiring – Fire rated and ACL, Kelani or equivalent			
	Conduits, sunk boxes – Polychrome or equivalent			
	RCCB, MCB and main switches – Shiendler or equivalent.			
	Lamp fittings – BS 4533			
	Distribution boards – As staded in the BoQ conforms to BS EN 60439			
Paint	Internal and external paint : Akzonoble, CIC paints or equivalent			
	Colors to match with nearby building			

Proposal(s) by the Bidder

Bidder can propose any additional improvements/suggestions to the proposed building/surroundings to be carried out free of charge in addition to the schedules of material and standards, drawings and specifications laid in this document by specifying in the chart attached herewith or by an annexure with the bid document. This will be considered during the evaluation of the bids in terms of financial values of the proposal, benefits of the employer with the time etc.,

	Proposal by the bidder	Location of the building
1		
2		
3		

Please attach document if the space above is not adequate

.....
Authorized Signature of the bidder

1.Scope of Work

All the installation works in the Bill of Quantities (BOQ) perform the work according to the Building Standards. The contractor shall be responsible for supply and install of BOQ items and testing, commissioning and maintaining of fully functional Local Area Network (LAN) as specified herein, indicated on the drawings issued during the installations or/and as instructed by Engineer.

The bidder should visit the site and carry out necessary inspection and measurement as are necessary before submitting the bidding document. The distance given are only for bidding purposes. Bidders shall be responsible to assess actual lengths of cables and path etc before bidding.

2.Warranty and Support

1. All cabling works (passive) shall have 20 years' systems warranty issued by the manufacturer. Contractor shall supervise and guide staff in maintaining to obtaining 20 years' system warranty.
2. Manufacturer Authorization letters shall submit for the active and passive equipment.
3. Data sheets for active and passive equipment shall be provided.
4. Network enclosure and other items should clean within the free maintenance period.

TECHNICAL SCHEDULES
OF
LOCAL AREA NETWORK SYSTEM

1.1) 8 Ports 10/100/1000 Layer 2 Switch

Minimum Technical Specifications		Bidder Response (Yes / No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of Origin		
4	Country of Manufacture		
5	Manufacturer should be ISO 9001 accredited		
6	Manufacturer authorization should be provided		
7	3 Year Comprehensive Warranty and Services with Guaranteed SLA of 1 hour On Site Presence for All Service Related Issues.		
8	Switching Features		
8.1	Switch should offer Wire-Speed Switching and Routing.		
9	Network Interfaces		
9.1	Should consist of at least 8 Nos of 1 Gbps supporting RJ-45 ports		
9.2	Should consist of at least 2 nos of built in SFP Interfaces		
10	Switch Performance		
10.1	Duplex switching capacity should be at least 20 Gbps or higher		
10.2	The Switch throughput capacity should be at least 30 Mpps or higher		
10.3	Should consist of at least 256MB of system DRAM		
10.4	Should consist of at least 32GB of system flash memory		
10.5	Dedicated packet buffer capacity should be at least 512KB		
10.6	Network latency should be less than < 4μs		
11	Switch Management		
11.1	The Switch should support HTTPS, SSH and SNMP		
11.2	Should be supported to GUI based and console based device management system		
11.3	Should support Sflow for traffic analysis		
11.4	Should support software defined networking		
11.5	Should consist of a console port for serial console management		
11.6	Should consist of a RJ45 Ethernet port for out of band network management		
12	Layer-2 Switching Features		
12.1	The Switch should support at least 4,000 IEEE 802.1q VLANs and should have full layer-2 manageable features.		
12.2	Should support private VLAN based network segmentation		
12.3	The Switch should support Minimum 8,000 MAC Address Table		
12.4	Should support IEEE 802.1w		
12.4	Should support IEEE 802.1s		
13	Network Security Features		

13.1	Should support IEEE 802.1X port-level access control			
13.2	Should support MAC based access control			
14	Multicasting			
14.1	Should support IGMP snooping			
15	Power	Should consist of a power supply system operating at 220v-240V/ 50Hz		
16	Reliability			
16.1	MTBF > 10 years			
17	Industrial compliance			
17.1	Should meet FCC compliance			
17.2	Should be UL validated			
18	Operational Parameters			
18.1	Operating temperature	0°C to 45°C		
18.2	Operating relative humidity	10-90%		
19	Support Services			
19.1	All defective parts should be replaced Free of Charge with the brand-new parts during the warranty period from manufacture's authorized Technical team			
19.2	Original equipment manufacturer should maintain all required spare parts in an independent in country parts depot or distributor warehouse.(proof documents should be attached along with the bid)			
19.3	Should have 24x7 access to the manufacturer's customer service or nominated distributor support center via phone and email for requesting troubleshooting assistance.			

1.2) 24 Ports 10/100/1000 (PoE 12 ports) Layer 2 Switch

Minimum Technical Specifications		Bidder Response (Yes / No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of Origin		
4	Country of Manufacture		
5	Manufacturer should be ISO 9001 accredited		
6	Manufacturer authorization should be provided		
7	3 Year Comprehensive Warranty and Services with Guaranteed SLA of 1 hour On Site Presence for All Service Related Issues.		
8	Switching Features		
8.1	Switch should offer Wire-Speed Switching and Routing.		
9	Network Interfaces		
9.1	Should consist of at least 24 Nos of 1 Gbps supporting RJ-45 ports		
9.2	Should consist of at least 4 nos of built in SFP		

	Interfaces			
10	Power over Ethernet Features			
10.1	12 nos of RJ-45 ports should support power over Ethernet feature with a power budget of at least 180 Watts			
10.2	All ports should support IEEE 802.3at			
11	Switch Performance			
11.1	Duplex switching capacity should be at least 55 Gbps or higher			
11.2	The Switch throughput capacity should be at least 80 Mpps or higher			
11.3	Should consist of at least 256MB of system DRAM			
11.4	Should consist of at least 32GB of system flash memory			
11.5	Dedicated packet buffer capacity should be at least 512KB			
11.6	Network latency should be less than < 4µs			
12	Switch Management			
12.1	The Switch should support HTTPS, SSH and SNMP			
12.2	Should be supported to GUI based and console based device management system			
12.3	Should support Sflow for traffic analysis			
12.4	Should support software defined networking			
12.5	Should consist of a console port for serial console management			
12.6	Should consist of a RJ45 Ethernet port for out of band network management			
13	Layer-2 Switching Features			
13.1	The Switch should support at least 4,000 IEEE 802.1q VLANs and should have full layer-2 manageable features.			
13.2	Should support private VLAN based network segmentation			
13.3	The Switch should support Minimum 8,000 MAC Address Table			
13.4	Should support IEEE 802.1w			
13.4	Should support IEEE 802.1s			
14	Network Security Features			
14.1	Should support IEEE 802.1X port-level access control			
4.2	Should support MAC based access control			
15	Multicasting			
15.1	Should support IGMP snooping			
16	Power	Should consist of a power supply system operating at 220v-240V/ 50Hz		
17	Reliability			
17.1	MTBF > 10 years			
18	Industrial compliance			
18.1	Should meet FCC compliance			
18.2	Should be UL validated			
19	Operational Parameters			
19.1	Operating temperature	0°C to 45°C		
19.2	Operating relative humidity	10-90%		
20	Support Services			
20.1	All defective parts should be replaced Free of Charge with the brand-new parts during the			

	warranty period from manufacture's authorized Technical team		
20.2	Original equipment manufacturer should maintain all required spare parts in an independent in country parts depot or distributor warehouse.(proof documents should be attached along with the bid)		
20.3	Should have 24x7 access to the manufacturer's customer service or nominated distributor support center via phone and email for requesting troubleshooting assistance.		

1.3 1G Multi-Mode LC SFP Transceiver

Minimum Technical Specifications		Bidder Response (Yes / No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of Origin		
4	Country of Manufacture		
5	Manufacture Authorization		
6	3 Year Comprehensive Warranty and Services with Guaranteed SLA of 1 hour On Site Presence for All Service Related Issues.		
7	Compatibility and Type		
7.1	The fiber optical transceiver Should be from the original network switch manufactures		
7.2	Adequate technical literature should be provided to validate the compatibility with the quoted switch models.		
7.3	Should support Multimode fiber optical cabling infrastructure		
8	Bandwidth		
8.1	Should support 1 Gbps bandwidth		
9	Original Equipment Manufacturer Support Services		
9.1	All defective parts should be replaced Free of Charge with the brand-new parts during the warranty period from manufacture's authorized support center or by a manufacturer authorized in country distributor. Documentary evidence shall be provided		
9.2	Original equipment manufacturer or manufacturer nominated in country distributor should maintain a 24x7 technical support desk, complete details of the support escalation procedure should be provided.		

1.4 – Multi-Mode LC SFP Transceiver it should compatible with Fortiswitch 108E- FPOE

2.1) 650 VA UPS with 10 Minutes (Minimum) Backup Time

Item	Minimum Requirement	Compliance	
		Yes/ No	Bidder's Response
Type	Line Interactive		
Output power	650 VA or higher as required		
Input / Output Voltage	230V		
Nominal frequency	50-60Hz		
Battery backup time (Full Load)	Minimum 10 minutes		
Protection	Power failures, Battery discharge, Poor battery, abnormal UPS behaviors must be alarmed through Audible Alarms and Lighting (LEDs)		
Warranty and support	2 years comprehensive warranty or above		
Model Details	Related Data Sheet		
Make			
Country of Origin			
Country of Manufacture			

3.1) 24-Ports CAT6 UTP Fully Loaded Patch Panel

Minimum Technical Specifications		Bidder Response (Yes/No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of origin		
4	Country of manufacture		
5	Manufacture authorization should be provided		
6	25 years system performance warranty should be provided		
7	5 year component warranty should be provided		
8	Product Features		
8.1	The 24 Ports Category 6 Patch Panel should be from the same structured cabling manufacturer		
8.2	Patch panel should be populated with 24 number of slots for direct cable termination with compatible keystone modules		
8.3	The patch panel should consist of a built-in rear cable management bar.		
8.4	Should be purpose built of for transmission of digital and analogue voice, image and data signals.		
8.5	The patch panel should consist of a holder for easy individual port identification.		

4.1) Cable Management Panel

Minimum Technical Specifications		Bidder Response (Yes / No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of Origin		
4	Country of Manufacture		
5	3 Year product warranty should be provided		
6	Manufacturer should be ISO 9001 accredited		
7	Manufacture authorization should be provided		
8	Product Features		
8.1	Should be 1 RU (rack unit) height		
8.2	Should be 19" Rack Mountable		
8.3	Should consist of a front cover		
9	Accessories		
9.1	Should include all related auxiliary mounting and cable routing components required for the installation		

5.0 Technical Specifications for Category 6 UTP Cable

Minimum Technical Specifications		Bidder Response (Yes /No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of origin		
4	Country of manufacture		
5	Manufacture authorization should be provided		
6	25 years system performance warranty should be provided		
7	Should provide a 05-year component warranty		
8	Cable Features		
8.1	Conductor should be 23 AWG bare copper wire		
8.2	The cable outer sheath should be low smoke zero halogen (LSOH) type		
8.3	Should be rated for IEEE 802.3af & 802.3at Power Over Ethernet applications.		
8.4	Installed bend radius	At least ≥ 22 mm	
8.5	Tensile strength	≤ 90 N	
8.6	Should consist of cable pair separator for near end cross talk elimination		
9	Operational Features		
9.1	Permanent Link Performance should comply to the below		
	Frequency [MHz]	250MHz or better	
	Attenuation [dB/100m]	30dB or better	
	Return loss [dB]	20dB or better	
9.2	The cable should be available in 305m spool		

9.3	The CAT6 UTP cable shall comply with a crush resistance greater to 1,000N/10cm or higher			
10	Industrial Compliance			
10.1	ISO/IEC 11801			
10.2	EN 50173			
10.3	Zero Halogen	IEC 60754-1		
10.4	Flame propagation	IEC 60332		
10.5	Smoke density	IEC 61034		
10.6	Reaction to fire (Euroclasses)	EN 13501-6: Eca		

5.2 Single Faceplate with RJ45 Keystone Jacks and sun box

Item	Minimum Requirement	Compliance	
		Yes/ No	Bidder's Response
Ports	Complete Faceplate with shutters and CAT 6 (RJ45) Keystone Jacks		
Standards	IEEE802.3:10BASE-T, IEEE802.3u:100BASE-TX, IEEE 802.3ab: 1000BASE-T		
	ANSI/TIA/EIA 568-C.2 CAT 6 and ISO/IEC 11801 Class E		
	Product shall have a standard certification number		
Model Details	Bandwidth of 250 MHz or higher		
	Gold plated Jack contacts		
	Related Data Sheet / Technical Literature for the quoted model is attached with the bid		
Make			
Country of Origin			
Country of Manufacture			

5.4) Copper Testing and issuing a Test Report

Item	Minimum Requirement	Compliance	
		Yes/ No	Bidder's Response
Description	Fluke or similar		

6.1, 6.2) CAT 6, Unshielded Patch Cords & Ply Leads

Minimum Technical Specifications		Bidder Response (Yes/No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of origin		
4	Country of manufacture		
5	25 years system performance warranty should be		

	provided		
6	Product Features		
6.1	Unshielded Twisted Pair Category 6 rated RJ45 patch cord operating up to 250 MHZ.		
6.2	Should consist of a RJ45 plug (Category 6 rated) and a molded anti snagging type boot on both ends		
6.3	Shall meet the IEEE 802.3af PoE compliance		
6.4	Patch code color	Black	
6.5	Patch cord length	0.5m and 3.0m	
6.6	Should consist of AWG 24 or greater conductor		
6.7	Should support 1000BaseT data transfer speed		
6.8	All patch cords proposed shall be factory terminated at both ends, field terminated patch cords will not be acceptable.		
7	Industrial Compliance		
7.1	ISO/IEC 11801		
7.2	EN 50173		
7.3	IEC 61935-2		
7.4	TIA/EIA 568-C.2		

7.1 Multimode Fiber Optical Cable

Minimum Technical Specifications		Bidder Response (Yes / No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of Origin		
4	Country of Manufacture		
5	25 years system performance warranty should be provided		
6	Manufacturer should be ISO 9001 accredited		
7	Manufacture authorization should be provided		
8	Product Configuration		
8.1	6 core Multimode OM3 type Indoor/Outdoor type fiber optic cable		
8.2	Should be manufactured for Euroclass Dca standard or higher		
8.3	Should be metal free with built in rodent protection		
8.4	Should be loose tube type construction and glass armor		
8.5	Should Low Smoke Zero Halogen (LSOH) sheath		
8.6	Should consist of a two colors ripcords for easy identification and safe opening of the cable sheath.		
9	Industrial Standard Compliance		
9.1	Flame retardant	IEC 60332-1-2/3-24	
9.2	Tensile performance	IEC 60794-1-2 E1	
9.3	Crush resistance	IEC 60794-1-2 E3	
9.4	Impact	IEC 60794-1-2 E4	
9.5	Repeated bending	IEC 60794-1-2 E6	
9.6	Torsion	IEC 60794-1-2 E7	
9.7	Bending Radius	IEC 60794-1-2 E11	
9.8	Water penetration	IEC 60794-1-2 F5B	

7.2 LC Fiber Optic Patch panel 12

Minimum Technical Specifications		Bidder Response (Yes / No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of Origin		
4	Country of Manufacture		
5	25 years system performance warranty should be provided		
6	Manufacturer should be ISO 9001 accredited		
7	Manufacture authorization should be provided		
8	Product Features		

8.1	Should consist of 12 nos of duplex LC type multimode rated interfaces		
8.2	Should be of 1 RU (Rack Unit) height		
8.3	Should be 19" rack mountable		
8.4	Should consist of an integrated lockable metal drawer for secure routing of the fiber optical cables.		
8.5	Should consist of a 12-fiber accommodating splice tray with all mounting accessories		
8.6	All blank plates/ports should be fully covered		
9	Accessories		
9.1	Should include all required auxiliary components for the installation including splice tray, holders and cable holders.		

7.3 Splicing with Pigtail

Minimum Technical Specifications		Bidder Response (Yes / No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of Origin		
4	Country of Manufacture		
5	25 years system performance warranty should be provided		
6	Manufacturer should be ISO 9001 accredited		
7	Manufacture authorization should be provided		
8	Product Specifications		
8.1	The fiber patch cord should be multimode OM3 semi tight buffer 900µm LC type		
8.2	Should be available in 1m length		
8.3	Durability of connector/ ferrule should be at least 1000 mating cycles		
8.4	Ferrule type should be Zirconia		
8.5	Insertion loss shall be a maximum of 0.25 dB or better		
9	Industry Standard Compliance		
9.1	Should meet IEC 61300 compliance		

8.0 Network Rack

Minimum Technical Specifications		Bidder Response (Yes / No)	Technical References (Page Numbers)
1	Make		
2	Model		
3	Country of Origin		
4	Country of Manufacture		
5	Should provide manufacturer warranty certification for 3 Years for the Product		
6	Manufacturer Should ISO 9001 accredited		
7	Manufacturer authorization Should be provided		
8	Rack Construction and Design		
8.1	Should be at least 12U, 19" Rack with at least 400mm depth		
8.2	Should be constructed using sheet steel material		
8.3	Should consist of a glass lockable front door		
8.4	Should consist of at least 2 Cable Entry Grommets from the top of the Rack		
8.5	Should consist of a 230V/50Hz 2 pack AC Fan system with 1m long power cable		
8.6	Should consist of a grounding point within the rack enclosure		

Schedule 1 – General Information

- (i) If pre-qualification is done the bidders are required to include information subsequent to that submitted with the pre-qualification application.
- (ii) For joint ventures, each joint venture partner shall furnish information separately.

ITB Clause reference	Description	Information (to be filled by the Bidder)	Remarks
4.1 (a)	Legal Status		Provide certified copies of Registration
	Written power of attorney of the signatory to the Bid	Provide original or certified copy of the power of attorney attested by a Notary and label as attachment to Clause 4.1(a)	
	If a Joint Venture, names and addresses of Joint Venture Partners	1. 2. 3.	Provide a draft copy of the Joint Venture Agreement or alternatively the memorandum of understanding
	If a Joint Venture, name of Lead Partner		
	For joint ventures, each joint venture partner shall furnish Legal Status separately		
	Name (Lead partner)		Provide certified copies and label as attachment to Clause 4.1(a)
	Legal status		
	Place of registration		
	Principle place of business		
	Written power of attorney of the signatory to the Bid	Provide original or certified copy of the power of attorney attested by a Notary and label as attachment to Clause 5.1	
	VAT Registration Number		
	Name (Partner 2)		Provide certified copies and label as attachment to Clause 4.1 (a)
	Legal status		
	Place of registration		
	Principle place of business		

	Written power of attorney of the signatory to the Bid	<i>Provide original or certified copy of the power of attorney attested by a Notary and label as attachment to Clause 4.1 (a)</i>	
	VAT Registration Number		
	Name (Partner 3)		<i>Provide certified copies and label as attachment to Clause 4.1 (a)</i>
	Legal status		
	Place of registration		
	Principle place of business		
	Written power of attorney of the signatory to the Bid	<i>Provide original or certified copy of the power of attorney attested by a Notary and label as attachment to Clause 4.1 (a)</i>	
	VAT Registration Number		
4.2 (a)	ICTAD Registration		<i>Provide certified copies and label as attachment to Clause 4.2(a)</i>
	Registration number		
	Grade		
	Specialty		
	Expiry Date		

**Schedule 2 – Annual Turn-over Information
(Construction only – Last five years)**

- (i) *If pre-qualification is done the bidders are required to include information subsequent to that submitted with the pre-qualification application.*
- (ii) *For joint ventures, each joint venture partner shall furnish information separately.*

Year	Turn-over	Remarks
1		<i>Attach audited reports and label as attachment to Clause 4.2</i>
2		
3		
4		
5		

Schedule 3 – Adequacy of Working Capital

If pre-qualification is done the bidders are required to include information subsequent to that submitted with the pre-qualification application

Source of credit line	Amount	Remarks
		<i>Provide documentary evidence and label as attachment to Clause 4.2</i>
Total		

Schedule 4 – Construction Experience in last five years

- (i) *If pre-qualification is done the bidders are required to include information subsequent to that submitted with the pre-qualification application.*
- (ii) *For joint ventures, each joint venture partner shall furnish information separately.*

[illegible]

- *Provide documentary evidence and label as attachment to Clause 4.2*

Schedule 5 – Major Items of Construction Equipment Proposed	
Type	Capacity

Schedule 6 – Construction Management Staff			
A. Key Professionals			
Name	Position	Task	
B. Support Staff			
Name	Position	Task	

Schedule 8 – Work Programme

Sheet 1 of

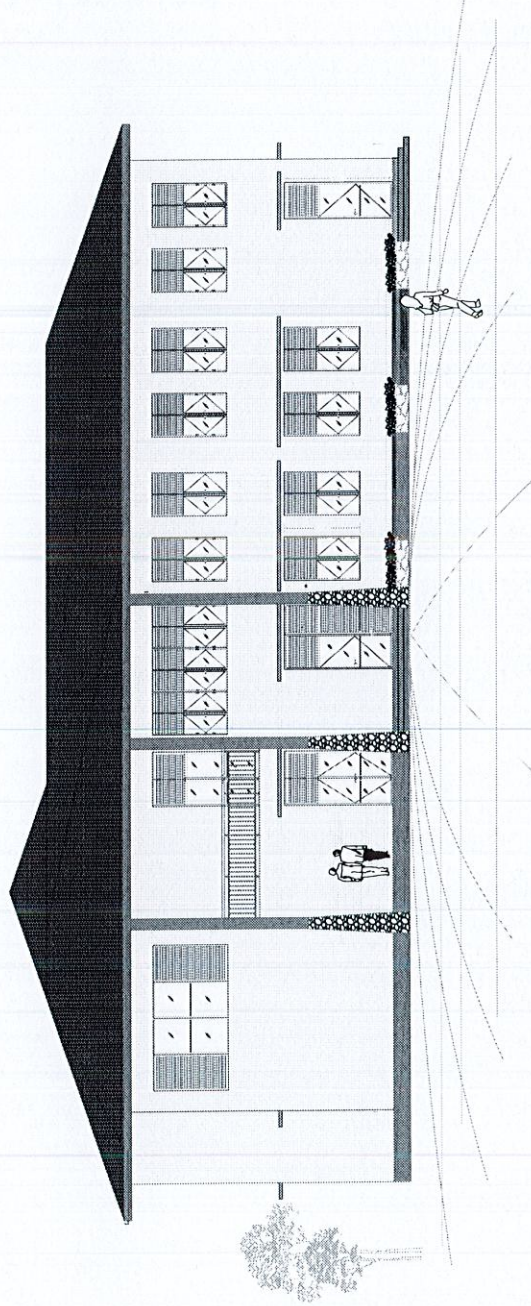
[1st, 2nd, etc. are months from the Start Date.]

[illegible]

Schedule 9 – Input percentages for Price Adjustment Formula		
Input Name <i>(Include major materials below the list, together with percentages for all inputs)</i>	ICTAD Reference for Indices	Percentage <i>(percentages listed should added to 90.0)</i>
Major plant	P1	
Small equipment	P2	
Skilled Labour	L1	
Unskilled Labour	L2	
	Total	90.0

DRAWINGS

ONLY FOR BIDDING PROCESS.
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FRONT ELEVATION

NOTE

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2. CONTRACTOR SHALL CHECK ALL THE DIMENSIONS GIVEN ON THE DRAWINGS AT SITE AND SHALL SUBMIT NECESSARY SHOP DRAWINGS TO THE ENGINEER FOR APPROVAL BY THE ENGINEER'S WORKS PRIOR TO IMPLEMENTING OF WORK.
3. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE STATED.
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7. IF ANY MISMATCH OR CONTRADICTION IN THE DRAWING DO NOT PROCEED WITHOUT CONSULTING THE ENGINEER.
8. THE CONSTRUCTION TECHNIQUES AND THE MATERIAL SHOULD BE IN ACCORDANCE WITH RELEVANT B.S.S AND CDA SPECIFICATIONS.

PROJECT:

Construction of Lecture Halls &
Examination Hall complex of the
Faculty of Medicine
Uva Wellasa University, Badulla.

CLIENT :

Vice Chancellor
Uva Wellasa University,
Badulla,
voffice@uw.ac.lk
083226400

ENGINEER :

Works Engineer
Uva Wellasa University,
Badulla,
faruk@uw.ac.lk
0773781343

CONTRACTOR :

FORM NO : UWC/FAW/NCB/125/02

DWG TITLE :

FRONT ELEVATION

DESIGN :	DRAWN :	CHECKED :	APPROVED :
Arch.Chaturanga Jayasinghe	Fazna	Works Engineer	Vice Chancellor

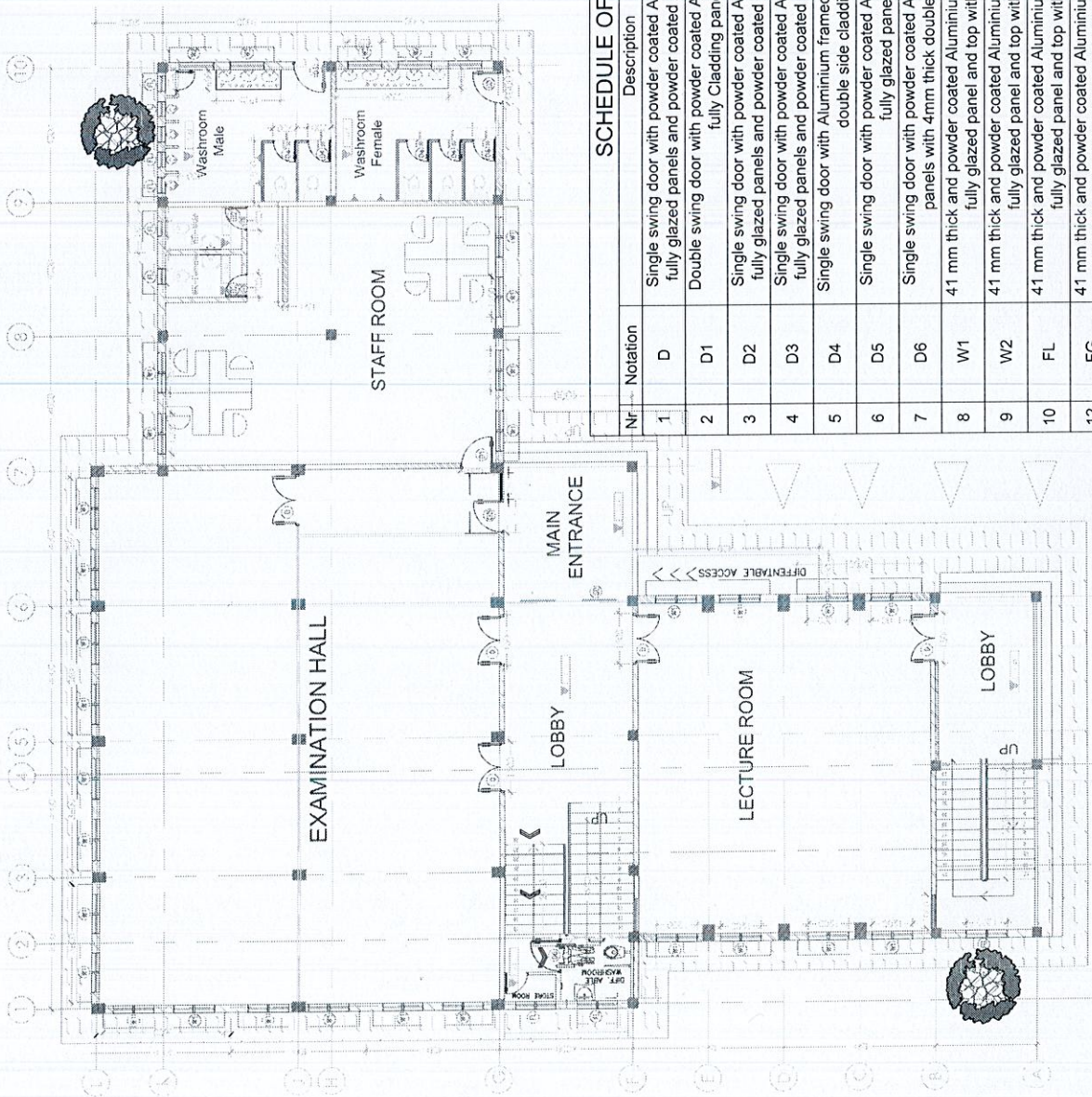
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DATE : 16.10.2025

DRAWING NO : UWC/2025/EXAM HALL/32/03

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299

- NOTE
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PROJECT:
**Construction of Lecture Halls &
Examination Hall complex of the
Faculty of Medicine
Uva Wellasa University, Badulla.**

CLIENT :
**Vice Chancellor
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0932226409**

ENGINEER :
**Works Engineer
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Badulla,
lanku@uw.ac.lk
0773791345**

CONTRACTOR :

JOB NO : UWU/ECW/NCh/75/102

DWG. TITLE :

GROUND FLOOR PLAN

DESIGN: Arch/Chathurani In-charge	DRAWN: Fazila Works Engineer	CHECKED: Vice Chancellor	APPROVED: Vice Chancellor
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SCALE : 1:100 DATE: 10.10.2024

DRAWING NO : UWU/ECW/EXAM/HALL/102/01

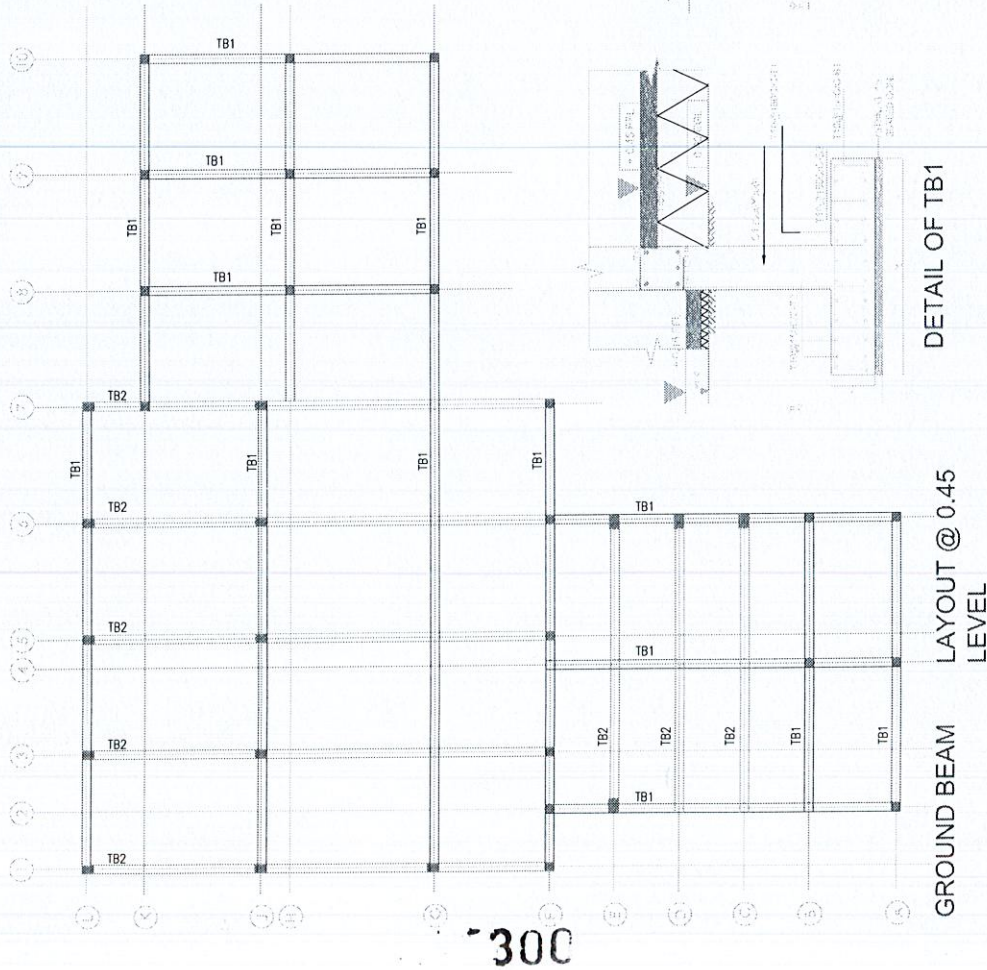
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SCHEDULE OF OPENINGS

Nr	Notation	Description	Dimensions (mm)	Quantity
1	D	Single swing door with powder coated Aluminium extrusions and fully glazed panels and powder coated Aluminium louvered top	1500 X 3000	4
2	D1	Double swing door with powder coated Aluminium extrusions and fully Cladding panels	1000 X 3000	2
3	D2	Single swing door with powder coated Aluminium extrusions and fully glazed panels and powder coated Aluminium louvered top	700 x 3000	1
4	D3	Single swing door with powder coated Aluminium extrusions and fully glazed panels and powder coated Aluminium louvered top	1000 X 3000	2
5	D4	Single swing door with Aluminium framed Cladded with 4mm thick double side cladding	700 X 1650	5
6	D5	Single swing door with powder coated Aluminium extrusions and fully glazed panels	1000 X 2100	1
7	D6	Single swing door with powder coated Aluminium extrusions and panels with 4mm thick double side cladding	1200 X 2100	1
8	W1	41 mm thick and powder coated Aluminium casement windows with fully glazed panel and top with fixed louvers	1200 X 2100	28
9	W2	41 mm thick and powder coated Aluminium casement windows with fully glazed panel and top with fixed louvers	1000 X 1500	5
10	FL	41 mm thick and powder coated Aluminium casement windows with fully glazed panel and top with fixed louvers	450 X 1500	7
12	FG	41 mm thick and powder coated Aluminium casement fixed glass of 5mm thick with fully glazed panel and top with fixed louvers	750 X 2100	1

GROUND FLOOR PLAN

ONLY FOR BIDDING PROCESS.
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GROUND BEAM LAYOUT

NOTE

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6. ALL GIVEN LEVELS ARE FINISH FLOOR LEVELS.
7. IF ANY MISMATCH OR CONTROVERSIAL IN THE DIMENSIONS ARE DETECTED, WITHOUT CONSULTING THE ENGINEER.
8. THE CONSTRUCTION TECHNIQUES AND THE MATERIAL SHOULD BE IN ACCORDANCE WITH RELEVANT IS/S AND OTHER SPECIFICATIONS.

PROJECT

Construction of Lecture Halls & Examination Hall complex of the Faculty of Medicine
Uva Wellasa University, Badulla.

CLIENT :

Vice Chancellor
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ENGINEER :

Works Engineer
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farook@uw.ac.lk
077781343

CONTRACTOR :

FIG NO : UMG / CW / NCB / 79 / 02

FIG TITLE :

GROUND BEAM LAYOUT

DESIGN	DRAWN	CHECKED	APPROVED
Arch/Challurani	Faruk	Works Engineer	Vice Chancellor
Iss: sample			

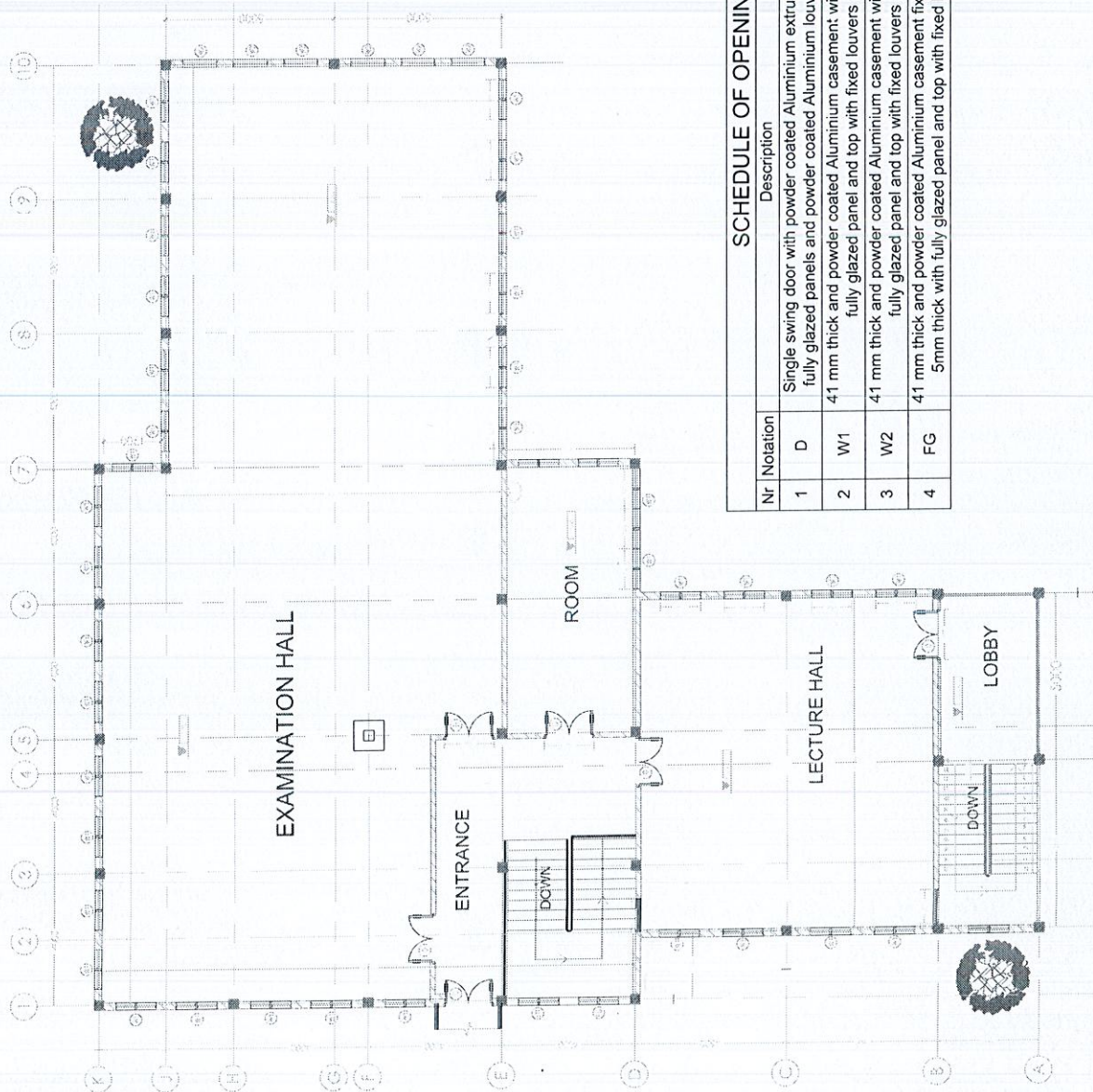
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DRAWING NO : UMG/CW/2023/EXAM HALL/ST/05

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SCHEDULE OF OPENINGS					
	Nr	Notation	Description	Dimensions (mm)	Quantity
	1	D	Single swing door with powder coated Aluminium extrusions and fully glazed panels and powder coated Aluminium lowered top	1500 X 3000	6
	2	W1	41 mm thick and powder coated Aluminium casement windows with fully glazed panel and top with fixed louvers	1200 X 2100	36
	3	W2	41 mm thick and powder coated Aluminium casement windows with fully glazed panel and top with fixed louvers	1000 X 1500	6
	4	FG	41 mm thick and powder coated Aluminium casement fixed glass of 5mm thick with fully glazed panel and top with fixed louvers		2

FIRST FLOOR PLAN

NOTE

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PROJECT

Construction of Lecture Halls & Examination Hall complex of the Faculty of Medicine
Uva Wellassa University, Badulla.

CLIENT

Vice Chancellor
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Badulla,
vcoffice@uw.ac.lk
0652226400

ENGINEER

Works Engineer
Uva Wellassa University,
Badulla,
farouk@uw.ac.lk
0773781343

CONTRACTOR :

JOB NO : UWU/CW/NCB/25/02

DWG TITLE :

FIRST FLOOR PLAN

DESIGNER	DRAWN	CHECKED	APPROVED
Arif Chaitam Jayasinghe	Farouk	Works Engineer	Vice Chancellor

SCALE : 1:100

DATE : 10.10.2025

DRAWING NO : UWU/CW/NCB/25/02/HALL/002

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DETAILS OF COLUMNS				
Nr	COLUMN NOTATION	X	Y	COVER
1	C1	300	300	30
2	C2	300	400	30
3	C3	350	500	30
4	CW1	150	2000	30
5	CW2	150	1500	30

THIS DRAWING TO BE READ IN CONJUNCTION
WITH ALL RELEVANT ARCHITECTURAL DRAWINGS.

- [illegible]

7. 10. 1993. 11. 10. 1993. 12. 10. 1993. 13. 10. 1993. 14. 10. 1993. 15. 10. 1993. 16. 10. 1993. 17. 10. 1993. 18. 10. 1993. 19. 10. 1993. 20. 10. 1993. 21. 10. 1993. 22. 10. 1993. 23. 10. 1993. 24. 10. 1993. 25. 10. 1993. 26. 10. 1993. 27. 10. 1993. 28. 10. 1993. 29. 10. 1993. 30. 10. 1993. 31. 10. 1993. 1. 11. 1993. 2. 11. 1993. 3. 11. 1993. 4. 11. 1993. 5. 11. 1993. 6. 11. 1993. 7. 11. 1993. 8. 11. 1993. 9. 11. 1993. 10. 11. 1993. 11. 11. 1993. 12. 11. 1993. 13. 11. 1993. 14. 11. 1993. 15. 11. 1993. 16. 11. 1993. 17. 11. 1993. 18. 11. 1993. 19. 11. 1993. 20. 11. 1993. 21. 11. 1993. 22. 11. 1993. 23. 11. 1993. 24. 11. 1993. 25. 11. 1993. 26. 11. 1993. 27. 11. 1993. 28. 11. 1993. 29. 11. 1993. 30. 11. 1993. 1. 12. 1993. 2. 12. 1993. 3. 12. 1993. 4. 12. 1993. 5. 12. 1993. 6. 12. 1993. 7. 12. 1993. 8. 12. 1993. 9. 12. 1993. 10. 12. 1993. 11. 12. 1993. 12. 12. 1993. 13. 12. 1993. 14. 12. 1993. 15. 12. 1993. 16. 12. 1993. 17. 12. 1993. 18. 12. 1993. 19. 12. 1993. 20. 12. 1993. 21. 12. 1993. 22. 12. 1993. 23. 12. 1993. 24. 12. 1993. 25. 12. 1993. 26. 12. 1993. 27. 12. 1993. 28. 12. 1993. 29. 12. 1993. 30. 12. 1993. 31. 12. 1993. 1. 1. 1994. 2. 1. 1994. 3. 1. 1994. 4. 1. 1994. 5. 1. 1994. 6. 1. 1994. 7. 1. 1994. 8. 1. 1994. 9. 1. 1994. 10. 1. 1994. 11. 1. 1994. 12. 1. 1994. 13. 1. 1994. 14. 1. 1994. 15. 1. 1994. 16. 1. 1994. 17. 1. 1994. 18. 1. 1994. 19. 1. 1994. 20. 1. 1994. 21. 1. 1994. 22. 1. 1994. 23. 1. 1994. 24. 1. 1994. 25. 1. 1994. 26. 1. 1994. 27. 1. 1994. 28. 1. 1994. 29. 1. 1994. 30. 1. 1994. 31. 1. 1994. 1. 2. 1994. 2. 2. 1994. 3. 2. 1994. 4. 2. 1994. 5. 2. 1994. 6. 2. 1994. 7. 2. 1994. 8. 2. 1994. 9. 2. 1994. 10. 2. 1994. 11. 2. 1994. 12. 2. 1994. 13. 2. 1994. 14. 2. 1994. 15. 2. 1994. 16. 2. 1994. 17. 2. 1994. 18. 2. 1994. 19. 2. 1994. 20. 2. 1994. 21. 2. 1994. 22. 2. 1994. 23. 2. 1994. 24. 2. 1994. 25. 2. 1994. 26. 2. 1994. 27. 2. 1994. 28. 2. 1994. 29. 2. 1994. 30. 2. 1994. 31. 2. 1994. 1. 3. 1994. 2. 3. 1994. 3. 3. 1994. 4. 3. 1994. 5. 3. 1994. 6. 3. 1994. 7. 3. 1994. 8. 3. 1994. 9. 3. 1994. 10. 3. 1994. 11. 3. 1994. 12. 3. 1994. 13. 3. 1994. 14. 3. 1994. 15. 3. 1994. 16. 3. 1994. 17. 3. 1994. 18. 3. 1994. 19. 3. 1994. 20. 3. 1994. 21. 3. 1994. 22. 3. 1994. 23. 3. 1994. 24. 3. 1994. 25. 3. 1994. 26. 3. 1994. 27. 3. 1994. 28. 3. 1994. 29. 3. 1994. 30. 3. 1994. 31. 3. 1994. 1. 4. 1994. 2. 4. 1994. 3. 4. 1994. 4. 4. 1994. 5. 4. 1994. 6. 4. 1994. 7. 4. 1994. 8. 4. 1994. 9. 4. 1994. 10. 4. 1994. 11. 4. 1994. 12. 4. 1994. 13. 4. 1994. 14. 4. 1994. 15. 4. 1994. 16. 4. 1994. 17. 4. 1994. 18. 4. 1994. 19. 4. 1994. 20. 4. 1994. 21. 4. 1994. 22. 4. 1994. 23. 4. 1994. 24. 4. 1994. 25. 4. 1994. 26. 4. 1994. 27. 4. 1994. 28. 4. 1994. 29. 4. 1994. 30. 4. 1994. 31. 4. 1994. 1. 5. 1994. 2. 5. 1994. 3. 5. 1994. 4. 5. 1994. 5. 5. 1994. 6. 5. 1994. 7. 5. 1994. 8. 5. 1994. 9. 5. 1994. 10. 5. 1994. 11. 5. 1994. 12. 5. 1994. 13. 5. 1994. 14. 5. 1994. 15. 5. 1994. 16. 5. 1994. 17. 5. 1994. 18. 5. 1994. 19. 5. 1994. 20. 5. 1994. 21. 5. 1994. 22. 5. 1994. 23. 5. 1994. 24. 5. 1994. 25. 5. 1994. 26. 5. 1994. 27. 5. 1994. 28. 5. 1994. 29. 5. 1994. 30. 5. 1994. 31. 5. 1994. 1. 6. 1994. 2. 6. 1994. 3. 6. 1994. 4. 6. 1994. 5. 6. 1994. 6. 6. 1994. 7. 6. 1994. 8. 6. 1994. 9. 6. 1994. 10. 6. 1994. 11. 6. 1994. 12. 6. 1994. 13. 6. 1994. 14. 6. 1994. 15. 6. 1994. 16. 6. 1994. 17. 6. 1994. 18. 6. 1994. 19. 6. 1994. 20. 6. 1994. 21. 6. 1994. 22. 6. 1994. 23. 6. 1994. 24. 6. 1994. 25. 6. 1994. 26. 6. 1994. 27. 6. 1994. 28. 6. 1994. 29. 6. 1994. 30. 6. 1994. 31. 6. 1994. 1. 7. 1994. 2. 7. 1994. 3. 7. 1994. 4. 7. 1994. 5. 7. 1994. 6. 7. 1994. 7. 7. 1994. 8. 7. 1994. 9. 7. 1994. 10. 7. 1994. 11. 7. 1994. 12. 7. 1994. 13. 7. 1994. 14. 7. 1994. 15. 7. 1994. 16. 7. 1994. 17. 7. 1994. 18. 7. 1994. 19. 7. 1994. 20. 7. 1994. 21. 7. 1994. 22. 7. 1994. 23. 7. 1994. 24. 7. 1994. 25. 7. 1994. 26. 7. 1994. 27. 7. 1994. 28. 7. 1994. 29. 7. 1994. 30. 7. 1994. 31. 7. 1994. 1. 8. 1994. 2. 8. 1994. 3. 8. 1994. 4. 8. 1994. 5. 8. 1994. 6. 8. 1994. 7. 8. 1994. 8. 8. 1994. 9. 8. 1994. 10. 8. 1994. 11. 8. 1994. 12. 8. 1994. 13. 8. 1994. 14. 8. 1994. 15. 8. 1994. 16. 8.

BAR TYPE
T-1 or R-Mid Steel

BAR LOC.
T-Top, B-Bottom

BAR SPA

THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL DIMENSIONS BEFORE COMMENCING WORK.

COLUMNS LAYOUT @ 0.45 LEVEL

ALL THE ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH RELEVANT STRUCTURAL DRAWINGS PRIOR TO EXECUTION OF THE WORKS.

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NO DIMENSIONS TO BE OBTAINED FROM DRAWING. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.

ALL GIVEN LEVELS ARE FINISH FLOOR LEVELS.

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Construction of Lecture Halls & Examination Hall complex of the Faculty of Medicine
Uva Wellasa University, Badulla.

Vice Chancellor
Uva Wellassa University,
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vceoffice@uwu.ac.lk
0552226400

Works Engineer
Uva Wellasa University,
Badulla,
arouk@uwu.ac.lk
9773781343

CONTRACTOR :

FOR NO: UWU/CW/NCR/75/02

DWG. TITLE;

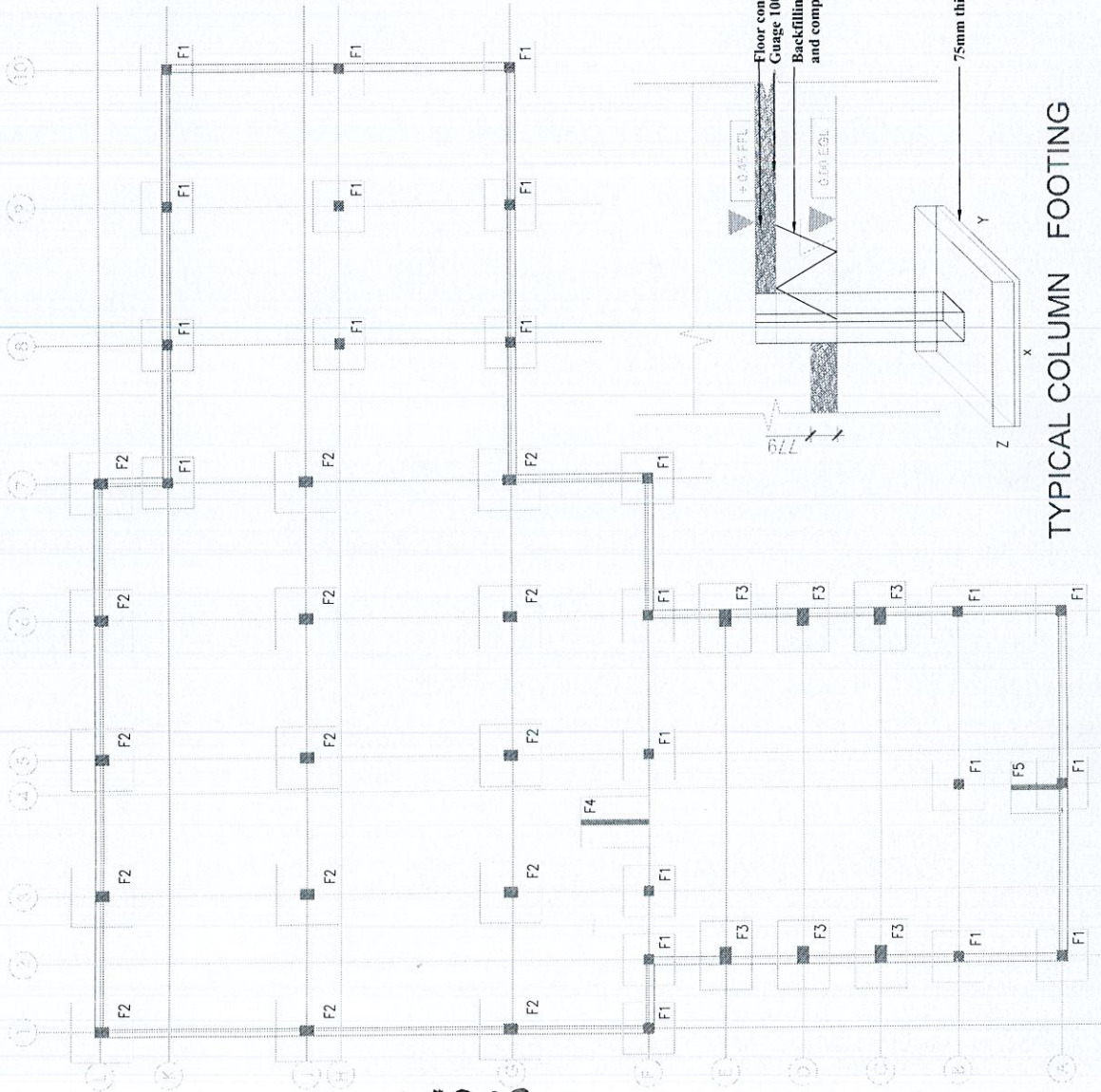
COLUMN LAYOUT - 01

| DESIGN : | DRAWN : | CHECKED : | APPROVED : |
|--------------------------|---------|----------------|-----------------|
| Ach Chhabra
Jav, ashp | Fuzia | Works Engineer | Vice Chancellor |

SCALE: 1:100
DRAWING NO: 1

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ONLY FOR BIDDING PROCESS.
NOT FOR CONSTRUCTION.



TYPICAL COLUMN FOOTING

- NOTE
1. ALL THE ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH RELEVANT STRUCTURAL DRAWINGS PRIOR TO EXECUTION OF THE WORKS.
 2. CONTRACTOR SHALL CHECK ALL THE DIMENSIONS GIVEN ON THE DRAWINGS AT SITE AND SHALL SUBMIT NECESSARY SHOP DRAWINGS AND MATERIAL DATA FOR APPROVAL OF THE ENGINEER PRIOR TO IMPLEMENTING OF WORK.
 3. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE STATED.
 4. ALL THE DIMENSIONS AND LEVELS MUST BE CHECKED AT SITE BEFORE CONSTRUCTION.
 5. NO DIMENSIONS TO BE SCALED FROM DRAWING. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
 6. ALL GIVEN LEVELS ARE FINISH FLOOR LEVELS.
 7. IF ANY DISMATCH OR CONTRADICTION IN THE DRAWING DO NOT PROCEED WITHOUT CONSULTING THE ENGINEER.
 8. THE CONSTRUCTION TECHNIQUES AND THE MATERIAL SHOULD BE IN ACCORDANCE WITH RELEVANT B.S.S AND C.O.A SPECIFICATIONS.

PROJECT:
Construction of Lecture Halls & Examination Hall complex of the Faculty of Medicine
Uva Wellassa University, Badulla.

CLIENT :
Vice Chancellor
Uva Wellassa University,
Badulla,
vuw@uw.ac.lk
095225400

ENGINEER :
Works Engineer
Uva Wellassa University,
Badulla,
farouk@uw.ac.lk
0773781343

CONTRACTOR :

JOB NO. : U.WU/CW/NCB/25/02
DWG. TITLE :
FOOTING LAYOUT

| DESIGNER : | DRAWN : | CHECKED : | APPROVED : |
|--------------------------|---------|----------------|-----------------|
| Arch.Chandani Jayasinghe | Luzia | Works Engineer | Vice Chancellor |

| | |
|--|-------------------|
| SCALE : 1:100 | DATE : 10.10.2025 |
| DRAWING NO. : U.WU/CW/25/EXAM HALL/ST/01 | |

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ONLY FOR BIDDING PROCESS.
NOT FOR CONSTRUCTION.

| SCHEDULE OF COLUMNS | | | | COLUMN REINFORCEMENT DETAIL | |
|---------------------|-----------------|-----------|--------|-----------------------------|----------------------|
| FLOOR | COLUMN NOTATION | DIMENSION | | | |
| | | LENGTH | BREATH | | |
| 1 | C1 | 300 | 300 | | |
| 2 | C2 | 300 | 300 | | |
| 3 | C3 | 225 | 225 | | |
| 4 | CW1 | 2000 | 150 | | |
| 5 | CW2 | 1500 | 150 | | |
| 6 | C4 | 300 | 300 | | Upto 6-15 level only |
| 7 | C5 | 300 | 300 | | |
| 8 | C6 | 225 | 225 | | |

COLUMN LAYOUT

- NOTE
1. ALL THE ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH RELEVANT SPECIFICATIONS, STANDARDS, CODES, AND SCHEDULES TO BE FOLLOWED.
 2. CONTRACTOR SHALL CHECK ALL THE DIMENSIONS GIVEN ON THE DRAWINGS AT SITE AND REPORT TO THE ENGINEER IN WRITING. APPROVAL BY THE ENGINEER IS REQUIRED PRIOR TO IMPLEMENTING OF WORK.
 3. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE STATED.
 4. ALL THE DIMENSIONS AND LEVELS MUST BE CHECKED AT SITE BEFORE CONSTRUCTION.
 5. NO DIMENSIONS TO BE SCALED FROM DRAWING. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
 6. ALL GIVEN LEVELS ARE FINISH FLOOR LEVELS.
 7. IF ANY MISMATCH OR CONTRADICTION IN THE DRAWINGS DO NOT PROCEED WITHOUT CONSULTING THE ENGINEER.
 8. THE CONSTRUCTION TECHNIQUES AND THE MATERIALS TO BE USED SHALL BE IN ACCORDANCE WITH RELEVANT B.S.S.S AND CIDA SPECIFICATIONS.

PROJECT:
Construction of Lecture Halls & Examination Hall complex of the Faculty of Medicine
Uva Wellassa University, Badulla.

CLIENT :
Vice Chancellor
Uva Wellassa University,
Badulla,
vuw.ac.lk
0952226400

ENGINEER
Works Engineer
Uva Wellassa University,
Badulla,
farook@vuw.ac.lk
0773791343

CONTRACTOR :

DIB NO : UWG / CW / NCW / 74 / 02

PNWG TITLE :

COLUMN LAYOUT - 03

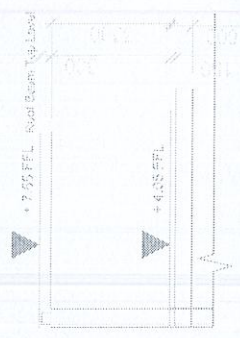
| DRAWN | CHECKED | APPROVED |
|--------|----------------|-----------------|
| Farook | Works Engineer | Vice Chancellor |

SCALE : VARIES

DATE: 10.10.2023

DRAWING NO : UWG/CW/NCW/AM/HALL/74/04

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305

COLUM

1. ALL THE ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH RELEVANT STRUCTURAL DRAWINGS PRIOR TO Erection OF THE WORKS
2. CONTRACTOR SHALL CHECK ALL THE DIMENSIONS GIVEN IN THE DRAWINGS AT SITE PRIOR TO CONSTRUCTION OF THE STRUCTURE. DRAWINGS, SAMPLES & TECHNICAL DATA FOR APPROVAL BY THE ENGINEER 02 WEEKS PRIOR TO IMPLEMENTING OF WORK.
3. ALL DIMENSIONS ARE GIVEN IN MILLIMETERS UNLESS OTHERWISE STATED.
4. ALL THE DIMENSIONS AND LEVELS MUST BE CHECKED AT SITE BEFORE CONSTRUCTION.
5. NO DIMENSIONS TO BE SCALED FROM DRAWING. ONLY WRITTEN DIMENSIONS TO BE FOLLOWED.
6. ALL GIVEN LEVELS ARE PRIOR 4.000 LEVELS.
7. IF ANY MISMATCH OR CONTRADICTION IN THE DRAWING DO NOT PROCEED WITHOUT CONSULTING THE ENGINEER.
8. THE CONSTRUCTION TECHNIQUES AND THE RELEVANT B.S.S.2 AND A.C.S.2 SPECIFICATION SHALL BE FOLLOWED.

**Construction of Lecture Halls &
Examination Hall complex of the
Faculty of Medicine
Uva Wellasa University, Badulla.**

Vice Chancellor
Uva Wellassa University,
Badulla.

Works Engineer
Uva Wellassa University,
Badulla.
farouk@uwu.ac.lk

DOI: 10.1002/anie.200714111

COLUMN LAYOUT - 02

| DESIGN : | DRAWN : | CHECKED : | APPROVED : |
|----------------------------|---------|----------------|-----------------|
| Arch Chathurani Jayasinghe | Puzna | Woods Engineer | Vice Chancellor |

SCALE: 1:160 DATE: 10.10.2025

DRAWING NO: UWC/CV/2025/EXAM HALL/ST/03

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1. THIS DRAWING TO BE READ IN CONJUNCTION WITH ALL RELEVANT ARCHITECTURAL DRAWINGS.

2. CONCRETE GRADE
Binding concrete = C15
Slab-on-potential C25
Walls = C20
Columns and vertical shafts C25
All other support structure elements C25
3. JOINTS, JOINTS BETWEEN INDICES
CLASS OF JOINTS BETWEEN JOINTS
TO BE AS FOLLOWS:
- COLUMN - Joints
- Beam - Joints
- Beam and Slab - Joints
4. NUMBER OF JOINTS BETWEEN JOINTS TO BE JOINTS
SHOWN IN JOINTS
5. THE JOINTS
6. JOINTS BETWEEN JOINTS TO BE JOINTS
SHOWN IN JOINTS

| DETAILS OF COLUMNS | | | | |
|--------------------|-----------------|-----|-----|-------|
| Nr | COLUMN NOTATION | X | Y | COVER |
| 1 | C4 | 300 | 300 | 30 |
| 2 | C5 | 300 | 300 | 30 |
| 3 | C6 | 225 | 225 | 5 |

BAR TYPE
T-Tor. R-Mild Steel

BAR SPACING

BAR MARK

T-Top, B-Bottom

7. THE CONTRACTOR IS RESPONSIBLE FOR VERIFYING ALL DIMENSIONS BEFORE COMMENCING WORK.

7

1. ALL THE ARCHITECTURAL DRAWINGS TO BE READ IN CONJUNCTION WITH RELEVANT STRUCTURAL DRAWINGS PRIOR TO EXECUTION OF THE WORKS.

2. CONTRACTOR SHALL CHECK ALL THE DIMENSIONS GIVEN ON THE DRAWINGS AT SITE AND SHALL SUBMIT NECESSARY SHOP DRAWINGS, SAMPLES & TECHNICAL DATA FOR APPROVAL OF THE ENGINEER PRIOR TO IMPLEMENTING OF WORK.
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7. IF ANY MISMATCH OR CONTRADICTION IN THE DRAWINGS DO NOT PROCEED WITHOUT CONSULTING THE ENGINEER.
8. THE CONSTRUCTION TECHNIQUES AND THE MATERIAL SHALL BE IN ACCORDANCE WITH RELEVANT B.S.S & IS & CIP&S SPECIFICATIONS.

Construction of Lecture Halls & Examination Hall complex of the Faculty of Medicine
Uva Wellasa University, Badulla.

Vice Chancellor
Uva Wellassa University,
Badulla.
vcoffice@uwu.ac.lk
0552226400

Works Engineer
Uva Wellasa University,
Badulla.
farouk@uwu.ac.lk
0773781343

CONTRACTOR :

FORM NO: CW/20/NCB/2592

DOC TITLE :

ROOF PLAN

| DESIGN : | DRAWN : | CHECKED : | APPROVED : |
|------------------------------|---------|----------------|-----------------|
| Arch Chathuram
Jayasindhe | Purna | Works Engineer | Vice Chancellor |

THE UNIVERSITY OF CHICAGO

ATE-10-19-2025

DRAWING NO. 1-WPCW2025TXAMHALLAR-34

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STANDARD FORMS [BID]

1001

FORM OF BID SECURITY

[this Guarantee form shall be filled in accordance with the instructions indicated in brackets]

----- [insert issuing agency's name, and address of issuing branch or office]

Beneficiary: Vice Chancellor, Uva Wellassa University, Passara Road Badulla
[insert (by PE) name and address of Employer]

Date: ----- [insert (by issuing agency) date]

BID GUARANTEE No.: ----- [insert (by issuing agency) number]
We have been informed that ----- [insert (by issuing agency) name of the Bidder] (hereinafter called "the Bidder") has submitted to you its bid dated ----- [insert (by issuing agency) date] (hereinafter called "the Bid") for the execution of [Construction of the Examination Hall Complex for the Faculty of Medicine of Uva Wellassa University] under Invitation for Bids No. UWU/CW/NCB/25/02

Further more, we understand that, according to your conditions, Bids must be supported by a Bid Guarantee.

At the request of the Bidder, we ----- [insert name of issuing agency] hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of ----- [insert amount in figures] ----- [insert amount in words] upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the bid conditions, because the Bidder:

- (a) has withdrawn its Bid during the period of bid validity specified; or
- (b) does not accept the correction of errors in accordance with the Instructions to Bidders (hereinafter "the ITB") of the IFB; or
- (c) having been notified of the acceptance of its Bid by the Employer/Purchaser during the period of bid validity, (i) fails or refuses to execute the Contract Form, if required, or (ii) fails or refuses to furnish the Performance Security, in accordance with the ITB.

This Guarantee shall expire: (a) if the Bidder is the successful bidder, upon our receipt of copies of the Contract signed by the Bidder and of the Performance Security issued to you by the Bidder; or (b) if the Bidder is not the successful bidder, upon the earlier of (i) the successful bidder furnishing the performance security, otherwise it will remain in force up to ----- (insert date)

Consequently, any demand for payment under this Guarantee must be received by us at the office on or before that date -----

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