



Organization for Relief Development (ORD)

INVITATION TO BID

ITB No.: AFG/ORD/19/14

Bid Documents for

Construction of 6 Classroom School Building

in Sherkhan Bandar Village, Imam Sahib District, Kunduz Province, Afghanistan

DATE: 14 July, 2019

(Deadline for Submission of Bid): 28 July 2019, 16:00 hrs (Afghanistan local time).

REQUIRED SEALED BIDS IN TWO ENVELOPES MARKED,

“TECHNICAL BID” AND “FINANCIAL BID”

IN SEPARATE ENVELOPES

Please ensure to sign the registration sheet at the ORD office while submitting sealed Bid!

Subject: Invitation to Bid
Projects Name: Construction of 6 classrooms School Building.
Invitation to Bid No.: AFG/ORD/19/14
Location: Imam Sahib Destrict, Kunduz Province, Afghanistan.
Date: 14 July, 2019

I. INTRODUCTION:

1. The Introduction of ORD

Organization for Relief Development-ORD is non-governmental, non-profit and non-political Organization that has been established in 2010, registered in Afghanistan Kabul, with the Islamic Republic of Afghanistan. ORD plays a critical role in providing management services for peace building, humanitarian assistance and development operations. These activities help suffering people in troubled parts of the Afghanistan. ORD's mission is to expand the capacity of its partners to implement peace building, humanitarian and development operations that matter for people in need. Working in some of the Afghanistan's most challenging environments, ORD vision is to always satisfy stakeholders with management services that meet better standards of quality, speed and cost effectiveness. By assisting its development partners, ORD makes significant, tangible contributions to results on the ground.

2. Invitation to Bid:

The Organization for Relief Development (ORD) is implementing partner of the Office of the United Nations High Commissioner for Refugees (UNHCR) for the above mentioned project (part of the Access to Opportunities & Support PSN with implementation of CPM projects in N/NE regions).

The Organization for Relief Development-ORD invites companies duly registered with the government of Afghanistan to submit sealed bid for the above mentioned project "Construction of 6 classrooms School Building" on the basis of the following terms and conditions.

3. Acknowledge:

You are kindly requested to confirm by an email to: procurement.ord@gmail.com that you will be submitting a bid.

4. Eligible Bidders:

- 4.1 This Invitation for Bids is open for all interested companies who have registered with the government of Afghanistan and have valid license.
- 4.2 The company, organization or individual is not listed in the sanction and embargo list of the UN Security Council.
- 4.3 The company, organization or individual is not legally barred from the procurement process on the grounds of previous violations of regulations on fraud and corruption.
- 4.4 The company, organization or individual to will not be contracted for considerable portions of the contract is an enterprise economically intertwined with persons conducting the tender.
- 4.5 The bidder shall be an Afghan company registered with the government of Afghanistan.

5. Cost of Bidding

The bidders shall bear all costs associated with the preparation and submission of their respective bids and the Employer will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process.

6. Period of performance:

All works for this project shall be completed within 184 calendar days after date of signing of the contract.

II. Bidding Documents:

1. Bidding Documents

The Bidding Documents, in addition to invitation for bids, are those stated below and all documents shall be signed /stamped by the bidder or his legally authorized representative and returned to the address according to the Bidding Data Sheet.

- (a) Invitation to Bid (applied to this document)
- (b) Criteria for Technical Bid of the Annex - 1
- (c) Bid Form in accordance of the annex - 2
- (d) Declaration of undertaking in accordance of the annex -3.
- (e) Price offering Sheet (Bill of Quantities) in accordance of annex - 4.
- (f) Drawings of the annex - 5
- (g) Additional a copy of each Circular Letter issued to bidders by the Employer (if applicable).

The Bidder must endorse each copy of such Circular Letter.

Prices must be quoted for all items in the Bill of Quantities.

The bidders are expected to examine carefully the contents of all the above documents.

Failure to comply with the requirements of bid submission will be at the Bidder's own risk, bids that are not substantially responsive to the requirements of the Bidding Documents will be rejected.

2. Clarification of Bidding Documents

Any prospective bidder requiring any clarification in respect of the Bidding Documents may notify the Employer in writing at procurement.ord@gmail.com. The request for clarification must reach the Employer not later than 5 days before the closing date of the bid. The Employer will respond to any request for clarification which he receives earlier than 5 days prior to the deadline for submission of bids.

The Employer will respond by e-mail providing clarification on the bidding documents. Written copies of the Employer's response including a description of the enquiry but without identifying its source will be communicated to all prospective Bidders, who had received the bidding documents and acknowledged their participation to the above mentioned email.

III. PREPARATION OF BID:

1. Language of Bid

The bid and all correspondence and documents related to the bid exchanged by a bidder and the Employer shall be in English language only as specified in the Bidding Data (BD).

2. Documents Comprising the Bid

The bid documents should be enclosed two parts (i) Technical bid and (ii) Financial bid and must be submitted separately in two sealed envelopes.

The submitted bid must include the following formation. Failure to supply all requested information or comply with the specific formats may disqualify the bidder from consideration.

1. Bid Form in accordance of the annex - 2.
2. Declaration of undertaking in accordance of the annex - 3.
3. Copy of valid business license.
4. Past Performance and experience (list and copy of contract for similar completed projects).
5. Proposed time schedule and the timeframe that the contractor should be completed the project.
6. List of machinery and equipment of the company.
7. List of qualification and experience of the key and technical personnel of the company.
8. Financial capability.
9. Other important documents, bidders feel need to be attached to support their bid.

3. Bid Prices

- 3.1 All prices shall be stated with applicable tax (in accordance with the current tax laws of the Islamic Republic of Afghanistan, and all other relevant provisions of the same law).
- 3.2 All unit prices shall be indicated in the spaced provided in the price sheet (BoQ). The bidder must sign and officially stamp the price sheet.

4. Bid Currencies

The offer should follow the given structure and prices shall be quoted in Afghani (AFN) as specified in the Bidding Data sheet (BD).

5. Bid Validity Period

Bids shall be valid for 90 days after the Date of Bid Opening specified in the BD.

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 which shall in no case be more than the original bid validity period. The request and the responses there to shall be made in writing.

7. Bid Security

Bid Security equal amount is (100,000 AFN) is mandatory and must provide in a form of Bank Guarantee from a recognized Bank of Afghanistan, otherwise bidders will disqualify for technical evaluation.

8. Format and Signing of Bid

8.1 Bidders are particularly directed that the amount entered on the Form of Bid shall be for performing the Contract strictly in accordance with the Bidding Documents.

8.2 All appendices to Bid are to be properly completed, signed and stamped.

8.3 Each bidder shall prepare by filling out the forms completely and without alterations one

- (1) Original specified in the Bidding Data, of the documents comprising the bid and clearly mark them "ORIGINAL"

8. Alternative Bid

Alternative bids are not allowed to be attached.

IV. SUBMISSION OF BID:

1. Deadline for submission of bid:

a. The closing date for submission of bids is:

The 28th of July 2019, 16:00h (Afghanistan local time). Late bids shall be rejected and electronic submission is not allowed.

b. Bids must be received by the Employer at the address specified no later than the deadline.

c. Bids with charge payable will not be accepted, nor will arrangements be undertaken to collect the bids from any delivery point other than that specified above. Bidders shall bear all expenses incurred in the preparation and delivery of bids. No claims will be entertained for refund of such expenses.

d. Where delivery of a bid is by mail and the bidder wishes to receive an acknowledgment of receipt of such bid, he/she shall make a request for such acknowledgment in a separate letter attached to but not included in the sealed bid package.

2. Submission, Sealing and Marking of Bids:

Technical bid and the Price bid must be submitted separate sealed envelopes.

The signed and stamped bid one original including with its all attachments shall be submitted in a sealed envelope.

The envelope of your bidding documents shall be marked as following:

a. Bidding documents - Technical Bid for:

Construction of 6 classrooms School Building in Kunduz Province of Afghanistan.

b. Bidding documents - price Bid for:

Construction of 6 classrooms School Building in Kunduz Province of Afghanistan

Invitation to Bid No.: AFG/ORD/19/14

3. The Employer's address for submission of bids is:

ORD Regional Office, Mazar-e-Sharif, House # 176, Street # 2 Toman, Barakat Square, district -4, Mazar-e-Sharif (city), Afghanistan.

9. Modification, Substitution and Withdrawal of Bids

The bidder may modify, or withdraw its bid after bid's submission, provided that the written notice of the modification, including substitution or withdrawal of the bids, received by the Employer prior to the deadline for submission of bids.

The Bidder's modification or withdrawal notice shall be prepared, sealed, marked, and dispatched. No bid may be modified by a bidder after the deadline for submission of bids.

V. BID OPENING AND EVALUATION:

1. Bid Opening:

The opening of the bid will be held with ORD members only. The bid opening will take place at: ORD Regional Office, Mazar-e-Sharif:

2. Process to be Confidential

Information relating to the examination, clarification, evaluation and post-qualification of bids and recommendations for the award of a contract shall not be disclosed to bidders or any other person not officially concerned with such process before the announcement of bid evaluation report.

Any effort by a bidder to influence ORD in the examination, evaluation, comparison, and post qualification of the bids or contract award decisions may result in the rejection of its bid.

3. Examination of Bids and Determination of Responsiveness

Prior to the detailed evaluation of bids, the Employer will determine whether each bid is substantially responsive to the requirements of the Bidding Documents.

A substantially responsive bid is one, which meets the eligibility criteria; has been properly signed; and conforms to all the terms, conditions and specifications of the Bidding Documents, without material deviation or reservation.

4. Evaluation and Comparison of Bid:

Bids will be evaluated in accordance with the following technical criteria:

Technical evaluation criteria for Award:

NO.	ASSESSMENT CRITERIA	WEIGHTING in %	POINTS AWARDED TO BIDDER
1	Company History, Bidder completeness and quality: (Evidence of the updated the company registration license / history of company), Completeness, discipline, order, signed & stamped all documents, etc.)	10	
2	Key & technical staff list and CVs provide suitably qualified personnel to fill as a minimum the following the key and technical positions in the last three years and their Certificates and CV's	10	
3	Equipment: Machinery and Equipment: The bidder must submit details of the available technical equipment and machinery with submission of the provable evidences as it is own or rented including its purchase agreements, manufacturing of equipment.	10	
4	Similar Projects: Completion of 3 similar projects with indication of provable evidence documents.	10	

5	Past Performance/ Work experience List of ongoing and completed projects with provable evidence documents. (At least one of the completed project value shall not be less than 85,000.00 USD in last three years).	15	
6	work methodology Provide a comprehensive work methodology for completion of the intended project.	10	
7	work plan (time schedule): Provide a comprehensive work plan / time schedule for implementation of the intended project..	15	
8	Revenues Average revenues of the last three years reach at least 130,000.00 USD.	5	
9	Financial Capability: The bidder must submit updated original bank statement which should show source of the support project, which implemented by related construction company. If bank statement is not original otherwise the scoring will be deduct.	15	
Total Technical Points		100	

Note: Firms scoring minimum 60 or more points will be considered as qualified in financial.

Price bid as per the price sheet is for the lowest bid price alone is generally not decisive according to technical and total financial scoring is 40.

4. Award of Contract:

4.1 Award

4.2.1 Subject to Clauses IB.34 and IB.38, 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 suitable evaluated Bid Price, provided that such bidder has been determined to be eligible in accordance with the provisions of Clause IB.5.

4.3.2 The Employer, at any stage of the bid evaluation, having credible reasons for or prima facie evidence of any defect in supplier's or contractor's capacities, may require the suppliers or contractors to provide information concerning their professional, technical, financial, legal or managerial competence whether already pre-qualified or not:

Provided that such qualification shall only be laid down after recording reasons therefore in writing. They shall form part of the records of that bid evaluation report.

5. Employer's Right to accept any Bid and to reject any or all Bids

5.1 Notwithstanding Clause IB.30, 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 bidders or any obligation except that the grounds for rejection of all bids shall upon request be communicated to any bidder who submitted a bid, without justification of grounds. Rejection of all bids shall be notified to all bidders promptly.

6. Notification of Award

- 6.1 Prior to expiration of the period of bid validity prescribed by the Employer, the Employer will notify the successful bidder in writing (“Letter of Acceptance”) that his Bid has been accepted. This letter shall name the sum which the Employer will pay the Contractor in consideration of the execution and completion of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called the “Contract Price”).
- 6.2 No Negotiation with the bidder having evaluated as lowest responsive or any other bidder shall be permitted, however, Employer may have clarification meetings to get clarify any item in the bid evaluation report.
- 6.3 The notification of award and its acceptance by the bidder will constitute the formation of the Contract, binding the Employer and the bidder till signing of the formal Contract Agreement.
- 6.4 Upon furnishing by the successful bidder of a Performance Security, the Employer will promptly notify the other bidders that their Bids have been unsuccessful and return their bid securities.

7. Performance Security

- 7.1 The successful bidder shall furnish to the Employer a Performance Security in the form and the amount stipulated in the Bidding Data and the Conditions of Contract within a period of 30 days after the receipt of Letter of Acceptance.
- 7.2 Failure of the successful bidder to comply with the requirements of Sub-Clause IB.36.1 or Clauses IB.37 or IB.39 shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security.

7. Signing of Contract Agreement

- 7.1 Within 14 days from the date of furnishing of acceptable Performance Security under the Conditions of Contract, the Employer will send the successful bidder the Contract Agreement in the form provided in the Bidding Documents, incorporating all agreements between the parties.
- 7.2 The formal Agreement between the Employer and the successful bidder shall be executed within 14 days of the receipt of the Contract Agreement by the successful bidder from the Employer.

8. General Performance of the Bidder

The Employer reserves the right to obtain information regarding performance of the bidders on their previously awarded contracts/works. The Employer may in case of consistent poor performance of any Bidder as reported by the employers of the previously awarded contracts, interlaid, reject his bid and/or refer the case to the relevant department in accordance with its rules, procedures and relevant laws of the land take such action as may be deemed

appropriate under the circumstances of the case including black listing of such Bidder and debarring him from participation in future bidding for similar works.

9. Integrity Pact

Not applicable.

10. Instructions not Part of Contract

Bids shall be prepared and submitted in accordance with these Instructions which are provided to assist bidders in preparing their bids, and do not constitute part of the Bid or the Contract Documents.

VI. BIDDING DATA SHEET (BDS):

A. General	
1.1	The Employer is Organization for Relief Development (ORD). The Work is: Construction of 6 classrooms School Building in Kunduz Province of Afghanistan
1.2	The project is funded by: Office of the United Nations High Commissioner for Refugees (UNHCR).
1.3	The Intended Completion period is 184 calendar days from date of signing of contract.
1.4	The qualification criteria are modified in technical criteria.
B. Bidding Documents	
2.1	The Employer's address for clarification is: ORD Regional Office, Mazar-i-Sharif, House # 176, Street# 2 Toman, Barakat Square, district-4, Mazar-i-Sharif Afghanistan. Phone No.: + 93 (0) 78 283 7700 E-mail add: procurement.ord@gmail.com
2.2	All questions in regard to that tender please send in written no later than 5 days before the closing date of the bid.
C. Preparation of Bids	
3.1	The language of the bid shall be English.
3.2	Any additional materials required to completed and submitted by the Bidders are: None
3.3	The Bid prices shall be quoted in Afghani (AFN)
3.4	The bid shall be valid for 90 days
3.5	The number of copies of the Bid to be completed and returned shall be one original and one copy (comprising all sections of the bid).
3.6	Alternative Bids shall not be considered.
D. Submission of Bids	

4.1	Bids received by fax and electronically shall not be accepted.
4.2	The Employer's address for the purpose of Bid submission is: ORD Regional Office, Mazar-i-Sharif, House #176, Street #2 Toman, Barakat Square, district-4, Mazar-i-Sharif (city), Afghanistan.
4.3	Name and code of the project has given in ITB.
4.4	The closing date for submission of bid is: 28th of July 2019, 16:00h (Afghanistan local time).
4.5	Late bids shall be rejected.
E. Bid Opening	
5.1	The bid opening will take place at: ORD Regional Office in Mazar-i-Sharif.
F. Evaluation of Bids	
6.1	Technical Evaluation: Bids shall be evaluated accordance with the given technical criteria in ITB. Bidders who pass in the technical through will be qualify for the financial.
6.2	The financial evaluation shall be execute according to the given criteria in ITB
E. Award of Contract	
7.1	Prior to the expiration of the period of bid validity, ORD shall send the successful bidder the contract / purchase order which constitute the notification of award.
8.1	The Bid Security amount is 100,000 AFN / After
Performance Guarantee	
9.1	Standard form amount of performance bond acceptable the employer shall be a Bank Guarantee. The successful bidder shall furnish to the Employer a performance Bond in the form of with the amount of 10 % value of the contract.

Attachments:

Annex 1: Technical Criteria / Post Qualification

Annex 2: Bid Form

Annex 3: Declaration of Undertaking

Annex 4: Bill of Quantity (Price Sheet)

Annex 5: Drawings

Annex 6: Technical Specification

Criteria for Technical Bid

All bidders shall provide the technical Bid and bids will be evaluated in accordance with the below technical criteria as:

1. Bidder must be a registered with the government of Afghanistan (evidence of the updated valid business license is mandatory).
2. Bidder must provide documented evidence of three (3) years of similar experience in Implementation of construction building as a prime contractor.
Provide a list of similar projects completed by bidder that include the items set forth.
 - a. The name and location of each such project.
 - b. The owner of each such project and its contact information.
 - c. The scope of work of each such project.
 - d. The date the work began.
 - e. The scheduled completion date.
 - f. The actual completion date.
 - g. The contract amount of the supply work.
 - h. Copy of contracts or completion certificate.
3. Bidder must provide documented evidence of successfully completed similar works, materials equipment/tools that included vertical similar to the size and scope of this proposed project. Include a list of projects meeting this criterion.
4. Bidder must provide the list of key and technical staff and qualification of them with their CVs.
5. Proposed Time Schedule (work plan) for implementation of the intended project.
6. Company financial capability. Bidder shall provide evidence that they have access to financial resources, to this end; bidder shall provide specific evidence, in form of Bank Letters and / or notarized statements and / or other information, to show that this requirement is met.
7. Bidder must provide documented technical machinery and equipment for implementation of the projects.
8. Even though the bidders may meet the above qualifying criteria, they can be subject to disqualification if they have made misleading or false representations in the forms, statements and attachments submitted in proof of the qualification requirements, and /or record of poor performance such as, not properly completing contract, inordinate delays in completion, litigation history, financial failures, etc.

Technical Bid Forms

The Bidder should provide the requested information / documents as per the below provided tables.

1. Contact Information

Contact Information	
Name of Company	
Contact Person	
Physical Address Street City Province	
Telephone Numbers	
E-mail address (mandatory)	
Signature of contact person	

2. Additional offices – List all additional regional / district offices:

Province	District	City/area

3. Company Registration License

Number:

Issue date:

Expiry date:

Note: copy of current company business license (front & back) shall be attached.

4. Bank Account Details – Name of commercial bank used:

Address:

Name of account:

Account #:

5. Organization History – Company was founded in (year): _____

Technical Competence & Resources

6. Personnel Resources – Please list your organization’s key personnel in the below tables **Table (1):**

1.1 Number of Staff:

	Managerial	Technical	Operative	Administrative	Other (specify)
Nos.					

1.2 List the key and technical staff (not more than five persons)

Key and technical Personnel				
No	Name	Position	Date of Joining company	Year of Experience

Proposed staff for completion of the intended project			
Name	title	Years with company	Experience & Job responsibility

7. Staff CVs – Please provide your company organization chart and CVs for all key and technical personnel (CVs for the listed personnel in Table 1.2 is mandatory).

1	Name:	
2	Gender	
3	Date of Birth:	
4	Nationality	
5	Position in the organization:	
6	Education	

7	Professional affiliation/membership of professional bodies.	
8	Professional trainings (Indicate significant training since degrees under 7/above)	
9	Language skills	
10	Work experience [Starting with present position, list in reverse order with name of organization and position held by staff)	

8. Equipment and Machinery: please provide the list with submission of provable evidence.
Table (3)

Equipment					
Type / Description / Model	Size /Capacity	Number	Current Location	Own or Leased	Age

Note: add additional row if needed.

Experience& Satisfactory Experience

- 9. Works Experience**–List at minimum 3 to maximum 6 projects, which has completed and under construction by your company (including at minimum 3 similar projects over the past three or five years).

For ongoing projects, copy of contract needed and for those projects, which are already completed the completion certificate must be provided – or documents which indicates that work was successfully completed.

Table (4)

1. Project Name	
Type of Contract/Agreement	
Description	
Location	Province: District:
Client	Name: Tell: Email(official):
Value	Award Value: Paid amount:
Start / End Dates	Start: End:
Completion	On Schedule () yes () no Certificate of Completion: () yes ()no
Comments	

2. Project Name	
Type of Contract/Agreement	
Description	
Location	Province: District:
Client	Name: Tell: Email (official):
Value	Award Value: Award Value:
Start / End Dates	Start: End:
Completion	On Schedule () yes () no Certificate of Completion: () yes ()no
Comments	

3. Project Name	
Type of Contract/Agreement	
Description	
Location	Province: District:
Client	Name: Tell: Email (official):

Value	Award Value: Paid amount:
Start / End Dates	Start: End:
Completion	On Schedule () yes () no Certificate of Completion: () yes ()no
Comments	

4. Project Name	
Type of Contract/Agreement	
Description	
Location	Province: District:
Client	Name: Tell: Email (official):
Value	Award Value: Paid amount:
Start / End Dates	Start: End:
Completion	On Schedule () yes () no Certificate of Completion: () yes ()no
Comments	
5. Project Name	
Type of Contract/Agreement	
Description	
Location	Province: District:
Client	Name: Tell: Email (official):
Value	Award Value: Paid amount:
Start / End Dates	Start: End:
Completion	On Schedule () yes () no Certificate of Completion: () yes ()no
Comments	

Note: add up to 5 more if needed.

Financial Status

10. Revenues

Table (5)

Total Annual Company Revenues		
Year	US\$	Afghanis
2018		
2017		
2016		

11. Applicants shall provide bank reference and / or letters of credit to demonstrate that they have access to lines of credit to the amount stated in Article B.4.

12. Financial Statement: these shall be the followings:

- Financial statements (balance sheets, included related notes, and income statements) for last three years.
- Bank reference and / or letters of credit.
- Statement regarding cash flow

Bid FORM

ITB No.:

Project Name: Company Name:

To:

Dear Sir or Madam,

1. Having examined the Conditions of Contract, Scope of Work, Specifications, Bill of Quantities and all other documents received with the Invitation to Bid for the execution of the Works in connection with the above named Project, we, the undersigned offer to execute and complete such Works and remedy any faults and defects therein in conformity with the conditions spelled out in the aforementioned documents for the sum of as mentioned in Price Proposal.

or such other sums as may be ascertained in accordance with the said conditions.

2. We undertake, if our Tender is accepted, to commence the Works within the time required in the contract conditions, and to complete the whole of the Works comprised in the contract within the time stated in the Contract Conditions.
3. We agree to abide by this Bid for the period of days from the submission/opening date stated in the Invitation to Bid and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
4. Unless and until a Contract Agreement is signed, this Bid, together with your written acceptance thereof, shall constitute a binding contract between us.
5. We understand that you are not bound to accept the lowest or any Bid you may receive.

Dated this : day of

Signature : in the capacity of

Signature : in the capacity of

duly authorized to sign Bid for and on behalf of

.....

.....

(Bidder name and address in block capitals)

Declaration of Undertaking

Invitation to Bid No.:

Project Name:

We underscore the importance of a free, fair and competitive procurement process that precludes fraudulent use. In this respect we have neither offered nor granted, directly or indirectly, any inadmissible advantages to any public servants or other persons in connection with our bid, nor will we offer or grant any such incentives or conditions in the present procurement process or, in the event that we are awarded the contract, in the subsequent execution of the contract.

We also underscore the importance of adhering to minimum social standards ("Core Labour Standards") in the implementation of the project. We undertake to comply with the Core Labour Standards ratified by the country of Afghanistan.

We will inform our staff about their respective obligations and about their obligation to fulfill this declaration of undertaking and to obey the laws of the country of Afghanistan.

We also declare that our company/all members of the consortium has/have not been included in the list of sanctions of the United Nations, nor of the EU, nor in any other list of sanctions and affirm that our company/all members of the consortium will immediately inform the client if this situation should occur at a later stage.

We acknowledge that, in the event that our company (or a member of the consortium) is added to a list of sanctions that is legally binding upon the client, the client is entitled to exclude our company/the consortium from the procurement procedure and, if the contract is awarded to our company/the consortium, to terminate the contract immediately if the statements made in the Declaration of Undertaking were objectively false or the reason for exclusion occurs after the Declaration of Undertaking has been issued.

(Place), this day of

Name of company:_____

Signature:_____

Seal:_____



BILL OF QUANTITIES

Construction of 6 Classrooms School Building

Project Code: AFG/ORD/19/14

Annex - 4

Project Title: Construction of 6 Classroom School Building

Location: Sherkhan Bandar Village, Amam Sahib District, Kunduz Province, Afghanistan

Subject: BoQ for One Storey Building

Date: 14 July 2019

No.	Description	Unit	Quantity	Unit cost [AFN]	Amount [AFN]
1.00	Mobilization and demobilization				
1.01	Mobilization: Installation of the site office, supplying and maintaining the complete equipment which is necessary for the construction work like tools, scaffolds, etc. including water and electricity supply for all works, stores and materials (incl. disposal of waste) for the workers, removal of all rubbish) incl. the necessary safety measures and protection during construction and cost for the site set up have to be included.	ls	1.00		
1.02	Demobilization: demobilization of the site (take out equipments, tools and etc) including pre and final cleaning of the complete project site.	ls	1.00		
2.00	Site Preparation				
2.01	Site Preparation: site preparation including grading, cutting, filling, watering, leveling and compacting, and taking out the extra excavated soil and debris in a suitable dumping site outside the project site. Site clearance before starting the project activities and after completion including all related activities as per site requirement according to the drawings.	m2	600.00		
3.00	Civil Work - 1 storey classroom building				
3.01	Excavation for footings, Stone Masonry foundation and walkways including taking out the waste materials from the site with it's all related activities according to the drawings.	m3	271.68		
3.02	Compaction under foundation: all the surfaces under the foundation shall be leveled and compacted minimum 95% of maximum density according to drawings and specification.	m2	376.05		
3.03	Plain Cement Concrete (PCC) under column footings and stone masonry foundation, T=7cm, M :150 With it's all related activities according to the drawing and technical specification.	m3	80.48		
3.04	Reinforced Concrete (1:1.5:3) for (F1, F2, F3), Ring Beam, Beams, Coulumn and slab with it's all related activities according to the drawing and technical specification Install concrete with suitable concrete placing equipment (pump, or similar), compact concrete with vibrators, Cement type: CEMI (best way or similar). Crush should be used in concrete ,concrete mix by a mixer).	m3	162.03		

3.05	Stone masonry Work: with it's all related activities according to the drawings and technical specification.	m3	167.61		
3.06	Pointing for out side face with 1:3 cement and sand mortar with it's all related activities according to the drawing and technical specification.	m2	38.42		
3.07	Layer of Compacted Soil from selected soil layer by layer each layer should be not more then T=35 cm and compacted for floor of building with it's all related activities according to the drawing and technical specification.	m3	91.57		
3.08	Supply and installation Handrail (metal) for staircase and ramps, best quality and approved by in charge engineers (Complete handrail and /fences according to the drawings and technical specification.	ml	16.00		
3.09	Brunt brick masonry (ground floor), T= 35cm / T =23cm with 1:5 cement -sand mortar with it's all related activities according to the drawings and technical specification.	m3	168.76		
3.10	Supply and installation of Chips with mortar for ground floor and stairs with it's all related activities according to the drawings and technical specification. Prior to supply the sample of granite tiles shall be approved by in charge engineer.	m2	425.51		
3.11	Supply and installation of 2cm thick marble stone with mortar for stairs sill with it's all related activities according to the drawings and technical specification. Prior to supply the sample of granite tiles shall be approved by in charge engineer.	m2	19.53		
3.12	Supply and installation of Wooden Doors and Windows incl. lock mechanism, 4mm glass for above opening with all required accessories according to the drawing and technical specification. Prior supplying the sample shall approved by the in charge engineer.	m2	121.71		
3.13	Oil paint for doors and windows with minimum three coats for both side .3 coats painting should be apply to all surfaces.	m2	121.71		
3.14	Plastering of Interior & Exterior walls, peak, Slab and parapet for ground and first floors (T=2.5cm) with 1:5 mortar of cement and sand with it's all related with it's all related activities in accordance to the attached drawing and technical specification.	m2	1,180.17		
3.15	Plastic paint (washable) for outside and cieli for inside with minimum three coats for interior and exterior wall (75% for inside and 100% for out side and ceiling), for ground and first floors with it's all related activities according to the drawings and technical specification. Min.3 coats painting should be apply to all surfaces.	m2	1,145.05		
3.16	Providing and installation of blackboard: Making and providing wooden frame, Special paint and installation of blackboards	m3	0.12		
3.17	Provide and Installation of downspouts, Gutter made from 22 gauge galvanized Iron sheeted with size (10x10)cm completed job with it's all related activities according to the drawings and technical specification.	m	16.80		

3.18	Piece of burnt brick with soil under insulation: to be will flated	m3	55.23		
3.19	Roof Insulation (Isogam): Installation of Isogam with all necessary requirements	m2	509.29		
3.20	Glass fitting for Windows and doors: 4mm white glass for doors and windows with trasnportationand installation	m2	98.57		
3.21	Fly screen: installation of fly screen with chufti complete	m2	82.69		
3.22	making of wooden truss: includes making wooden fram, Iron sheett according the map with all necessary Requirements.	m2	480	Not for porpsed cost	
3.23	Provide and Installation of Chimny (Stove hole) with metal cup / cover and chimney including painting and with it's all related activities according to drawings and technical specification.	No	8.00		
3.24	Layering of stone for walkway around the building T=20 cm with compaction and it's all related activities.	m2	83.42		
3.25	Chair and table: making chair and table with all necessary works.	set	120.00		
3.26	Signboard: Metal visibility sing board and stone signboard, prepare and installation of singboard size (1*0.7) from marble stone with all necessary work	m2	3.60		
3.27	Personal: One Forman and one storekeeper is needed along the project timeline	md	450.00		
3.28	Hand Tools, Stationary and transportatoin: It includes hand tools like shovel pick axe etc, stationary for CDC use and transportation cost for CDC travel to the market or bank	ls	1.00		
Sub Total (1,2,3)					

4.00	Electrical Installation - 1 storey 6 classroom building				
4.01	Floursecent light fixture 2x36w,50Hz, (130-260)V High quality	NO	28		
4.02	Floursecent light fixture 1x40w, 50Hz (130-260)V High quality	NO	9		
4.03	Two pole switch under plaster, 10A, 1 phase high quality made in iran	NO	8		
4.04	two way switch under plaster, 10A 1 phase high quality made in iran	NO	7		
4.05	One pole switch under plaster, 10A 1 phase high quality made in iran	NO	0		
4.06	Socket outlet, single phase, 16AM high quality made in iran	NO	27		
4.07	Wire 1x2,5mm2 copper made in Iran high quality	Meter	1		
4.08	wire 1x4mm2 copper made in Iran high quality	Meter	610		
4.09	PVC CONDUIT 1 inch high quality	Meter	340		
4.10	Cable 1x25 mm2 copper for grounding	Meter	15		
4.11	Cable 1x35 mm2 copper for conduction of grounding rods	Meter	9		
4.12	Main Disterbution panel complete with one Phase 1x70 Amp main CB, 2x35 automatic fuse+RCBO & 8x20 automatic fuse=RCBO. (Residual current circuit breaker with over current). I=0.03Ma. T=0.1secant.	No	3		
4.13	PVC ceiling joint box small size	No	50		
4.14	Supply and install earthling system consisting of welding 5X35mm galvanized steel sheets at foundation bands and to be connected to the main distribution board in addition to 5X35mm galv. steel sheets connected between the earthing pits rods and the main distribution board, overall length is 152.0 m, the resistance of the earthing system must not be more than 2 Ohm, The price includes the manhole earthing pits (6No.) and all connections such as but not limited to: stainless steel neutral bars at earthing pits incl. appropriate clamps for steel sheet 5x35mm and 20mm and 16mm down contactors and copper coated electrodes to avoid contact corrosion.	No	50		
4.15	Cable 1(4x25mm2) cupper fro main feeder+1x16mm2 cupper for grounding hgih quality made in turkey	Meter	37		
4.16	PVC conduit 3 inch high quality made in Iran	Meter	100		
4.17	Skilled Labour	md	8.1		
Iranian wire, cable, joint box, switch, socket and newn rods should be used					
Sub Total (4) Electrical Installation - 1 storey 6 classroom building					
Sub-Total 1,2,3,4 (civil work-1 storey 6 classroom building)					
Grand-Total (civil work-1 storey 6 classroom building)					

Company Name:

Date:14 July 2019

Signature (Name / Position):

Stamp / Seal:

Total Price (AFN) -

MINISTRY OF EDUCATION

(MOE/DOC)

DEPARTMENT OF CONSTRUCTION / TECHNICAL SERVICES

(DOC)

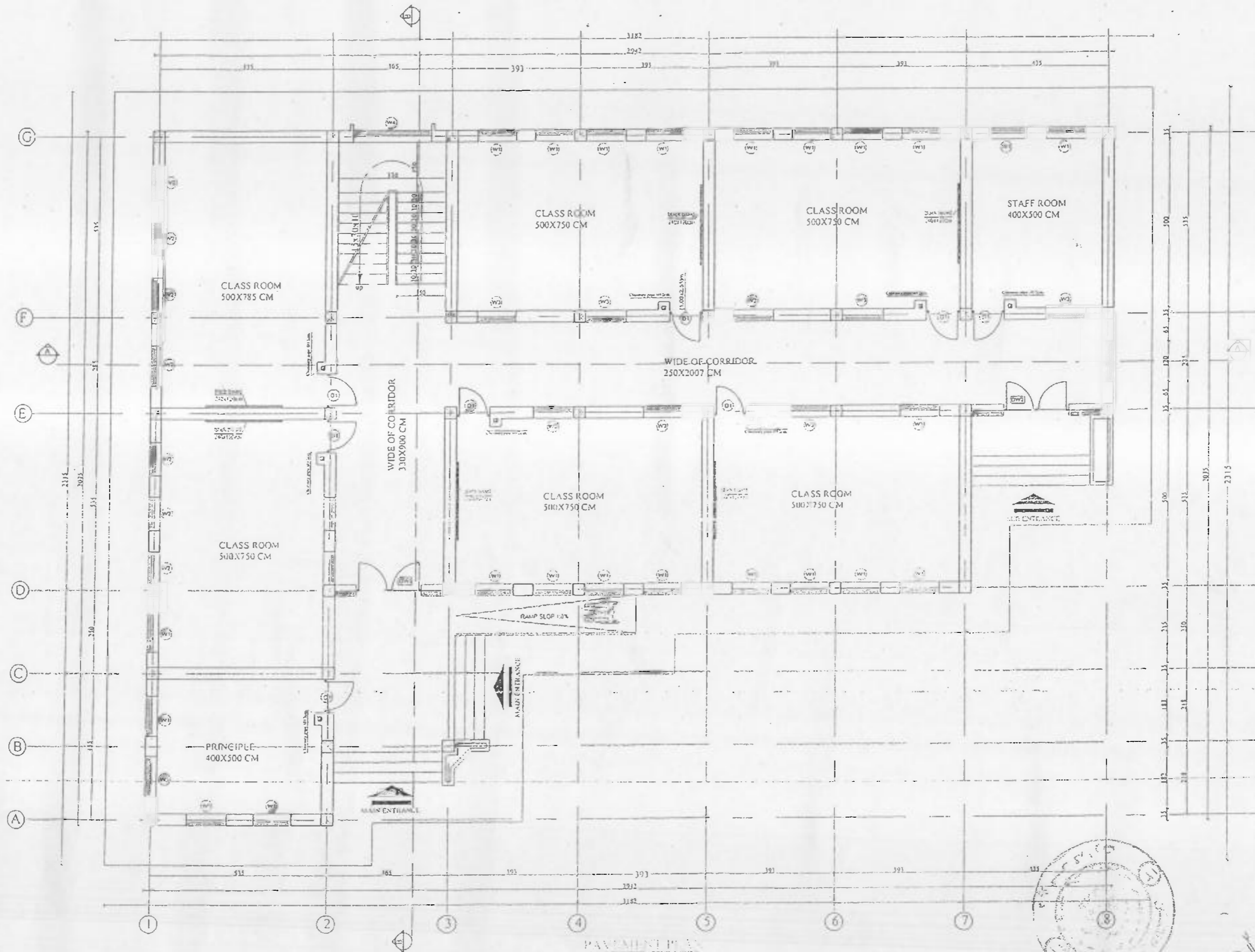
6 CLASS ROOM SCHOOL RCC SLAB
WITH IRON SHEET ROOF

ARCHITECTURE
&
ENGINEERING

DESIGN

MARCH 2015





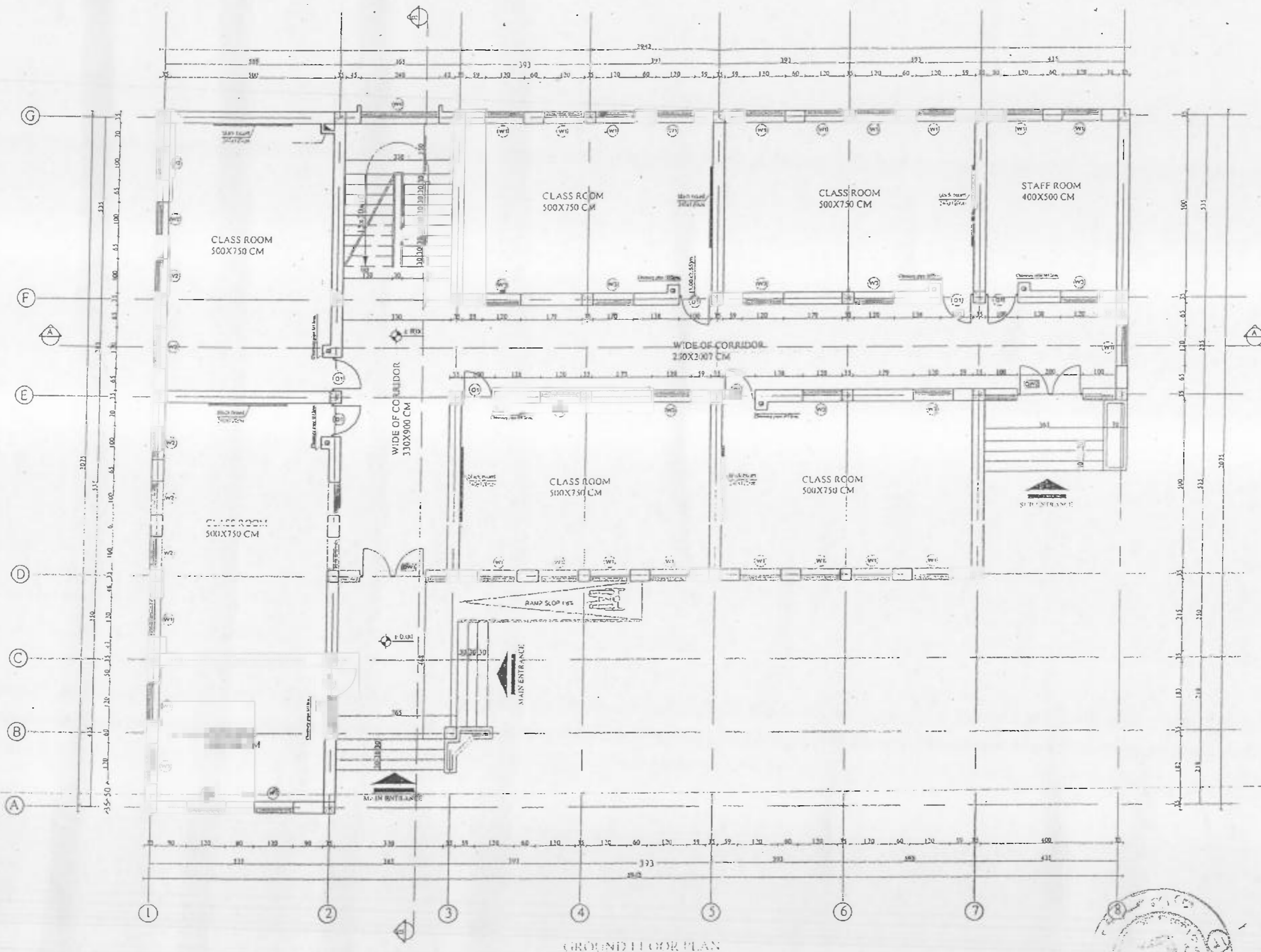
MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN IN AFGHANISTAN

PROJECT LOCATION	AFGHANISTAN	DESIGNER	ENGINEER	DATE	1/1/2011
PROJECT NAME	STANDARD SCHOOL DESIGN	DESIGNER	ENGINEER	DATE	1/1/2011
PROJECT LOCATION	AFGHANISTAN	DESIGNER	ENGINEER	DATE	1/1/2011
PROJECT NAME	STANDARD SCHOOL DESIGN	DESIGNER	ENGINEER	DATE	1/1/2011

PROJECT NAME	STANDARD SCHOOL DESIGN
PROJECT LOCATION	AFGHANISTAN
PROJECT DATE	1/1/2011
PROJECT DRAWING TITLE	CLASS ROOM / PAVEMENT PLAN





MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN IN AFGHANISTAN

ARCHITECT/DESIGN	ALIMAKILA AFZALI	APPROVED/DATE	ENG. ABDULMONEM HAD	DESIGNED/TYPE	ARCHITECTURE
SUPERVISOR/DESIGN	ENG. HADIMAT	DATE	AS SHOWN/DATE	DATE NO.	11
DATE APPROVED	ENG. HADIMAT	DATE	MARCH 2011		

PROJECT NAME

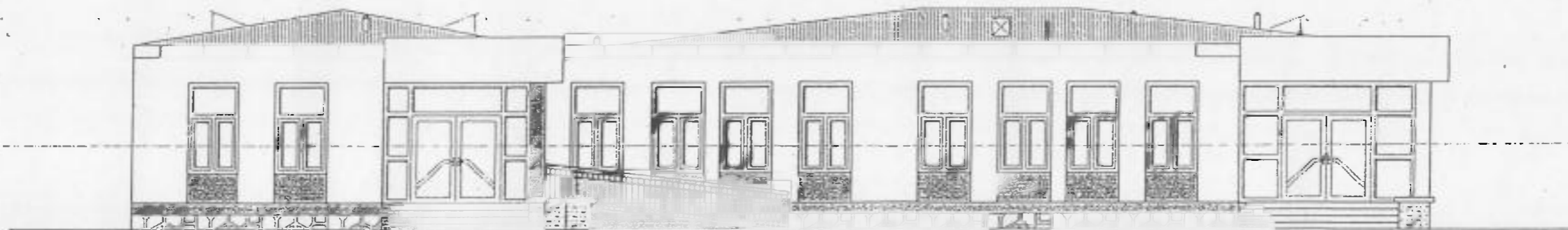
PROJECT TYPE DRAWING TITLE: GROUND FLOOR PLAN



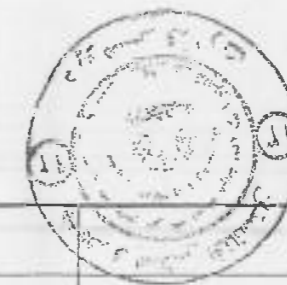




BACK ELEVATION



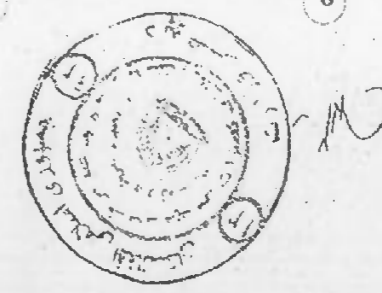
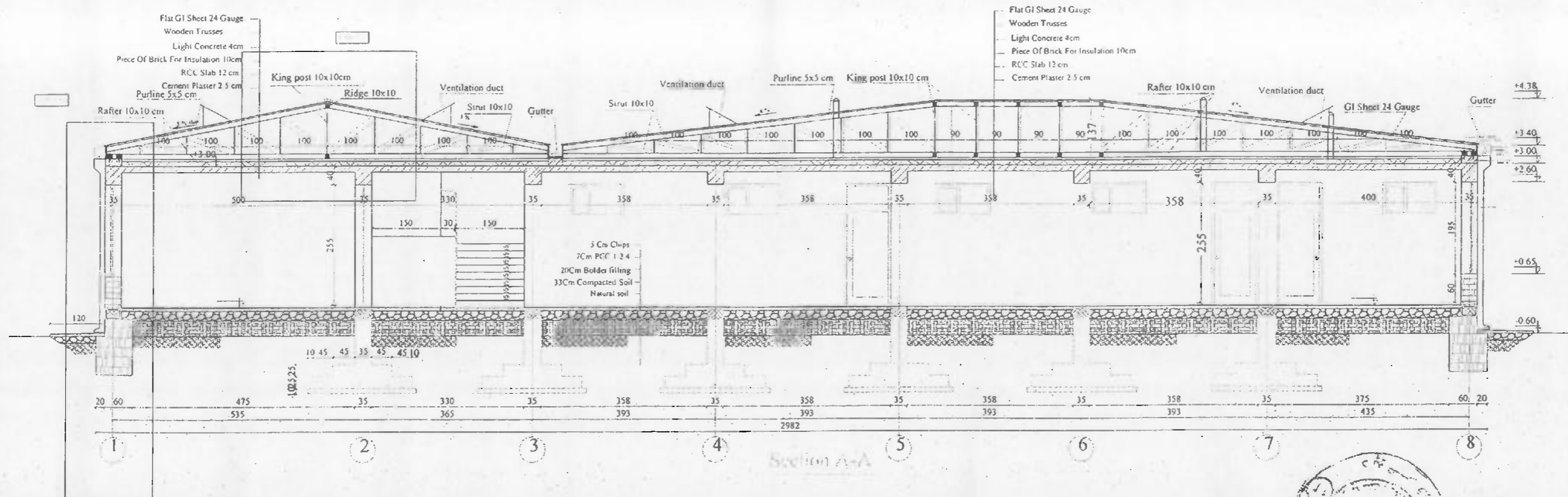
FRONT ELEVATION



MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN
IN AFGHANISTAN

ARCHITECT DESIGN	ARCHITECT	APPROVED DESIGN	ENGINEER	ARCHITECTURE	PROJECT NAME	PROJECT TYPE/DRAWING TITLE: CLASS ROOM FRONT & BACK ELEVATION	N
ARCHITECT DESIGN	ARCHITECT	APPROVED DESIGN	ENGINEER	ARCHITECTURE	PROJECT NAME		

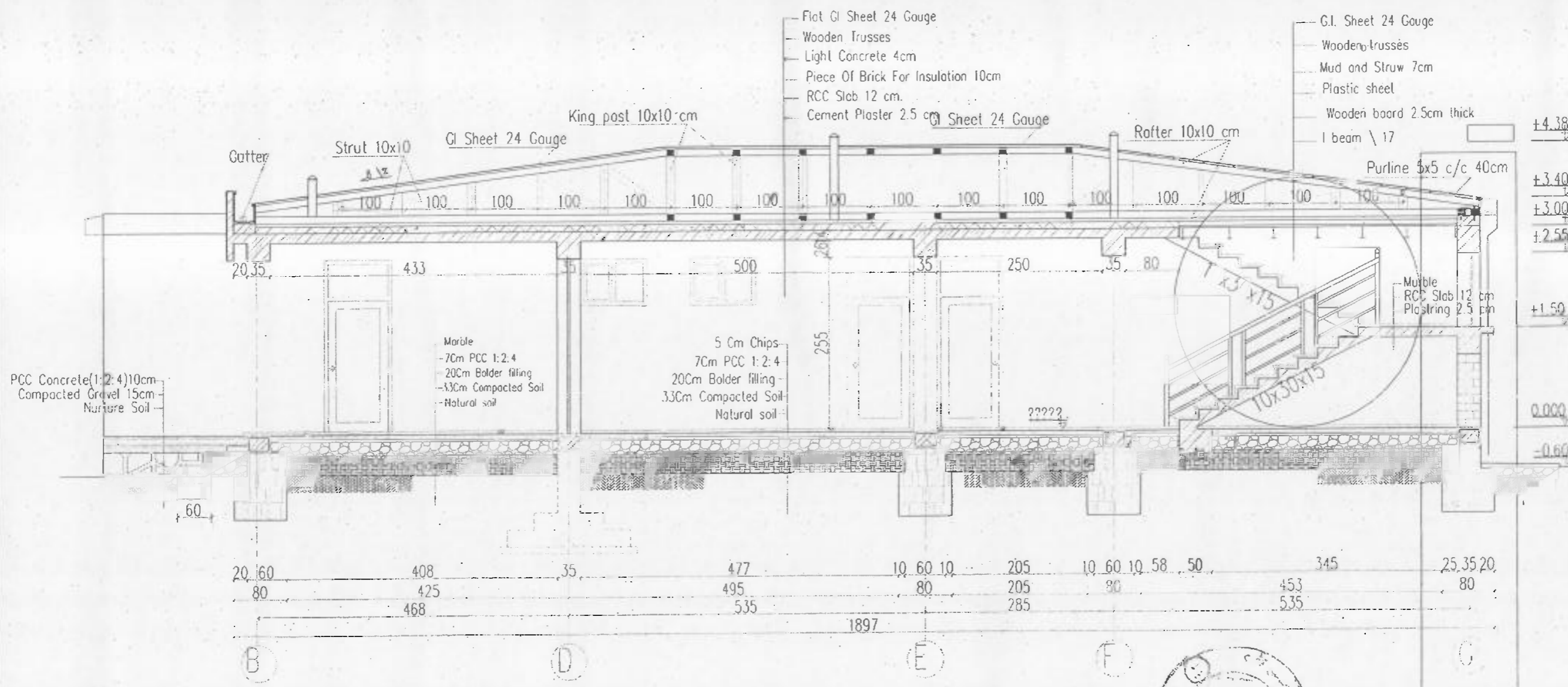


MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN IN AFGHANISTAN

DESIGNED BY	ASR AHMAD AFRIDI	APPROVED BY	ENG. ABDULMOJIB RAO	DATE	15/03/2015	ARCHITECTURE	PROJECT NAME
DRAWN BY	ENG. HADAYAT	CHECKED BY	ASR AHMAD AFRIDI	DATE	15/03/2015	PROJECT TYPE/DRAWING TITLE	6 CLASS ROOM / SECTION A-A
PROJECT SUPERVISOR	ENG. AB. MATIN	REVIEWED DATE	MARCH 2015	CODE	101/100		

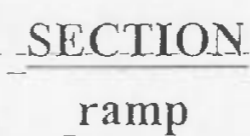
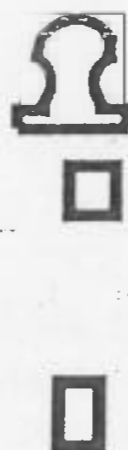




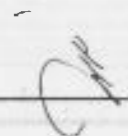
MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN
IN AFGHANISTAN

ARCHITECT/DESIGN	ARI KAMILA AFZALI	APPROVED: Date/Misc	ENG. ABDULMOMEN	DESIGN TYPE	ARCHITECTURE	PROJECT NAME
ENGINEER/DESIGN	ENG. HAEDHAT	SCALE	As shown (1/10)	DATE		PROJECT TYPE/DRAWING TITLE
APPROVED BY	ENG. HAMID	REVISOR DATE	MARCH 2015			6 CLASS ROOM V SECTION B-B



Natural Soil



STANDARD SCHOOL DESIGN IN AFGHANISTAN

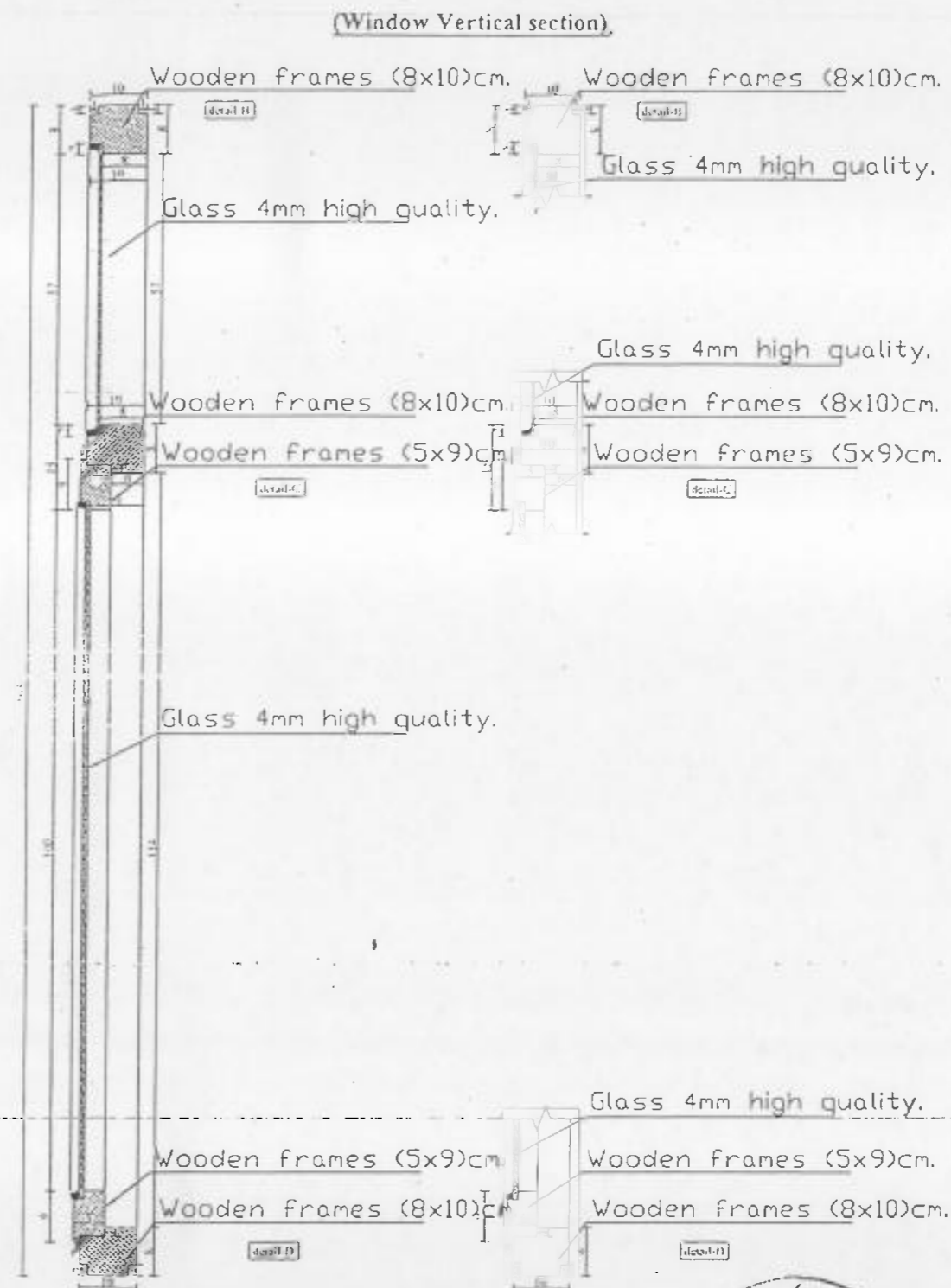
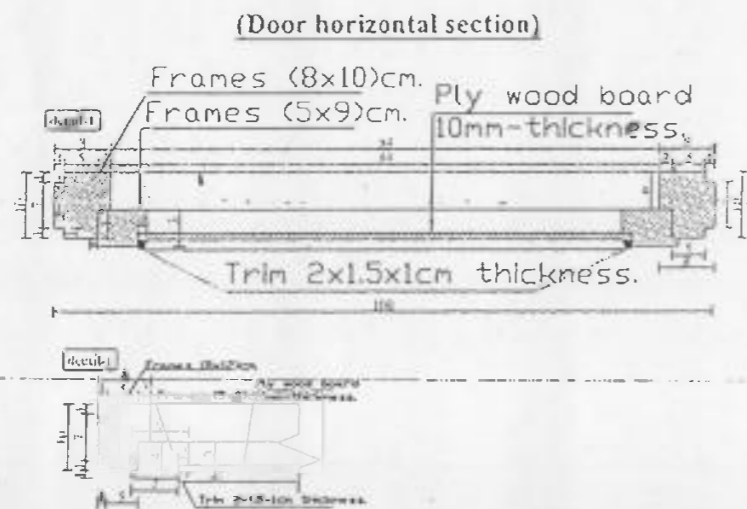
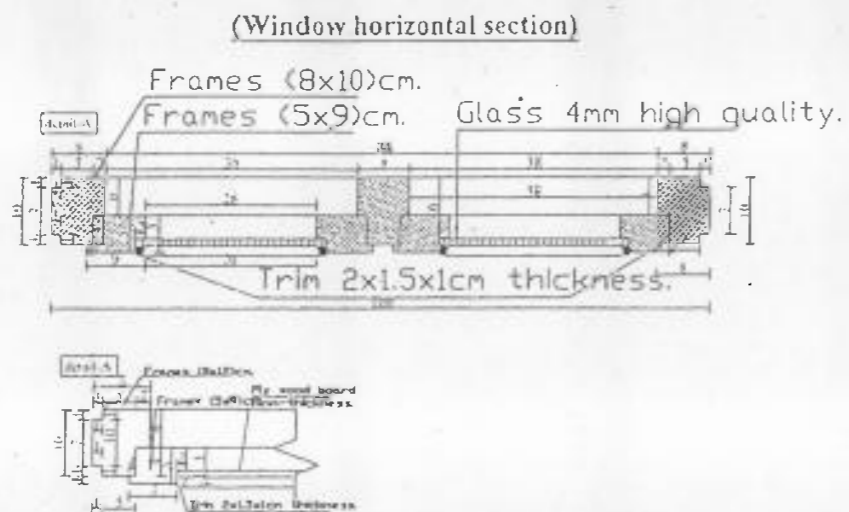
ARCTIC THERMOS	ALL MARKS A FIRM	PROPOSED ONE-STOP	THE ABOVE-MADE	DEVELOPMENT
ARCTIC THERMOS	PROPOSED YAT	SEALING	DEVELOPMENT	1700-NO 6-154
ARCTIC THERMOS	PROPOSED YAT	SEALING	DEVELOPMENT	



PROJECT NAME:

PROJECT & PAPER DRAWING TITLE: **CLASS ROOM RAMP & DOOR DETAILS**





MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

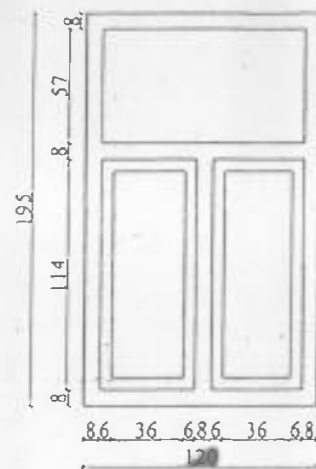
STANDARD SCHOOL DESIGN
IN AFGHANISTAN

ARCHITECT/DESIGN	ADNAN KAWAFZALI	APPROVED: Doc/Mod	ENG. ADDULAH MUMIN	DRAWING TYPE	ARCHITECTURE	PROJECT NAME	
STRUCTURE DESIGN	NG. HADYALI	SCALE	As shown (1:1)	DATE: 8/1/2014	12/13	PROJECT TYPE/DRAWING TITLE	CLAS BUILDING - DOOR & WINDOW DETAILS
DATE OF APPROVAL	2014/01/08	REVISION DATE	MAR 11 2014				

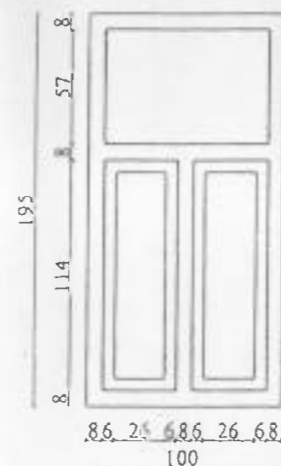


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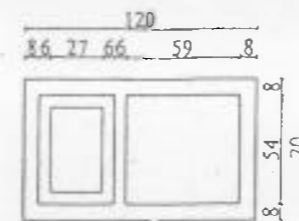
Door's & window's details



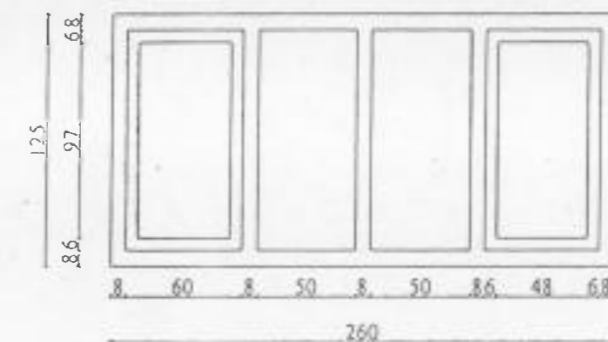
window 1, N=25



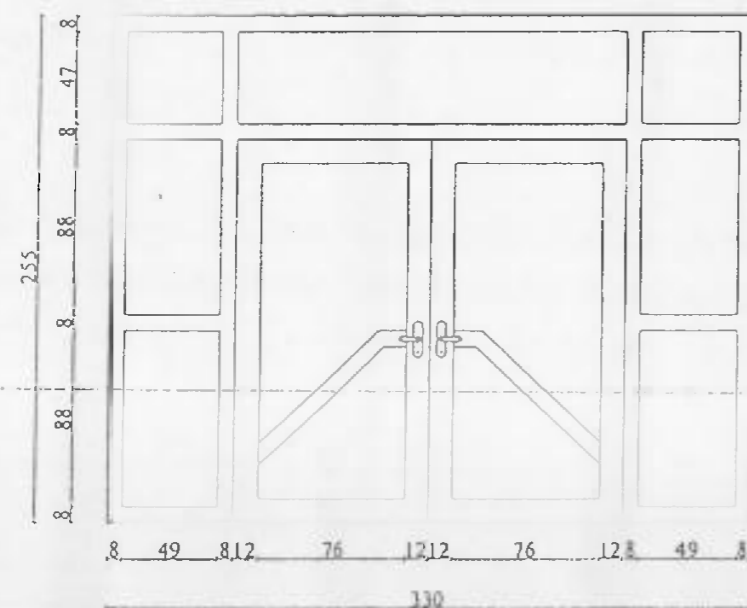
window 2, N=6



window 3, N=11



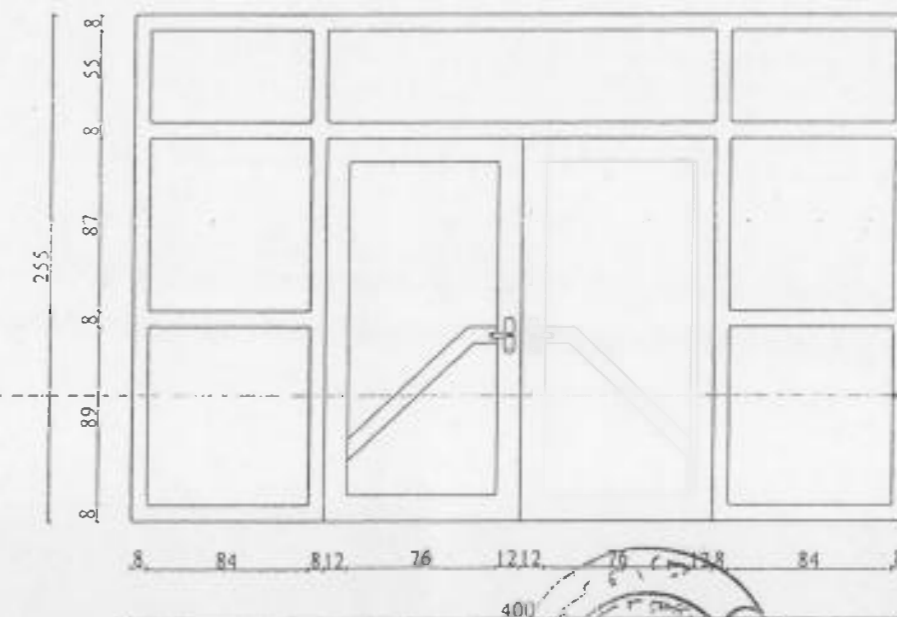
window 4, N=1



Door window 1, N=1



Door 1, N=8



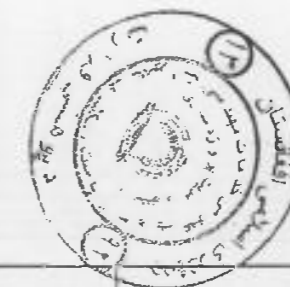
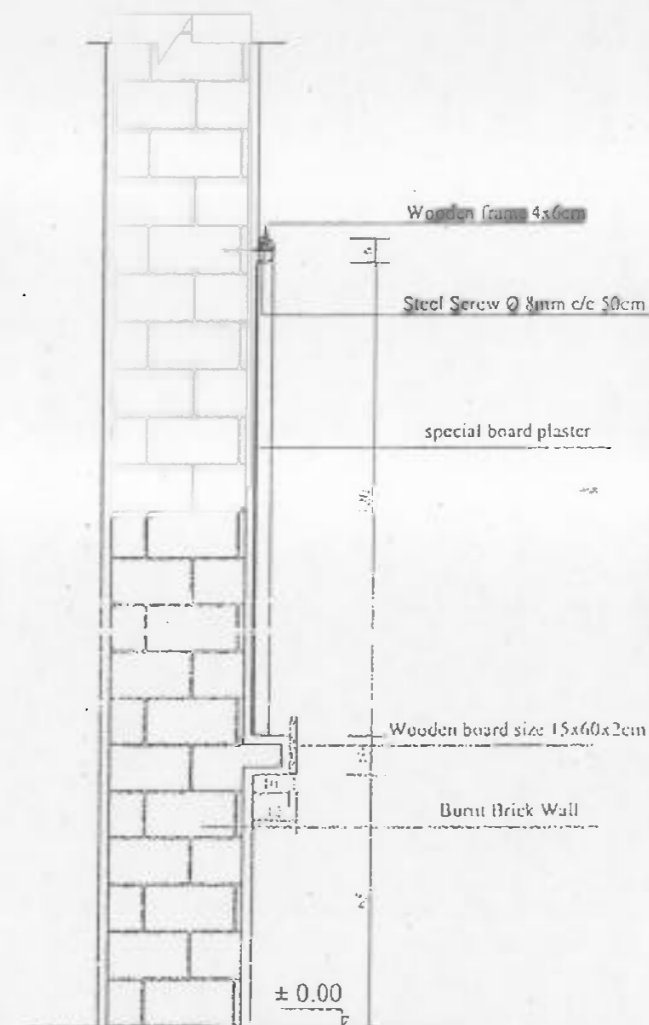
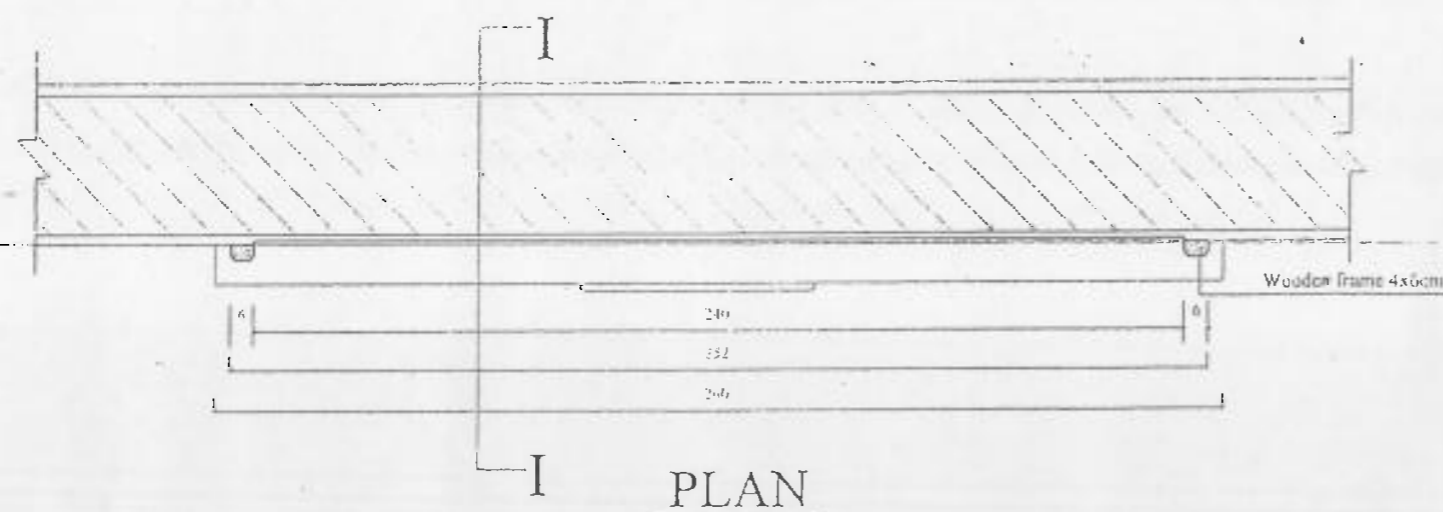
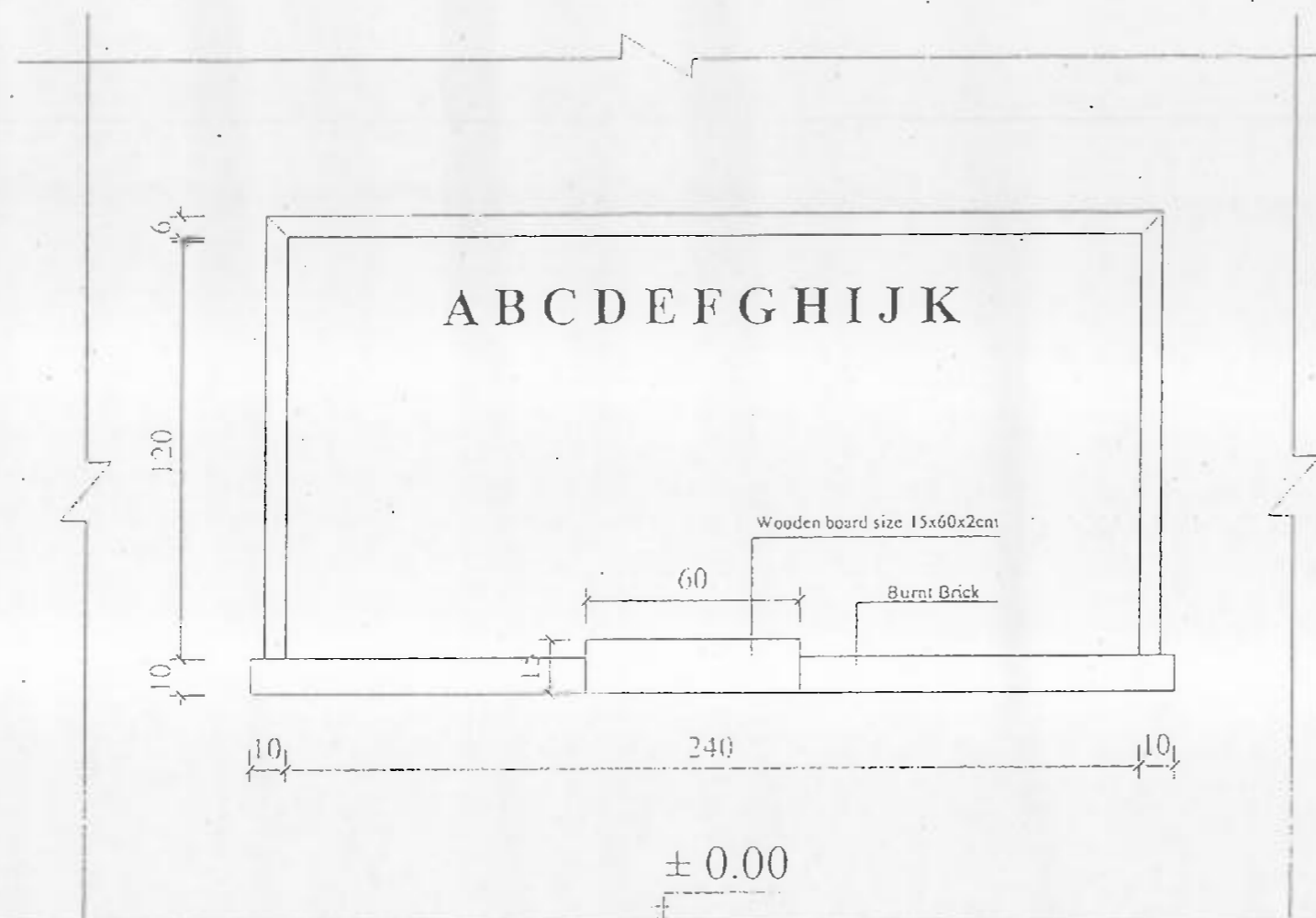
Door window 2, N=1

MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN
IN AFGHANISTAN

PROJECT LOCATION	MINISTRY OF EDUCATION	APPROVED BY	DR. ABDEL MONEEM	DRAWING TYPE	ARCHITECTURE	PROJECT NAME	
DATE OF REVISION	DATE OF REVISION	SCALE	AS SHOWN	DATE NO.	11/11	PROJECT LOCATION	
DATE OF APPROVAL	DATE OF APPROVAL	REVISION DATE	DATE OF 2011	DATE NO.	11/11	PROJECT LOCATION	

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MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN
IN AFGHANISTAN

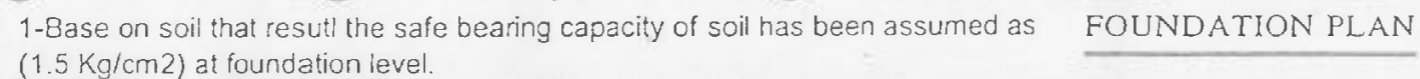
ARCHITECT/DESIGN	AFGANI A. A. ZALI	ARCHITECT/DESIGN	AFGANI A. A. ZALI	ARCHITECT/DESIGN	AFGANI A. A. ZALI
STRUCTURAL DESIGN	ENGINER A. A. ZALI	STRUCTURAL DESIGN	ENGINER A. A. ZALI	STRUCTURAL DESIGN	ENGINER A. A. ZALI
MECHANICAL DESIGN	ENGINER A. A. ZALI	MECHANICAL DESIGN	ENGINER A. A. ZALI	MECHANICAL DESIGN	ENGINER A. A. ZALI
ELECTRICAL DESIGN	ENGINER A. A. ZALI	ELECTRICAL DESIGN	ENGINER A. A. ZALI	ELECTRICAL DESIGN	ENGINER A. A. ZALI



PROJECT NAME

PROJECT TYPE, DRAWING TITLE, CLASS ROOM BOARD DETAIL



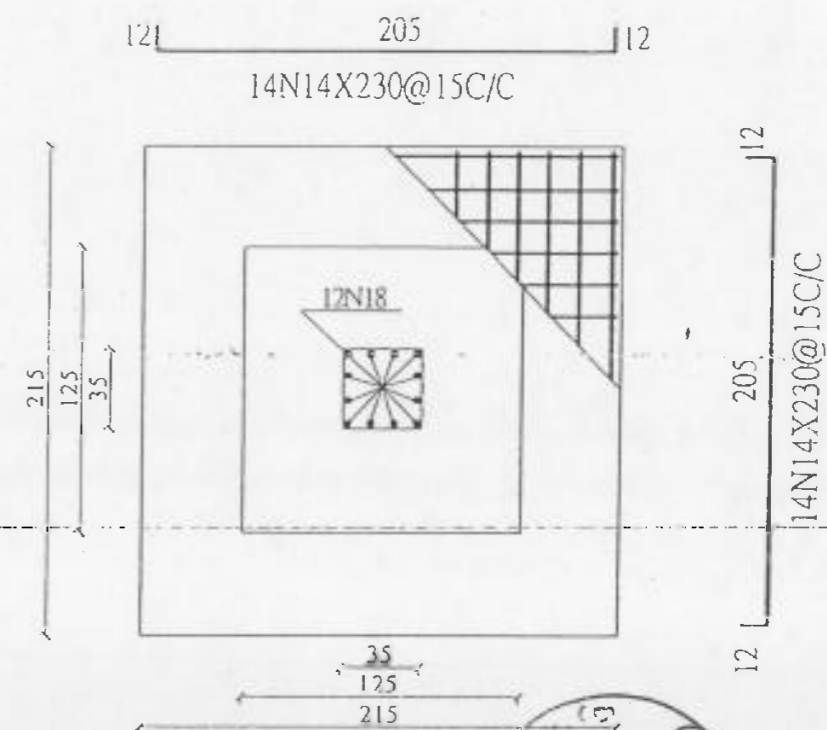
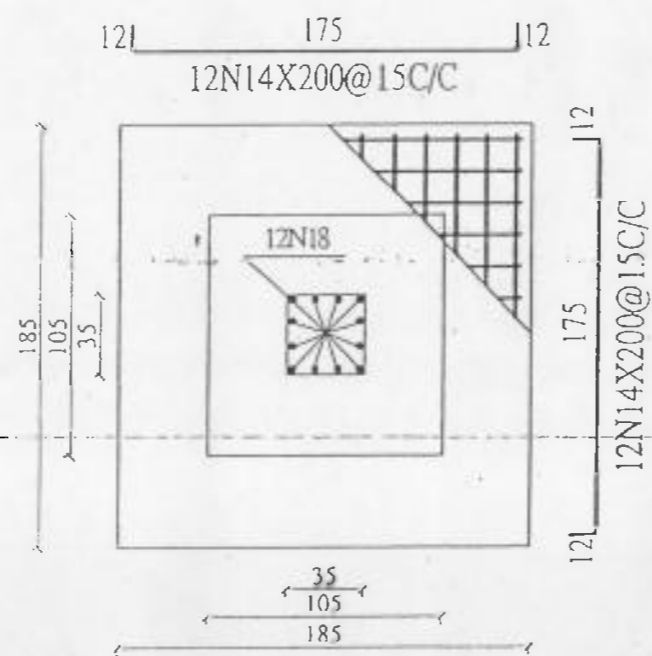
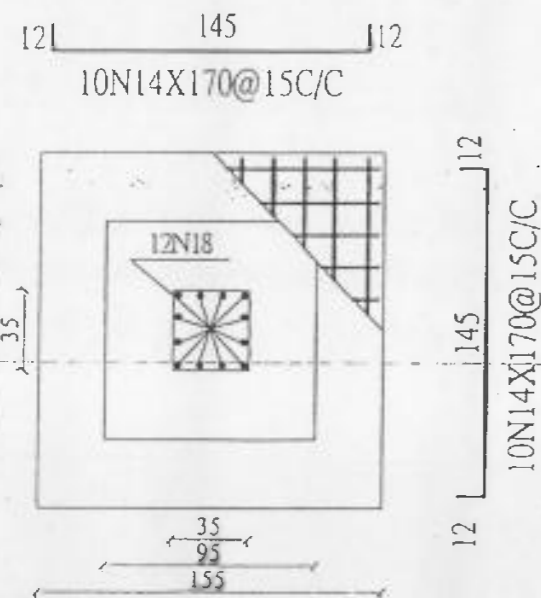
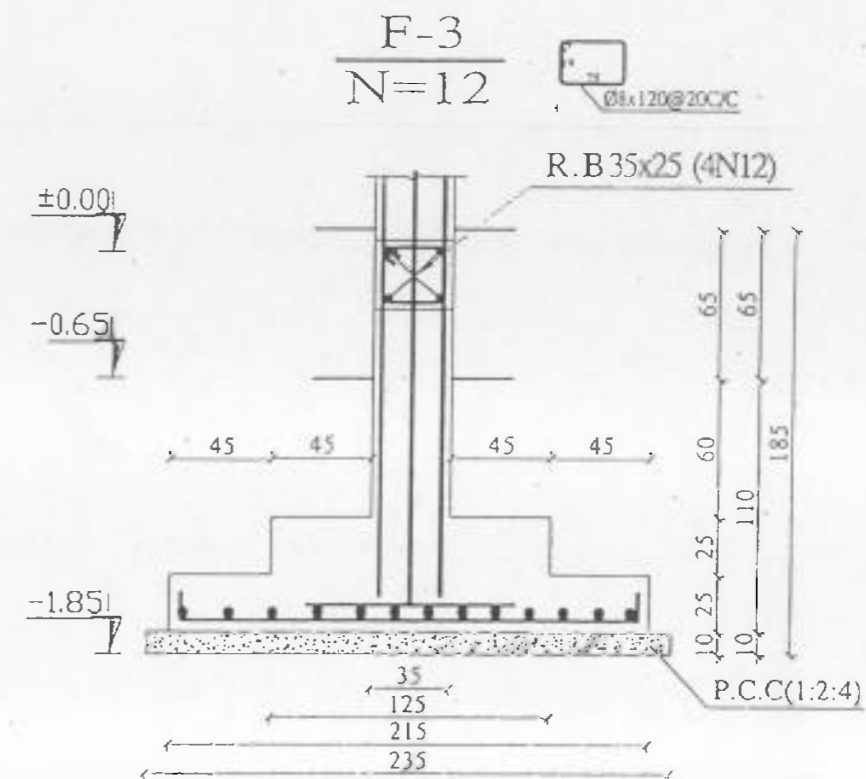
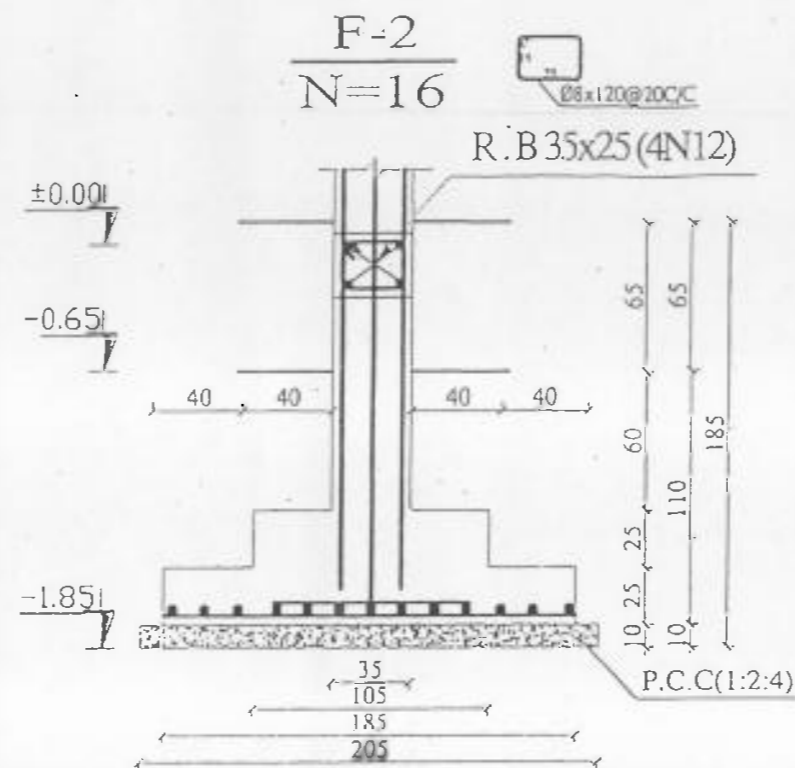
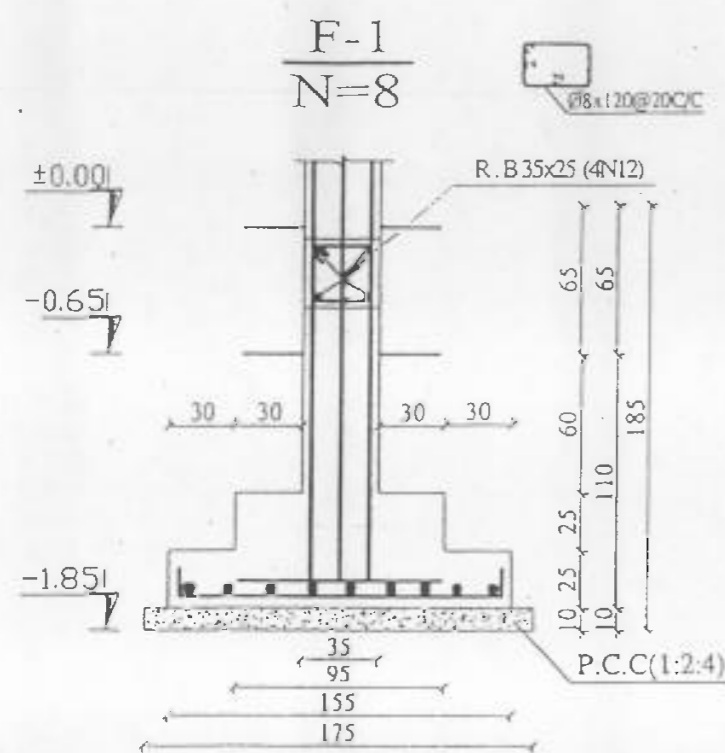


3-Concrete for all reinforced elements will be of ratio(1:1.5:3) and cubical strength of (200kg/cm²) after 28 days.

5-Reinforcement grade 2 deformed bars having minimum yield stress(4200Kg/cm²) that shown by (N).

6-P.C.C(1:2:4).

COLLECTION PLAN



MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN
IN AFGHANISTAN

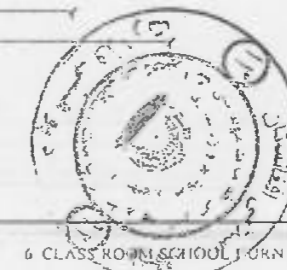
DESIGNER	ENGINEER	APPROVER	DATE
ENGINER AMIR			

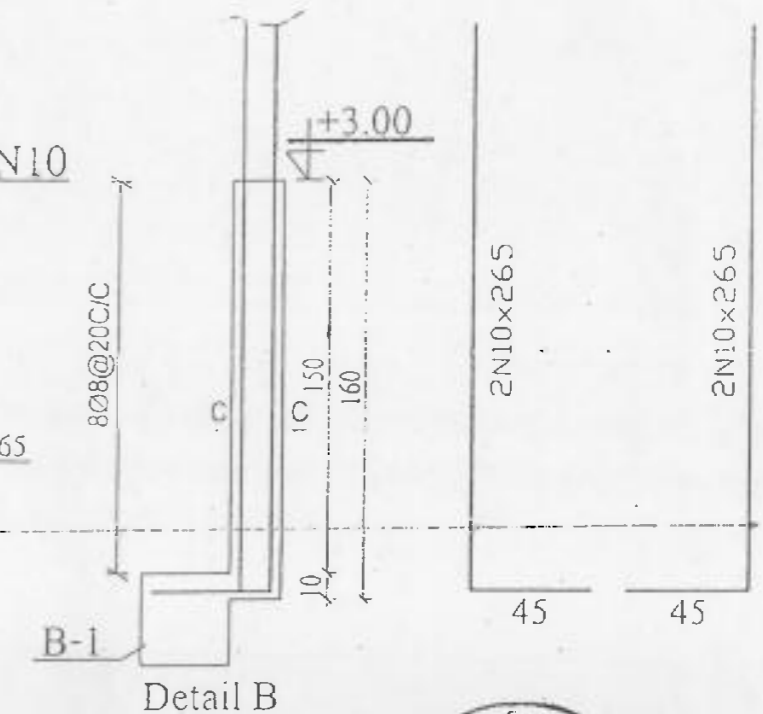
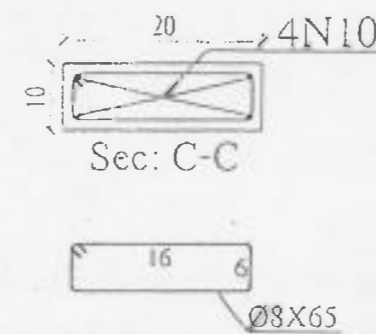
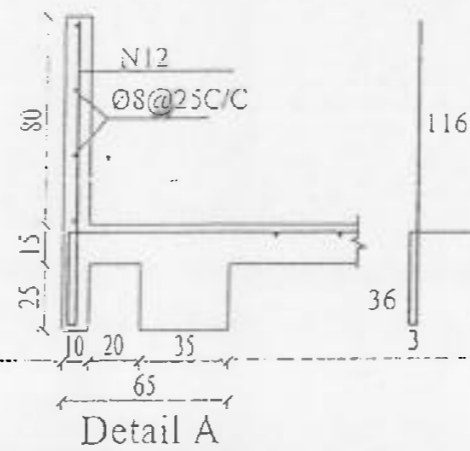
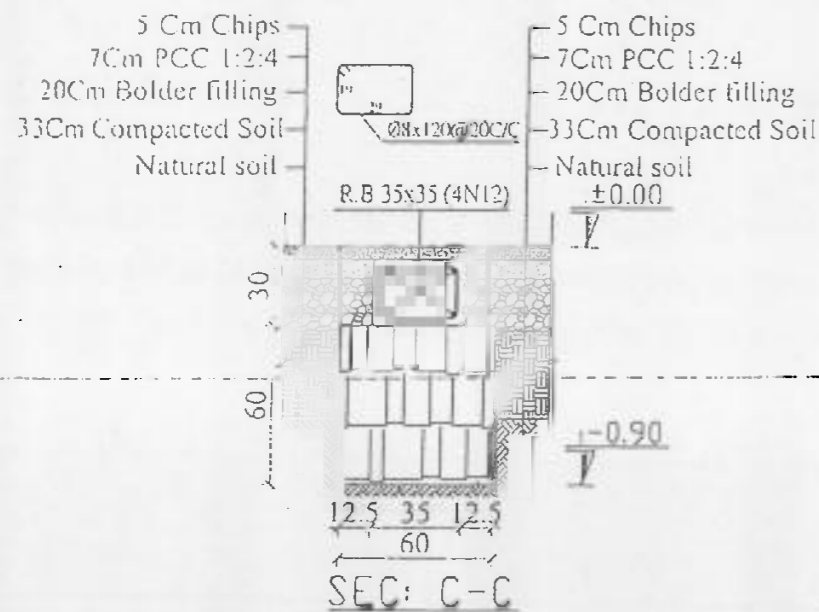
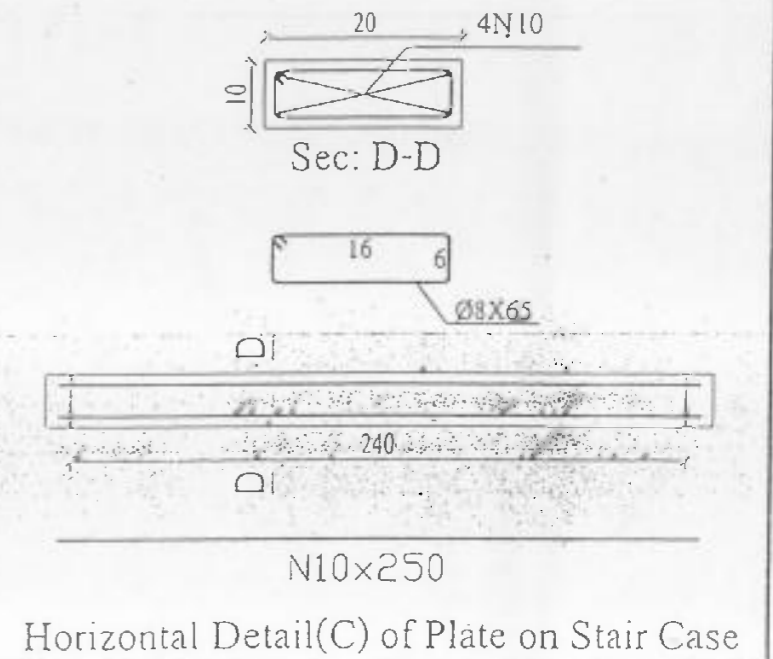
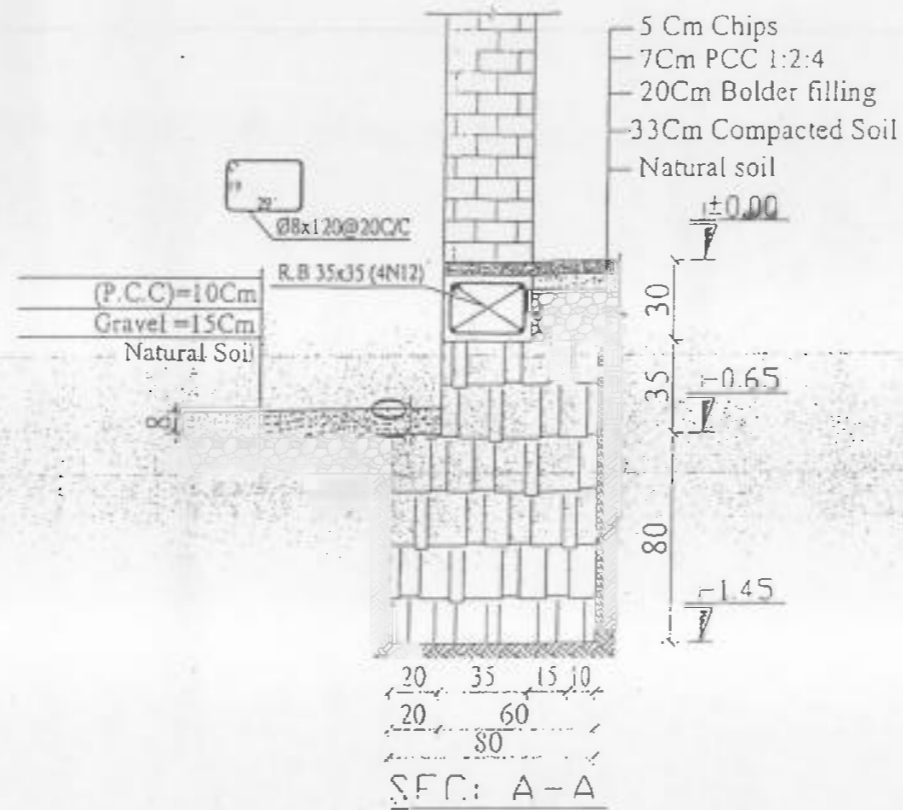
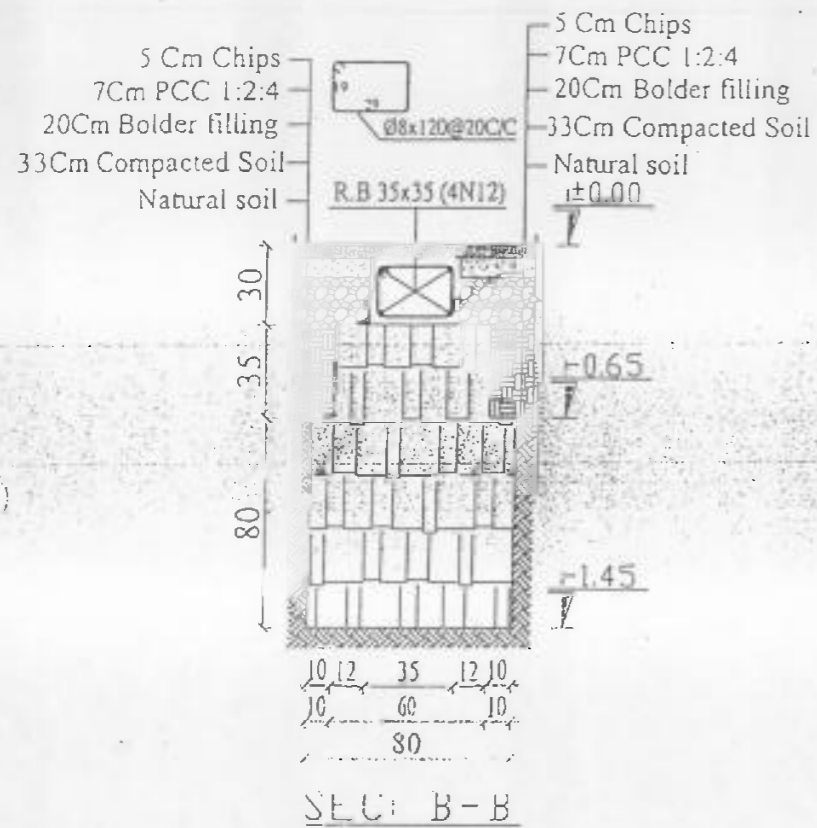
PROJECT NAME

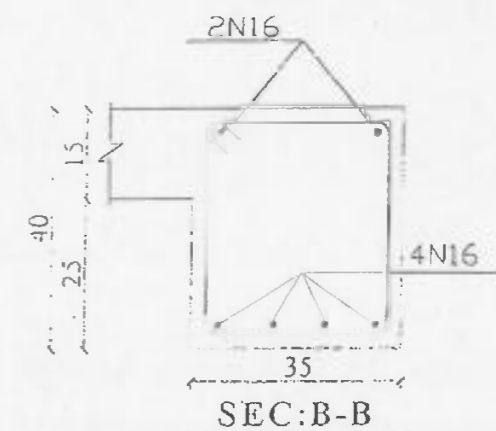
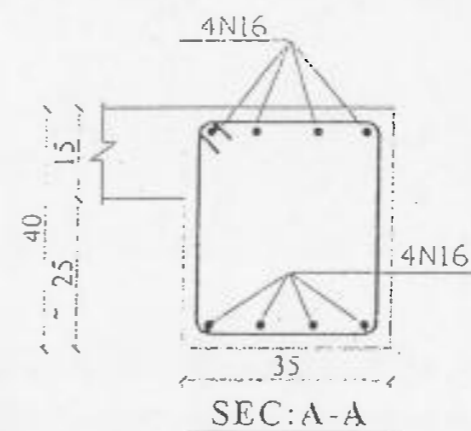
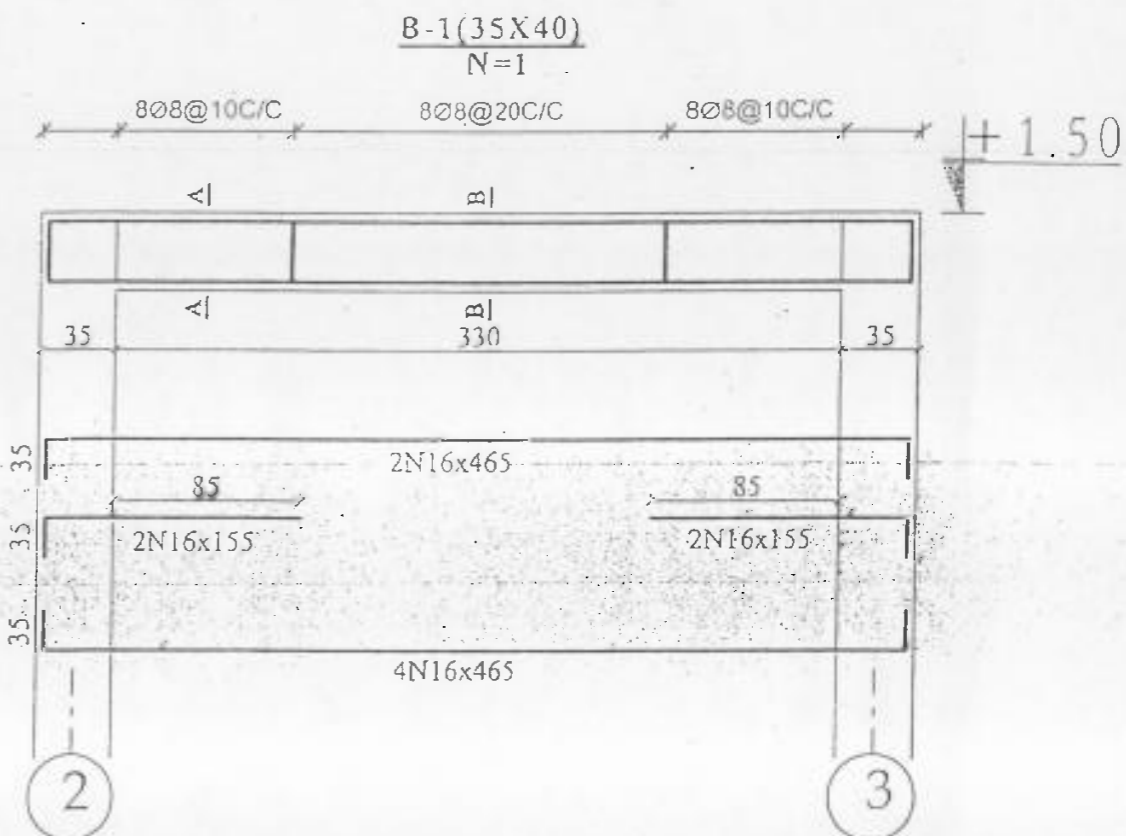
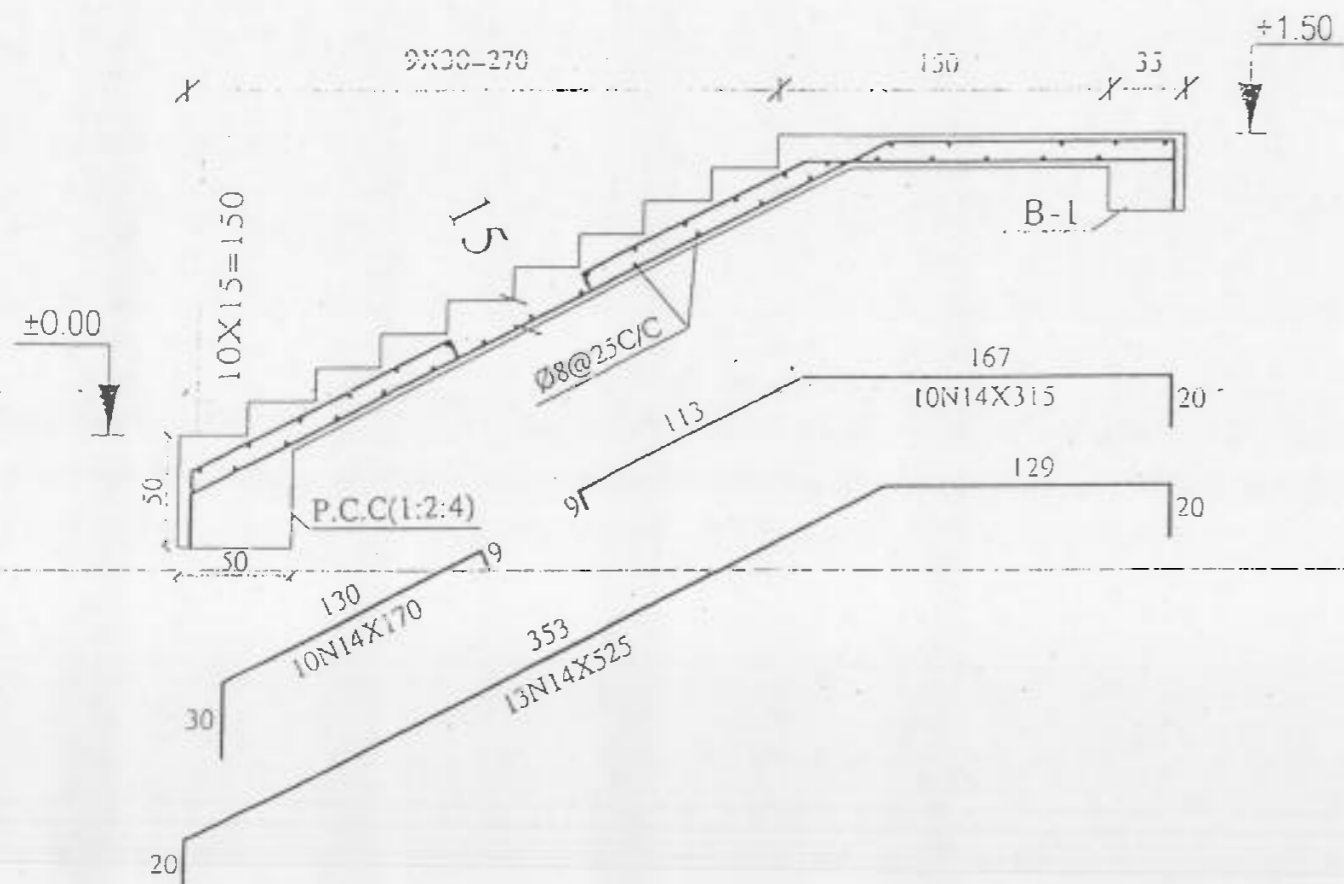
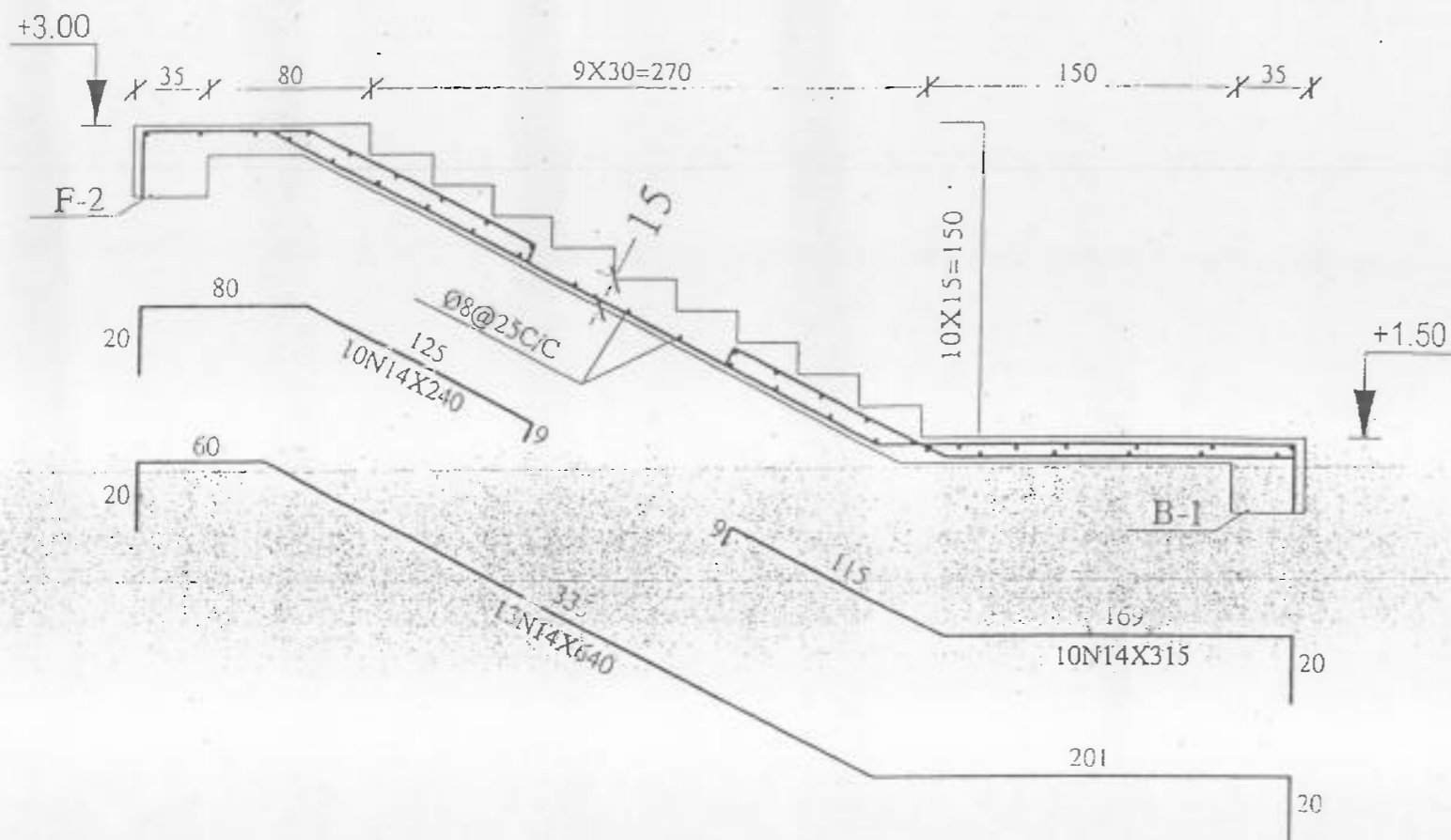
6 CLASS ROOM SCHOOL FORN BRICK R.C.C. ROOF

DRAWING TITLE

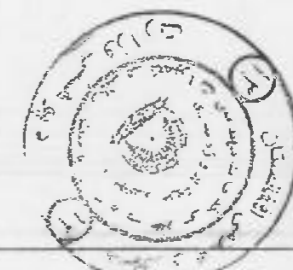
FOUNDATION (F-1, F-2, F-3)







STAIR CASE DETAILING



MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN
IN AFGHANISTAN

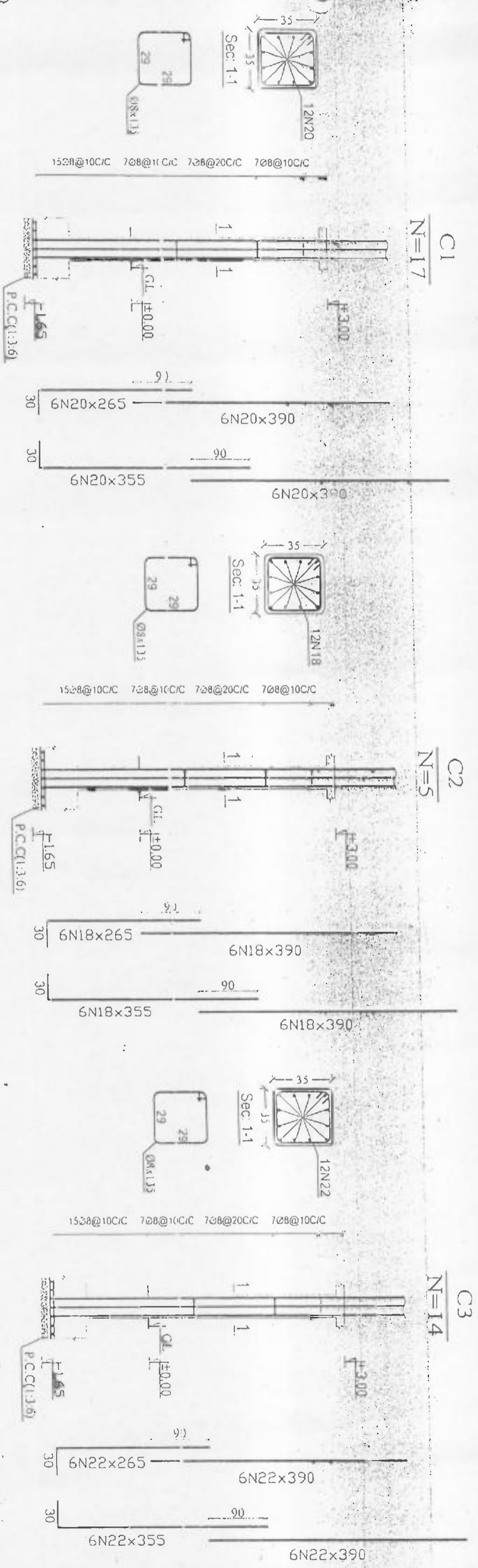
PROJECT NAME
DRAWING TITLE

PROJECT NAME

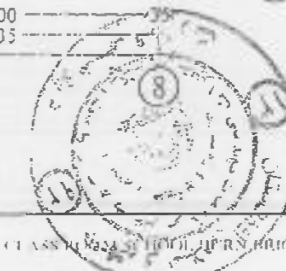
DRAWING TITLE

6 CLASS ROOM SECTION

COLUMNS DETAILING

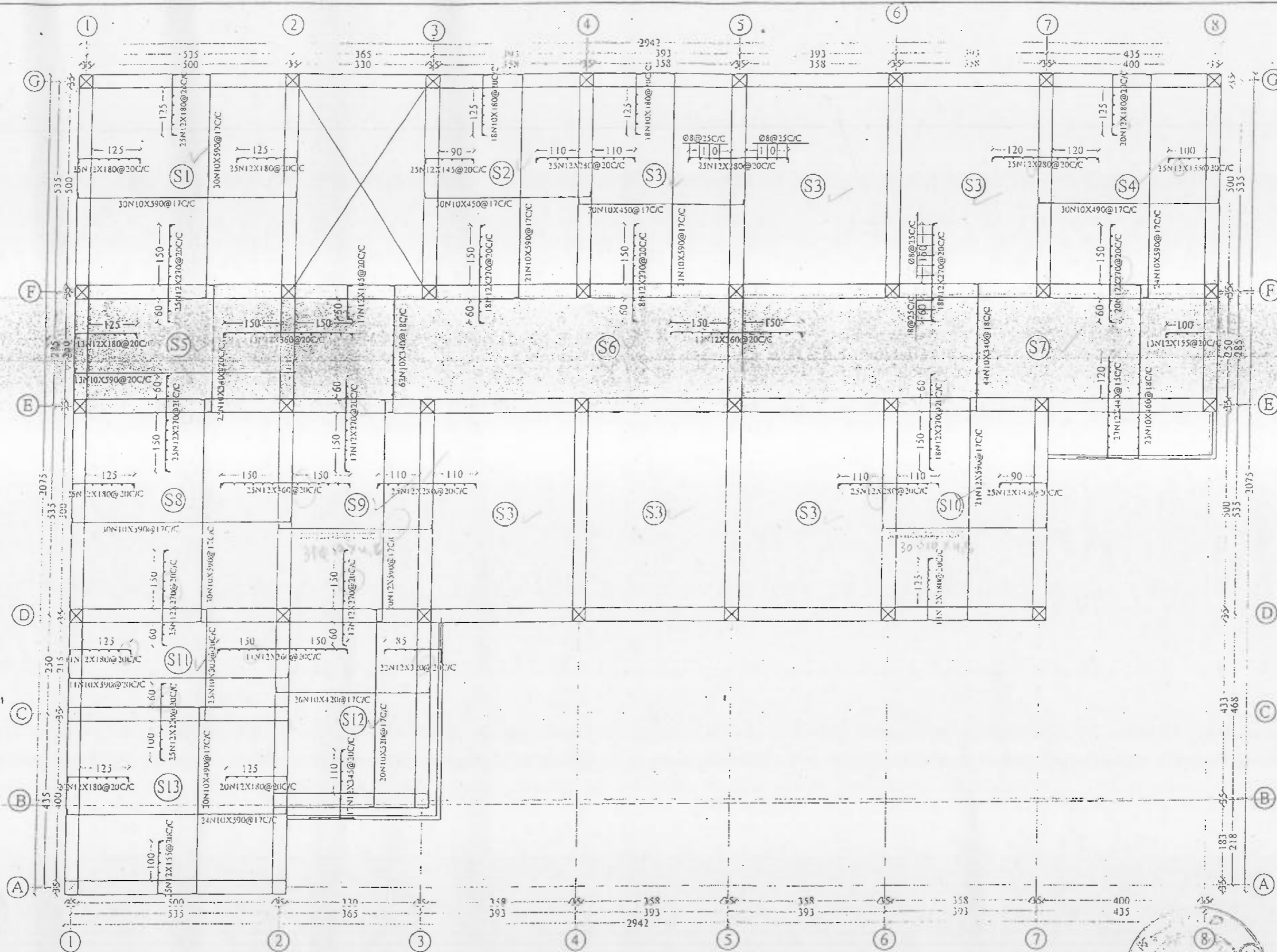


Handwritten signature or mark.



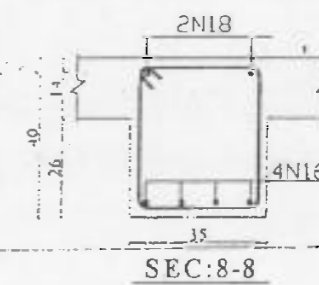
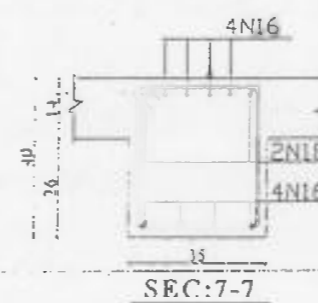
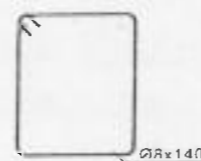
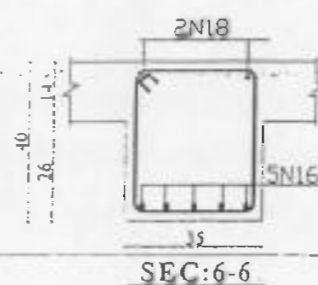
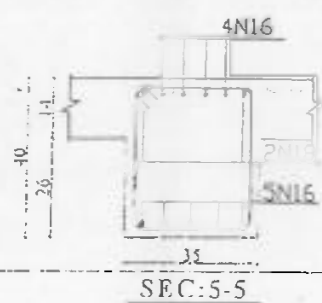
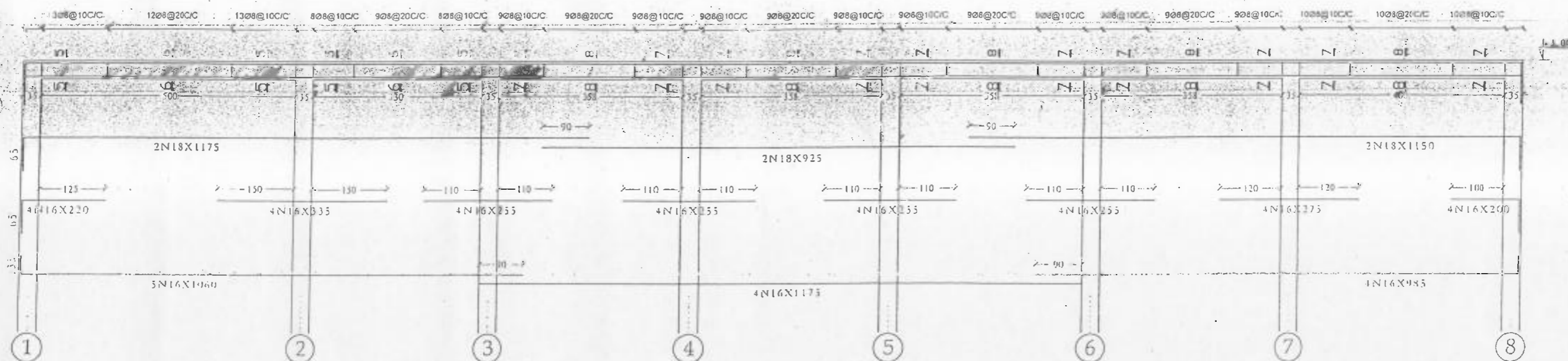
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FOR A WINNING TITLE!



GROUND FLOOR REINFORCEMENT PLAN AT LEVEL 3.00

F-2(35X40)
N=2



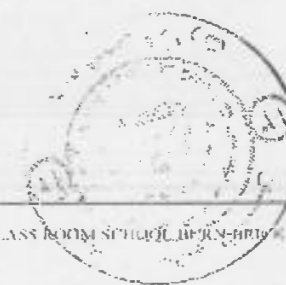
MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN
IN AFGHANISTAN

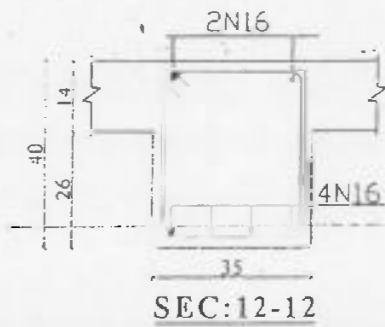
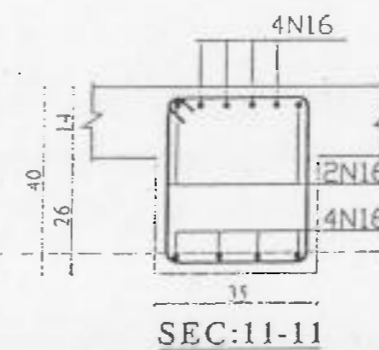
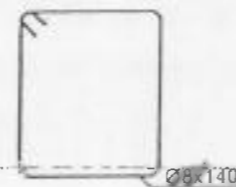
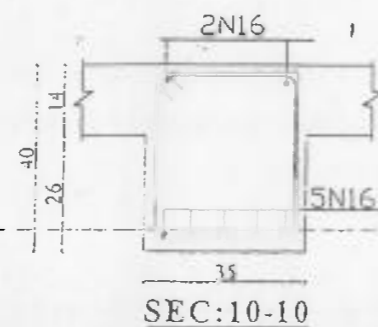
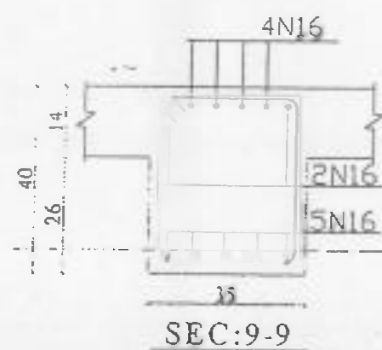
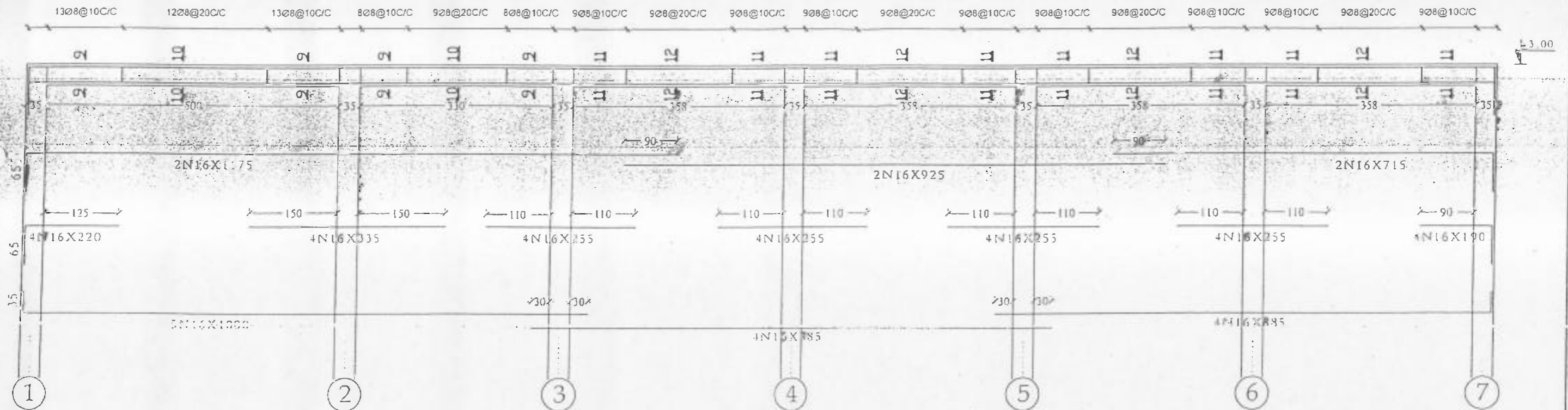
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CHECKED BY: [Signature]
APPROVED BY: [Signature]
ENGINEER: [Signature]
DRAWING TYPE: STRUCTURAL

PROJECT NAME
DRAWING TITLE

5 CLASS ROOM SCHOOL BUILDING - R.A.C. ROOM



F-3(35X40)
N=1



MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION

STANDARD SCHOOL DESIGN
IN AFGHANISTAN

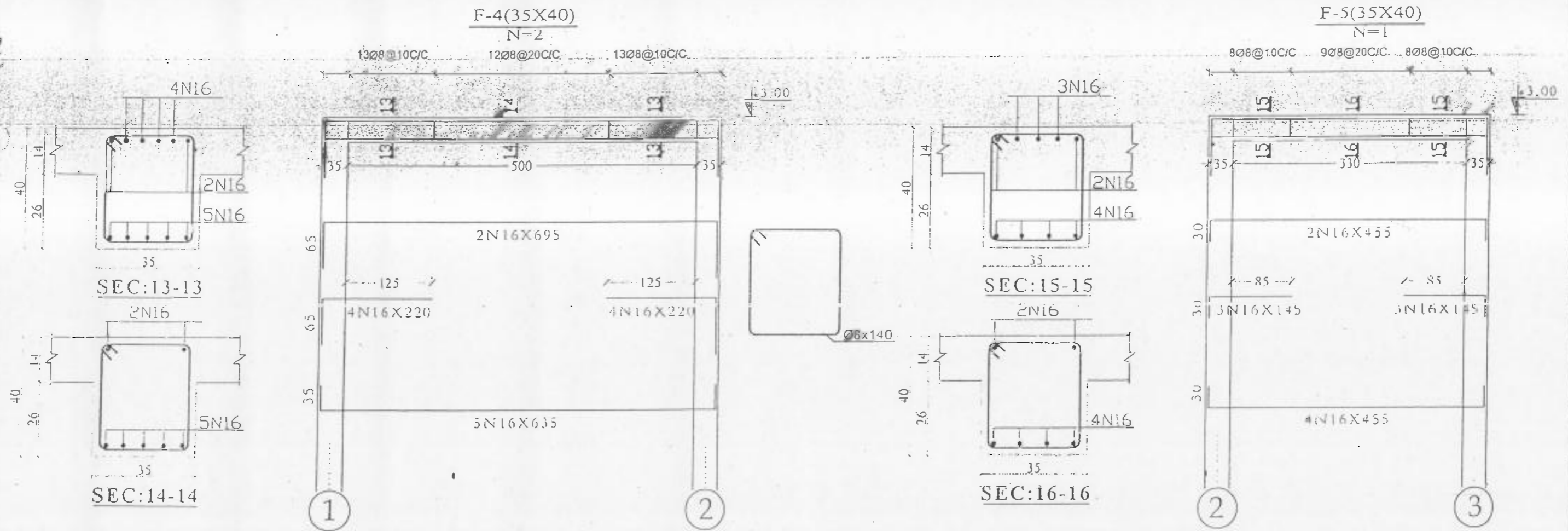
REVISIONS
DESIGNED BY
CHECKED BY
APPROVED BY
DATE
DRAWING NO.
SCALE

PROJECT NAME
DRAWING TITLE

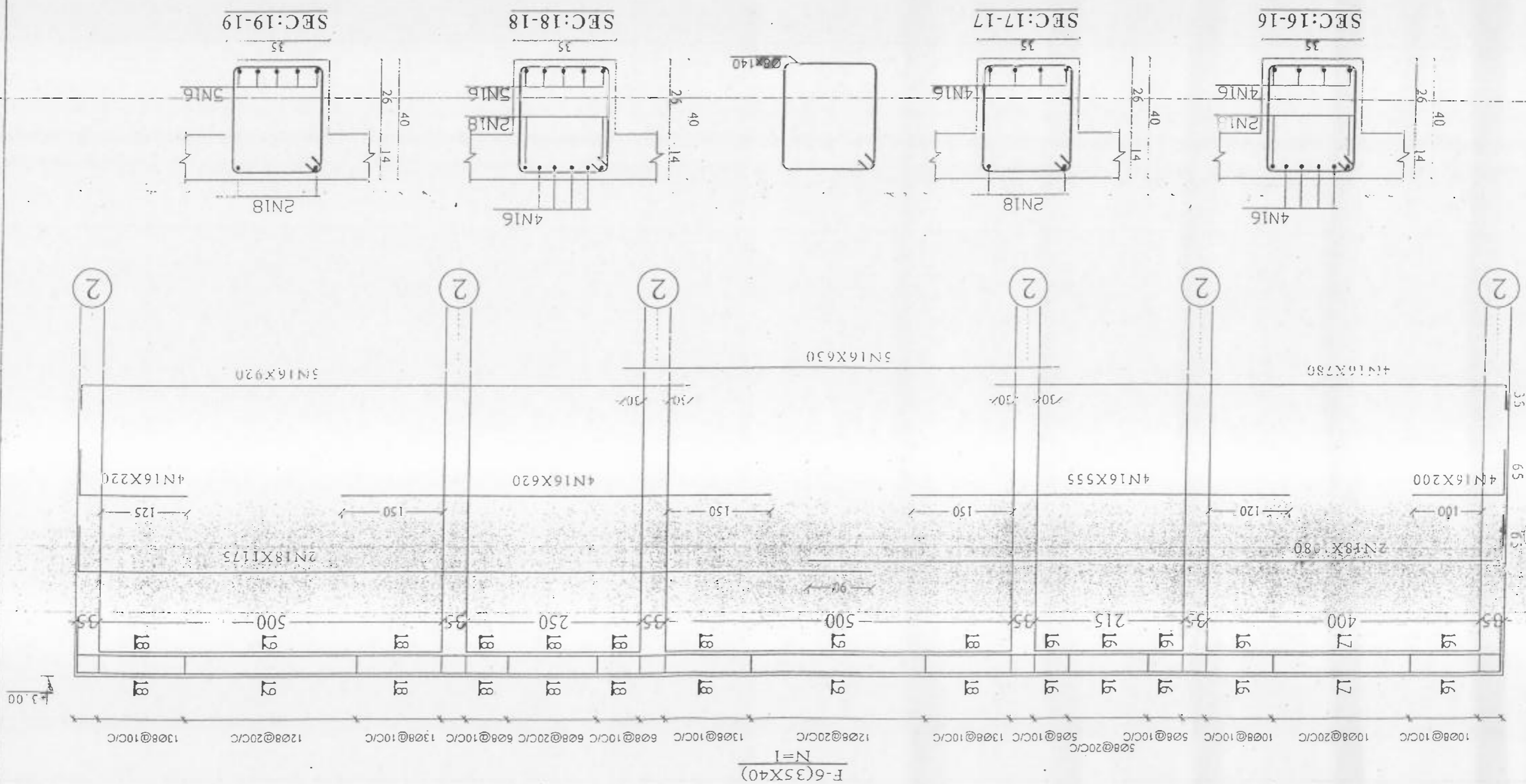
4 CLASS ROOM SCHOOL BURN BRICK R.C.C. ROOM
CLASS ROOM FLOORING



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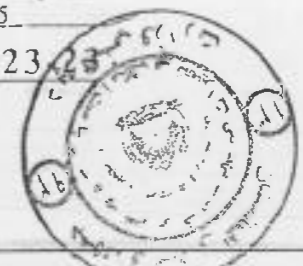
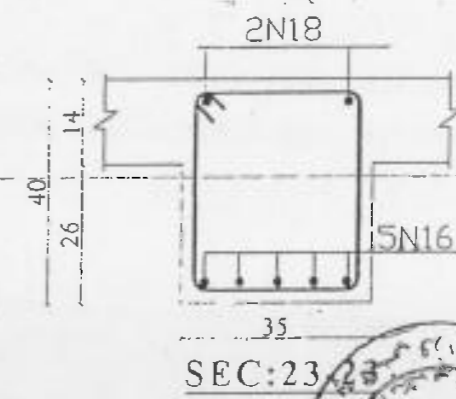
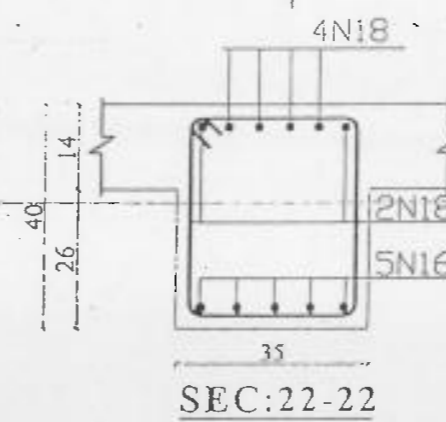
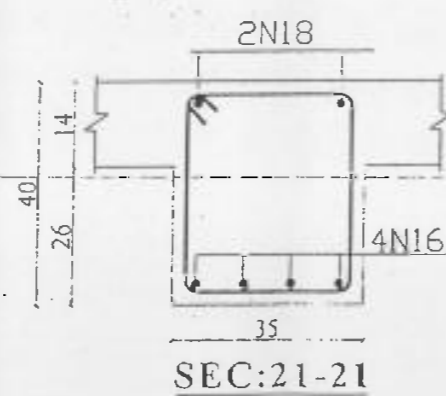
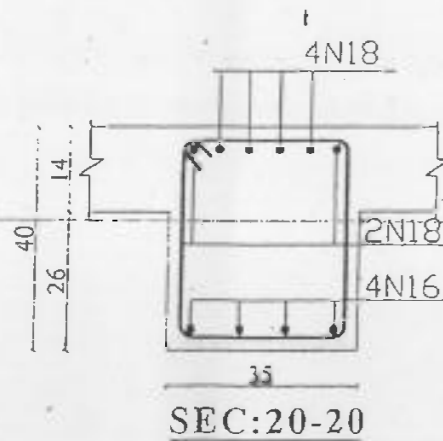
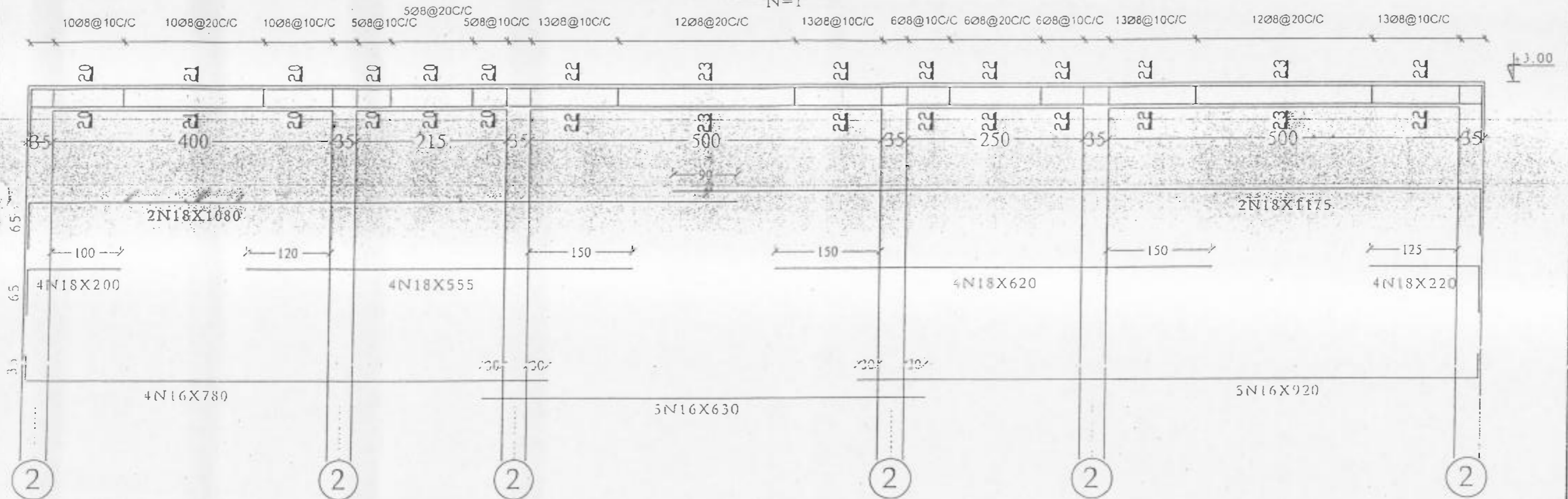


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F-7(35X40)

N=1

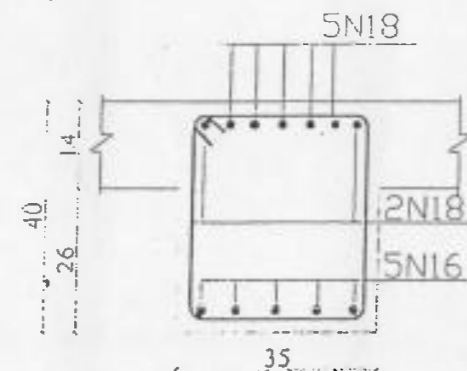
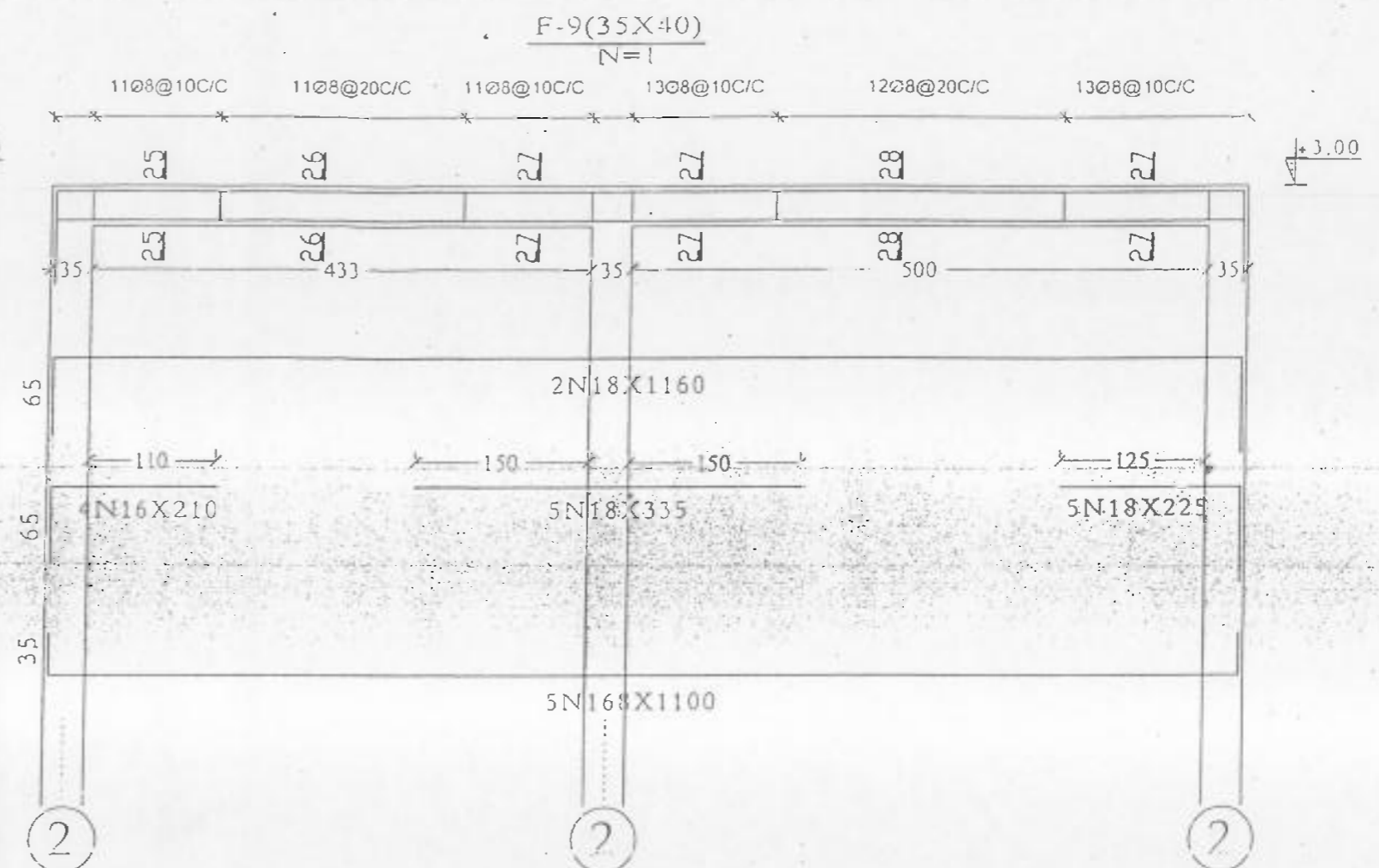
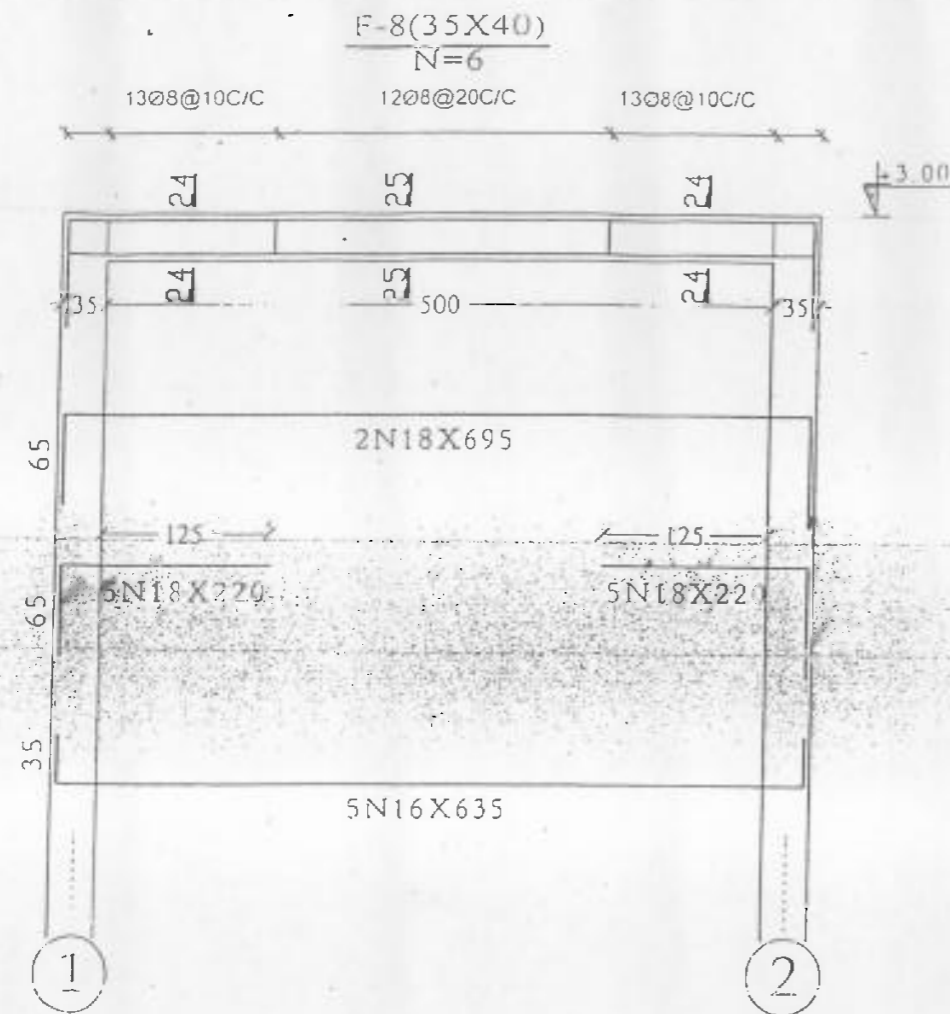


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DEPARTMENT OF CONSTRUCTION

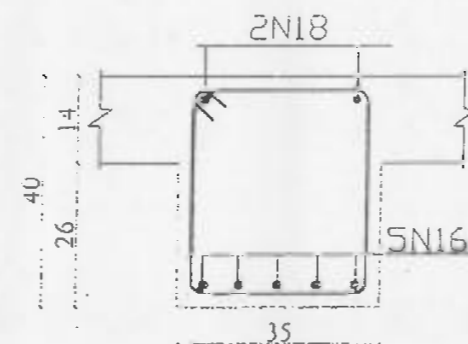
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PROJECT NAME
DRAWING TITLE

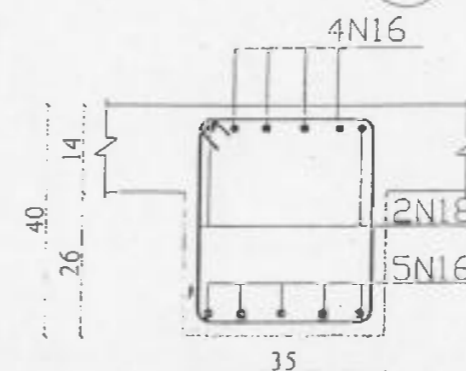
5 CLASS ROOM SCHOOL - BERN BRICK B.C. 5044
GRADE: FOURTH GRADE



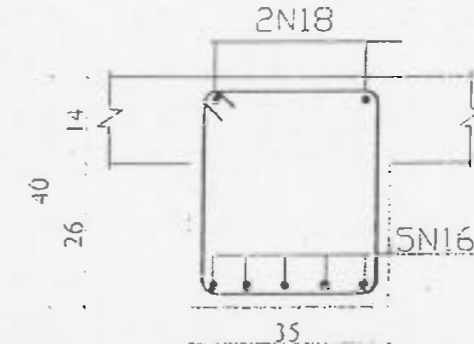
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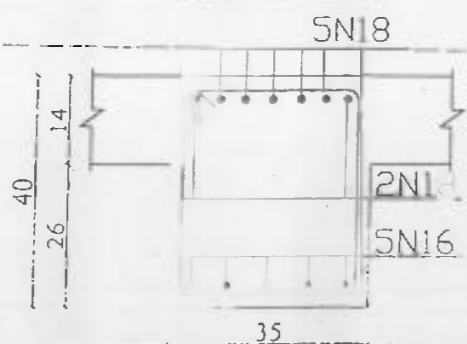
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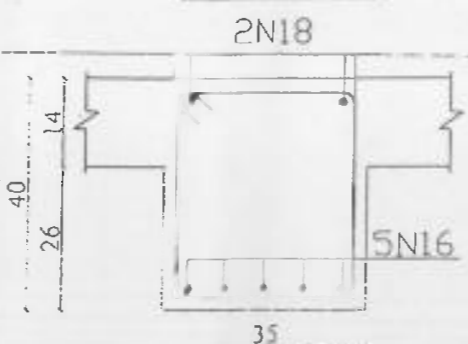
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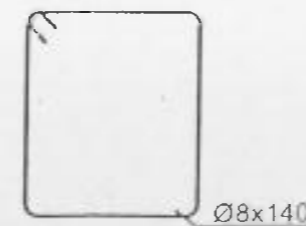
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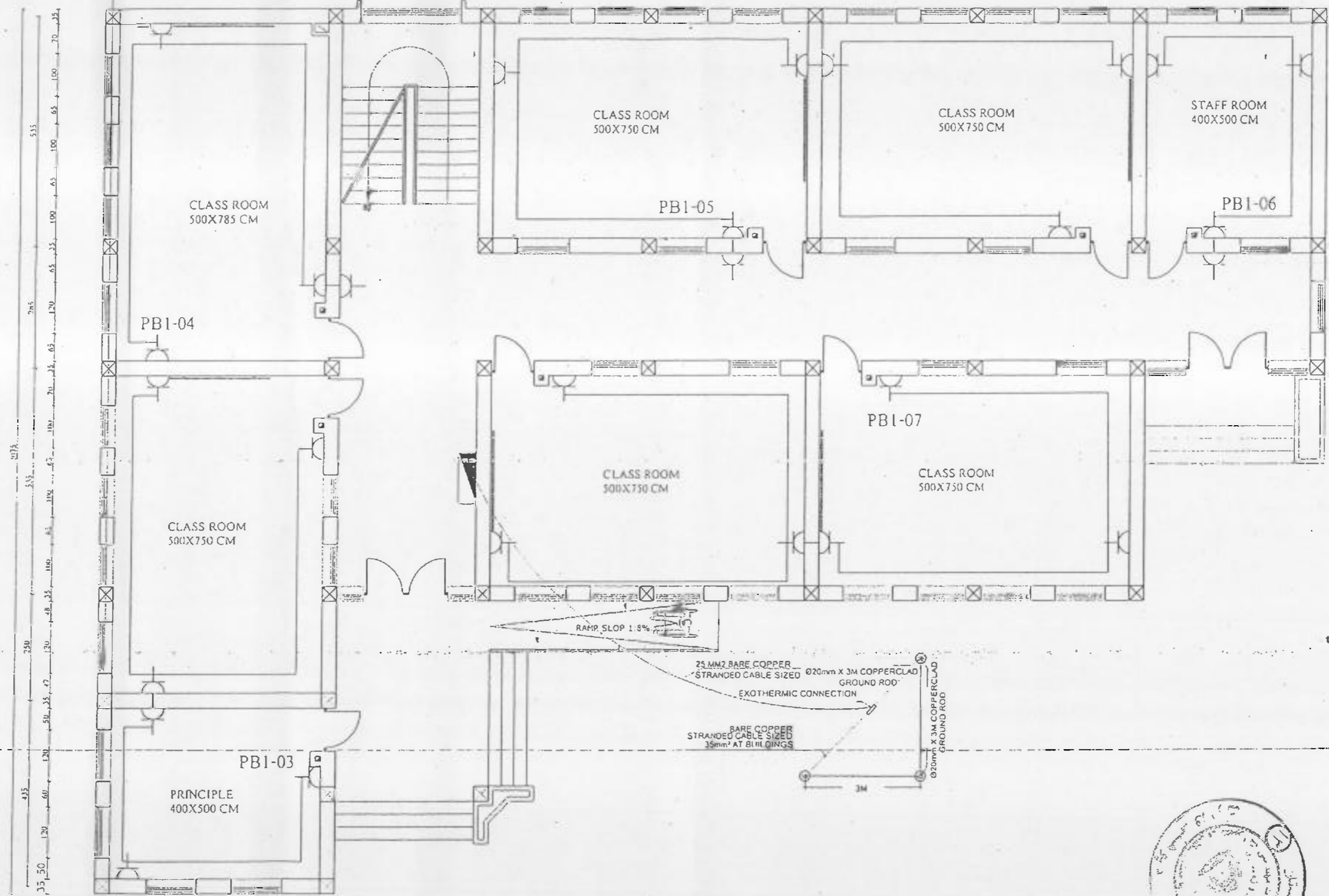


SEC:27-27



SEC:28-28





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DEPARTMENT OF CONSTRUCTION



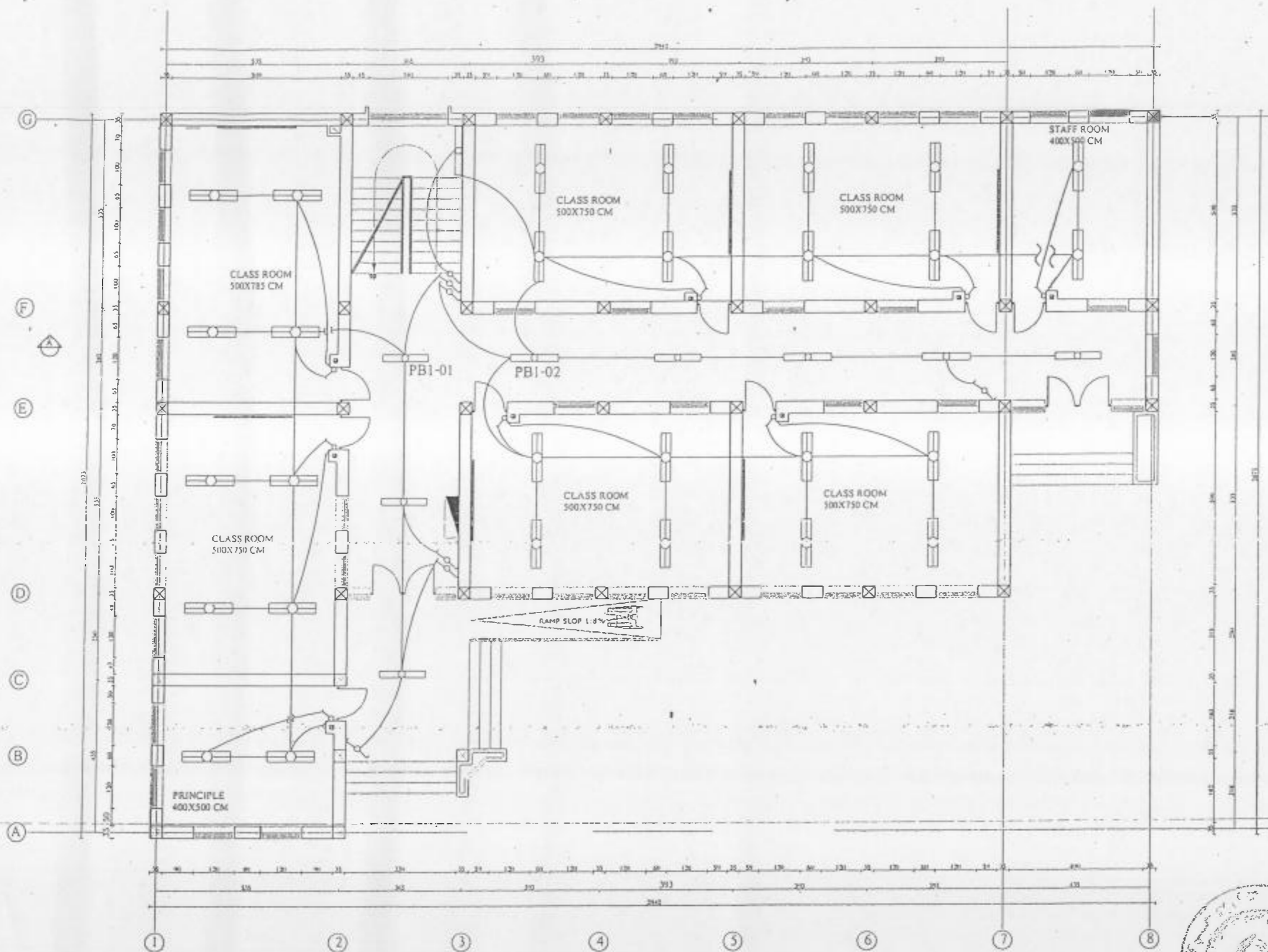
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IN AFGHANISTAN

DESIGNED BY	DATE	PROJECT NAME	PROJECT LOCATION	PROJECT NO.
DRAWN BY	DATE	PROJECT NAME	PROJECT LOCATION	PROJECT NO.
CHECKED BY	DATE	PROJECT NAME	PROJECT LOCATION	PROJECT NO.
APPROVED BY	DATE	PROJECT NAME	PROJECT LOCATION	PROJECT NO.

PROJECT NAME

DRAWING TITLE

6Class School Iron Sheet Roof
GROUND POWER PLAN



FURNITURE PLAN



MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION



STANDARD SCHOOL DESIGN
IN AFGHANISTAN

DESIGNER	DATE	APPROVED	DATE	PROJECT NAME	TYPE

PROJECT NAME

DRAWING TITLE

6Class School Iron Sheet Roof
GROUND FLOOR LIGHTING PLAN



PANEL SCHEDULE AND SINGLE LINE DIAGRAM

PANEL BOARD NAME : PBI			25AMP BUS BAR RATE			MAIN BREAKER : 35 A		
PANEL LOCATION: GROUND FLOOR			PANEL 220 VOLT , 1 PHASE			3 WIRE , 50HZ 50KA 150 / 0.5 SEC		
NAME ENCLOSURE						RECESSED MOUNTED		
WIRE , CONDUIT AND DESCRIPTION			SINGLE PHASE			TRIP & CIRCUIT		
WIRE AND CONDUIT	GND WIRE	DESCRIPTION	A (VA)	A (VA)	A (VA)	AMP	CKT	CKT
2(1x2.5mm ²)Ø20mm	2.5mm ²	LIGHTING	393.0000			16	1	2
2(1x4mm ²)Ø20mm	4mm ²	RECEPTACLE		364.0		20	3	4
2(1x4mm ²)Ø20mm	4mm ²	RECEPTACLE			1008.0	20	5	6
2(1x4mm ²)Ø20mm	4mm ²	RECEPTACLE	584.0000			20	7	8
		SPARE					9	10
SUB - TOTAL IN (VA)			1257.0	864.0	1008.0	-	-	-
TOTAL PHASE (A) *			2007.0	9.1				
TOTAL PHASE (A) *			1440.0	-8.5				
TOTAL PHASE (A) *			1728.0	7.9				
TOTAL CONNECTED LOAD			5175.0	235				
DEMAND FACTOR			0.7					
DEMAND LOAD			3622.5					
25% FUTURE LOAD			905.6					
TOTAL LOAD			4528.1					
TOTAL AMPERE			20.6					
BREAKER SIZE			25.7					
WIRE , CONDUIT AND DESCRIPTION			SINGLE PHASE			TRIP & CIRCUIT		
WIRE AND CONDUIT	GND WIRE	DESCRIPTION	A (VA)	A (VA)	A (VA)	AMP	CKT	CKT
2(1x2.5mm ²)Ø20mm	2.5mm ²	RECEPTACLE				750.0		
2(1x4mm ²)Ø20mm	4mm ²	RECEPTACLE			576.0			
2(1x4mm ²)Ø20mm	4mm ²	RECEPTACLE			720.0			
		SPARE						
		SPARE						
SUB - TOTAL IN (VA)			750.0	576.0	720.0	-	-	-

1(2x25mm ²) Cu P.V.C/PVC									
Ø50mm PVC CONDUIT									
25 AMP									
BP-1 GROUND FLOOR 25 AMP BUS BAR RATE ALL 16&20 CB +RCBG									
16A	16A	20A	20A	20A	20A	20A	20A	20A	20A
	P=0.4KVA	P=0.75KVA	P=0.84KVA	P=0.576KVA	P=1.00KVA	P=0.72KVA	P=0.84KVA		
1 - 2(1x2.5mm ²)+2.5mm ² CU GND									
2 - 2(1x2.5mm ²)+2.5mm ² CU GND									
3 - 2(1x4mm ²)+4mm ² CU GND									
4 - 2(1x4mm ²)+4mm ² CU GND									
5 - 2(1x4mm ²)+4mm ² CU GND									
6 - 2(1x4mm ²)+4mm ² CU GND									
7 - 2(1x4mm ²)+4mm ² CU GND									
8 -									
9 -									
10 -									
LIGHTING									
LIGHTING									
RECEPTACLE									
RECEPTACLE									
RECEPTACLE									
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SPARES									
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DEPARTMENT OF CONSTRUCTION



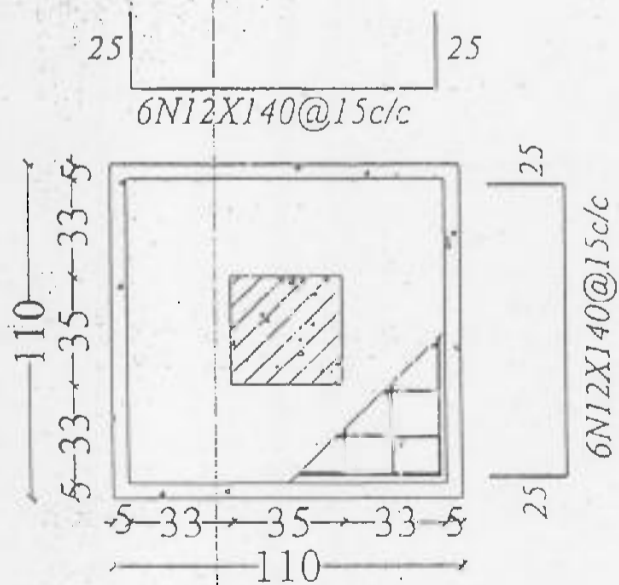
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IN AFGHANISTAN

PROJECT NAME
DRAWING TITLE

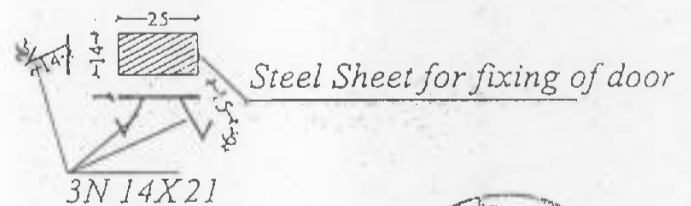
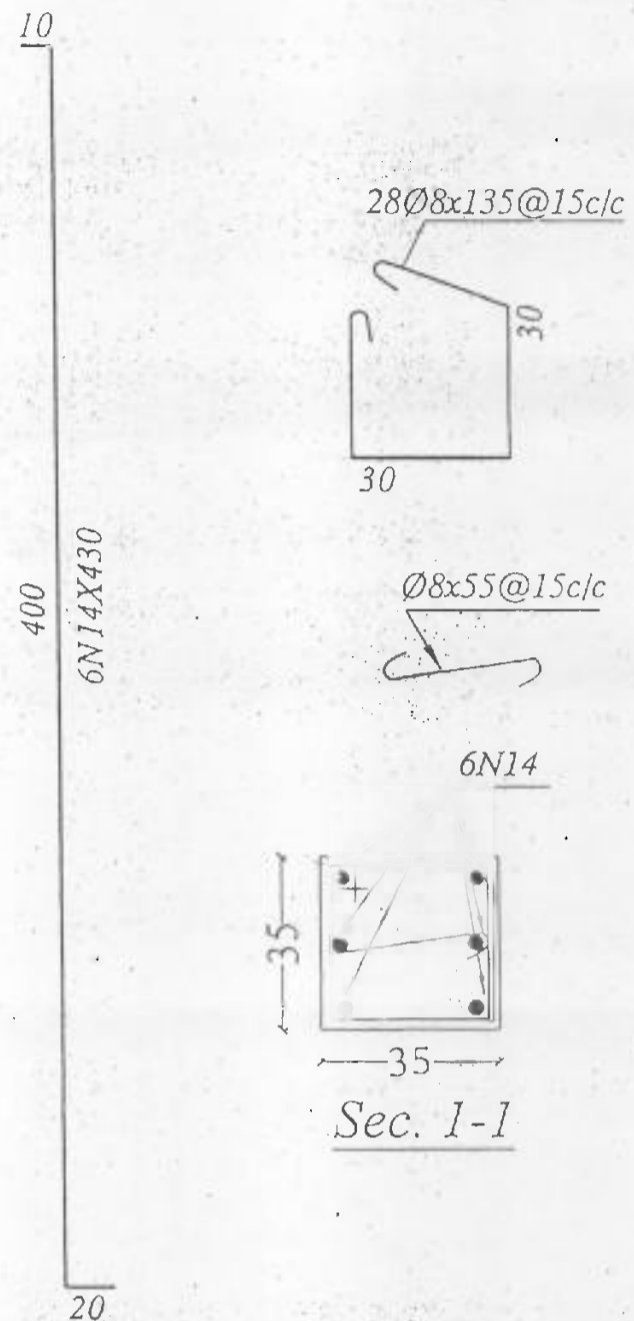
PROJECT NAME
DRAWING TITLE

6Class School Iron Sheet Roof
PANEL SCHEDULE AND SINGLE LINE DIAGRAM

Architectural drawing of a door frame showing dimensions and materials. The frame is made of R.C.C. (1:1.5:3) and P.C.C. (1:2:4). The door is made of steel sheet. The frame has a height of 275 cm and a width of 110 cm. The door is 80 cm high and 50 cm wide. The frame is labeled "Steel Sheet for fixing of door". The materials are labeled "P.C.C-1:2:4", "R.C.C-1:1.5:3", and "P.c.c(1:2:4) T=10cm". The door is labeled "28N8X135 @ 15c/c". The frame is labeled "I".

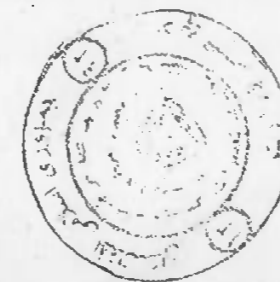


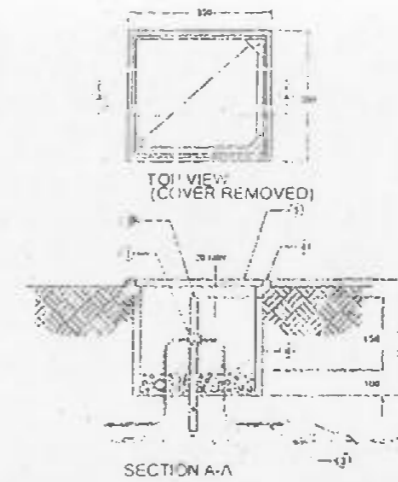
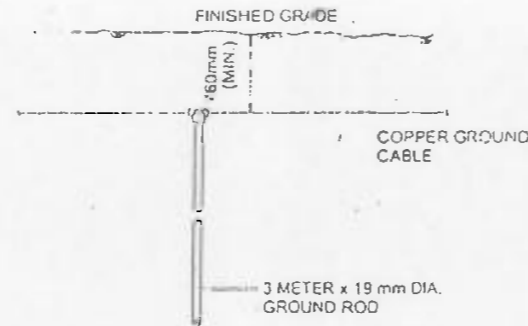
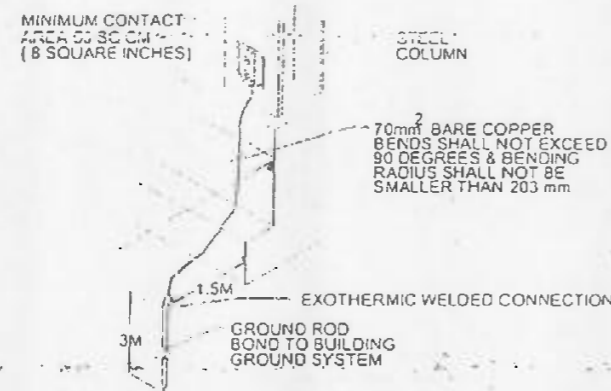
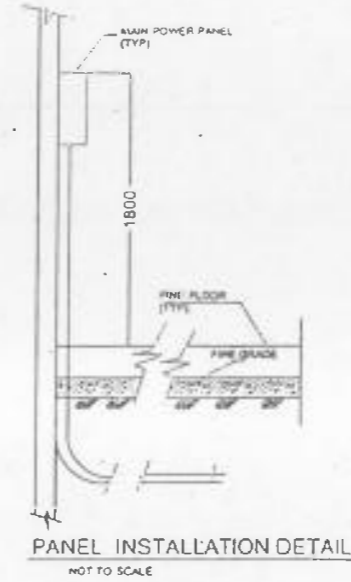
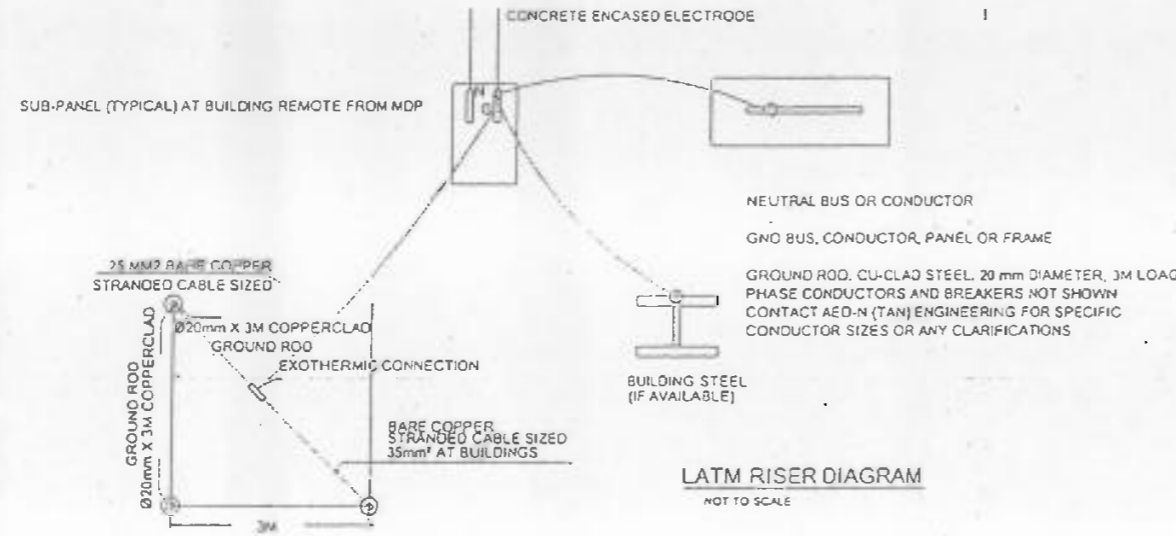
F-1
No -3



Note-All Diminsion in CM







- MATERIAL LIST**
- ① GROUND ROD
 - ② EXOTHERMIC WELD
 - ③ GROUNDING CONDUCTOR 70mm² COPPER
 - ④ POLYMER CONCRETE FIBERGLASS REINFORCED BOX
 - ⑤ COVER FOR ABOVE BOX
 - ⑥ GRAVEL OR CRUSHED STONE

COLUMN-GROUNDING-DETAIL

NOT TO SCALE

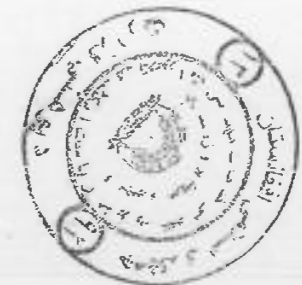
BELOW-GRADE-GROUNDING-ROD DETAIL

NOT TO SCALE

GROUND ROD ACCESS BOX INSTALLATION DETAIL

NOT TO SCALE

Edm



MINISTRY OF EDUCATION
DEPARTMENT OF CONSTRUCTION



STANDARD SCHOOL DESIGN
IN AFGHANISTAN

DATE	BY	CHKD	APPD	REV	DATE
15/05/2019	EDM				
15/05/2019	EDM				
15/05/2019	EDM				
15/05/2019	EDM				

PROJECT NAME

DRAWING TITLE

6 Class School Iron Sheet Roof
GROUNDING

PRODUCED BY AN AUTODESK EDUCATIONAL PRODUCT

NOTES

- 1-Hight of sockets 450mm from floor.
- 2-Hight of switches 1350mm from floor.
- 3-Hight of panel boards 1800mm the highest.
- 4-All wire 1x2.5 and 1x4mm² should install in conduit pipe 20mm diameters.
- 5-All conduit must be in the plaster.
- 6-All bulbs, switches and sockets which are in moisture & out door must be water prove type.
- 7-Connect Phase wire in CB and Neutral wire in RCBO.
- 8-Use three color wire brown for phase, blue for neutral & green with yellow stripe for grounding.
- 9-PB Panel Board.
- 10-CB Circuit Breaker.
- 11-All connection must have plastic joint clapper (from one bulb to other.
- 12-Install ceiling PVC joint box for 2x36W & 1x40W bulb (small size which are not shown from down) bulb should cover them.
- 13-R.C.B.O Residual Circuit Breaker Over Current.
- 14-Amp = Amperes.
- 15-W = Watt.
- 16-Hz = Hertz.
- 17-Resistant of grounding should be not more then 25 Ohm per NEC code.
- 18-All wire in Panel board must have mark 1,2,3..Which show the Circuit numbers.
- 19-All wire in panel boards must be in plastic cover.

RCBO(Residual Circuit Breaker Over Current



Organization for Relief Development (ORD)



TECHNICAL SPECIFICATION

PROJECT:

Construction of 6 classrooms School Building

LOCATION

**Sherkhan Bandar Village, Imam Sahib District, Kunduz
Province, Afghanistan**

Bid DOCUMENTS (Technical Specification)

Annex - 6

1. GENERAL REQUIREMENTS

1.1 General Technical Requirements

The General Specification provided below shall be read in conjunction with the following documents for the respective contract:

- Bills of Quantity
- Drawings

2. SUMMARY OF WORK

General:

The project is including construction of a one-storey community center building, (163 square meters approx.) consisting of reinforced concrete footing, stone masonry wall foundation, PCC, brick masonry wall, reinforced concrete beams and slabs, construction roof insulation (Isogam) in accordance with the attached provided drawings and technical specification.

The awarded company will have to provide construction services for construction of the proposed project with its all related activities according to the attached provided drawings, technical specification and bill of quantities.

Work shall be executed in accordance with the drawings, technical specification and bill of quantities which is included to this tender document, and all requirements set forth in the bill of quantities but not included in the drawings or technical specification, shall be considered as set forth in both and vice versa.

The overall work of the Contractor is to complete the construction with appurtenances using quality materials and workmanship as specified in this document. The Contractor is required not only to complete the work according to the Specifications and Drawings to insure the safety of workers and conditions and property on site.

For any discrepancies or differences in the Drawings, Specifications or Contract Documents, the Contractor is required to submit in writing the discrepancies.

Contractor's Responsibilities:

Labors:

- a) The Contractor shall provide sufficient number of skilled and unskilled labor needed for project construction. The Contractor shall pay reasonable wages for all labors recruited temporary or permanently at the project site.
- b) The Contractor shall be responsible for the safety of all skilled and unskilled laborers and other staff that are on the job site.
- c) Shall provide insurance and in the case of injury or loss of life compensate relatives an amount acceptable to the community elders and the Afghan government.

Materials:

Before ordering a material of any description intended for the Permanent Works, the Contractor shall submit for the approval of the Employer the name of the maker or supplier proposed and details of the place of origin and specification of the material. If

requested by the Employer, the Contractor shall supply to the Employer for his retention a copy of any such order placed.

Natural Materials:

The Contractor shall make all arrangements for locating, selecting and processing natural materials to comply with the Specifications and shall submit to the Employer for approval full information regarding the proposed location well in advance of commencement of working of the material. Approval of a source does not imply that all material in that source is approved.

Equipment:

The Contractor shall be responsible to provide the project site with all necessary equipment, in sufficient numbers and brands, in order to ensure completion of the Works as per schedule.

Water Supply:

The Contractor shall make his own arrangements for the supply of water for the purposes of the Contract. The quality of the water shall be to the approval of the Employer and suitable for the purpose for which it is intended.

Wastewater shall be disposed of clear of the Site to the satisfaction of the Employer so as to cause no damage or complaint.

Latrines:

The Contractor shall provide throughout the period of construction of the Works and shall maintain and cleanse suitable and sufficient latrines for use by his employees.

He shall ensure that his employees do not foul the Site but make proper use of the latrines.

Contractor's Power Supply:

The Contractor shall make his own arrangements for the supply of electric power for the purposes of the Contract.

Camps and Accommodation:

The Contractor shall construct and maintain a camp /camps to provide living accommodation for his staff and operatives.

The Contractor shall be responsible for and provide all services to the living quarters and shall pay all charges in connection therewith and shall see to it that all sanitary laws and other laws and regulations in force in the area are complied with. The Contractor shall be responsible for and provide all necessary fencing and security to these areas.

Disruption of Local Communities and Maintenance of Existing Irrigation Flows:

The Contractor shall take all measures necessary to avoid nuisance and disruption to local communities. In particular, the Contractor shall ensure no damage is done to crops, pasture or woodland and outside the area for which the Employer's approval for bush clearance has been given, that all irrigation supplies to such areas are maintained and that the Contractor's operations do not cause flooding or pollution hazards.

Irrigation is carried out in parts of the project area. In the course of construction of the Works the Contractor shall not interrupt the water supply to an existing irrigation

consumer or reduce it below the flow normal for the growing crops, taking into account the time of year, without the recorded and witnessed consent of the consumer.

Before commencing any work which could cause interruption to the existing irrigation supplies the Contractor shall submit, in accordance with Clause 1.7 hereof, full details of his proposed methods of maintaining such supplies.

Archaeological Findings:

The Contractor agrees that should he or any of his employees and sub-contractors, in the performance of this Contract, discovers evidence of possible scientific, pre-historical, historical or archaeological materials; he will notify the Employer immediately in writing, giving the location and nature of the findings. Where appropriate, by reason of a discovery, the Employer may order delays in the time of performance and/or changes in the works.

Graveyards in existence at the time of preparation of the Drawings are shown thereon. The Contractor shall not trespass, excavate in or otherwise disturb graveyards, whether shown on the Drawings or not. In the case of unidentified graveyards or burial sites, the Contractor shall notify the Employer in writing, and the Employer shall make such design changes as are needed.

Landscape Preservation:

The Contractor shall exercise care to preserve the natural landscape and shall conduct his construction operations so as to prevent any unnecessary destruction, scarring or defacing of the natural surroundings in the vicinity of the work. Except where clearing is required for permanent works, for approved construction roads and for excavation operations, all trees, native shrubbery, vegetation, fences and walls shall be preserved and protected from damage which may be caused by the Contractor's construction and restoration operations and equipment. Movement of crews and equipment within the rights-of-way and over routes provided for access to the work shall be performed in a manner to minimize damage to grazing land, crops or property.

Water Pollution:

The Contractor shall comply with applicable regulations concerning the control and abatement of water pollution as follows:

- (a) The Contractor's construction activities shall be performed by methods that will prevent entrance or accidental spillage, of solid matter, contaminants, debris and other objectionable pollutants and wastes into flowing streams, flowing or dry watercourses, lakes and underground water sources. Sanitary wastes shall be disposed of in the soil by burial at approved sites or by other approved methods.
- (b) The Contractor will provide suitable sanitary facilities for the use of his personnel.

Disposal of Waste:

The disposal of waste materials shall be as follows:

Waste materials, including but not restricted to refuse, garbage, sanitary wastes, industrial wastes and oil and other petroleum products, shall be disposed of by the Contractor. Disposal of waste material shall be by burying, where burial of such materials is approved by the Employer, by burning, where burning of such materials is approved by the engineer, or by removal from the construction area.

All waste material to be disposed of by burning shall be piled in designated burning areas in such a manner as will cause the least fire hazard. Burning shall be thorough and

complete and all charred pieces remaining after burning, except for scattered small pieces, shall be removed from the construction area and disposed of as otherwise provided in this Clause. The Contractor shall at all times take special precautions to prevent fire from spreading beyond the piles being burned and shall be liable for any damage caused by his burning operations.

The waste materials to be disposed of by removal from the construction area shall be disposed of prior to the completion of the work under these Specifications. Waste materials to be disposed of by dumping shall be hauled to an approved dumpsite. It shall be the responsibility of the Contractor to make any necessary arrangements.

Grazing of Livestock:

The Contractor shall provide reasonable care by hiring watchmen to ensure that livestock are not allowed within the construction rights-of-way during the operations.

Wildlife:

The Contractor shall take all necessary precautions to prevent danger to wildlife. The Contractor shall fully cooperate and assist as necessary with any protection plans developed by state authorities to avoid damage to or disturbance of wildlife.

Utilities:

It shall be the Contractor's responsibility to locate on the site all utilities whether or not they are indicated on the Drawings and to make the necessary arrangements with the utilities authorities for any work in the vicinity of the utilities and or diversions of the utilities. All such work shall be at the cost of the Contractor.

Clearance of Site and Layout of Buildings:

The work to be done under this section consists of dismantling and demolition of Structure (if any) including clearing out site of all rubbish, grass, shrubs, under growth, roots and trees.

Securing permanent bench marks at given levels and grades wherever required. Grading and leveling of the site to achieve a proper drainage.

Removing construction or demolition debris after completion of the work to a at least 100 meters from the outermost lines of the site or as required authorities. Marks pegs, flags, pillars or any similar item and labour required for the of the work shall be arranged by the Contractor. The cost of such item included in the rate quoted by the Contractor in other items of work to be out under the Contract.

No tree shall be cut without the written orders. The wood obtained shall be neatly and handed over to the Employer or his representative.

The ground shall be leveled and graded in accordance with the plans, sections or in the absence of such drawings as may be directed.

Construction Requirements

Demolition Work

During demolition the Contractor shall see that no damage or injury is done to the work which are to be retained, and that the demolition is executed propitiate tools and in such a manner as to render unserviceable as little of as possible.

Boards battens, frames and wood work, sheets, tiles, slates, trusses, R.S. beams materials likely to be damaged if dropped from a height, shall be the ground or lowered with ropes.

Dust Prevention

To minimize nuisance from dust, arrangements shall be made for the erection and of screens, canvas, or other suitable material and for watering the work i.e. demolition proceeds.

Sorting and Removal

All dismantled materials shall be property of the Employer and shall be sorted and stacked where ordered. Doors and windows shall be removed from the chowkhats with their hinges before dismantling the later. The work of removing dismantled rules of the local Municipal Corporation etc. and instruction of the plotting and stacking the same will be done within the rate.

Disposal

As required, the Contractor shall remove the whole or a portion of dismantled material from the site of work.

Measurement

The measurement for clearance of site and layout of Buildings shall not be made

Rate and payment

The cost for clearance of site and layout of Buildings shall be deemed to have been included in the rates of other items in the Bill of Quantities.

Construction Mobilization

General:

This section details the items deemed necessary to the mobilization and start-up on the project site. No additional payment will be accepted for mobilization unless stated in the Bills of Quantity.

Contractor's Mobilization Area

The Contractor will be permitted to use an area approved by the employer within the contract limits for operation of his construction equipment and plants, shops, warehouses, and offices.

The Contractor is responsible for obtaining any required additional mobilization area above that designated.

The construction site shall be cleared of construction debris and other materials and the area restored to its final grade.

All facilities within the Contractor's mobilization area shall be of substantial construction suitable for the local weather conditions.

Material Procurement and Storage

Shop Drawings and Samples: Prior to the procurement of materials, The Contractor shall submit for the review and approval of the Employer samples of materials and shop drawings as well if necessary and to be used on the project Shop drawings are to include data sheets on the materials as provided by the manufacturer.

All materials and equipment provided for the project shall be new with no defects as supplied or when installed.

The Contractor shall be responsible to transport and store all materials and equipment for the work and any damage of materials in storage or transport will be at the Contractors expense.

Project Staking Prior to Construction

Prior to starting construction work, the Contractor shall set construction stakes to establish elevations and building corners in accordance with the Drawings and shall secure approval of the staking work from the Employer's engineer.

The Contractor shall with the Employer or his authorized representative verify the property line of the site and stake the proposed location of all facilities, including latrine, well, septic system, and main buildings.

The Contractor shall check dimensions and layout on the Drawings for accuracy.

Temporary Site Facilities

1. Prior to starting work, the Contractor at his expense shall setup and maintain temporary facilities as needed for the project. This shall include but is not limited to temporary access roads, water tanks, generators, tents for workers, temporary kitchens and latrines.

2. The Contractor shall make arrangements with the community for any adjacent land, water supply, temporary equipment, or other amenities needed and pay for it and restore it to original conditions when the project is finished.

3. Trucking of water as needed for the project shall be the responsibility of the Contractor.

4. The Contractor shall set up a temporary office and warehouse on the project site with appropriate communication equipment.

5. A temporary sign, which the contents of the sign will be provided by the Employer, shall be set at the project site.

6. All temporary site facilities to be removed after completion of the Works at the Contractor's expenses.

5. Protection of Utilities and Environment

1. Prior to starting work, the Contractor shall determine the location of all utilities and have them flagged accordingly.

2. Any damage to existing utilities shall be repaired at the expense of the Contractor.

3. The Contractor shall be responsible to ensure the protection of natural resources and environment including but not limited to the groundwater, surface water, local vegetation, crops, and trees. Any correction required will be at the Contractor's expense.

Inspection & Tests Reports:

All equipment and materials furnished under these specifications and all work performed in connection therewith will be subject to rigid inspection by the Employer or the Employer authorized Representative. Acceptance of equipment and material or the waiving off inspection thereof shall in no way relieve the Contractor of his responsibility for meeting the requirements of the Contract.

The Contractor shall furnish the Employer with certified true copies of test reports of all materials used in the manufacture and fabrication of all equipment and material including metal work, steel pipes, fire bricks etc. The result of these tests shall be in

such form as to show compliance with the applicable Specifications, standards and codes for the material used.

Weather:

No work is to be undertaken when, in the opinion of the Employer, the weather is so unsuitable that proper protection of the work cannot be ensured.

3. SITE WORK

This section details the items necessary to clearing and the subsurface and surface preparation of the site for construction.

Clearing and Site Preparation

All work executed by or on behalf of the Contractor in the performance of this Contract shall be in accordance with an agreed Health and Safety Plan. The Contractor shall observe high standards of safety for persons and machines at all times and with regard to safety, and shall comply with local laws and ensure strict adherence to the following:

- (a) The Contractor shall take appropriate precautions where personnel are required to work in confined spaces and other hazardous areas, and to only permit employees to work in confined spaces or other hazardous areas when there are adequate and continuous communication links with colleagues equipped to provide emergency assistance.
- (b) The Contractor shall protect men working in trenches from cave-ins by the proper shoring or sloping of trenches, and shall take special care of persons working in the trenches, and prohibit individual employees from working alone in trenches.
- (c) The Contractor shall protect personnel from the moving parts of the machines by installing and maintaining proper guards.
- (d) The Contractor shall not permit casual observers close to excavating operations.
- (e) The Contractor shall provide adequate fencing around temporary open excavations.

Earth work in Excavation of Foundation

Excavation:

Foundation trenches shall be dug out to the exact width of foundation concrete and the sides shall be vertical .If the soil is not good and does not permit vertical sides the size should be sloped back or protected with timber shoring .Excavated earth shall not be placed within 1m of the edge of the trench. Further requirements for the excavation of foundations are as following.

1. Excavate for foundations, buildings, site improvements, and utilities as required on the Drawings.
2. Excavate top soil and black dirt to a depth of 20 cm and stock pile on the site for later use in final grading of the site.
3. Excavate and remove rocks that are larger than 15 cm in size from the project site. Excavate rock without blasting unless approved by the Employer's engineer.

Finish of trenches:

The bottom of the foundation trenches shall be perfectly both longitudinally and transversely and sides of the trenches shall be dressed perfectly vertical from bottom up to the least thickness of loose concrete so that concrete may be laid to the exact width as per design. The bed of the trench shall be lightly watered and well rammed. Excess digging if done through mistake shall be filled with concrete at the expense of the contractor. Soft or defective spots shall be dug out and removed filled with concrete or stabilized soil. If rocks or boulders are found during excavation, these should be removed and the bottom of the trenches shall not be laid before the inspection and approval of the trench by the in charge engineer.

Measurement:

The measurement of the excavation shall be taken in cum (cubic meters) as for rectangular trench bottom width of concrete (stonemasonry) multiplied by the vertical depth of foundation from ground level and multiplied by the length of the trenches even though the contractor might have excavated with sloping side or widened then required for his convenience.

Earth work in Filling

- (a) Earth: Earth used for filling shall be loose, free from brick –bat, stone, boulder not larger than 75mm in any direction, salts, organic or other foreign matter. Normally excavated earth from the same area shall be used for filling. However, if such earth contains deleterious material, salt-peter earth etc. the same shall not be used.
- (b) Filling: The spaces around the foundations, pipes and drains in trenches shall be cleared of all debris, brick-bats etc. the filling shall be done in layers not exceeding 20cm each layer. Each layer shall be watered, rammed and consolidated before succeeding one is laid. Earth shall be rammed with iron rammer where feasible and with the bull-ends of crowbars where rammer cannot be used. Special care shall be taken that no damage is caused to the pipes, drains and masonry in the trenches below. In case of filling under floors the finished level of filling shall be kept sloping, as intended to be given to the floor.

Gravel Filling in Plinth

- (a) Gravel: used for filling shall be coarse, free from dust, organic and foreign matter.
- (b) Filling: gravel shall be spread uniformly to a layer not exceeding 20cm each layer. On the entire filling area ramming shall be started by a number of rammer in a row for the space between the two plinth walls. Size of gravel shall not exceed 15cm.

4. CONSTRUCTION MATERIALS

All the material used in the work shall be good quality available and as the specification. The final acceptance of materials lies with the implementation engineer. Implementation engineers are responsible for the materials used in civil work under their control!

Particular care shall be taken in the storage of material, particularly before use so they are not damaged and to prevent any contamination.

1.1 Sand for mortar, plaster and concrete:

Sand for use in mortar, plaster and for concrete shall be clean natural material graded from fine to coarse. It has to be free from organic matter, lumps, clay and other rubbish. Implementation engineer note: sand shall not contain more than 10% of material finer than 0.1 mm and not more than 5% remaining on 2.3 mm sieve. All material shall pass through a 10mm screen and shall be substantially non-plastic. If there is doubt about the quality of the sand, testing should be carried out prior to start of the work.

1.2 Aggregate for concrete:

Course aggregate shall consist of quarried or crushed hard stone or a combination of these. It shall be clean, well shaped, and free from soft materials

Coarse aggregate has to comply with following grading.

Sieve size (mm)	Percentage of dry weight passing
25	100
20	75-100
12.6	40-80
10	20-60
5	0-20
1.18	Nothing to pass this sieve!

Implementation engineer note:

The right coarse aggregate will consist of approximately even parts smallish rocks up to 10mm and over 10-25mm. All material has to pass through a 25mm screen. If in doubt the coarse aggregate should be tested prior to start of work.

1.3 Cement:

Cement shall be Portland cement M400. All cement must be fresh and dry. The bags must be stored in dry conditions protected from rain damp-proof

1.4 Water for mortar Stone Masonry, brick masonry, plaster and concrete

Water used in mortar Stone Masonry, brick masonry plaster and for concrete shall be clean and fresh. Water has to be approved by the Implementation Engineer. Water from excavations, surface drains or irrigation canals must not be used unless approved by the Implementing Engineer.

1.5 Reinforcing steel

Reinforcement bars shall be deformed cold worked ribbed steel bars of the size and dimensions shown on the drawings. Reinforcing steel shall be free from pitting, rust, mill scale, paint, oil, grease, adhering earth or any other dirt. Such materials will prevent the bond between the concrete and reinforcement, cause corrosion of the reinforcement and cause the breaking of the concrete.

1.6 Stone for masonry work

Stone shall be procured from an approved source and shall be hard, tough, compact and durable. Free from faults and openings, in general individual stones for masonry work shall weigh between 5kg to 40kg and be of various sizes.

1.7 Shuttering work

2. Production of mortar Stone Masonry, Brick Masonry, plaster and concrete:

2.1 Mortar:

Mortar shall be proportioned as detailed on the drawings. (Material requirements are explained in this manual.) The water content used shall be the minimum required to produce a workable mix. And the ratio of w/c (water/cement) should be regarded and maintained carefully.

The materials shall be mixed in small quantities and for immediate use. Mixed mortar For mortar Stone Masonry, Brick Masonry, and plaster shall not stand unused for more than 30 minutes and has to be constantly worked over with trowel or shovel until used. Additional water is not allowed to be added after mixing. The constituent materials shall be mixed in the exact proportions specified on the drawings.

Examples:

The drawing may show a detail, which requires 1:3 plaster. This means that one part of cement (10 cubic ft) is to be mixed with three parts of sand (30 cubic ft) and sufficient water (between 65% and 75% by weight of cement) to result in a smooth paste which can be applied to the drain or wall surface.

A 1:4 would then be made up of one part of cement (10 cubic ft) is to be mixed with four parts of sand (40 cubic ft) and sufficient water.

It is not required that materials are mixed by measuring in cubic ft. any measure will do as long as all materials are measured with it. This means that a 1:3 plaster can be made of: ONE bucket of cement mixed with three buckets of sand and sufficient water to result in a smooth paste. Also the same mixture of 1:3 CSM plaster can be made of: ONE ghee tin of cement mixed with three ghee tins of sand and sufficient water to result in a smooth paste.

Mixture of cement & sand in 1 cubic m mortar

	water	sand	cement	Ratio	grade of Mixture
	cubic m	cubic m	kg	cement : sand	
	0/209	1/11	222	1:6	200
	0/230	1/08	260	1:5	250
	0/251	1/04	312	1:4	300
	0/280	1/01	346	1: 3.5	350
	0/290	0/98	390	1:3	400
	0/300	0/93	445	1: 2.5	450
	0/280	0/87	520	1:2	500

2.2 Measurement of materials for concrete:

Fine and coarse aggregate and cement shall be mixed in the proportions shown on the drawings or as otherwise directed by the Implementing Engineer. A guideline for the production of concrete intended for compaction by hand is as follows:

The quantities of water and aggregates per 50kg of cement shall be approximately as follows:

Concrete Mix by Volume	One 50kg Bag of cement by volume ()	Total Aggregate by volume ()	Fine Aggregates by volume (Liter)	Coarse Aggregates by volume (Liter)	Quantity of water (Liter)
1: 4: 8 (M: 70)	35	420	140	280	45
1: 3: 6 (M: 100)	35	315	105	210	35
1: 2: 4 (M: 150)	35	210	70	140	31
1: 1,5: 3 (M: 200) It is ok and should mixed trough the hand	35	158	53	105	28
1: 1: 2 (M: 250) It is ok and should mixed trough the hand	35	105	35	70	25

Reinforced cement concrete of 1:1.5:3 proportion; best quality steel, cement (375kg per m³), clean coarse sand and crashed gravel chips <=32mm including screening of chips, mixing the aggregates, placing and formworks, curing at least for 14-18 days and cold climate 28 days.

plain cement concrete of 1:2:4 proportion; clean coarse sand and crashed gravel, cement (325 kg/m³) this concrete is used in front of the doors and inside the building, the surface should be done smooth and outside with a slope of 1,5% from the building

CONCRETE GRADE	RATIO BETWEEN CEMENT, SAND AND GRAVEL	BATCH WITH ONE BAG CEMENT			MATERIAL REQUIRED FOR		
		NUMBER OF BOXES OF AGGREGATE		APPROX YIELD PER BATCH	1 CUBIC METER FINISHED CONCRETE (APPROX)		
		FINE (SAND)	COARSE (GRAVEL)		CEMENT IN	FINE	COARSE
				BAGS (KG)	(M3)	(M3)	
7 LEAN	1:4:8 (40 mm)	4	8	0.30 m3	3.3 (166kg)	0.47	0.94
10 (MASS)	1:3:6 (50 mm)	3	6	0.24 m3	4.3 (215kg)	0.46	0.92
15	1:2:4 (20 mm)	2	4	0.16 m3	6 (300kg)	0.42	0.84
20	1:1.5:3 (20 mm)	1.5	3	0.14m3	7.3 (380kg)	0.38	0.76

If it is found on site that measuring in liters is difficult then any other measure can be used. This measure could be ghee tin, a wheel barrow, a bucket or a drum made up by a community member. The only requirement is for the Implementation Engineer to measure the item as follows:

Using a container with a known volume, 1.5 liter Coca Cola bottle, establish how many liters fit into the measure which will be used.

For the specified mix of concrete divide the required volumes (refer to the table above) by the volume which fits into the container.

The number resulting from this calculation is the correct mixing ratio for the specified mix.

GAUGE BOX

Concrete can be batched by volume. Gauge boxes can be made from steel, wood or plywood.

Box dimensions (0.4*0.3*0.3)

Inside measurements

Volume = 0.036m³ or 36 liters

Length
400mm

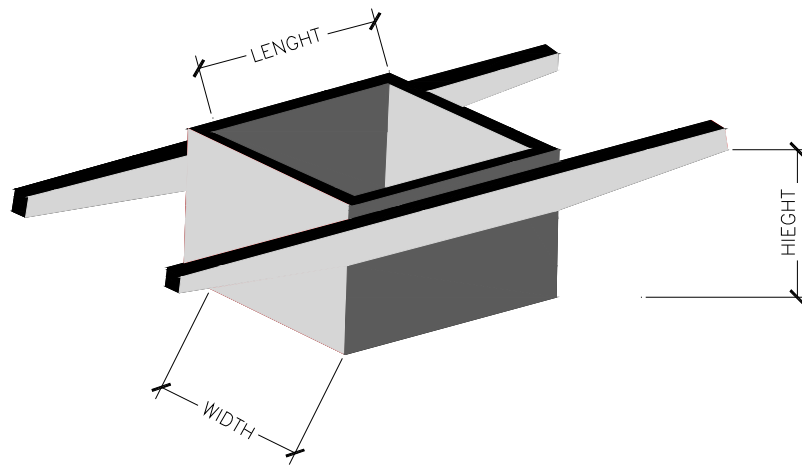
Width
300mm

Height
300mm

36

liters

is equal to 1 bag (50kg) of cement



2.3 How to mix and place the concrete

The aggregates and cement shall be mixed together before adding water until the dry mix is of a same color and consistency throughout. Water (as described in this manual) shall be added in sufficient quantity to produce a workable mix. Refer to the mixing table above. The Implementation Engineer will always determine the exact amount of water to be added to the mix.

Concrete must be mixed on clean ground for a duration required for uniform distribution of the ingredients to produce a homogeneous mass of consistent color but for not less than 10 (ten) minutes. Trained laborers who have been previously instructed by the Implementation Engineer shall do the mixing. A competent person on site or the Implementation Engineer himself must supervise mixing times and material quantities. At the conclusion of mixing, the area shall be thoroughly cleaned out before the concrete remaining in them has had time to set. The mixed concrete shall be placed while fresh and in any event not later than thirty (30) minutes after being mixed.

2.4 Compaction of concrete

Particular attention shall be paid to proper compaction of the concrete. The intention is to produce a dense, uniform and water tight concrete of maximum strength. Compaction of the concrete shall be carried out by mechanical vibration if this is available. If this is unavailable then hand tamping (using short lengths of steel reinforcing) is required. Move the steel rods until the concrete become homogenous and some water appears on the top surface. It is not allowed to compact the concrete until all the sands come to the surface and coarse aggregate is at the bottom. This is called segregation and results in poor quality concrete. The Implementation Engineer will decide when the concrete is well enough compacted.

2.5 Curing of concrete

Particular attention shall be given to "curing" the concrete to allow the slow chemical hardening process to be completed. Concrete requires all exposed surfaces to be kept continuously damp for at least 6 (six) days. The surface shall never be allowed to

become dry during this period. Curing shall start immediately after laying of the concrete and shall be maintained uninterrupted. The Implementation Engineer will develop a method of curing.

Great care shall be taken to keep the temperature of concrete as low as possible during hot weather so as to prevent cracking or crazing of the concrete. In hot weather consideration shall be given to carrying out concreting operations in the very early morning or late evening. The Implementation Engineer will decide the best time for concreting.

1. Excavation:

Excavation of foundations must be performed according to the drawing and the excavated soil should be displaced from the construction Area then the base of foundation must be checked by the designer if the base is found weak the designer should give his direction if the base needs for test of bearing the contractor will be responsible for testing and cost of testing from his own budget.

2. Stone Masonry:

Stone masonry with 1:5 cement-sand mortars for foundation. Stones shall be of good quality, mortar shall fill out the space between the stones approx. 35%. Random stone masonry in super structure shall have a straight level course every 60cm and through stone shall be provided at not far a part then one meter at each of such levels. Other details shall be carried out as per instruction of engineer-in-charge.

Filling soil will be compacted every 15cm using the compaction machine by suitable moisture should be compacted and pressed well.

When the 5.1 process is completed the 70mm stone base course from river boulder will be laid hand after that the sorted river gravel thicker than 12mm dia without sand should be put and well compacted by machine.

3. Brick Masonry:

Brick masonry mortar must be according to the Ratio which is mentioned in the bill of costing. Bricks shall be of best quality mark of brick should be 140 Kg/cm² and normal size (min 21x11x6 cm) with normal shape sides of brick must be completely 90° and side line must be straight. Required specifications of sand is regarded to the article 1.1 and the mortar is regarded to the article 2.1 of technical specification. Placement of mortar in vertical and horizontal bonded lines should be considered and not to be less than 1.5 cm, mortar used on vertical and horizontal bonded lines are to be with same thick it is required to have the same thick of mortar in all brick works. Before starting brick works the bricks are to be kept in water for 24 hours. The brick should have the capacity of required water suction. If the brick falls down or demolishes due to water suction the brick is not useful. For selection of bricks it is required to consider the followings:

- Brick should have good surface not to have cracks. Brick which have mix of gravel and stone pieces will create non surfaced division of load and will cause brick damage on the wall.
- Bricks are to be baked in coal ovens.
- Burned (Karand) bricks are not to be used.
- Bricks must have pink color and should be the same color.

- Bricks should be made of non-layered and non-salted clays.
- Bricks works should be done through stairs, Walking on brick wall is not allowed.
- Bricks should be made of good quality clay (Ras) without mix of sand and alkaline material, existing of sand and alkaline material in clay will have bad effect on bricks.
- Brick wall should have the same surface difference in surface will cause difference in plaster's thickness.
- Vertical lines are not to be on each other.

Brick wall should be kept wet for 28 days in cold weather and 14 days for hot weather.

Testing of white layers on baked brick

Laying brick in a pot sized 150mm Diameter and 30 mm height and placing water up 25 mm of pot. The test should be done in a room with 30 C° heat. The bricks must be under water until it completely sucks the water or the water vaporizes this action should be repeated for one or two times, then we should dry the brick and consider the followings:

If there is no white layer on brick, It is very good.

If there is 10% white layer, It is good.

If there is less than 50% white layer, It is med quality.

Percentage of water suction	Brick Strength Kg/cm	Classification of Brick
20-15	140-105	A
25-20	70-55	B
NC-25	35-NC	C

5. CONCRETE WORK

5.1 Material

5.1.1 Steel

Reinforcement shall be deformed reinforcement, except that plain reinforcement shall be permitted for spiral, stirrups or ties and reinforcement of structural steel shall be permitted by construction codes.

The steel shall be free from corrosion, lose ruts scales oil grease, paint, etc. the steel bar shall be round and capable of being bent (doubled over) without fracture. Bars shall be hooked and bent accurately and placed in position as per design and drawing. Joints in the bar should be avoided as far as possible, when joints have to be made as per drawing and design in any kind of discrepancy the overlap of tension and compression bars shall be made as per ACI building code. While concreting steel bar shall be given side and bottom covers of concrete by placing pre-cast cover blocks underneath of 1:2 cement mortar 2.5cmx2.5 cm in section and thickness of specified cover ,4cm to 5cm (1 1/2" to 2") for beam and 1cm to 2cm (1/2" to 3/4") for slab . During laying and compacting of concrete the reinforcing bars should not move from their position and bars of laid portions should not be disturbed.

All reinforcing steel bars shall be deformed billet steel and shall meet the requirements of Grade 420 Mpa. Testing shall be performed by the Contractor to verify tensile strength.

The Contractor shall perform tests and provide certified test results by an independent testing laboratory to the Employer's representative of reinforcement steel which shall have minimum yield strength of (420Mpa).

5.1.2 Cement:

Cement shall be Portland type I. All cement must be fresh and dry. For utilization of cement the following conditions are required.

1. Utilize Charat, Best way or equivalent cement, 400-M, Type I. If water and soils are saline, Type 5 is required.
2. Provide new cement showing it is not older than 3 months.
3. Secure adequate amounts of cement for the work from a single source do not change brand or type of cement without approval of the Employer's engineer.
4. Cement shall be stored in a watertight and well-ventilated building.

PORTLAND CEMENT

These specifications cover five types of port-land cement, as follows: -

- | | |
|------------|---|
| Type – I | For use in general concrete construction when the special properties specified for type-II, III, IV and V are not required. |
| Type – II | For use in general concrete construction exposed to moderate sulphate action, or when moderate heat of hydration is required. |
| Type – III | For use when high early strength is required. |
| Type – IV | For use when low heat of hydration is required. |
| Type – V | For use when high sulphate resistance is required. |

5.1.3 Aggregate

Aggregate shall be of inert materials and should be clean, dense hard, sound durable, non-absorbent and capable of developing good bond with mortar. Coarse aggregate shall be of hard broken stone of granite or similar stone, free from dust, dirt and other foreign matters. The stone ballast shall be of 20mm (3/4") size and down and all should be retained in 5mm square mesh (1/4" square) and well graded such that the voids do not exceed 42 percent. Gravel shall be screened to sizes and, if so required, thoroughly washed using methods approved by the Employer or his authorized representative. The size of aggregates shall be as indicated on the Drawings. Nominal maximum size of coarse aggregate shall not be larger than:

1. 1/5 the narrowest dimension between sides of forms, nor
2. 1/3 the depth of the slab, nor
3. 3/4 the minimum clear spacing between individual reinforcing bars or wires.

Bundles of bars, individual tendon or ducts. This limitation shall not apply if, in the judgment of the engineer, workability and methods of consolidation are such that concrete can be placed without honey-combs or voids.

5.1.4 Water

Water used in mixing and curing concrete shall be clean and free from injurious amounts of oils, acids, alkalis, salts, organic materials, or other substance deleterious to concrete or reinforcement. Non potable water shall not be used in concrete.

5.1.5 Sand

Sand shall be consisting of hard, sharp and angular grains and shall pass through screen of 5mm (3/16") square mesh. Sand shall be of standard specification clean and free from dust, dirt, and organic matters.

Source

Fine Aggregate shall be obtained from approved sources.

Grading

Fine Aggregate shall consist of well graded sand stone screening other inert material of similar characterize - tics or a combination of these.

Fine Aggregate shall conform to the requirements of B.S. 882 and/or PS 243. Only Fine Aggregate of grading zones 1 to 3 (B.S. 882) shall be used. Aggregate of zone A may be used for special mixes only after written approval.

Cleanliness

Fine Aggregate shall be clean and free from clay lumps soft and flaky particles, shale alkali organic matter loam mica and injurious amounts of deleterious substances shall not exceed 5 percent by weight.

Quality

Fine Aggregate shall be sharp cubical hard dense and durable. H

Storage and Protection

Fine Aggregate shall be stacked on a brick, wooden or other suitable platform so as to adequately protect it from dust and other admixtures. These may be washed if required.

5.2. Mixing of Concrete

5.2.1 Hand Mixing

Hand mixing by batches shall be permitted on small works. Normally all structural concrete shall be mixed in mixer machine .Mixing by hand shall be employed only in special cases with specific prior permission of Employer engineer. Mixing shall be done in masonry platform or sheet iron tray. For concrete mix first cement and sand shall be mixed dry thoroughly and then this dry mix of cement and sand shall be placed over stack of boxes of stone aggregate and the whole mixed dry turning at least three times to have uniform mix. Water shall then be added slowly and gradually with a water-can while being mixed to the required quantity 25 to 30 liter (5 to 6 gallons) per bag of cement, to give a plastic mix of the required workability and water proper cement ratio. The whole shall be mixed thoroughly turning at least three times to give a uniform concrete.

5.2.2 Machine Mixing

Aggregate sand and cement shall be put into the cement concrete mixer to have the required proportion .For concrete mix first gravel then sand then cement shall be put into cement concrete mixer. The machine shall then be revolved to mix materials dry and then water shall be added gradually to the required quantity, 25 to 30 liters (5 to 6 gallons) per bags of cement to have the required water cement ratio. The mixing should be through to have a plastic mix of uniform color. It requires 1 ½ to 2 minutes rotation for through mixing. Mixed concrete shall be unloaded on a masonry platform or on a sheet iron. Output of concrete mixer is 15to 20 mixes per hour.

S.No.	Type of Concrete	Slump Adopted in mm
1	Concrete work for road	20mm to 50mm
2	Footings, unreinforced walls	25mm to 75mm
3	Beams and slabs	50mm to 100mm
4	Columns, retaining walls and thin vertical members, etc.	50mm to 120mm
5	Impermeable work	75mm to 120mm
6	Vibrated concrete	12m to 25mm
7	Mass concrete	25mm to 50mm
8	Ramps and other sloped surfaces	20mm to 75mm

5.3 Shuttering:

5.3.1 Main Requirements of Shuttering:

Centering and shuttering shall be made with timber (plywood) or steel plate close and tight to prevent leakage, with necessary props, bracings and wedges sufficiently strong and stable and should not be yield on laying concrete .the form work should satisfy the following requirements.

5.3 Shuttering:

5.3.1 Main Requirements of Shuttering:

Centering and shuttering shall be made with timber (plywood) or steel plate close and tight to prevent leakage, with necessary props, bracings and wedges sufficiently strong and stable and should not be yield on laying concrete .the form work should satisfy the following requirements.

1. It should be strong enough to withstand all types of dead and live loads such as self weight, weight of reinforcement, weight of wet concrete, loads due to workmen, construction, construction equipment, other incident all loads and forces caused by dumping and consolidation of concrete, imposed upon it during and after casting of concrete.
2. It should be rigidly constructed and efficiently propped and braced (both horizontally and vertically) so as to retain its shape without undue deflection.
3. The joints in the formwork should be tight against leakage of cement grout.
4. The formwork should be constructed in such a manner that it may permit the removal of various parts in desired sequences without jarring or damaging the concrete.
5. The formwork should be set accurately to the desired line and levels and should have plane surfaces.
6. The formwork should as light as possible.
7. The material of formwork should not warp or get distorted when exposed to sun, rain or water during concreting.

8. The formwork should as light as possible.
9. The material of formwork should not warp or get distorted when exposed to sun, rain or water during concreting.
10. The formwork should rest on firm base.

5.3.2 Surface treatment for shuttering

The surfaces of timber shuttering that would come in contact with concrete shall be thoroughly cleaned and well wetted and coated with ,raw linseed oil, or form oil of approved manufacture, or any other approved material such as polythene sheets, to prevent adhesion of concrete to form work.

The Employer engineer shall inspect and accept the form work as to its strength, alignment and general fitness before placing any concrete in the forms. But such inspection shall not relieve the contractor of his responsibility for safety of man, machinery, materials and for results obtained.

5.3.3 Camber

Suitable camber shall be provided in horizontal members of structures especially in long members to counteract the effects of deflection .the camber for beams and slabs shall be 4mm per meter i.e.1 in 250and for cantilevers, at free end shall be 1/50th of the project length or as directed by the Employer engineer.

5.4.4 Removal of form work

The form work shall be removed avoiding shock or vibration that may cause any damage to concrete .in a slab and beam construction, sides of beam shall be stripped first, then the under sides of slab and lastly the underside of the beam .the period that shall elapse after the concrete been laid before under taking the work of easing and removal of centering and shuttering shall be as given bellow.

Parts of structure	Where ordinary Portland cement is used forms may be removed after expiry of the following periods:
Walls columns and vertical faces of all structural members	24 to 48 hour as may be decided by the Engineer
Slabs (props left under)	3 days
Beams Soffits (props left under)	7 days
Removal of props under slabs a.spanning up to 4.5m b.spanning over 4.5m	7 days 14 days
Removal of props under beams and arches a. spanning up to 6m b. spanning over 6m	14 days 21 days

In case of cantilever slabs and beams, the centering shall remain till structures for bearing down have been erected and have sufficient strength.

5.5 Placing of concrete

5.5.1 Pouring into moulds

Placing of concrete shall be commenced only after the Employer engineer has inspected the centering, shuttering and reinforcement as placed and approved the same. Shuttering shall be clean and free from all saw dust, pieces of wood or other foreign materials and shall be treated as prescribed in surface treatment for shuttering.

In case of casting of concrete of slabs and beams, wooden planks or cat –walks support directly on the centering by means of wooden blocks shall be provided to convey the concrete to the place of deposition without disturbing the reinforcement. Labors shall not be allowed to walk over the reinforcement.

In deep trenches and footings, concrete shall be placed through chutes as directed by the Employer engineer. In case of columns and walls, the shuttering shall be so adjusted that the vertical drop of concrete is not more than 1.5 meters at a time. During cold weather, with below 4.5°C temperature, laying of concrete shall not be done. During hot weather, precaution shall be taken to see that the temperature of wet concrete does not exceed 38°C. Unless permitted by the engineer no concrete shall be laid within half an hour of the closing time of the day. The time between mixing and placing of concrete shall not exceed the initial setting time of cement of 30 minutes.

5.3.4 Compaction

Concrete shall be compacted into dense mass immediately after placing by means of mechanical vibrators designed for continuous operations during the whole period occupied for placing of concrete. The vibrators shall be so adjusted that the center of vibrations approximates to the center of the mass being compacted at the time of placing. For certain items such as roof slab, depending on the thickness of the members and feasibility of vibrating the same. The layer of concrete shall be so placed that the bottom layer does not finally set before the top layer is placed.

Compaction shall be continued until the mortar fills the spaces between the coarse aggregate and begins to cream up to form an even surface. Needle vibrators shall be withdrawn slowly so as to prevent formation of loose pockets in the case of internal vibrators. The specific instructions of makers of the particular type of vibrator used shall be strictly complied with. Shaking of reinforcement for the purpose of compaction should be avoided. Compaction shall be completed before the initial setting starts. Over vibration or vibration of very wet mixes is harmful and shall be avoided. Under vibration is also harmful.

5.6 Curing

After about two hours laying when concrete has begun to harden, it shall be kept damp by covering with wet gunny bags or wet sand for 24 hours, and then cured by flooding with continuous water making mud walls 7.5 cm (3") high or by covering with wet sand or earth and kept damp continuously for 15 days. If specified, curing may be done by covering concrete with special type of waterproof paper as to prevent water escaping or evaporating.

6. MASONRY WORK

6.1 Brick Masonry

6.1.1 Brick

All bricks shall be of first class of standard specification made of good brick earth thoroughly burnt, and shall be of deep cherry red or copper color. Bricks shall be regular in shape and their edges should be sharp and shall emit clear ringing sound on being struck and shall be free from cracks, chips, flaws and lumps of any kind. Bricks shall not absorb water more than one –sixth of their weight after one hour of soaking by immersing in water. Bricks shall have a minimum crushing strength of 105 kg per sq cm (1500Lbs sq in)

6.1.2 Mortar

The brickwork shall be done with the specified mortar (cement) mixing the ingredients in the specified proportion. In the case of cement the unit of measurement for cement shall be a bag of cement and this shall be taken as 0.035 cum. Sand in specified proportion shall be measured in boxes of suitable size 35cm x25cm x40cm. Sand shall be measured on the basis of its dry volume. In case of damp sand, its quantities shall be increased suitably to allow for bulkage. Material of mortar shall be first mixed dry till of uniform color on a solid clean watertight platform and then mixed wet at least three times by adding water gradually and evenly to have a workable consistency of stiff paste. Only the quantity of cement mortar which can be used within 30 minutes shall be prepared at a time.

6.1.3 Soaking of Bricks:

All bricks shall be thoroughly soaked in water by submerging them in clean water for at least four hour just before use. The wetted bricks shall be stacked on a clean platform to avoid any contact with mud.

6.1.4 Laying

The bricklaying shall be of English bond unless specially mentioned. A layer of mortar shall be spread on full width over a suitable length of the lower course.

Each brick shall be properly bedded with frog upward and set home (in position) by gently tapping with handle of trowel or wooden mallet. Its inside face shall be buttered with mortar before the next brick is laid and pressed against it. On completion of a course, all vertical joints shall be used fully filled from the top with the mortar. Half or cut bricks shall not be used except where necessary to complete the bond. No damaged or broken bricks shall be used. closer in such cases, shall be cut to the required size and used near the ends of the walls. In exposed brickwork, selected bricks of specified class shall be used for face work. The brickwork shall be true to line, plumb and all vertical joints shall be truly vertical. Vertical joints in alternate course shall be come directly one over the other. Thickness of brick course shall be kept uniform. All connected brickwork shall be carried up simultaneously and no portion of work shall left more than one meter below the rest of the work. Where this not possible, in the opinion of the engineer, the work shall be raked back according to bond (and not toothed) at angle not steeper than 45.

6.1.5 Curing

The brick work shall be kept wet for a period of at least 10 days after laying. At the end of day's work the tops of wall be flooded with water by making small weak mortar edging to contain at least 2.5cm (1") deep water.

6.1.6 Scaffolding

Necessary and suitable scaffolding shall be provided to facilitate the construction of brick wall. Scaffolding shall be sound and strong and supports and members sufficiently strong so as to with stand all loads likely to come upon them.

6.1.7 Measurement

Brickwork shall be measured in cu m (cu ft). Different kinds of brickwork with different mortar shall be taken under separate items. The thickness of wall shall be taken as multiple of half brick as half brick 10cm , one brick 20cm , 1 ½ brick 30cm and so on. The rate shall be for complete work including scaffolding and all tools and plants.

6.2 Stonemasonry

6.2.1 Stone

Prior to start of work, the engineer shall inspect and shall verify the applicable conditions for surface shall be smooth, clean and free of foreign substance when mortar is applied.

Stone shall be hard, sound, free from decay and weathering .stones with pours matters or with boulder skin shall be rejected .the size of stones shall not be less then 20cm in any direction.

6.2.2 Cement

Cement and sand for cement mortar shall be of standard specification.

6.2.3 Mortar

The ingredients of mortar, cement and sand shall be first mixed dry in the specified proportion till of uniform color on solid clean platform and then mixed wet at least three times by adding water gradually and evenly.

6.2.4 Laying

All stones shall be thoroughly wetted before laying. The stones shall be hammer dressed with mallet on the bed and from all other faces to them to come into close proximity with each other securing close joint. The walls shall be carried up truly plumb. Faces stone shall not be narrower than its height and shall tail back and bond well into the backing. The stones shall be arranged to break joint on the face for at least half the height with those of course above or below. Stone should be so laid that all joints are quit full of mortar and the thickness of joints shall not exceed 20mm. Interstices between stones shall be wedged with stone chips and spalls to avoid thick beds of joints and mortar.

7. FINISHING WORK

7.1 Plastering

Plasterwork of building must be according to the Ratio, which is mentioned in the bill of quantity. The joints of the brickwork shall be raked out to a depth of 20-25mm and the surface of the wall shall be washed and kept wet for two days before plastering. The materials of mortar, cement and sand or any other specified should be of standard

specification. the materials or mortar shall be first dry mixed, by measuring with boxes to have the required proportion (as specified), and then the water added slowly and gradually and mixed thoroughly. The thickness of plastering shall be as specified usually 12mm (1/2") applied in two or three coats. To ensure uniform thickness of plaster, patches of 15cmx15cm (6") strip 1m (3') part or 10cm (4") wide plaster shall be applied first at about 2m (6') apart to act as a guide. First mortar shall be dashed and pressed over the surface and then brought to a true smooth and uniform surface by means of float and trowel .External plastering shall be started from top and worked down toward floor .Internal plastering shall be started whenever the building frames is ready and centering of the roof slab have been removed .Ceiling plastering shall be completed before starting of wall plaster. All corners and edges shall be rounded .the plastered surface shall be kept for at least 10days .the surface should be protected from rain, sun, frost, etc.

The work shall be tested frequently with a straight edge and plumb bob. At the end of the day the plaster shall be left cut clean to line .When the next day's plastering is started the edge of the old work shall be scrapped ,cleaned and wetted with cement slurry . At the end of the day the plastering shall be closed on the body of the wall and not near than 15cm to any corner. Curing shall be started as soon as the plaster has hardened sufficiently not to be damaged when watered .the plaster shall be kept wet for at least 10 days .Any effective plaster shall be cut in rectangular shape and replaced.

The proportion of mortar to be used is: For external and internal walls and RCC ceiling 1:4 (cement: sand)

7.1.2 Sand for Plastering

Sand shall be cleaned, hard durable, angular, sharp and gritty to touch and free from mica, salts alkalis, organic and vegetable matters .it should not contains more then 5% of clay or silt. Sand should be dry before being measured .If damped sand is used, compensation shall be made for bulking by adding additional sand up to the extent of bulking .Sand shall be natural river sand or pit sand of approved quality.

Sand for plastering or pointing fine or medium sand shall be used .this shall be screened through a sieve having 9 meshes per sq cm, and the bigger particle excluded and rejected .Fine sand should not pass more than 20% through a sieve of 400 meshes per sq cm and not more than 5% should pass through a sieve of 1600 meshes per sq cm. Fineness modules sand should not be less than 1.0

7.2 Painting

The brand of the paint shall be specified prior to use by the Employer, and ready made paint of the require color should be used .it thinning is required, pure turpentine me be added to the required extent .the surface shall be made perfectly smooth by rubbing with sand paper of different grades, first with coarse one and successively with fine sand papers. All holes and open joints should be filled with strong putty or with a mixture of glue and plaster of smoothened by rubbing with sand paper .in steel work, all rusts and scales shall be perfectly removed by crapping and brushing.

The number of coats shall be as specified in BoQ, one priming coat and then two coats of paints shall be applied.

The paint shall be applied with brushes evenly and smoothly by crossing and laying of in the direction of grains of wood-work and no brush marks should be visible. each coat shall be perfectly dry before the next is applied .before the next coat is applied ,the surface shall be rubbed with No 0 sandpaper ,to give a smooth and glazed surface the paint should be stirred in the container immediately before use.

Brushes should be cleaned and washed with turpentine at the end of the day's work and kept dry. If stiff paint is used it should be first prepared by mixing with doubled boiled linseed oil and turpentine to a thin cream.

If old paint is to be removed, it may be removed by washing with soda water or with caustic soda or blowing with blow lamp and scrapping or by using any patent remover .After removing the paint the surface should be dried and rubbed with sand paper and smoothened before paint is applied .In old painted surface if paint is not required to be removed but required repainting, the surface should be washed with soap water and then paint shall be applied.

Paint coating for cement plaster on exterior and interior walls and ceilings consisting of a ground coat and a finishing coat due to manufacturer's codes. The finishing coat has to cover the ground coat completely.

All surfaces have to be dry, clean and free from dust / oil.

Joints between walls and ceiling cut by trowel. Inclusive all soffits of windows and doors, painting of small areas, cleaning if necessary

7.3 Painting in Steel Work

All rust scales, dirt, supplied delivery marks, oil, grease, etc, shall be removed by rubbing with sand paper before painting .Special care shall be taken for cleaning of corners. All structural steel work shall be painted with red lead before erection except the surface which will be in contact with concrete. Where corrosive effect is likelihood from sea atmosphere, a coat of raw linseed oil shall be applied on the surface immediately after cleaning and before the 1st coat of red lead is applied .Two to three coats of approved ready-mixed paint shall be allowed to dry up perfectly before the succeeding coat is laid over it. Painting shall be carried out during the dry weather.

7.4 Varnishing

Knots, holes, cracks, etc., shall be filled and covered with putty made of whiting and linseed oil. The wood work shall be rubbed down with sand paper sufficiently smooth to remove any grain marks and it shall be cleaned before-hand. Two coats of boiled linseed oil or two thin coat of glue as specified shall be applied and each such coat shall be allowed to dry up and rubbed down smooth with a fine sand paper. The varnish shall be applied with brushes using strong firm strokes, of brushes and spread evenly. The brushes shall be of good quality and perfectly cleaned. In no case sand paper shall be rubbed across the grain. Which may cause the finest marks on the finished surface .Specified quality of copal varnish shall then be laid on the prepared surface in thin coats unless any other brand is specially mentioned. For new wood work a second coat shall be applied after the first coat of varnish has thoroughly been dried up. Varnishing shall be done during dry weather and should not be allowed to be under taken in rainy days.

7.5 Oil Painting:

Oil painting inside and outside :(2 coats) inside 1,0m; leveling and smoothing of the walls is also included and the painting process must be performed step by step.

8. TILE WORKS

8.1 Pre-cast terrazzo

Terrazzo tiles shall generally conform to code, the specific sizes of tile shall be used .the thickness of tile shall not less than 20mm .thus for nominal size of 30cmx30cm the actual size shall be 29.85cmX29.85cm.Tolerance on length and breadth shall be plus or

minus one million ,tolerance on thickness shall be plus or minus 5mm.The tile shall be manufactured under hydraulic pressure of not less than 140kg per square centimeter and shall be given the first grinding with machine before delivery to site. The proportion of cement to aggregate in the backing of the tiles in the backing of the tiles shall not be leaner than 1:3 by weight .The finished thickness of the upper layer shall not be less than 5mm for size of marble chips from the smallest up to 6mm .For other size of marble chips the finished thickness shall be as specially mentioned.

8.2 Marble Stone for Stair

The stair risers and treads shall be finished according to exact sizes including the marble stipe topping making allowance for grinding of marble. The nosing shall be flush with the marble toppings, and shall be protected as specified or shown on Drawings.

8.3 Ceramic Tile

The work covered under this section comprises of providing and laying best quality local made glazed/matt ceramic tiles of approved size and pattern wherever required or shown on the drawings or mentioned in the Bill of Quantities.

Material requirements

Except as otherwise specified the following British Standards and Code of Practice shall be applicable to materials and fixing methods for ceramic tile work: -

- a) British Standard 1281:1966 "Glazed Ceramic Tiles and Tile. Fittings for internal wall".
- b) British Standard C.P.212: for fixing methods and workmanship.

Joint Filling

Joint Filler shall be white Portland Cement grout which shall bond to dry tile, shall be non-shrinking, stain resistant, permanent in color, and shall not inhabit fungus and bacterial growth. It shall be odorless and non-toxic, of smooth consistency for easy preparation and neat, rapid installation, and shall contain non-metallic material. Grout shall be water resistant and shall not wash out under water.

Adhesives

Adhesives for ceramic tilling as specified in the British Code of Practice C.P 212 or Dry Bond Floor and wall thin set mortar as manufactured by Shabbir Tile and Ceramics Limited or equivalent approved.

Samples and Tests

The samples shall be furnished in sizes and colors and adequate in number for testing in an approved laboratory.

Construction Requirements

a. In Cement Sand Mortar

Surfaces to receive the ceramic tiling shall be clean and free of dirt, dust, oil, grease or other objectionable matter. Setting beds and tile shall be installed with their respective surfaces to true planes, level or pitched to off-sets as required by the drawings, so that the surface of the completed tiling work will be at the elevations and grades shown. Re-tempering of mortar will not be permitted. Tiles shall be laid out from the centre lines of each space outward and adjustments made along walls, partitions and borders, if any, so as to symmetries the pattern with a minimum of cut tiles.

Joint between tiles shall be of uniform width and the same as the tile installed. Fractional changes in dimensions without varying the uniformity of joint widths shall be permitted. Tile shall be cut with a suitable cutting tool and rough edges shall be rubbed smooth. Cut-tiles misfits shall be laid to the straight edges. Straight edges shall be accurately set to the lines established and reset at suitable intervals to keep the joints parallel over the entire area.

Over the existing bed a topping of 1-1/2" thick PCC 1:2:4 shall be laid. Scratch coats for application as foundation coats shall be not less than 5/8" thick and shall be composed by volume of 1 part Grey Portland Cement to 3 parts dry sand, mixed with the minimum amount of water necessary to produce a workable mass. Mortar for scratch coats shall be used within one hour after mixing and re-tempering will not be permitted. Scratch coats shall be applied in sufficient quantity and with sufficient pressure to cover the entire area and to form good keys, shall be protected and kept moist during the curing period. Scratch coats shall be thoroughly damp-cured, and an interval of not less than 24 nor more than 48 hours shall be permitted between application of scratch coats and application of float coats.

Float coats shall be composed by volume of part Grey Portland cement to 2 parts dry sand, mixed with a minimum amount of water necessary to produce a workable mass. Float coats shall be applied in sufficient quantity to entire area and to form a god key, shall be brought out flush with the temporary screeds or guide strips so placed as to give a true even surface at the proper distance from the finish suitable for reception of tiles.

Joints shall be straight, level perpendicular and of even width throughout. Vertical joints shall be maintained plumb for the entire height of the tile work. Each tile shall be brought to true level and plane by uniformly applied pressure under a straight edge or rubber faced block. Tiles that are out of true plane or misplaced shall be removed and reset. Damaged or defective tiles shall be replaced. The tile shall be installed as follows:

Wall tile shall be set by troweling a skim coat of neat Portland Cement on the float coat or by applying a skim coat to the back of each tile unit and immediately floating the tile into place. After tile has set remove mortar using a minimum of water. Replace damage tiles.

After the tiles have been thoroughly set, joints shall be grouted full with a plastic mix of neat, white cement immediately after a suitable area of tile has been set. The joints shall be struck flush and excess mortar shall be cut off and wiped from the mortar joints after grout has been cleaned from the surface shall be roughened at once and filled flush with the tile edge, before the mortar begins to harden. Tile skirting and coves shall be solidly backed with mortar.

b. In Thin Set Mortar

Tiles laid in Thin Set Mortar shall be applied as per details shown on drawings and shall consist of a P.C.C. base of specified thickness. Tiles shall be set by troweling a skin coat of Dry Bond Mortar on the base coat and combed with a notched edge of trowel. Back butter each tile unit to ensure 100% mortar coverage and float the tile into place, tapping the tile to ensure maximum bond strength. All other installation requirements shall be as per specifications mentioned above.

MEASUREMENT

The measurement shall be made in sq.m of the actual surfaces completed and approved.

RATE AND PAYMENT

The payment shall be made at the unit rates per sq.m stated in the Bill of Quantities.

Such payment shall constitute full compensation for all materials, equipment labour including all incidentals, necessary to complete the work. The cost of PCC base is included in the cost of tile work.

9. WOOD WORK (CARPENTER'S WORK)

All wood work of which the scantling exceeds 20 sq cm (3 sq in) sections and which is not specially molded or carved comes under carpenter's work. This include all timber work in frame (chauhats) of doors and windows , in roof works as beams , struts , ties, rafters purlin etc .

Timber shall be as specified, may be Russian wood or equalent. The timber shall be of the best quality well seasoned and free from saps, knots, warps, crack and other defects. The scantling shall be sawn in direction of the grains. All wood work shall be planed and neatly and truly finished to the exact dimension. All joints shall be neat and strong, truly and accurately fitted, and coated with white lead before being fitted together.

All portion of timber built in to or in contact of masonry or concrete shall be given two coats of solignum or tar or other approved preservations. Exposed surfaced of timbers shall be painted with two coats of approved paint over a coat of priming.

All beams shall be bedded on plats with minimum bearing of 25 cm and 6mm clear air spaces shall be left on each side. No wood work shall be fixed with in 60 cm of any fire place or flue.

Measurement of wood work shall taken in sq m (sq ft)for the finished work fixed in position including sawing ,planning , jointing , nails ,screws ,etc. painting of wood work shall be measured separate item.

9.1 Doors and windows

Timbers shall be of the kind as specified, Russian (Khar) or equalent quality. The timber shall be of the best quality well seasoned and free from saps, knots, warps, crack and other defects

All wood work shall be planed and neatly and truly finished to the exact dimension. All joints shall be neat and strong, truly and accurately fitted, and glued before being fitted together.

All windows shall be made with single glazing frame (5mm thick glass for interior and exterior windows).

9.1.1 Frame

The frames shall be properly farmed and jointed by mortis and tension joints with hard wooden pins and the joints shall be coated with white lead before being fitted together.

The Chaukhats shall be of section as per drawing, may be 7.5x10cm 10x10cm, 8x12cm or similar section. For double leaves the Chaukhats shall be of 8x12cm cm section. Concealed faces of Chaukhats shall be painted with two coats of coal tar or solignum (or

any other approved quality) and the other face shall be painted with a prime coat before fixing in position.

9.1.2 Shutters or leaves

The Shutters may be paneled, glazed, part paneled and part glazed, battened, or Venetian as specified. The Chauhats of Shutters shall be 1/2" to 2 3/4" 3cm to 5cm as specified in drawings. The style rails and panels shall be planed and neatly and truly finished to the exact dimension. The style rails and panels shall be framed properly and accurately with mortise and tenon joints and fixed with wooden pins. Panels shall be of one piece without any joints and shall be fixed with 12 mm (1/2") insertions into the rails and styles and rails provided with moldings as per design.

The Chauhats of panels shall be 12mm to 25 mm (1/2" to 1") as specified. All rails over 15cm (6") in width shall have double tenon. No tenon shall exceed one-fourth of thickness of the plank. For glazed windows sash bars shall not be less than 40mm x 40mm and glasses shall be fixed with nails and putty or with wooden beading over felt as specified. All joints shall be glued before being fitted. (For joints see Details in drawings)

(a) Fitting all doors shall be providing with handles on both side and all windows with handles on the inner side. One of the doors of each room shall be provide with sliding bolts on outer side for locking. Necessary hinges, tower bolts, hook bolts, hook bolts, stop for keeping the leaves open and also wooden blocks to prevent leaves striking the jambs of wall etc, shall be provide. The fitting may be iron, brass or oxidized as specified of approved quality. screws drivers and not by hammering.

(b) Painting The surface of Shutter and Chauhats shall be painted with two coats of priming. Faces of Chauhats in contact with masonry shall be painted with two coats of solignum (or any other equalent oil) or coater or other preservative before fixing. A prime coat of painting with primer paints shall be applied on the remaining surface before fixing in position.

(c) Measurement The rate shall be for the complete work including hanging and fixing in position. the Chauhats shall be measured in cu m (cu ft) under wood work for the finished work, and length of tenon, horns, etc shall be added to right length the Measurement of Shutters shall be taken in sq m (sq ft) for the finished work in closed position overlaps of two Shutters shall not be measured. the painting shall be measured separately under a separate item in sq m (sq ft) the cost of fitting may be excluded if specified, and the fitting supplied by the department or Employer, but the fixing of the fitting and hanging in position shall be include in the rate (for the Measurement refer chapter 14 methods of Measurement).

9.2 Glazing

Glass shall be of the best quality and free from bubble, scratches and other imperfection. The thickness of glass shall be 5mm or as specified. the glass panes shall be fixed in 15 mm rebate of the wooden frame leaving 1.5mm clear gap all round for allowing for expansions. The rebate shall be painted before glasses are fixed putty shall be of best quality made of finely powdered whiting and linseed oil kneaded into a stiff paste. First a thin layer of putty (back putty) shall be applied on the rebate, then glass shall be fixed in position by a few small nails and then putty (front putty) shall be supplied and

pressed in position and finished off neatly and in such a manner that no putty projects beyond that rebate . The putty shall then be painted with coat of paint.

In case of large glass panes or plate glasses, these should be fixed in the rebate by. Molded wooden fillets all round with brass or nickel screw, inserting a strip of felt or rubber in the rebate under the glass to act as a cushion. The wooden fillets shall be finished with painting.

9.3 Carpentry Work:

Carpentry work for all doors, windows, inclusive of steelwork, flies screen, oil painting, glass, and etc each of good quality and according to the specification by the direction of implementing Engineer must be performed. The of door and windows must thick in 8*10 and plate of door must thick 6*12 and plate of windows must thick 5*10cm and the wood must be as in drawing

10. STEEL DOORS AND WINDOWS:

10.1 Material

Steel doors and windows shall be manufactured using rolled steel section of the weight. They shall be fixed, center hung, top hung, bottom hung or composite as specified.

10.2 Size:

The steel doors and windows shall be according to the specified size and design. The sizes of doors and windows shall be calculated so as to allow 1.25cm clearance on all four sides of opening to allow for easy fitting of door, and windows and ventilators into opening .The actual sizes of doors, windows and ventilator not vary by more than 1.5mm from those given in drawings.

10.3 Fabrication

Both the fixed and opening frames shall be constructed of sections which have been cut to length and miter. The corner of fixed and opening frames shall be welded to form a solid-fused welded joint conforming to the requirements given below. All frames shall be square and flat. The process of welding adopted may flash or butt welding or any other suitable method which gives the desired results.

Requirements of welded joints

Visual inspection test:- when two opposite corner of frame are cut, paint removed and inspected, the joint shall conform to the following

1. Welds should have been made all along the place of meeting members.
2. welds should have been grounded ,and
3. Complete cross section of the corner shall be checked up to see that the joint is completely solid and there is no cavity visible.

10.4 Micro and Macro Examination

From the two opposite corner obtained for visual test, the flanges of the section shall be cut with the help of a saw. The cut surfaces of the remaining portion shall be polished, etched and examined. The polished and etched faces of the weld and the base metal shall be free from cracks and fairly free from under cutting, overlaps gross porosity and entrapped slag.

10.5 Fillet weld test

The fillet weld in remaining portion of the joint obtained shall be fractured by hammering. The fractured surface shall be free from slag porosity, cracks, penetration defect and fusion defects.

10.6 Door

The hinge pin shall be of electro-galvanized steel of suitable thickness and size. In case of double doors, the first closing leaf shall be the left hand leaf locking at the door from the push side. The first closing shutter has a concealed steel bolt at the top and bottom. The bolts shall be so constructed as not to work loose or drop by their own weight. Single and double shutter door shall be provided with a three way bolting device.

10.7 Windows

For fixed windows the frames shall be fabricated as described in fabrication .But side hung windows for fixing steel hinges slots shall be cut and fixed frame and hinges inserted inside and welded to the frame. The hinges shall be of projecting types the hinge pin shall be of galvanized steel.

Friction hinges shall be provided for side hung windows shutters if specified. The handle plate shall be welded, screwed or riveted to the opening frame in such manner that it should be fixed before it is glazed and should not be easily removable after glazing. The handles shall have a two point nose which shall engage with a brass striking plate on the fixed frame in a slightly opened position as well as in closed position.

The boss of the handle shall incorporate a friction device to prevent handle from dropping under its own weight and the assembly shall be so designed that the rotation of the handle may not cause it to unscrew from the pin. The strike plate shall be so designed and fixed in such a position in relation to handle that with the latter bearing against it stop, there shall be adequate light fit between casement and outer frame. In case where nonfriction type hinges are provided, the windows shall be fitted with peg stags which shall be either of black oxidized steel or as specified, 300mm long with steel peg and locking brackets. The pegs stay has three holes to open the side hung casement in three different angles. Side hang casement fitted with friction hinges shall not be provided with a peg stay.

10.8 Galvanizing

All steel surfaces shall be thoroughly cleaned of rust, scale and dirt, where so specified, the steel surfaces shall be treated for rust-proofing by the hot dip, zinc spray or electro-galvanizing process. The rate shall be exclusive of final finishing coats but shall include the priming coat.

10.9 Fixing

Where opening are flush and with rendered finish a clearance of 1.25cm shall be provided between the steel frame and opening. In case of external masonry finish "Fair Faced" and with rebated jambs a minimum 1.25cm clearance between frame and opening shall be provided.

10.10 Roof GI sheet:

Provision and installation of galvanized metal sheets for the roofing (Russian type 24 Gauge) including all joints and connections, the purling and eaves are also included in this item. Nails, washers, sealing material, holding devices etc are included.

10.11 Metal downspout & gutter

Steel sheet type downspouts diameter size shall be minimum 100 mm. All steel gutters and downspouts shall be painted.

The downspout and rain gutter shall be made from 22 gauge galvanized metal sheet. Down pipes shall be metal. Metal down pipes shall be installed as shown on the design drawings. Steel sheet type downspouts diameter size shall be minimum 100 mm. All steel down pipes shall be 2 coat antirust primed and painted finish. The clips for holding pipes in place shall be metal with plastic strips on the pipe surface. The clips shall be attached to the Building with screws and dowels in standard size and shape.

11. WOOD WORK

DESCRIPTION

The work covered under this section of Specifications consists of furnishing all labour and materials and performing all operations in connection with installation of all wood work, mill work, construction, assembly and surface finish treatment, building in of all cabinet type of items, complete in every respect, including all related items, supports etc. of wood or metal and incidentals, associated wood work appurtenances, the application of all 'Hardware' in connection with finished wood work, in strict accordance with requirements of Drawings, as specified herein subject to the terms and conditions of the Contract Documents. The work under this section shall further conform to the requirements of the British Standard Codes of Practice, e.g. Cp. 151:Part 11:1957, CP.112.1001952 and all the British Standards relied therein and/or bearing relevance to this item of work.

MATERIALS

Timber

Materials for the work included in this section shall conform to the following:

i) General Characteristics

The timber shall be in accordance with the requirements of BS:1186 'Quantity of Timber and Workman ship in Joinery', Part 1, 'Quality of Timber'. First quality timber shall be from the heart of a sound tree, the sap wood being entirely removed, the wood being uniform in substance, straight in fiber, free from large or dead knots, flaws, shakes or blemishes of any kind. The color of good timber shall be uniform throughout and among colored timbers; darkness of color is an apparent indication of strength and durability.

ii) Seasoning of Timber

Timber shall be properly seasoned. It shall be kiln or air dried to reduce the moisture content to a minimum of 20% of its natural weight.

The methods of seasoning timber are as follows:

(a) Air Seasoning

This consists of sawing the logs into planks or rectangular sections of convenient size for used and stacking them in such a way that air can circulate around the wood, preferably in open sided sheds. The moisture contents will be reduced to about 15%. The time depends on the type of wood, its thickness and the weather. Generally, soft wood takes 2 to 3 months and hard wood about 8 to 12 months for every inch thickness.

(b) Kiln Seasoning

This process consists of drying the wood in a kiln. The process consists of fanning a blend of warm dry air and warm moist air over the wood at a controlled humidity. Kiln drying is preferable for internal joinery and furniture as air seasoning does not reduce the moisture contents sufficiently to ensure a stable equilibrium. Time taken to kiln-dry hard woods varies from a few days in the case of thinner boards upto 3 to 4 weeks for 3 inch planks.

iii) Preservation of Timber

Preservatives may be applied in a variety of ways including pressure impregnation, hot and cold open-tank treatment, sleeping, dipping, brushing and spraying depending upon the use of timber and class of the preservative treatment according to the British Standard Code of Practice CP: 98: 1964. Local proprietary products of chemical wood preservatives under the label of "WOOD GUARD" or equivalent shall be used along-with their implied methods of use etc.

iv) Timber Quality

The requirements set forth in BS: 1186: 745, 'Animal Glues for Wood' casein glues complying with BS: 745, 'Cold Setting Casein Glue for Wood', or synthetic resin adhesive complying with BS: 1204, 'Cold Setting Synthetic Resin Adhesives for Construction Work in Wood' shall be used. For lush doors and other forms of construction that rely mainly upon the adhesive, and particularly where exposure conditions are severe and prolonged dampness is likely to occur, one of the more moisture resistant shall be employed, the choice depending upon the severity of the conditions to which the work will be exposed.

v) Nails and Screws

For joiners work, wire nails oval, chequered head, lost head round or panel-pins complying, with BS: 1202, 'Wire Nails and Cut Nails for Building Purposes' or wood screws in accordance with BS: 1210 shall be used. The gauge of nail or screw used shall be suited to the woods being fixed and to which a fixing is being made, and the length shall be such as will give a sufficiently strong and secure fixing. CP: 112. 'The Structural Use of Timber in Buildings' shall be followed which gives relation ship between gauge, amount of penetration and strength. All nails and screws used with reactive timber (becoming stained and disfigured by reaction with ferrous metals) shall be of non-ferrous metals or shall be protected in some manner before use if the wood work is likely to be subjected to moist conditions, e.g. external doors.

Ply wood

BS: 565: 1963 Section 5, 'Glossary of Terms Applicable to Ply Wood', defines ply wood as 'an assembled product made up of plies and adhesives, the chief characteristic being the crossed plies which distribute the longitudinal wood strength'. The term ply wood in general sense includes similar products such as laminated board, block board and batten board. BS: 1455: 1963 shall be used for acceptable standards of ply wood.

Three Ply and Multiple Ply Wood

Three ply constructions include a 'face' a 'back' and a core or inner ply. Multiply includes a face, a back and a core of three or more inner plies. With very few exceptions the grain of each veneer in the core runs at right angles to that of the veneers on either side of it.

The construction of ply wood may be balanced with an odd number of veneers arranged symmetrically or unbalanced. The tendency of the finished board to distort is reduced by adopting a balanced construction.

The construction may vary for a given panel thickness by the inclusion of veneers of various thickness. This will affect the strength properties.

Ply wood according to BS:1455:1963 is classified into two main types, viz interior and resin bonded.

Interior type ply wood is suitable for most interior work including flush doors, door panels wall paneling, balustrades, sub-flooring, kitchen figments, and any location where resistance to moisture is not required. Adhesive used include casein, soya, blood albumen and animal glues as well as synthetic resin extended with other substances.

Synthetic resin bonded ply wood while being suitable for the same purpose as interior type, has a much greater resistance to moisture. The more resistant types are suitable for external flush doors and door panels, wall sheathing, shop front fascias, sign boards shuttering and form work for concrete and for any purpose where it may be exposed to moisture. Adhesives used include urea, melaminephenol and resorcinol formaldehyde (arranged in order of increasing moisture resistance).

The CONTRACTOR shall procure ply wood according to various grades specified in BS:1455:1963 "Ply wood Manufactured from Tropical Hard Woods" and are briefly given as under for guidance.

Grade 1Veneer: Shall be of one or two pieces of firm smoothly cut veneer. When of two pieces, the joint shall be approximately at the centre of the board. The veneers shall be free from knots, worm and beetle holes, splits, dotes, glue-stains, filling or inlaying of any kind of other defects. No end joints are permissible.

Grade 11 Veneer: Shall present a solid surface free from open defects. Veneers, when jointed need not necessarily be matched for color or be of equal width. A few sound knots are permitted with occasional minor discoloration and slight glue stains, isolated pin holes not along the plane of the veneer. Occasional splits not wider than 1/32 inch and not longer than 1/10 of the length of the panel or slightly opened joints may be filled with a suitable filler. No end joints are permissible.

Grade 111 Veneer: May include wood defects including work holes which are excluded from Grade 1 and 11 above in number and sized which will not impair the serviceability of the ply wood. It may also include manufacturing defects such as rough cutting, overlaps, gaps or splits provided these do not affect the use of the ply wood. No end joints are permitted.

The uses, for which ply wood made with the grades defined above are considered useful, are outlined hereunder:

Grade1 For use in its natural state.

Grade11 For use where subsequent painting and / or veneering is intended.

Grade111 For use where it is not normally visible.

Under the Specifications where combinations o above grade are required, these combined grades may range from 1/11, 11/11 and 11/111, as additional grades of these Specifications.

ii) Laminated Board

This is built-up board, with narrow strip 3 to 7 mm wide, faced both sides with either one or two veneers from 1.2mm to 3.7 mm thick. Where single or double face veneers are used, the grain usually runs at right angles to the grain of the core strip. This type of board when available varies between ½ inch to 1 inch and is an ideal base for the highest class of veneered wood. For detailed specification BS:3444:1961, 'Block Board and Laminated Board shall be used.

iii) Block Board

This board is of similar construction to laminated above but core is built-up of blocks upto 1 inch wide. It is used as a base for veneering and for painted work but is considered slightly inferior to laminated board for the former use. The range of size and thick-nesses in which it is manufactured are similar to those of laminated board. For detailed Specifications BS:3444:1961, 'Block Board and Laminated Board' shall be used.

iv) Fabrication

Ply wood can be worked by all normal wood working tools, both hand and machine and can be fixed by panel pins, screws, rivets, gluing, grooving, into framing, tonguing and grooving and by metal tooth plate or split ring connectors. For exterior work, galvanized and copper nails and also waterproof adhesives shall be used.

Boards

The proprietary boards are known as fibre building boards and chip boards or particle boards. The fibre boards include hard boards insulation boards and straw boards. These boards follow the description in the following order:

i) Fibre Building Boards

Fibre building boards form the largest category with the number of different types as detailed hereunder: -

(a) Hard Board

Density from 30 to 50 lbs per cft. There are three main sub-divisions, being medium (30-50) lbs per cft.) standard medium (50 lbs per cft.) tempered hard board/standard hard board treated to increase hardness and resistance to water.

(b) Insulation Board

Maximum density 25 lbs per cft. Minimum thickness 7/16 inch, maximum thermal conductivity (K) 0.45. They have five sub-divisions, viz homogeneous, laminated bitumen bonded, bitumen impregnated, acoustic (of low density and specially designed often with perforated surface to increase sound absorption). These boards have good qualities of thermal insulation and sound absorption and are of qualities of thermal insulation and sound absorption and are recommended accordingly.

(c) Straw Boards

These are compressed straw slabs, consisting of straw formed into slabs 2 inches thick by heat and pressure and with proprietary paper glued to the sides. Edges too are bound with paper. The slabs are fairly stiff and have thermal conductivity (K) of 0.6.

ii) Wood-Chip Board (Particle Board)

Chip boards are made from wood particles in the form of chips or shavings of a controlled size combined with a thermosetting synthetic resin glue binder and formed into panels under the influence of mechanical pressure and heat. The process of adhesion is controlled resulting in a variety of boards with different but predictable physical properties. Chip board lends itself well to uses such as sheathing, flooring and sub-flooring, wall paneling, partitions, shelves, furniture and veneered boards, core stock. It is little affected dimensionally by changes in atmospheric humidity, but in wet conditions it has a limited resistance to moisture.

The mechanical strength properties are good for high-density boards. In the density range 30.55 lbs/cft typical value of the modulus of rupture lies between 1500 to 3000 lbs/sq. inch. An average value for the modulus of elasticity is 300,000 lbs/sq. inch.

The surface finish of standard boards is comparatively rough and to support a good quality paint or varnish finish requires sanding and filling. Special grade of the board are prepared for painting which have a paper surface permanently bonded to the board during manufacture.

Particle boards are made in grades of high, medium and low density but the bulk production has been of medium density mainly in thickness of 1/2" and 3/4". These Specifications rely on BS:2504:1963, 'Medium Density Resin Bonded Wood chip Board' for quality of the board and requirements for density, strength and other properties. The density range of this board is from 30 lbs/cft to 50 lbs cft and thermal conductivity is of the order of 0.7 to 1.0 B.T.U. in/ft. 2/h °F, BS:1811:1961 will be relied upon for testing of the wood chip board.

8 PLUMBING WORKS

All pipes and fittings should be classified according to their types. Diameters, jointing and fixing. Pipes of different type and different type of jointing should be taken separately. The diameter shall be nominal diameter of the internal bore.

Pipes shall be measured in running meter (r-ft) net as laid or fixed with overall fitting such as bends, junction, etc. which shall not be measured separately. The length shall be measured along the center line of the pipe and fitting. Method of laying and jointing shall be fully described. Testing of pipe line shall be included in the item. Lead caulked joints shall be enumerated separately.

Digging and refilling of trenches, concrete bedding etc. shall be either measured separately or clubbed with the main item. Usually for small diameter pipes the digging and refilling, timbering if required, concrete bedding, etc are included with the main item and fully described.

12.1 Fitting and appliances

Gullies, siphons, intercepting traps etc including concrete bedding and sitting in position shall be enumerated stating the size.

Connection of fitting, elbow, bends tees connectors unions, diminishing socket and the like shall be enumerated.

Cutting through walls, floors etc and making good shall be included with the item.

Closet pans, urinals, flushing cisterns, lavatory basins, bath tubs, shower rose and other fitting shall be enumerated stating the size and fully described.

Sluice valves, stop cock, hydrants, surface boxes, water meters, etc shall be described stating size and enumerated.

Bib- cocks, pillar cocks, ball cock, ferrules, gratings, etc shall be described stating the size and enumerated.

Boilers, cisterns, cylinder, water tank, etc shall be enumerated. Stating the size, capacity materials, etc and fully described.

Manholes

Manholes up to 6m (20ft) depth shall be enumerated stating the size and depth and shall include cast iron cover with frame (weight to be stated) foot iron inverts, materials and mortar. Formwork etc all of which shall be fully described.

Manholes shall be classified under three different groups as follows: -

- | | | | |
|-------|------------|---------------------------|-----------------------|
| (i) | Shallow | up to 2.1 m | (7") in depth. |
| (ii) | Deep | above 2.1m and up to 7.2m | (7" to 14") in depth |
| (iii) | Extra deep | above 4.2m and up to 6.0m | (14" to 20") in depth |

Manholes under each classification shall be enumerated separately stating the size and least depth and the extra depth shall be measured in running meter (r ft) and totaled up separately for each classification and taken as "extra over " under separate item following the main item .depth shall be from the top of manhole to the invert of channel. Manholes exceeding 6m (20") in depth shall be measured in details under the various items of works, brickwork, concert, C.I. cover with frame, etc.

12.2 PIPE MATERIALS

General: Pipe shall conform to the respective specifications and other requirements as follows: Provide Polyvinyl Vinyl Chloride (PVC) conforming to ASTM D 3034, Type PSM with a maximum SDR of 35, size 380 mm or less in diameter. PVC shall be certified as meeting the requirements of ASTM D 1784, cell Class 12454 B. Minimum pipe sizes for the main lines shall be 200mm diameter and service lines/laterals shall be a minimum of 150 mm diameter. Smaller diameters shall not be used.

Fittings: Fittings shall be compatible with pipe supplied and shall have a strength not less than that of the pipe. Fittings shall conform to the respective specifications and requirements as follows: provide PVC fittings conforming to ASTM D 3034 for type PSM pipe.

Joints: Joints installation requirements shall comply with the manufacturers installation instructions.

Flexible plastic pipe (PVC or high density polyethylene pipe) gasket joints shall conform to ASTM D3212.

Branch Connections: Branch connections for new piping installations shall be made using regular fittings.

Branch connections for upgrades or repairs may be made using regular fittings or solvent-cemented saddles as approved. Saddles for PVC pipe shall conform to Table 4 of ASTM D 3034. The minimum depth of the cover over the pipe crown shall be 0.8m.

Building Connections and Service Lines: Building connections and service lines will be planned to eliminate as many bends as practical and provide convenience in rodding. Bends greater than 45 degrees made with one fitting should be avoided; combinations of elbows such as 45-45 or 30-60 degrees should be used with a cleanout provided. Connections to other sewers will be made directly to the pipe with standard fittings rather than through manholes. However, a manhole must be used if the connection is more than 31m from the building cleanout. Tee connections to the main or branch are not allowed. Service connection lines will be a minimum of 150 mm diameter and laid at a minimum 1% grade.

Service laterals shall be at least 150 mm and sloped to maintain the minimum velocity as described in paragraph "Gravity Sewer."

Cleanouts: Cleanouts must be installed on all sewer-building connections to provide a means for inserting cleaning rods into the underground pipe. Install manufactured way fittings. In lieu of a way fitting, an inspection chamber may be installed. The inspection chamber shall be of the same construction as a manhole. Preferably, the cleanout will be of the same diameter as the building sewer, and never be smaller than 150 mm. Cleanouts shall be located within 1 meter from the building.

12.3 WASH BASIN

Supply and installation of Wash Basins together with "S" trap fit and consoles to support, including all connections, all fittings, seals and transportation.

40cmx50cm console-type white-colored vitrified ceramic wash basin, equipped with "S" trap fit and 40cmx50cmx6mm float-glass, moist resistive wall-hung mirror with sides chamfered, attached to wall with four hard PVC clips and dowels, 15cmx50cm white-colored vitrified ceramic shelf, and attachments.

12.4 FLOOR DRAIN

Supply and installation of Floor Drains including all connections, all fittings, seals and transportation.

Samples and Certificates of Floor Drains shall be submitted.

PVC 10cmx10cm floor strainer with stainless steel lid.

12.5 WASH BASIN MIXER

Supply and installation of Wash Basin Mixers including all connections, all fittings, seals and transportation.

Sample and Certificate of Wash Basin Mixer shall be submitted.

12.6 WC

Supply and installation of WC including all connections, all fittings, seals and transportation.

Sample and Certificate of WCs shall be submitted for approval

Vitrified white-colored water closet with bottom drain, equipped with close-coupled tank (min. 6lt) with flush mechanism, PVC seat and lid.

12.7 SHOWER MIXER

Supply and installation of Shower Mixers including all connections, all fittings, seals and transportation.

Sample and Certificate of Shower Mixer shall be submitted.

Single lever shower mixer of die-cast chromium body, equipped with ball type valve, attached with shower with flexible hose covered by chromium spiral.

12.8 KITCHEN SINK

Supply and installation of Kitchen Sinks together with "S" trap fit and consoles to support, including all connections, all fittings, seals and transportation.

Sample and Certificate of Kitchen Sink and "S" trap fit shall be submitted.

Single bowl, 18 gauge stainless steel, 18/10 chrome nickel content, under mount type kitchen sink with mounting clips, having nominal dimensions of 580mmx516mmx220mm, together with "S" trap fit and 1-1/2 inc tailpiece.

12.9 KITCHEN MIXER

Supply and installation of Kitchen Mixers including all connections, all fittings, seals and transportation.

Sample and Certificate of Kitchen Mixer shall be submitted for approval.

Kitchen mixer with cast brass body and swing spout, metal lever handle, equipped with ball type valve.

12.10 PAPER TOWEL HANGER

Supply and installation of stainless steel paper towel hanger, including all connections, and transportation.

Sample and Certificate of Paper Towel Hanger shall be submitted.

12.11 TOILET PAPER HOLDER

Supply and installation of stainless steel toilet paper holder, including all connections, and transportation.

Sample and Certificate of toilet paper holder shall be submitted.

12.12 TOWEL HANGER

Supply and installation of stainless steel towel hanger, including all connections, and transportation.

Sample and Certificate of towel hanger shall be submitted.

13. ELECTRICAL

13.1 GENERAL

This section describes the general requirements for the materials and installation of materials, equipment and accessories as required or shown on drawings, for electrical equipment.

13.1 Conductors (wiring)

1. All wiring shall be 3-wire copper and shall be provided in conduit.
2. Unless otherwise indicated on the Drawings, wire size for all main circuits shall be a minimum 2.5 mm and sub-circuits 1.5 mm.
3. Color coding shall be per international standards.

13.2 Junction Boxes

1. Standard-galvanized steel square outlet boxes, of 50mm depth and not less than 1.20 mm. thickness, shall be provided for all lighting connections.
- 13.3 Fuse Box and Main Switch
 1. Standard-galvanized steel square fuse box, space as shown on the drawings.
- 13.4 Light Fixtures, Switches and Sockets
 1. Best quality Turkish or Iranian made fixtures, switches and sockets shall be provided, white in color.
 2. Best quality Iranian tube lights and outdoor grade lamps to be provided as shown on the drawings.
- 13.5 Conduit and Conduit Wiring Systems
 1. Conduit shall be PVC or metal, specified and manufactured for electrical conduit.
 2. Conduits shall be a minimum size of 13 mm and the number of circuits contained in a single conduit shall be no more than three.
- 13.6 Supervision
 1. The Contractor shall provide an experienced electrician to direct and be responsible for the work associated with this section.
 2. The Contractor shall comply with all applicable building codes, local ordinances, and regulations.
- 13.7 Wiring Systems
 1. Conductors for the different systems shall be kept separate and individual.
 2. All non-current carrying metal parts of equipment and materials of the electrical system and related systems shall be grounded.
 - 3 Grounding electrodes shall be driven to a depth, not less than 60 cm below the original ground surface and not less than 60 cm away from exterior surfaces and foundations.
- 8.5 Grounding electrodes shall be the solid copper rods having a diameter of not less than 12 mm and a length of not less than 3 meters.

9. TECHNICAL CONDITIONS IN WORKING AREA:

1. The construction area should be surrounded when considered
2. Place of materials, stock. Machines, staff and etc should be properly specified.
3. Staff won't be allowed to work area until they wear waist coat , helmet, shoes, gloves etc
4. If the height is higher than 1.8 meter the use of protection belt and scaffold is necessary.
5. Safe Technical Manual completely described to staff by field engineer
6. Usage of Machinery will be done by professional staff.
7. When need any transportation please use internal vehicle
8. In use of Scaffolds the assured of engineers should be considered
9. Do not hire Children under age of 18 in construction work
10. Health Emergency Box must be in work area