Bhutan Power Corporation Limited
Distribution Services
Distribution Construction Department
Electrification Division
Thimphu: Bhutan

Specification No. BPC/DS/DCD/ED/C-08

Bidding Document
For
Up-gradation of 33/11 kV Substation at Thimphu Mini Hydel (TMH), Thimphu

Volume II Part-I – Form and GTPs

April 2021

VOULME II

FORMS AND GTPS

CONTENTS

Section 3A – FORMS

1. FORM OF BID (Technical)

NAME OF CONTRACT: Up-gradation of 33/11 kV Substation at Thimphu Mini Hydel (TMH), Thimphu.

To: General Manager,
Distribution Construction Department,
Distribution Services,
Bhutan Power Corporation Limited,
Thimphu: Bhutan.

Gentlemen,

1. Having examined the Condition of Contract, Specification, Drawings and Bill of Quantities and Addenda for the execution of the above-named works, we, the undersigned, offer to execute and complete such works and remedy any defects therein in conformity with the Condition of Contract, Specification, Drawings, Bill of Quantities, Annexure and Addenda as specified in the Appendix to Bid or such other terms as may be ascertained in accordance with the said Conditions.

2. We undertake, if our Tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Appendix to Tender.

3. We agree to abide by this Tender for the period of 120 days (29.09.2021) from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

4. The Bid is submitted under our covering letter reference _____dated _____ and the completed Bid documents and other information, required by the Instruction to Bidders, which are enclosed therewith all of which shall be read and construed as forming part hereof.

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

6. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this _____ Day of _____2021

Signature _____ in the capacity of _____

Duly authorized to sign tenders for and on behalf of _____

(IN BLOCK CAPITALS)

Address _____

Witness _____

Address _____.

Occupation _____

2. FORM OF BID (Financial)

NAME OF CONTRACT: Up-gradation of 33/11 kV Substation at Thimphu Mini Hydel, Thimphu.

To: General Manager,
Distribution Construction Department,
Distribution Services,
Bhutan Power Corporation Limited,
Thimphu: Bhutan.

Gentlemen,

1. Having examined the Condition of Contract, Specification, Drawings and Bill of Quantities and Addenda for the execution of the above-named works, we, the undersigned, offer to execute and complete such works and remedy any defects therein in conformity with the Condition of Contract, Specification, Drawings, Bill of Quantities, Annexure and Addenda for the sum of _____ (_____) as specified in the Appendix to Bid 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 as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Appendix to Tender.

3. We agree to abide by this Tender for the period of 120 days (29.09.2021) from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.

4. The Bid is submitted under our covering letter reference _____dated _____ and the completed Bid documents and other information, required by the Instruction to Bidders, which are enclosed therewith all of which shall be read and construed as forming part hereof.

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

6. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this _____ Day of _____2021

Signature _____ in the capacity of _____

Duly authorized to sign tenders for and on behalf of _____

(IN BLOCK CAPITALS)

Address _____

Witness _____

Address _____.

Occupation _____

3. APPENDIX TO BID

The bidders shall fill the Appendix to Bid.

	Sub clause	
Amount of Performance Security	10.1	Ten (10) percent of the contract price
Time for Completion	25.1	Twelve (12) months from the date of handing over the site
Amount of Liquidated Damages	27.1	0.1% for every day of delay of the price of each package
Limit of Liquidated Damages	27.1	Ten (10) percent of the total contract Price of each package
Defects Liability Period	1.1.11	One (1) year from the taking over of the works
Retention Money	33.7	Ten(10) percent of the interim payment certificates

4. FORM OF BID SECURITY (BANK GUARANTEE)

WHEREAS,_____[Name of Bidder] (hereinafter called "the Bidder") has submitted his bid dated_____[date] for the Up-gradation of 33/11 kV Substation at Thimphu Mini Hydel, Thimphu (hereinafter called " the Bid").

KNOW ALL MEN by these presents that We _____[Name of Bank] of _____[Name of Country] having our registered office at (hereinafter called the " Bank") are bound unto the sum of _____[Mention amount in figure and in words] for which payment well and truly to be made to the said Employer, the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this _____day of 2021.

THE CONDITIONS of this obligation are:

If the Bidder withdraws his Bid during the period of Bid validity specified it the Form of Bid: or

If the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instruction of Bidders: or

If the Bidder having been notified of the acceptance of his Bid by the Employer during the period of bid validity:

a) fails or refuses to execute the Form of Agreement in accordance with the Instruction to Bidders, if required; or

b) fails or refuses to furnish the Performance Security, in accordance with the Instruction to Bidders,

we undertake to pay to the Employer up to the above amount upon the receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date _____days beyond the period of bid validity as stated in the instruction to bidders or as it may be extended by the Employer, notice of which extensions(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE _____ SIGNATURE FO THE BANK _____

WITNESS _____ SEAL _____
(Signature, Name and Address)

5. AGREEMENT (To be used later)

This Agreement made the _____day of _____ between Bhutan _____ (hereinafter called "the Employer") of the one part _____ (hereinafter called "the Contractor") of the other part.

Whereas the Employer is desirous that certain Works should be executed by the Contractor namely _____ thereof and has accepted a bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein in the sum of _____ (herein called the "Contract Price")

Now it is agreed as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.

2. The contract shall consist of this contract agreement form and the following documents and the drawings, specifications and other documents referred to therein (herein called the "Contract Documents"), all of which by this reference are incorporated herein and made part thereof. The following document shall be deemed to form and be read and construed as part of this Agreement, viz:

    i. This Agreement
    ii. The Letter of Acceptance;
    iii. The said Bid along with clarifications and correspondence from the date of Bid Opening to signing of Contract Agreement;
    iv. The Technical Specifications and the Scope of Works as indicated in BPC's bid document read along with all amendments thereof;
    v. The Drawings; and
    vi. The Priced Bill of Quantities.
    vii. Any other document forming Part of the Contract.

3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.

4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein the Contract Price or such other sum as may become payable under the provision of the Contract at the times and in the manner prescribed by the Contract , the total estimated contract price and details of which are indicated in the Contract Price Schedule enclosed, all the unit rates therein being firm and not subject to any Price Variation provisions of the Original Contract.

5. Any notice under the contract shall be in the form of a letter, or facsimile. Notices to either party shall be given to the following address, unless subsequently modified by either party in writing at the following address:

Client's Address

The General Manager,
Distribution Construction Department
Bhutan Power Corporation Limited
Post Box 580
Thimphu: Bhutan

Tel: +975-2-335931 (Direct) /325095
Fax: +975-2-321847

And notice to the Contractor shall be properly addressed to:

Tel:
Fax:
Email:

IN WITNESS WHEREOF, the parties hereto have caused the agreement to be signed in their respective names as on the date written.

SIGNED, SEALED AND DELIVERED

Binding Signature of Employer ***Binding Signature of Contractor***

Signed in the presence of:

Witness of Employer **Witness of Contractor**

6. PERFORMANCE BANK GUARANTEE (To be used latter)

To: _____(Name of Employer)
_____(Address of Employer)

WHEREAS _____[Name and address of Contractor] (hereinafter called " the Contractor") has undertaken, in pursuance of Contract No. _____ dated _____ to execute the complete works related to Up-gradation of 33/11 kV substations at Thimphu Mini Hydel(TMH), Thimphu (hereinafter called "the Contract");

AND WHEREAS it has been stipulated by you in the said contract that the Contractor shall furnish you with a Bank Guarantee by a recognized Bank for the same specified therein as security for compliance with his obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE, we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of _____(amount of Guarantee) _____(in word), such sum being payable in the currency in which the Contract Price is payable, and we undertake to pay you , upon your first written demand and without cavil or argument, any sum or sums within the limits of _____(amount if Guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we herby waive notice of any such change, addition or modification.

This guarantee shall be valid until the date of taking over of the works and release of Performance Certificate by the Employer. A separate Bank Guarantee covering defects liability period will be necessary.

SIGNATURE AND SEAL OF THE GUARANTOR _____
NAME OF BANK _____
ADDRESS _____
DATE _____

7. BANK GUARANTEE FOR ADVANCE PAYMENT (To be used latter)

To: _____(Name of Employer)
_____ (Address of Employer)
_____ (Name of the Contract)

Gentlemen:

In accordance with the provisions of the Terms & Condition of Contract, _____[Name and address of Contractor] (hereinafter called "the Contractor") shall deposit with the _____(name of Employer), a bank guarantee for advance under the said Clause of the Contract in an amount of _____(amount of Guarantee) _____(in words).

We, the _____(bank or financial institutions), as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to _____(name of Employer), on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding _____(amount of Guarantee) _____ (in words).;

We further agree that no change or addition to or other modification of the terms of the contract or of works to be performed thereunder or of any of the Contract documents which may be made between, _____(name of Employer), and the Contractor, shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall be valid for the whole contract period and until the advance payments are fully recovered.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until _____(name of Employer), received full repayment of the same amount from the Contractor.

SIGNATURE AND SEAL OF THE GUARANTOR
_____

NAME OF BANK _____
ADDRESS _____
DATE _____

8. DEVIATIONS FROM AND EXCEPTION TO BID DOCUMENT

The Bidder shall specify below, in detail, all deviations from and exceptions to the Bid Document. Any entry shall be referenced to the Bid Document Clause No. to which they refer.

The Bidder shall be deemed to be compliant with the content and intent of the Bid Document except in respect of deviations and exceptions listed in this Schedule.

No deviation from and exception to the Bid Document shall be made subsequently to the Contract without the written approval of the Employer.

Clause No.	Details of Deviation/Exception	Reasons for Deviation/Exception

Declaration: This page and attached ……. Pages of deviations from the Bid Document is a complete record of such deviations.

In case NO DEVIATION is mentioned here and deviation of clauses/specification is mentioned else where, then it will be taken as a deviation.

Signature of Bidder: ……

Place & Date ……

9. PROPOSED JV PARTNER

Bidder shall submit a list of all JV partners they propose to employ together with a brief description of the Plant of Works they propose to hire.

Equipment they propose to hire	Proposed JV Partner with details of JV agreement and responsibility of each partner.

Signature of Bidder: ……..

Place & Date: ……..

10. CONTRACOTR'S KEY PERSONNEL

The Bidder shall submit an organization structure chart and summaries below the names of all key personnel whom they or their major sub-contractors propose to employ on the works together with a brief resume of their qualification and experience. These persons shall be available at the site and changes can be done only after due approval of BPC.

Organization Structure Ref. No.	Position	Name	CV or Resume of previous Experience, Responsibilities and Employer

The duties and responsibilities of the above personnel should be shown on the organization structure chart (showing head office and site responsibility of key personnel). Site and Office organ gram shall be submitted.

Signature of Bidder: ……..

Date: ……..

11. BIDDER'S EXPERIENCE

Bidder shall state below the relevant project experience.

Items/Group of Items	Details of Bidder's Experience	Detail of JV/Sub-Contractor's Experience

Signature of Bidder: ……..

Date: ……..

12. QUALIFICATION REQUIREMENT OF BIDDER'S EXPERIENCE

Bidder shall furnish this information for such works which have been carried out during last ten (10) years and which are under successful operation for at least three years. Supporting documents shall be enclosed in respect of minimum quantum of works as per Qualification criteria given in Section 1 of this bidding document.

PAST EXPERIENCE OF BIDDER AS ERECTOR

Sl.#.	Name & Address of Clients	Name of Work	Voltage Level	Details of work carried out	Contract period	Start date	End date	Value of Works

Performance certificates to be enclosed

Signature of Bidder: ……..

Date: ……..

13. STATUS OF CONTRACTOR'S IN PROGRESS

Give full information of all the uncompleted works on the Contract now in progress.

Name of Project	Country	Employer/Clients	Contract Amount (Currency)	Amount Completed (Currency)	Date of Commencement	Schedule date of completion
TOTAL						

Signature of Bidder: ……..

Date: ……..

14. FINANCIAL STATUS OF BIDDER

Fill in the blanks for the last Three (3) years in the original currency and also attach copies of the Balance Sheets for the se years.

1.	Capital:	_____
2.	Total current assets:	_____
2.1	Total cash and deposit:	_____
2.2	Deposits with bids or otherwise as guarantees (due within 90 days)	_____
2.3	Accounts receivable from completed contracts (due within 90 days)	_____
2.4	Amount receivable after deducting retention from uncompleted contracts (due within 90 days)	_____
2.5	Stocks and bonds at present market value	_____
2.6	Buildings and loans at present market value	_____
2.7	Life insurance at cash surrender value (for an individual or partnership only)	_____
2.8	Other current assets	_____
3.	Total current liabilities	_____
3.1	Notes payable (to banks, regular and for certified checks and to others)	_____
3.2	Accounts payable	_____
3.3	Other current liabilities	_____
4.	Total assets	_____
5.	Total liabilities	_____
6.	Current credit resources	_____

7.	Net worth	_____
8.	Total profit before tax	_____
9.	Turnover in the previous financial years	_____
10.	Amount of balance	_____
11.	Date of balance	_____
12.	Bank references and address	_____
13.	Bonding capacity	List names of institutions and bondable amounts: attach respective letters from sureties

Institution	Currency
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Remarks:
Item 1: The amount for share capital shall include retained earnings.

Item 6: The maximum current credit resources the Bidder's bank(s) available for the fulfillment of Bidder's obligation for the Project if the Bidder is awarded the contract shall be stated and certified by the Bank.

Item 13: Attach respective letters from the banks.

Signature of Bidder: ……..
Date: ……..

Signature of the Auditor: ……..
Place & date: …….

15. IMPLEMENTATION METHODOLOGY

WORK SCHEDULE

The bidder shall provide a detailed programme covering installation and commissioning phases of the project. This programme shall conform to the key dates in the Bidding Document.

The programme shall include a bar chart of the principal quantities of work forecast for execution monthly, and payments expected to be made in connection herewith in accordance with the Condition of Contract.

The programme shall be made using a Project Management software like Microsoft Project and submit with the bid. The Bidder shall also submit soft copy of the detail schedule to the Engineer/Employer for approval after 15 days of the signing of the contract agreement.

16. Equipments and Tools

a) List of main equipment and plants available with the contractor.

Item No.	Description	Quantity Capacity	Place where they are	Present value	Remarks Hire/Purchased

b) List all the equipments and plants to be made available for Construction and Erection in case you are awarded the Contract.

Item No.	Description	Quantity Capacity	Place where they are	Present value

17. INTEGRITY PACT

1 General

Whereas **……**representing **……..**, the Royal Government of Bhutan, hereafter referred to as the Employer on one part and …… representing the …… on the other part, herby execute this agreement as follows:

This agreement should be part of the tender document, which shall be signed and submitted along with the tender document. The head of the employing agency/or his authorized representative should be the signing authority. For the Bidders, the Bidder himself or his authorized representative must sign the Integrity Pact (IP). If the winning Bidder had not signed during the submission of the bid, the bid of that bidder will be rejected.

2 Objectives

Now, therefore, the Employer and the Bidder agree to enter into this pre-contract agreement, hereinafter referred to as Integrity Pact, to avoid all forms of corruption by following a system that is fair, transparent and free from any influence/unprejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:

2.1 Enabling the Employer to obtain the desired works at a reasonable and competitive price in conformity with the defined specifications of the goods and services; and

2.2 Enabling bidders to abstain from bribing or any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also refrain from bribing and other corrupt practices and the Employer will commit to prevent corruption, in any form by their officials by following transparent procedures.

3 Commitments of the Employer:

The Employer commits itself to the following:

3.1 The Employer undertakes that no official of the Employer, connected directly or indirectly with the Contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favor or any material or immaterial benefit or any other advantage from the Bidder, either for themselves

or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the Contract.

3.2 The Employer further confirms that its officials has not favored any prospective Bidder in any form that could afford an undue advantage to that particular Bidder during the tendering stage and will further treat all Bidders alike.

3.3 All the officials of the Employer shall report to the Head of the employing agency or an appropriate Government office any attempted or completed violation of the clauses 3.1 and 3,2 .

3.4 Following report on violation of clauses 3.1 and 3.2 by official (s), through any source, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the Employer and such a person shall be debarred from further dealings related to the contract process. In such a case while on enquiry is being conducted by the Employer the proceedings under the Contract would not be stalled.

4 Commitments of Bidders

The Bidder commits himself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of his bid or during any pre-contract or post-contract stage in order to secure the contract or in furtherance to secure it and in particular commits himself to the following:

4.1 The Bidder will not offer, directly or through intermediaries, any bribe, gift, consideration, reward favor, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Employer, connected directly or indirectly with the bidding process, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the Contract.

4.2 The Bidder further undertakes that he has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favor, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Employer or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the Contract or any other contract with the Government for showing or forbearing to

show favor or disfavor to any person in relation to the Contract or any other contract with the Government.

4.3 The Bidder will not collude with other parties interested in the contract to preclude the competitive bid price, impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.

4.4 The Bidder, either while presenting the bid or during pre-contract negotiations or before signing the Contract, shall disclose any payments he has made, is committed to or intends to make to officials of the Employer of their family members, agents, brokers or any other intermediaries in connection with the Contract and the details of services agreed upon for such payments.

5 Sanctions for violation

The breach of any aforesaid provisions or providing false information by the employers, including manipulation of information by evaluators, shall face administrative charges and penal actions as per the existing relevant rules and laws.

The breach of the Pact or providing false information by the Bidder or any one employed by him or acting on his behalf (whether with or without the knowledge of the Bidder) or the commission of any offence by the Bidder or any one employed by him or acting on his behalf, shall be dealt with as per the provisions of the Penal Code of Bhutan, 2004, and the Anti-Corruption Act, 2006.

The Employer/relevant agency shall also take all or any one of the following actions, whenever required:

5.1 To immediately call off the pre-contact negotiations without assigning any reason or giving any compensation to the Bidder. However, the proceedings with the other Bidder(s) would continue.

5.2 To immediately cancel the Contract, if already awarded/signed, without giving any compensation to the Bidder.

5.3 The Earnest Money/Security Deposit/Performance bond shall stand forfeited.

5.4 To recover all sums already paid by the Employer.

5.5 To encash the advance bank guarantee and performance bond/warranty bond, if furnished by the Bidder, in order to recover the payments, already made by the Employer, along with interest.

5.6 To cancel all or any other Contracts with the Bidder.

5.7 To debar the Bidder from entering into any bid from the government of Bhutan as per the Debarment Rule.

6 Conflict of Interest

6.1 A conflict of interest involves a conflict between the public duty and private interests (for favor or vengeance) of a public official, in which the public official has private interest which could improperly influence the performance of their official duties and responsibilities. Conflict of Interest would arise in a situation when any concerned members of both the parties are related either directly or indirectly, or has any association or had any confrontation. Thus, conflict of interest of any tender committee member must be declared in the prescribed form (attached).

6.2 The Bidder shall not lent to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any committee member, and if he does so, the Employer shall be entitled forthwith to rescind the Contract and all other Contracts with the Bidder.

7 Examination of Books of Accounts

7.1 In case of any allegation of violation of any provisions of this Integrity Pact or payment of commission, the Employer/authorized persons or relevant agencies shall be entitled to examine the Books of Accounts of the Bidder and the Bidder shall provide necessary information of the relevant financial documents and shall extend all possible help for the purpose of such examination.

8 Monitoring and Arbitration

8.1 The respective procuring agency shall be responsible for monitoring and arbitration of IP as per the Procurement Rules.

9 Legal Actions

9.1 The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force relating to any civil or criminal proceedings.

10 **Validity**

10.1 The validity of this Integrity Pact shall cover the tender process and extend until the completion of the Contract to the satisfaction of both the Employer and the Bidder.

10.2 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

We, hereby declare that we have read and understood the clauses of this agreement and shall abide by it. Further, the information provided in this agreement are true and correct to the best of our knowledge and belief.

The parties hereby sign this Integrity Pact at **……... on ……..**

…….. **……**

EMPLOYER **BIDDER**

Witness: Witness

1._____ 1. _____

2._____ 2._____

Section 3B – Guaranteed Technical Particulars

SCHEDULE -1

GUARANTEED TECHNICAL PARTICULARS OF TRANSFORMERS

Sr. No.	Description	Unit	Particulars
A.	**TRANSFORMER**		
1.0	Name of Manufacturer and country of origin		
2.0	Applicable standards		
3.0	Rated power	MVA	
4.0	No. of phases and rated frequency	/-Hz	
5.0	No-load voltage ratio		
6.0	No. of windings and material of conductor		
7.0	Type of cooling		
8.0	Terminal connections		
8.1	Primary winding		
8.2	Secondary winding		
9.0	Vector group		
10.0	Temperature rise over design ambient		
10.1	Top Oil by thermometer	^{o}C	
10.2	Windings by resistance	^{o}C	
11.0	No load loss at rated frequency and at		
	a) rated voltage	kW	
	b) 110% of rated voltage	kW	
12.0	Full load loss at Principle tapping corrected to 75^{o} C	kW	
13.0	Auxiliary losses	kW	
14.0	Tolerance on losses	%	
15.0	Whether transformer main tank with bushings/ radiators, fittings and accessories can withstand full vacuum?	Yes/No	
16.0	Impedance voltage		
16.1	Positive sequence		
	a) At principle tap	%	

SCHEDULE -1

GUARANTEED TECHNICAL PARTICULARS OF TRANSFORMERS

Sr. No.	Description	Unit	Particulars
	b) At maximum voltage tap	%	
16.2	Zero sequence		
	a) At principle tap	%	
	b) At maximum voltage tap	%	
17.0	Percentage reactance		
	a) At principle tap	%	
	b) At maximum voltage tap	%	
18.0	Percentage resistance		
	a) At principle tap	%	
	b) At maximum voltage tap	%	
19.0	Efficiency at rated voltage, frequency and full load and at		
	a) Unity power factor	%	
	b) 0.8 p.f. lagging	%	
20.0	Efficiency at rated voltage, frequency and 75% load and at		
	a) Unity power factor	%	
	b) 0.8 p.f. lagging	%	
21.0	Efficiency at rated voltage, frequency and 50% load and at		
	a) Unity power factor	%	
	b) 0.8 p.f. lagging	%	
22.0	No load current and power factor at rated frequency and at	A/-	
	a) Rated voltage	A/-	
	b) 110% rated voltage	A/	
23.0	Core flux density in core at rated frequency and at		
	a) 100% rated voltage	Wb/m2	
	b) 110% rated voltage	Wb/m2	
24.0	Overfluxing capability		

SCHEDULE -1

GUARANTEED TECHNICAL PARTICULARS OF TRANSFORMERS

Sr. No.	Description	Unit	Particulars
25.0	Core lamination material and grade		
26.0	Type of winding insulation		
26.1	Primary		
26.2	Secondary		
27.0	Rated lightning impulse withstand voltage		
27.1	Primary winding	kVp	
27.2	Secondary winding	kVp	
28.0	Rated short duration induced or separate source AC withstand voltage		
28.1	Primary winding	kV	
28.2	Secondary winding	kV	
29.0	Noise level of transformer	dB	
30.0	Maximum current density		
30.1	Primary winding	A/mm2	
30.2	Secondary winding	A/mm2	
31.0	Minimum clearance in air		
31.1	Phase to phase		
	a) Primary	mm	
	b) Secondary	mm	
31.2	Phase to earth		
	a) Primary	mm	
	b) Secondary	mm	
32.0	Bushings		
32.1	Type		
	a) Primary		
	b) Secondary		
32.2	One minute power frequency withstand voltage		

SCHEDULE -1

GUARANTEED TECHNICAL PARTICULARS OF TRANSFORMERS

Sr. No.	Description	Unit	Particulars
	a) Primary bushing	kV	
	b) Secondary (line and neutral) bushing	kV	
32.3	Rated lightning impulse withstand voltage		
	a) Primary bushing	kVp	
	b) Secondary (line and neutral) bushing	kVp	
32.4	Nominal creepage distance		
	a) Primary bushing	mm	
	b) Secondary bushing	mm	
33.0	Are radiators detachable ?	Yes/No	
34.0	Whether core earthing provided	Yes/No	
35.0	Overall dimensions (length x breadth x height)	mm	
35.1	Maximum transport dimensions (length x breadth x height)	mm	
36.0	Estimated weight		
36.1	Core and coils	Kg	
36.2	Tank and fittings	Kg	
36.3	Radiators	Kg	
36.4	Oil	Kg	
36.5	Complete transformer	Kg	
36.6	Heaviest piece for untanking	Kg	
37.0	Whether bidirectional and flanged wheels provided ?	Yes/No	
38.0	Whether disconnecting chamber provided ?	Yes/No	
39.0	Whether all accessories and fittings provided on transformers as per specification included ?	Yes/No	

SCHEDULE -1

GUARANTEED TECHNICAL PARTICULARS OF TRANSFORMERS

Sr. No.	Description	Unit	Particulars
40.0	Whether the transformer is with cable box or not	Yes/No	
B.	**ON LOAD TAP CHANGER (OLTC)**		
1.0	Name of manufacturer and country		
2.0	Applicable standards		
3.0	Type		
4.0	Whether OLTC on primary/secondary	Primary/ Secondary	
5.0	Rated voltage	kV	
6.0	Rated current	A	
7.0	Number of steps		
8.0	Tapping steps		
9.0	Tapping range		

The above data shall be furnished for all types of Power and Distrbution Transformers.

Signature of Bidder _____

SCHEDULE -2

.

GUARANTEED TECHNICAL PARTICULARS OF 36 kV INDOOR SWITCHGEAR (GIS)

Sr. No.	Description	Unit	Particulars
A	**General**		
1.0	Name of manufacturer and country		
2.0	Applicable standards		
3.0	Short-time current withstand and time	kA/sec	
4.0	Dynamic rating	kAp	
5.0	Rated Voltage	kV	
6.0	Clearances		
6.1	Phase to phase	mm	
6.2	Between live parts and earth	mm	
7.0	Rated short duration power frequency withstand voltage	kV	
8.0	Thickness of sheet steel (hot or cold rolled)		
8.1	Frame	mm	
8.2	Door	mm	
8.3	Covers	mm	
9.0	Dimensions (W x D x H)		
9.1	Circuit breaker cubicle	mm	
9.2	Cable/VT cubicle	mm	
10.0	Drawout space required in front	mm	
11.0	Clear space required at the rear	mm	
12.0	Total weight of cubicle	kg	
B	**Circuit Breaker**		
1.0	Name of Manufacturer		
2.0	Type of breaker	Vacuum/SF6	
3.0	Rated current inside cubicle under site conditions	A	
4.0	Rated short-circuit breaking current and time	kA/Sec	
5.0	Impulse withstand voltage	kVp	
6.0	One minute power frequency withstand voltage	kV	
7.0	Rated operating duty		
8.0	Time rate of contact travel		
8.1	On closing	m/sec	
8.2	On tripping	m/sec	

SCHEDULE -2

.

GUARANTEED TECHNICAL PARTICULARS OF 36 kV INDOOR SWITCHGEAR (GIS)

Sr. No.	Description	Unit	Particulars
9.0	Type of contacts		
10.0	Material of contacts		
11.0	Rated line-charging breaking current	A	
12.0	Type and material of interphase barriers		
13.0	Method of tripping		
13.1	Normal		
13.2	Emergency		
14.0	Type of closing mechanism		
15.0	Normal voltage of closing mechanism	V	
16.0	Power required to operate closing mechanism at normal voltage	W	
17.0	Type of tripping mechanism		
18.0	Normal voltage of tripping mechanism	V	
19.0	Power consumption of trip coil	W	
20.0	Spring charging motor details		
20.1	Output rating	kW	
20.2	Rated voltage	V	
20.3	Class of insulation		
20.4	Spring charging time	Sec.	
21.0	Applicable standards		
C	**Bus Bars**		
1.0	Material		
2.0	Cross section	mm x mm	
3.0	Type of insulation		
4.0	Minimum clearance		
4.1	Between phases	mm	
4.2	Phase to earth	mm	
5.0	Continuous current rating	A	
6.0	Short-time current rating (3 sec.)	kA	
7.0	Temperature rise over design ambient temperature	^{o}C	
D	**Current Transformers**		

SCHEDULE -2

.

GUARANTEED TECHNICAL PARTICULARS OF 36 kV INDOOR SWITCHGEAR (GIS)

Sr. No.	Description	Unit	Particulars
1.0	Name of manufacturer and country		
2.0	Applicable standards		
3.0	Class of insulation		
4.0	Temperature rise of winding over design specified ambient	□C	
5.0	Impulse withstand voltage	kVp	
6.0	One minute power frequency withstand voltage	kV	
7.0	Rated short-time current withstand (3 sec)	kA	
8.0	Whether ratio, taps, burdens, accuracies etc. are as per enclosed drawings	Yes/No	
9.0	Rated extended primary current	%	
E	**Voltage Transformers**		
1.0	Name of manufacturer and country		
2.0	Applicable standards		
3.0	Overvoltage factor		
4.0	Class of insulation		
5.0	Temperature rise of winding over design ambient temperature	^{o}C	
6.0	One minute power frequency withstand voltage	kV	
7.0	Impulse withstand voltage	kVp	
8.0	Whether ratio, burdens, accuracies etc. are as per enclosed drawings	Yes/No	
F.	**Relays Provided in the Breaker** General		
1.0	Name & Country of Manufacturer.		
2.0	Required Auxiliary Power supply	± V AC/DC	
3.0	Standards to which the relays conform.		
4.0	All tests as specified shall be carried out.	Yes / No	
5.0	Operating temperature range	± ^{0}C	
6.0	Tropicalisation provided	Yes / No	
7.0	All auxiliary relays required with main protection relay schemes included.	Yes / No	
8.0	Minimum rating of contacts for auxiliary and output relays :		
	(a) Voltage	V, DC	
	(b) Continuous current	A, DC	
	(c) Make & carry for 1 sec.	A, DC	

SCHEDULE -2

.

GUARANTEED TECHNICAL PARTICULARS OF 36 kV INDOOR SWITCHGEAR (GIS)

Sr. No.	Description	Unit	Particulars
	(d) Breaking capacity (i) Resistive	Watts	
	(ii) Inductive	W	
9.0	Auxiliary CT / VT provided for input to all static relays and wherever required for electro-magnetic relays.	Yes / No	
10.0	Protection of the Relay: Over current, Earth fault and other protection		
	a) 50 - Definite time overcurrent protection	Yes / No	
	b) 51- Inverse time overcurrent protection	Yes / No	
	c) 67 - Three phase directional overcurrent	Yes / No	
	d) 49 - Thermal overload	Yes / No	
	e) 37 - Three phase undercurrent	Yes / No	
	f) 46 - Negative sequence overcurrent	Yes / No	
	g) 50N - Earthfault protection	Yes / No	
	h) 51N - IDMTL earth-fault	Yes / No	
	i) 50BF - Circuit breaker failure detection	Yes / No	
	j) 46BC - Broken conductor detection I2/I1	Yes / No	
	k) 86 - Output relay latching	Yes / No	
11.0	Transformer Differential Unit		
11.1	(a) Manufacturer's type / designation		
	(b) Numerical/Static/Electromagnetic		
11.2	Rated current or (&) Voltage		
11.3	(a) Operating principles		
	(b) Literature / Write-up enclosed	Yes / No	
11.4	Protection of Relays		
	a) 87 - High Impedence three phase differential protection	Yes / No	
	b) 87G - Restricted earth fault protection	Yes / No	
	c) 50 - Definite time overcurrent protection	Yes / No	
	d) 51- Inverse time overcurrent protection	Yes / No	
	e) 49 - Thermal over load protection	Yes / No	
	f) 59 - Over voltage Protection	Yes / No	
	g) 27 - under voltage Protection	Yes / No	
	h) 81 - Under frequency protection	Yes / No	
12.0	Tripping Relays		DEVICE NO. 86
12.1	(a) Manufacturer's type / designation		
	(b) Static / Electromagnetic		
12.2	Rated voltage	V, DC	
12.3	(a) Operating Principles		
	(b) Literature / Write-up enclosed.	Yes / No	
12.4	Adequate no. of relays provided to complete the scheme	Yes / No	
13.0	Trip Circuit Supervision Relays		
13.1	(a) Manufacturer's type / designation		
	(b) Static or Electromagnetic		
13.2	Rated voltage	V, DC	
13.3	(a) Operating principles		

SCHEDULE -2

.

GUARANTEED TECHNICAL PARTICULARS OF 36 kV INDOOR SWITCHGEAR (GIS)

Sr. No.	Description	Unit	Particulars
	(b) Literature / Write-up enclosed	Yes / No	
13.4	Monitoring of breaker trip coil in both close & open position provided	Yes / No	
13.5	Safety resistors provided to limit the current if the relay coil is short-circuited	Yes / No	
14.0	Indicating Lamps		
14.1	Type		
14.2	Ratings		
	(a) Voltage	V	
	(b) Wattage	W	
14.3	Series resistors are provided	Yes / No	
14.4	Series resistors - ohms - W		
14.5	Life of lamp in burning hours	Hrs.	
15.0	Annunciators		
15.1	Make		
15.2	Dimensions of each window (L x W x H)	Mm	
15.3	No. of lamps per window		
15.4	Lamps - V - W		
15.5	Initiating contact requirements		
	(a) Making current	A	
	(b) Impulse duration	ms	
16.0	Indicating Meters		
16.1	Make		
16.2	Type of movement		
16.3	Type designation		
16.4	CT / VT sec. current / Volt	A, V	
16.5	Burden :		
	(a) Current coil	VA	
	(b) Voltage coil	VA	
16.6	Details of shunt, if any		

SCHEDULE -2

.

GUARANTEED TECHNICAL PARTICULARS OF 36 kV INDOOR SWITCHGEAR (GIS)

Sr. No.	Description	Unit	Particulars
	(a) Rated current	A	
	(b) Rated voltage drop	V	
16.7	Accuracy class & standard.		
16.8	Total deflection angle	Degrees	
16.9	Total scale length	mm	
16.1	Suitable for specified reference operating conditions	Yes / No	
17.0	Multifunction meter		
17.1	Make		
17.2	Type of measurement (3 phase, 3 wire unbalanced power / 3 phase, 4 wire unbalanced power)		
17.3	Measuring range in primary watts.		
17.3.1	CT ratio	A/A	
17.3.2	VT ratio	V/V	
17.4	Accuracy and standard to which meter conforms :		
17.5	Burden		
	(a) Current coil	VA	
	(b) Voltage coil	VA	
17.6	No. of digits in the meter		
17.7	Impulse contact for remote summation or printing provided or connectivity with the plant computer provided		
17.8	Details of impulse contacts		
	(a) Impulse frequency	No. per sec.	
	(b) Duration	ms	
	(c) Contact rating	W,V	
17.9	Mounting details		
17.10	Literature with connection diagram furnished	Yes / No	
18.0	Deviations		
	All deviations from specifications submitted separately.	Yes / No	
	Compliance will be taken for granted if the deviation is not specifically mentioned.		

Signature of Bidder _____

SCHEDULE - 3

GUARANTEED TECHNICAL PARTICULARS OF
CURRENT TRANSFORMERS

Sr. No.	Description	Unit	Particulars
1.0	Manufacturer's name and country of origin:		
2.0	Manufacturer's type, designation and model:		
3.0	Current transformers data: (Core-I / Core-II /Core-III / Core-IV		
	Rated primary current :	A	
	b. Rated secondary current :	A	
	c. Transformation ratio:		
	d. Rated burden		
	e. Class of accuracy:		
	f. Accuracy limit factor:		
	g. Knee point voltage :	V	
	h. Excitation current at knee point voltage :	mA	
	i. Resistance of secondary winding at 75°C :	Ω	
4.0	Nominal rated voltage	kV	
5.0	Short time current rating and time	kA/Sec	
6.0	Rated dynamic current (Peak value)		
7.0	Instrument security factor for the winding meant for measurement and metering	A	
8.0	Creepage distance	mm	
9.0	One minute power frequency dry withstand test voltage	kV (rms)	
10.0	One minute power frequency wet withstand test voltage	kV (rms)	
11.0	1.2/50 micro second full wave impulse withstand test voltage	kV(Peak)	
12.0	Weight of oil per CT	KG	
13.0	Class of oil		
14.0	Whether pressure relief device provided (Yes/No)		
15.0	Total weight per C.T.	KG	
16.0	Overall dimensions (mm x mm x mm):	mm	
17.0	Single/ Double tier		
18.0	Mounting details	kg	

SCHEDULE - 3

GUARANTEED TECHNICAL PARTICULARS OF
CURRENT TRANSFORMERS

Sr. No.	Description	Unit	Particulars

Signature of Bidder _____

SCHEDULE -4

GUARANTEED TECHNICAL PARTICULARS OF CABLES

Sr. No.	Description	Unit	Particulars
1.0	Name of manufacturer and country		
2.0	Applicable standards		
3.0	Rated voltage	V	
4.0	Conductor		
4.1	Material		
4.2	Cross sectional area	mm^2	
4.3	Whether stranded	Yes/No	
5.0	Insulation		
5.1	Material		
5.2	Thickness	mm	
6.0	Inner sheath		
6.1	Material		
6.2	Whether extruded or wrapped ?		
6.3	Thickness	mm	
7.0	Outer Sheath		
7.1	Material		
7.2	Thickness	mm	
8.0	Material of armour		
9.0	Whether round wire or tape ?		
10.0	Details of screen, if any		
11.0	Total overall diameter of cable	mm	
12.0	DC resistance at 20°C	ohms/km	
13.0	Test voltage		
13.1	One minute power frequency withstand voltage	kV	
13.2	Impulse withstand voltage	kVp	

SCHEDULE -4

GUARANTEED TECHNICAL PARTICULARS OF CABLES

Sr. No.	Description	Unit	Particulars
13.3	Water immersion test voltage	kV	
14.0	Type of cable end sealing		
15.0	Cable drums		
15.1	Dimensions	mm	
15.2	Weight	kg	
15.3	Nominal length per drum	m	

Bidder shall furnish the above data for each rating/size of MV/ LV Cable and control cable

Signature : _____

Volume II Part-2 – Price Schedule

SCHEDULE OF PRICES

Preamble:

1. The Contract is of item rate turnkey in nature and includes the definitive engineering and design that shall ultimately define actual quantities of work.

2. The provisional quantities of various items of civil works like excavation/ filling, foundations, supply and erection of steelwork, construction of control building structures for the proposed substation/works and for electrical items such as 33 kV, 11 kV and LT cables etc. are given in the price-schedule. However, the quantities may vary consequent to actual execution of the work. The payment shall be made for the actual quantities used for various items. For all items especially cables etc., after the award of the work, the contractor shall assess the required quantities and shall procure the requisite quantities only so as to minimize the stores and spares. BPC will take back only minimum spares.

3. Where the unit rates have been asked in the price schedule, the quantity variation may not be limited to 20% and the unit rates will govern for the actual quantity of work and no price variation will be permitted. For items where quantity is mentioned as 'LOT', is deemed that the Contractor has included the all inclusive price, which will be on lumpsum basis, and the total payment for any LOT item shall not exceed the amount quoted in the Bid. Contractor shall submit the list of items considered for the LOT with breakup of prices in the Bid.

4. It shall be a condition of this contract that the all-inclusive rates quoted in Schedule of Rates / Prices shall not be varied for reasons of change in respective quantities.

5. Further, it shall also be an important condition of this contract that there shall not be any change in Unit Rates of items consequent to revision of labour rates, fuel rates etc. by the Government of Bhutan.

6. The supply rate against each item shall be an all-inclusive rate, and be inclusive of supply, freight, transport, insurance. The Bidder shall indicate the all-inclusive rate separately for each item. Further, the all-inclusive unit rates shall be on FAS basis inclusive of ex-works price, packing and forwarding charges, railway freight, transport charges to actual work site, storage where necessary, charges for transit insurance, insurance of material/ goods at site. Bidder shall indicate Bhutan Sales Tax(BST) and Customs Duty(CD) applicable on the item separately.

7. All labour, supervision, inspection, testing and commissioning costs should be covered in Schedules for erection of substation equipment. The charges/ expenses to be incurred on testing and commissioning of the entire system as a whole shall be included in the prices for individual activities.

8. The total price for each activity should cover all costs and expenses required for supply, delivery, storage, erection, testing, commissioning and maintenance of works together with all risks, liabilities, contingencies, insurances and obligations imposed and implied by the Contractor.

9. Bidder shall enter prices in relevant schedules for the supply of specified spares to site. These prices will be considered during bid evaluation.

10. All items of work specified in the specifications may not have been included in the price-schedule. The items of work not specifically called for in the Schedules are deemed to have been covered under the items called for, to leave the works complete, as per the specifications. The rate quoted by the Contractor shall be deemed to be all inclusive, to cover the smaller items specified but not included in the Price-Schedule. In case if any major item has been missed out in the schedule, the bidders shall make a mention of such item separately in the respective schedule, with the cost of carrying out the works.

11. In addition to the points stipulated/ highlighted in these clauses, all the conditions mentioned in the specifications, pertaining to measurement of quantities and unit rates of scheduled items shall apply.

12. It is deemed that the Bidder has understood the site conditions, environment, transport facilities, soil data etc. while preparing the price schedule and has adequately provided for them in his quoted prices. No claims of extra compensation will be payable for items and situations not foreseen and not incorporated by him in the schedules.

13. The wording under "Description" in the schedules is for subject matter guidance only. The Bidder's price shall include separately all works as specified in the specifications and drawings and all contractual obligations whether specifically mentioned or not.

14. The Bidder shall, if so desired by the Employer/Engineer, furnish at any stage of the bidding or Contract execution, break-up of prices considered for any or all items covered in various activities.

15. The contractor shall be paid for the foundations and other RCC items of work to suit actual soil characteristics as per the Unit Rates of individual items like ordinary concrete, steel reinforcement bars, excavation etc, based on the actual quantities.

16. The rates for excavation shall be deemed to include execution of all items mentioned in the specifications like earth work for casting of foundations, benching and back filling, compacting, leveling, de-watering etc., It also includes cost of shoring and shuttering wherever used. The rates for concreting shall together cover cost of all materials for concreting, forming including form boxes, casting concrete, curing and also cost of all materials related with the item.

17. Unit rates for reinforcement shall include supply, cutting, bending, tying, properly placing, providing lap and every other work needed for casting of the concrete, as specified. Similarly the Rates for other items like stone masonry revetment shall be deemed to be all-inclusive.

18. Control Room (CR) Building - The rate for the CR shall be for supply, transport, storage and insurance of all materials at site, all labour and plant for erection, finishing as per specifications and tentative drawings included therein.

19. Adjustment of Prices not in the schedule.

a) For Supply

If the rates contained it the Schedules are not directly applicable to the specific work in question, suitable rates shall be established by the Engineer reflecting the level of pricing in the Schedule of Prices.

Where the rates are not contained in the said Schedule, the amount shall be such as is in all the circumstances reasonable. Else the rates shall be derived based on joint observation of cost and the payment shall be made on the basis of quotation or the actual invoices from the manufacturer plus 20%(Twenty percent) towards Contractors overheads & profit, including taxes and deductions.

b) For Erection & Civil Works

"The determination of rates for the erection and civil variation shall be based on the following":

i. Any item of the work, for which the unit rate is available in the contract (with or without specified quantity), shall be valued using the unit rate in the contract, irrespective of the quantity of the work.

ii. If any altered or substituted work includes any item/work for which no rate is specified in the contract, the rate for such item/work shall be derived from the rate available in the contract for similar items based on appropriate measures like weights, volume, etc. as applicable.

iii. If any altered or substituted work includes any item/work for which no rate is specified in the contract and the rate can not be derived as indicated in (ii) above, then the rate of such item of work shall be worked out based on the rates available for such item in BSR 2021 (or latest BSR), if applicable in BSR 2021, the cost index on BSR 2021 being determined by the ratio of the value of the contract price for similar works (using the original estimated quantities in the contract) to the value of these similar works of the contract with BSR 2021 rates.

iv. For deriving rate of those items, which do not exist in BSR 2021 (or latest BSR) or in the contract cannot be derived as indicated above, "similar class of work" shall be interpreted as items having similar procedure of working. The rates shall be derived by adding/deducting the additional/reduction material/labour components involved in the BSR 2021 and worked out as per the procedure provided in (iii) above.

v. If the items altered/substituted works do not fall under all the above categories, the rates shall be fixed by the Engineer, on the basis of the other rates in the contract with proper rate analysis and/or using any other reasonable means. This shall be based on the joint observation of the cost for the actual payment made for such works plus 20% overhead and profit.

SUMMARY OF PRICES

Description	Price in Ngultrum/ Rupees
Schedule 1– 1 A	
Schedule 1– 1 B	
Schedule 1– 1 C	
Schedule 1– 1 D	
Schedule 1– 1 E	
GRAND TOTAL	

Amount in words:

Price Schedule for Up-gradation of 33/11 kV TMH Substation with GIS panels

ABSTRACT

SCHEDULE 1: 2 x 10 MVA, 33/11 kV substation at TMH.

Figures in Nu

Sl. No.	Schedule	Particulars	Amount
1.0	Schedule 1– 1 A	For Supply & Delivery of equipment	
2.0	Schedule 1– 1 B	For erection, testing & commissioning of equipment	
3.0	Schedule 1– 1 C	For civil works	
4.0	Schedule 1– 1 D	Internal Wiring	
5.0	Schedule 1– 1 E	For supply of essential spares	
Total Amount			

SCHEDULE 1A: SCHEDULE FOR SUPPLY AND DELIVERY OF SUBSTATION EQUIPMENT

Sl. No	Description	Unit	Qty	Unit Price			Total FAS excluding BST/CD	Provision for BST/CD			Total FAS including BST/CD
				Ex-Works	FAS excluding BST/CD	FAS including BST/CD		BST%	CD%	Value(BST+ CD)	
			1	2	3	4	5=1 x 3	6	7	8=(6+7)x1 x 2	9=1 x 4
A.	**Equipment**										
	Transformer										
a)	33/11 kV, 10 MVA power transformer with NCT (Including RTCC Panel)	Nos.	2								
b)	11/0.4 kV, 63kVA station transformer	Nos.	1								
2	**33 kV indoor GIS switchgear with numerical relays, meters, CTs, line PTs as per specifications.**										
a)	25 kA,GIS (2 incomer, 2 transformer feeder, 1 buscoupler)	Nos.	5								
	Bus/Line PT panel with under voltage relay (to be mounted on incomer and transformer feeders with PT selector Switch) pricing should be included in the panels										
3	**Instrument Transformer**										
a)	11 kV, 600-300/1-1-1A, 3 or 4 core for 11 kV ICs and BC (to be installed on existing CT compartment)	Nos.	12								
b)	11 kV, 300-150/1-1-1A, 2 core for 11 kV OGs (to be installed on existing CT compartment)	Nos.	12								
B.	**Cables**										
1	**HV Cables**										
a)	**33kV**										
	1Cx630 sq. mm.	M	500								
b)	**11kV**										
	1Cx1000 sq. mm.	M	250								
2	**HV Cables - outdoor and indoor termination kits**										
a)	33 kV GIS termination, 1CX630 sq.mm(1 Set = 3 nos of 1C termination)	set	4								
b)	33 kV termination, Heat Shrinkable - 1CX630 Sq.mm (1 Set = 3 nos of 1C termination)	set	4								
c)	11 kV termination, 1CX1000 sq.mm (1 Set = 3 nos of 1C termination)	set	4								
3	**LV power, control and instrumentation cables wth lugs & glands**										
a)	5C x 2.5 Sq. mm	M	150								
b)	12Cx2.5 Sq.mm	M	500								

C.	**Cabling system**										
a)	Aluminium Cable Trays, 50x50x5(angle), 30x5 mm(flat), 300 mm(width) with support material	M	25								
b)	Conduits, bends, tees, junction boxes, accessories for cabling system.	L.S.	1								
D.	**Earthing and lightning protection system**										
a)	GEE slab earthing	Nos.	72								
b)	50 x 6 mm MS flat Grid conductor including nuts & bolts.	M	250								
c)	50 x 6 mm GI flat for riser including nuts & bolts.	M	100								
E.	**Miscellaneous Item**										
a)	Rubber mats as per specifications	Nos.	7								
	TOTAL WORKS										

SCHEDULE 1B: SCHEDULE FOR ERECTION, TESTING & COMMISSIONING OF SUBSTATION EQUIPMENT

Sl. No	Description	Unit	Qty	Unit Rate	Total Price
			1	2	3=1x2
A.	**Equipment**				
1	33/11 kV, 10 MVA power transformer with NCT (Including RTCC Panel)	Nos.	2.00		
2	33 kV indoor GIS switchgear with numerical relays, meters, CTs, line PTs as per specifications.				
a)	25 kA,GIS (2 incomer, 2 transformer feeder, 1 buscoupler)	Nos.	5.00		
b)	Bus PT panel with under voltage relay (cost to be included in a)				
3	**Instrument Transformer**				
a)	11 kV, 600-300/1-1-1A, 3 or 4 core for 11 kV ICs and BC (to be installed on existing CT compartment)	Nos	12		
b)	11 kV, 300-150/1-1A, 2 core for 11 kV outgoing (to be removed from existing IC & Bus-coupler and installed on out going panel)	Set	24		
B.	**Cables including supply of tiles and sand as required for direct burial as per drawings.**				
1	**HV Cables**				
a)	**33kV**				
	1Cx630 sq. mm.	M	500.00		
b)	**11kV**				
	1Cx1000 sq. mm.	M	250.00		
2	**HV Cables - outdoor and indoor termination kits**				
a)	33 kV GIS termination, Heat Shrinkable	set	4		
b)	33 kV termination, Heat Shrinkable	set	4		
d)	11 kV termination Heat Shrinkable	set	4		
3	**LV power, control and instrumentation cables**	Lot	1.00		
C.	**Cabling system**				
a)	Erection of all accessories with cable trays, conduits, bends, tees, junction boxes, accessories for cabling system.	Lot	1.00		
D.	**Earthing and lightning protection system including civil and earth works**				
a)	Digging, laying and connection of GEE slab earthing as per the approved drawing and specifications	Nos.	72.00		
b)	50 x 6 mm MS flat Grid conductor including nuts & bolts.	M	250.00		
c)	50 x 6 mm GI flat for riser including nuts & bolts.	M	100.00		
	TOTAL WORKS				

SCHEDULE -1C: SCHEDULE FOR CIVIL WORKS

Item No.	Description	Unit	Provisional Quantity	Unit Price	Total Price
		1	2	3	4=(3x2)
1.0	**Control Room Building**				
A	***EARTHWORK***				
1	Earth work in excavation over areas, depth >300mm, width >1.5m, area >10 Sq.m on plan, including disposal of excavated earth within all lead and lift & disposed soil to be neatly dressed- Hard soil	Cu.M.	300.00		
2	Excavation in foundation trenches or drains not exceeding 1.5m in width or area 10 sq.m on plan, including dressing & ramming, disposal of surplus soil for all lead and lift -hard soil	CuM	36.00		
3	Filling of trenches, sides of foundations etc. in layers <200mm using selected excavated earth, ramming etc. within lead 50 m & lift 1.5m	CuM	19.00		
4	Providing and laying sand bedding, including watering, ramming and dressing-in ground floor	CuM	5.00		
	Hand excavation and refilling in layers < 200mm, of trenches for pipes & sockets, cables, including dressing of sides/ ramming of bottom, depth upto 1.5m, disposal of surplus material within lead of 50m: All kinds of soil- Pipes, cables etc. 80mm < dia < 300mm	RM	50.00		
B	***STONE WORK***				
1	Providing and laying Hand packed stone filling or soling with stones	CuM	18.00		
2	Providing & laying Random Rubble Masonry with hard stone in foundation & plinth - In CM 1:5 (under plinth beams)	CuM	9.00		
C	***DRAINAGE AND PLINTH PROTECTION***				
1	Providing and laying Plinth Protection and grouted with fine sand mix including well rammed, finishing the top smooth -with 50mm thick cement concrete 1:3:6, 20mm aggregates, laid over 75mm thick layer of compacted gravel (40mm)	SqM	55.00		
2	Constructing second class brick masonry open surface drain in cement mortar 1:4 including earth work in excavation 100 mm thick concrete bed 1:5:10, 40mm aggregate and 25mm thick cement concrete 1:2:4,12 mm aggregate for filling haunches including 12mm cement plastering 1:4 with a floating coat of neat cement and disposal of surplus earth etc. complete- 150mm wide x 200mm depth	RM	55.00		
3	Providing & laying H.D.P.E Pipes, 6 PN, including H.D.P.E fittings (excluding trenching, refilling & thrust block)- 110mm dia	RM	50.00		
4	Providing & laying H.D.P.E pipes, 2.5 PN, including H.D.P.E fittings (excluding trenching, refilling & thrust block) provision for cables at below plinth- 160mm dia	RM	24.00		
D	***CONCRETE/R.C.C WORK***				
1	Providing and laying in position plain cement concrete 1:3:6, 20mm aggregate excluding the cost of centering and shuttering in floors of ground floor	CuM	11.00		
2	Providing & laying Cement concrete 1:4:8, 40 mm agg., excluding p&f the cost of centering & shuttering-in foundation and plinth (Below wall footing)	CuM	2.00		
3	Providing & laying R.C.C 1:1.5:3, 20mm agg. excluding the cost of formwork & reinforcement cost in (Footing pad below plinth)-all works upto plinth level	CuM	4.00		
4	Providing & laying R.C.C 1:1.5:3, 20mm agg. excluding the cost of formwork & reinforcement cost for- columns	CuM	8.00		

5	Providing & laying R.C.C 1:1.5:3, 20mm agg. Excluding the cost of formwork and reinforcement cost for-slab	CuM	13.00		
6	Providing & laying R.C.C 1:1.5:3, 20mm agg. excluding the cost of formwork & reinforcement cost for - (Floor beams and lintels)	CuM	16.00		
7	Bhutan type Traditional Cornices in R.C.C 1:1.5:3, 20 mm aggregate including cost of formwork including finishing with 6mm thick plaster on the exposed surface with cement mortar 1:3 as per standrad design excluding cost of reinforcement & decorative painting .				
a	Single Storied building, including Phana	RM	39.00		
b	Lintel cornice (only cornice portion at external face)	RM	24.00		
E	**TMT BARS**				
1	Providing & fixing cold twisted deformed bar (Fe500) for R.C.C work incl. cutting, bending, binding & placing in position complete	KG	5090.00		
F	**FORMWORK**				
	Providing & fixing centering and shuttering (formwork), including strutting, propping etc. and removal of formwork.				
1	Foundation and plinth	SqM	26.00		
2	Beams and lintels	SqM	100.00		
3	Columns	SqM	50.00		
4	Steps	SqM	2.50		
5	Roof slab	SqM	75.00		
G	***BRICK WORK***				
1	Providing and laying autoclaved aerated cement blocks masonry (AAC blocks) in super structure above plinth level up to floor V level with RCC band at sill level and lintel level with approved block laying polymer modified adhesive mortar all complete as per direction of Engineer-in-Charge. (The payment of RCC band and reinforcement shall be made separately).	CuM	30.00		
H	***DOORS & WINDOWS- Providing and fixing Doors and Windows complete as per the drawing and specification. (Incl. pink primer in window & pink primer and enamel paint in door)***				
1	W1	Each	8.00		
2	W2	Each	3.00		
3	Main door	Each	1.00		
4	D1	Each	2.00		
I	***STEEL WORK***				
1	Steel work welded, in built up sections, trusses, frame works including cutting, hoisting, fixing and appl. Priming coat of red lead	Kg	2450.00		
2	Providing & Fixing M.S. round hold-down bolts with nuts & washer plates	Kg	40.00		
3	Providing, cutting, making, welding and fixing M.S straps, flats, sole plates, etc	Kg	227.00		
4	Providing and fixing in positiong with vertical channels 20x10x2mm and braced with flat iron, diagonals 20x5mm with top and bottom rails of T-iron 40x40x6mm with 38mm dia steel pulleys complete with bolts, nuts, locking arrangement, stoppers hangdles including applying a priming coat of red lead paint-collapsible steel shutters-	SqM	12.50		
J	***FLOORING (shades and sizes to be approved by the employer)***				
1	Providing and laying moisture barrier using plastic sheeting underlay- 50 micro-meter	SqM	50.00		

2	Providing & laying Epoxy Flooring with complete accessories required/ as directed by Engineer	SqM	50.00		
3	Providing & laying 150 mm Epoxy skirting in ground floor vertified and polished - in white cement	RM	41.00		
K	***PLASTERING***				
1	Providing & laying 15mm cement plaster on rough side of single or half -brick wall - C.M 1:4 (Internal walls above plinth)	SqM	110.00		
2	Providing & laying 20mm cement plaster - C.M 1:4 (External walls Above plinth)	SqM	105.00		
3	Providing & laying cement plaster, finished with floating coat of neat cement - 20mm plaster in C.M 1:4 in plinth walls	SqM	17.00		
4	Providing & applying putty of thickness 2mm or more over plastered surface to preparte the surface even and smooth complete.	SqM	110.00		
5	Providing and fixing gypsum board (12mm thick) for false ceiling including the cost of frames for all the rooms-complete	SqM	75.00		
L	***PAINTING***				
1	Providing and applying one coat of primers of approved color and texture by the client on the eave board - pink primer	SqM	12.00		
2	Providing and applying two coats of synthetic enamel paint of approved color and texture by the client on eave board	SqM	12.00		
3	Providing & applying one coat of primers (on external wall surface) -Cement primer	SqM	105.00		
4	Finishing wall with Water- Proof Cement Paint - New work, three coats (on external wall surface)	SqM	105.00		
5	Providing & applying finishing coats - Acrylic washable distemper, two coats on new work, including cement primer coat - internal walls.	SqM	110.00		
6	Providing, preparing and applying Sumdang Traditional Bhutanese painting (Washable) - Ding quality to cornices at floor levels and windows level	L/s	1.00		
M	***ROOFING***				
1	Providing and fixing pre-painted corrugated roofing sheets, including bolts, hooks and nuts 8mm dia. With bitumen and G.I. Impet washers filled with white lead for connection, excluding the cost of purlins, rafter and trusses- 25g (0.50mm)	SqM	160.00		
2	Providing & fixing 600mm ridges or hips in plain G.I. including bolts, hooks and nuts 8mm dia G.I limpet and bitumen washers for connection, 24g.	RM	15.00		
3	providing and fixing 450mm over all semi-circular G.I gutter, including brackets, bolts, nuts, washers and rain water pipes connections, exlcluding the cost of pipes - 24g sheets	RM	30.00		
4	Providing & fixing Cement Bonded Particle board lining with necessary nails/screws etc. complete, excluding the cost of frame- 6mm	SqM	70.00		
5	Providing & fixing Eaves board (250x25mm thick hard wood) with moulding fitted and fixed with necessary screws complete	RM	50.00		
6	Providing & fixing mixed conifer (undressed) in ceiling frames etc.	CuM	2.00		
7	Providing and fixing on wall face single socketed rigid PVC (Working Pressure 4kgf per sq.cm) rain water pipes including jointing with seal ring leaving 10 mm gap for thermal expansion- complete- 110mm dia	RM	29.00		
8	Providing and fixing on wall face PVC coupler for rigid rain water pipes including jointing with seal ring leaving 10 mm gap for thermal expansion - complete- 110mm dia	Each	4.00		
9	Providing and fixing on wall face PVC bend for rigid rain water pipes including jointing with seal ring leaving 10 mm gap for thermal expansion - complete	Each	12.00		
2.0	**Substation works**				
A	**DISMANTLING**				

1	Demolishing reinforced concrete, including stacking steel bars and disposal of rubbish within all lead	CuM	59.00		
2	Demolishing cement concrete 1:3:6 & richer, including disposal of materials within all lead	CuM	19.00		
3	Demolishing brick work including stacking useful materials & disposal of rubbish within all lead-In cement mortar	CuM	2.00		
4	Dismantling steelwork including all equipment (LAs, PLCC trapping, Isolators, CTs, PTs, 33 kV outdoor breakers etc) in built up sections in channels, angles, tees and flats in all gusset plates, bolts, nuts, cutting rivets, welding etc. including dismembering and stacking and transport to Gidakom, ESD Thimphu store.	KG	3000.00		
5	Demolishing stone rubble masonry including stacking useful materials & disposal of rubbish at all lead- In cement mortar	CuM	60.00		
B	**Earthwork**				
1	Excavation in foundation trenches or drains not exceeding 1.5m in width or area 10 sq.m on plan, including dressing & ramming, disposal of surplus soil within all lead & all lift- hard soil (for transformer foundation)	CuM	100.00		
C	**F i l l i n g/b e d d i n g**				
1	Filling of trenches, sides of foundations etc. in layers <200mm using selected excavated earth, ramming etc. within lead 50 m & lift 1.5m (for transformer foundation and cable trench)	CuM	20.00		
D	**Stone works**				
1	Providing and laying Hand packed stone filling or soling with stones (for transformer foundation and cable trench)	CuM	17.00		
2	Providing, supplying and placing of aggregates/shingles of size 40mm	CuM	15.00		
E	**Form works**				
1	Providing & fixing centering and shuttering (formwork), including strutting, propping etc. and removal of formwork -Foundation, plinth, slab, etc (for transformer foundation and cable trench)	SqM	720.00		
F	**PCC works**				
1	Providing and laying in position plain cement concrete 1:3:6 (1 cement : 3 sand : 6 graded crushed rock 20 mm nominal size) excluding the cost of centering and shuttering - All work upto plinth level (for transformer foundation and cable trench)	CuM	36.00		
G	**S t e e l R e i n f o r c e m e n t works**				
1	Providing & fixing Thermo-Mechanically Treated reinforcement bar (Yield Strength 500 MPa) for R.C.C work including cutting, bending, binding and placing in position complete (for transformer foundation and cable trench)	KG	9,900.00		
H	**RCC works**				
1	Providing & laying in position reinforced cement concrete M20, 1:1.5:3 (excluding the cost of centering, shuttering and reinforcement) - all work upto plinth level (for transformer foundation and cable trench)	CuM	116.00		
I	**Steel work**				
1	Steel work welded, in built up sections, trusses, frame-works including cutting, hoisting, fixing and appl. priming coat of red-Tees,angles, rail tracks, flates, channels, tubulars section	KG	3000.00		
2	Providing and fixing of chequered plate 8mm thick (with provision of hole to lift the cover plate using handle) to cover the Cable Trench	KG	2000.00		
J	**Brick works**				
1	Providing & laying AAC One Brick work (250mm) using chemical adhesive mortar, for fire wall	CuM	6.00		
K	**Plastering works**				
1	Providing & laying 20mm cement plaster-C.M 1:4	SqM	41.00		
2	Providing & laying G.I. pipes including G.I. fittings (excluding trenching, refilling & thrust block)- 150mm	RM	36.00		

L	**Retaining wall**				
1	SM0072Providing and laying Hand packed stone filling or soling with stones	CuM	9.00		
2	Providing and laying in position plain cement concrete 1:3:6, 20mm aggregate excluding the cost of centering and shuttering.- All work upto plinth level	CuM	6.00		
3	Providing and laying in position plain cement concrete 1:2:4, 20mm aggregate excluding the cost of centering and shuttering.	CuM	1.50		
4	Providing & laying Random Rubble Masonry with hard stone in foundation & plinth- In cement mortar 1:4	CuM	98.00		
5	Providing & laying H.D.P.E Pipes, 2.5 PN for weep holes- 110mm dia	RM	75.00		
6	Filling of trenches, sides of foundations, walls etc. in layers <200mm using selected excavated earth, ramming etc. within lead 50 m & lift 1.5m	CuM	375.00		
M	**Fencing**				
1	Providing and applying finishing coats- Aluminium paint, one coat on old work (on exsiting fence)	sq.m	180.00		
2	Repair and one coat of aluminium paint on exsiting barbed wire	L/s	1.00		
N	**Road Works, Drains and Gate**				
1	Earthwork in excavation over areas, exceeding 300mm in depth, 1.5 m in width as well as 10 sq.m on plan including disposal of excavated earth (disposed earth to be levelled and neatly dressed)- hard soil	CuM	300.00		
2	Excavation in foundation trenches or drains not exceeding 1.5m in width or area 10 sq.m on plan, including dressing & ramming, disposal of surplus soil for all lead and lift -hard soil	CuM	198.00		
3	Providing & laying Hand packed stone filling/soling	Cu.M.	60.00		
4	Providing and laying in position plain cement concrete 1:2:4, 20mm aggregate excluding the cost of centering and shuttering	Cu.M.	27.00		
5	Providing & fixing centering and shuttering (formwork), including strutting, propping etc. and removal of formwork	SqM	15.00		
6	Providing & fixing compound gate including hinge-supports complete as per drawing	Each	2.00		
	Total Amount (Nu.)				

SCHEDULE 1D : SCHEDULE FOR INTERNAL WIRING

Item No.	Item Description	Unit	Quantity	Rate (Nu.)	Amount (Nu.)
	COST OF ELECTRICAL WORKS		**1**	**2**	**3=1x2**
	Wiring and accessories				
A1	Wiring for light, fan, call bell and 2 pin socket outlet with 1.5 sq.mm 1.1 kv grade, PVC insulated copper conductor cable in recessed HDPE pipe including connections, painting, testing and commissioning etc. as required.				
A1a	Short Point	pt.	2		
A1b	Medium point	pt.	4		
A1c	Long point	pt.	12		
A2	Wiring for points in excess length above long points with 1.1kv grade, PVC insulated copper conductor cable in recessed HDPE pipe including connections, painting, testing and commissioning etc. as required.				
A2a	2x1.5 sq mm	m	30		
A3	Wiring for lighting circuit with 1.1 kv grade, PVC insulated copper conductor cable in recessed HDPE pipe including connections, painting, testing and commissioning etc. as required.				
A3a	2 x 2.5 sq mm	m	35		
A4	Wiring for 3/5 pin, 6/16A plug point with 4 sq mm 1.1 kv grade, PVC insulated copper conductor cable in recessed HDPE pipe with providing and fixing 3/5 pin, 6/16A socket outlet and switch including earthing the third pin, connections, painting, testing and commissioning etc. as required.				
A4a	Long point	pt	4		
A5	Wiring for points in excess length above long points with 1.1kv grade, PVC insulated copper conductor cable in recessed HDPE pipe including connections, earth wire, painting, testing and commissioning etc. as required.				
A5a	2x4 sq mm	m	15		
A6	Supply and fixing of HDPE pipe on recessed including all accessories such as screws, bends, elbows, Tees, corners, etc, complete as required.				
A6a	25 mm dia	m	60		
B	***Lighting fixture and accessories***				
B1	Supply of recessed Cirrus Mini Pro luminiare (with a dimension of 312mm X 312mm), a perfect solution for all recessed /surface mount indoor general lighting application. At false ceiling, complete with all its accessories .	each	16		
B2	Supply of spot light 12-W LED complete with all its accessories.	each	1		
B3	supply of Exaust fan complete with all accessories etc.	each	1		
C	***CONTROL GEAR AND PROTECTIONS***				
C1	Supplying of SPN distribution board (DIN type, horizontal) with metal door, 415 volt AC complete with all accessories without MCB/isolator/RCCB/RCBO out going or incoming etc. as required.				
C1a	8 way	each	1		
	Supplying of miniature circuit breaker (MCB) single pole. 230 volt AC complete with all accessories suitable to fix on a din-bar etc. as required.				
C2a	6A	each	3		
C2b	16A	each	5		
	Supply of residual current circuit breaker (RCCB/RCBO) 4 pole, sensitivity 100mA, 415V AC complete with all accessories suitable to fix on a din-bar etc. as required.				
C3a	25A, RCCB	each	1		
	Supplying of 4 core 1.1kv grade XLPE aluminium armoured power cable.				
C4a	10 sq.mm	m	20		
	Supplying of heavy duty brass double compression gland for 4 core 1.1kv grade PVC insulated and sheathed copper/aluminium conductor armoured/un-armoured power cables.				
C5a	27mm dia, 16sq.mm	each	1		

D	***ERECTION AND INSTALLATION***				
	Installation testing and commissioning of pre wired fittings of all surface/Recessed type complete with all accessories and tubes directly on ceiling/wall as required including connection with PVC insulated copper conductor.				
D1a	1.5 sq mm single core cable 1.1 KV grade	each	17		
	Installation, testing and commissioning of SPN/TPN/four pole residual current circuit breaker (RCCO) (DIN type) complete with all accessories to accommodate on/in prefabricated MS surface/MS cubical control panel board including drilling holes, connections etc. as required.				
D1c	25A, 415V	each	1		
	Installation, testing and commissioning of SPN/TPN DB (DIN type, horizontal/vertical)with nodoor/metal door or arcylic door (double/single door) complete with all accessories to accommodate incoming RCCB/RCBO FP 40/63A sensitivity 30/100/300mA and out going SP MCB 6/10/16A on/in prefabricated MS surface/MS cubical control panel board including drilling holes, connections etc. as required.				
D1d	8 way	each	1		
	Laying of one number PVC insulated and sheathed power cable copper/aluminium,armoured/un-armoured 1.1KV single core to four core direct in the ground including excavation, sand cushing protective covering and refilling the trenches etc. as required				
D1e	Above 6sq.mm to 25sq.mm	m	20		
	Installation, testing and commissioning of end termination with single/double compression gland for PVC insulated and sheathed aluminium/copper conductor cable of 1.1kv grade including connections etc. as required.				
D1f	20/22/25mm dia	each	1		
E	***EARTHING***				
E1	Providing and fixing of earthing including all accessories, machinery enclosure, C.I cover plate having,locking arrangement, watering pipe with excavation and refilling work including charcoal or coke and salt complete as required as per standard earthing drawing - With G.I earth plate 600x600x6mm and GI pipe 20mm.				
E1a	With Copper plate (600x600x3mm)	each	1		
	Providing and laying wire for loop earthing in existing surface/recessed PVC/MS/steel conduit or casing capping or wooden batten along with other wires as required.				
E1b	2.032mm (14SWG) cu. earth wire	m	20		
E1c	Providing and fixing lightning arrester including holes etc. complete as required - 25mm dia 900mm, long copper tube four prong at top with 85mm dia 3mm thick copper base plate	each	1		
	Providing and fixing matel strip on parapet or surface of wall/roof for lighting conductor as requierd horizontal/vertical run as required.				
E1d	25x4 mm GI strip	m	15		
	Providing and laying earth connection from earth electrodes in 15mm dia GI pipe from earth electrode as required as per guidance of standard earthing drawing.				
E1e	With 4.06mm dia (8SWG) GI wire	m	30		
	Total for Electrical internal wiring				

SCHEDULE 1E: SCHEDULE FOR SUPPLY OF ESSENTIAL SPARES.

Sl. No	Description	Unit	Qty	Unit Price				Provision for BST/CD			Total FAS including BST/CD
				Ex-Works	FAS excluding BST/CD	FAS including BST/CD	Total FAS excluding BST/CD	BST%	CD%	Value(BST+ CD)	
			1	2	3	4	5=1 x 3	6	7	8=(6+7)x1 x 2	9=1 x 4
1.0	**SWITCHGEAR**										
1.1	**33kV (GIS)**										
1.1.1	Closing Coil	Nos.	2								
1.1.2	Trip Coil	Nos.	2								
1.1.3	CurrentTransformer (1 set - 3 phases) for outgoing	Set	1								
2.0	**TRANSFORMER**										
2.1	Local and Remote winding temperature indicator	No.	1								
2.2	Oil temperature indicator	No.	1								
2.3	Magnetic Oil Level gauge	No.	1								
2.4	Winding Temperature sensing element	No.	1								
2.5	Oil Temperature sensing element	No.	1								
2.6	Temperature transducer	No.	1								
2.7	Tap position transducer	No.	1								
	TOTAL SPARE ITEMS										

Part III – Bid Purpose Drawings

RevNo	Revision note	Date	Signature	Checked

LEGEND

SYMBOLS

- VOLTAGE TRANSFORMER
- CURRENT TRANSFORMER
- FIG. INDICATES NO. OF CTs/VTs R-RELAYING H-INSTRUMENTATION
- CIRCUIT BREAKER
- INSULATOR
- LIGHTNING ARRESTER
- FUSE (THICK LINE INDICATES SUPPLY SIDE)
- HT HRC FUSE
- AUTO-RECLOSER CIRCUIT BREAKER
- LBS WITH HT HRC FUSE
- GANG OPERATED AIR BREAK SWITCH
- TWO WINDING TRANSFORMER
- GENERATOR(RESERVED)

RELAYING

50	INSTANTANEOUS O/C RELAY
51	INVERSE TIME PHASE OVERCURRENT RELAY
REF	RESTRICTED EARTH FAULT RELAY

INSTRUMENTATION

A	AMMETER
V	VOLT METER
W	WATT METER
VAR	VAR METER
VS	VOLT METER SELECTOR SWITCH
F	FREQUENCY METER
PF	POWER FACTOR METER
kWh	ENERGY METER
MFM	MULTI FUNCTION METER

TMH, THIMPHU 33/11kV substation

Note:
THIS SCHEMATIC IS NOT MEANT TO BE A DETAILED SPECIFICATION OF THE SUBSTATION. IT IS FOR ILLUSTRATION PURPOSE ONLY.

NOTE:

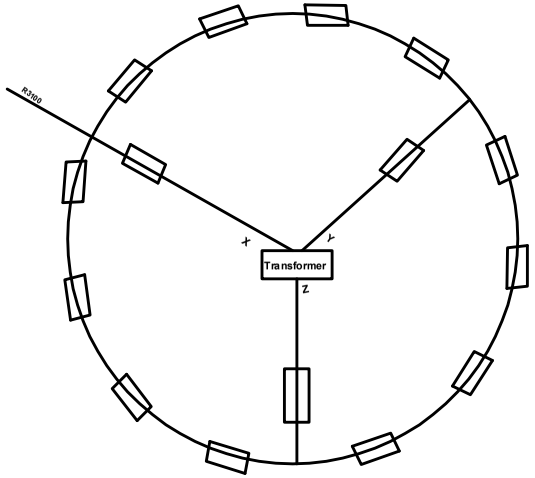
THIMPHU MINI HYDEL THIMPHU

Title: PROPOSED SCHEMATIC FOR THE 33/11kV SUBSTATION AT TMH, THIMPHU.		**File Name:** *BPC/DS/DCD/ED/C-35/F-5*	**Date:** *May 2020*	**Scale:** *NTS*
Division: Electricity Services Division THIMPHU	Bhutan Power Corporation Limited	**Project:** *Electrification Division Distribution Construction Department*		**Code:**

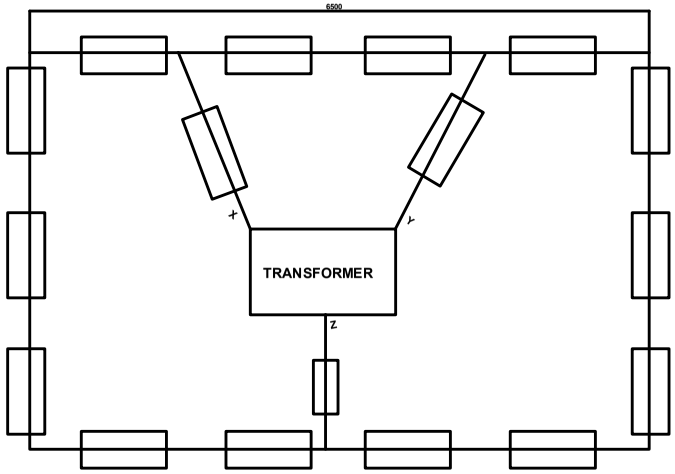
ANNEX-C

RevNo	Revision note

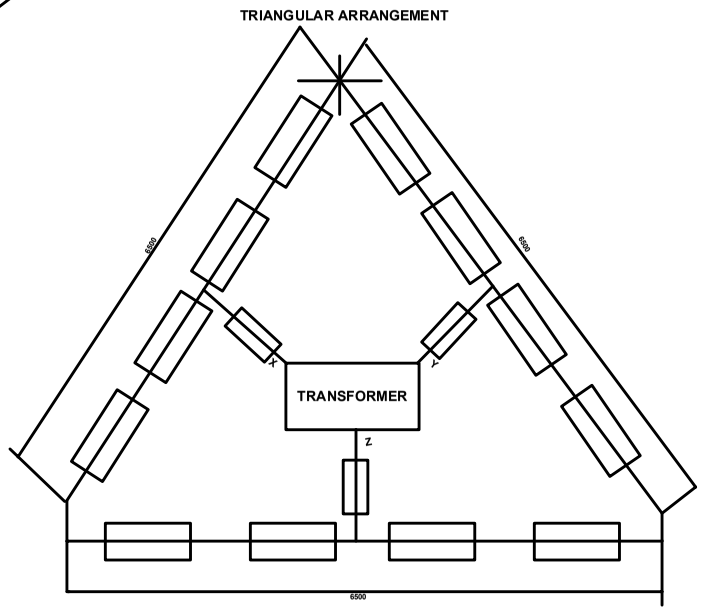
CIRCULAR ARRANGEMENT



RECTANGULAR ARRANGEMENT



TRIANGULAR ARRANGEMENT



THE CONNECTION POINTS SHOULD BE AS FOLLOWS:
a) Two earth point to neutral earthing.
b) One earth point to body.
c) Rectangular arrangement can be done for grid at CRB and numbers can be depend upon the value of the site soil resitivity.

Note:
THIS SCHEMATIC IS NOT MEANT TO BE A DETAILED SPECIFICATION OF THE SUBSTATION. IT IS FOR ILLUSTRATION PURPOSE ONLY.

ANNEX-C

NOTE:

THIMPHU MINI HYDEL THIMPHU

Title: INDICATIVE ARRANGEMENT OF GEE SLAB EARTHING DISTRIBUTION SUBSTATION		File Name: *BPC/DS/DCD/ED/C-08/F-5*	Date: *March 2021*	Scale: *NTS*
Division: **Electricity Services Division THIMPHU**	Bhutan Power Corporation Limited	Project: ***Electrification Division Distribution Construction Department***		Code:

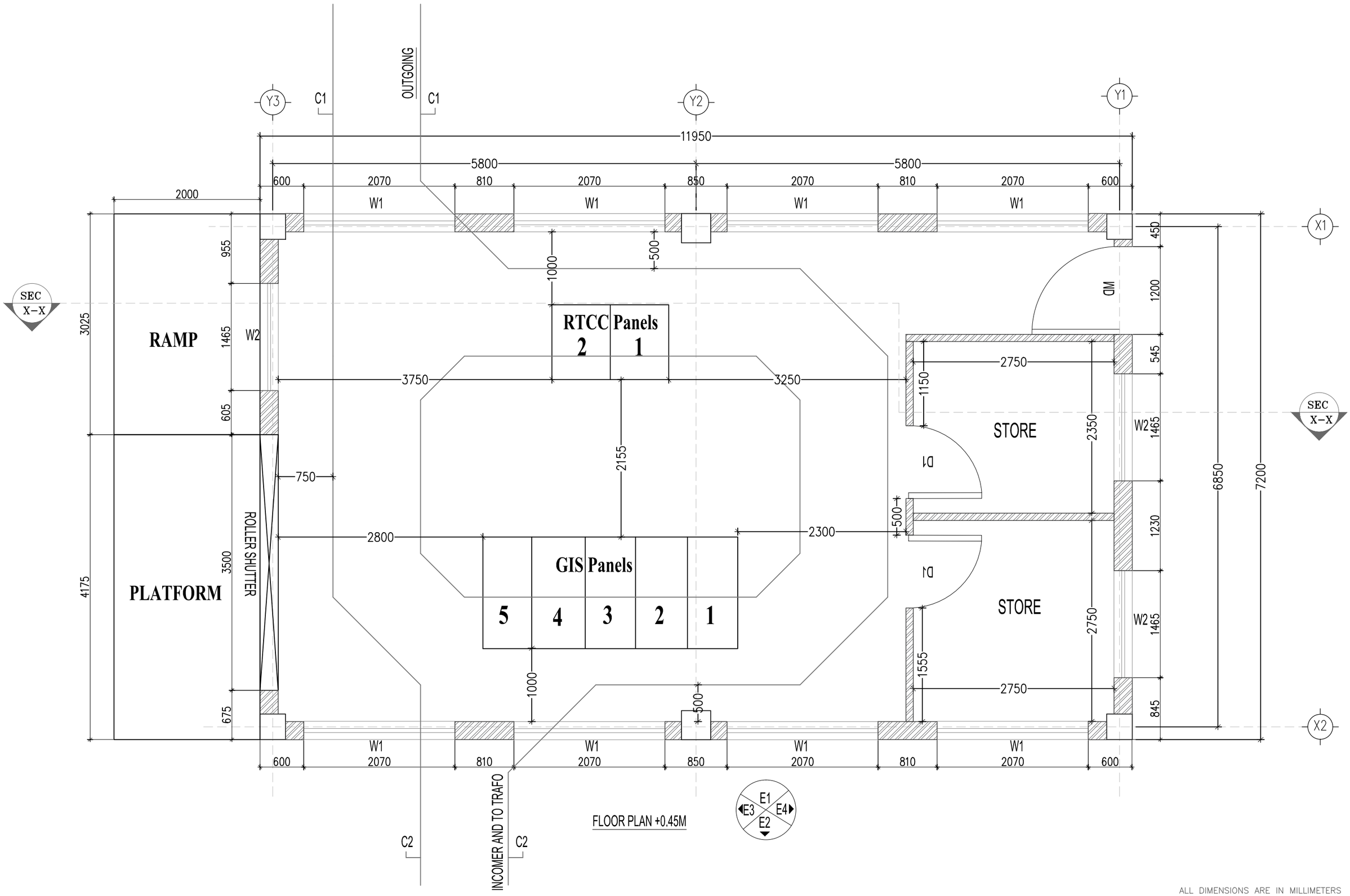
ARCHITECTURAL DRAWING

CONTROL ROOM BUILDING

PROJECT : Upgradation of Thimphu Mini Hydro Power Plant

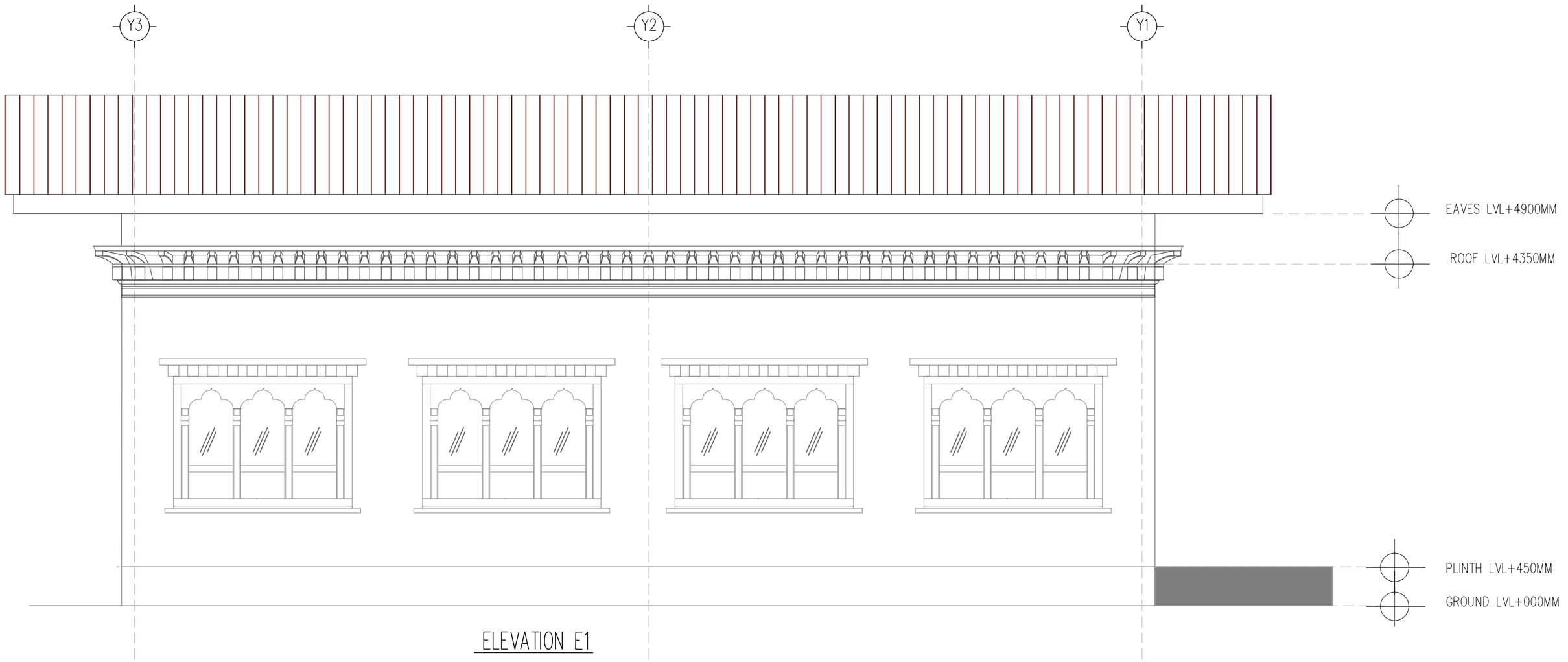
LOCATION Junshina, Thimphu

BHUTAN POWER CORPORATION LIMITED
THIMPHU BHUTAN
Electrification Division



ALL DIMENSIONS ARE IN MILLIMETERS

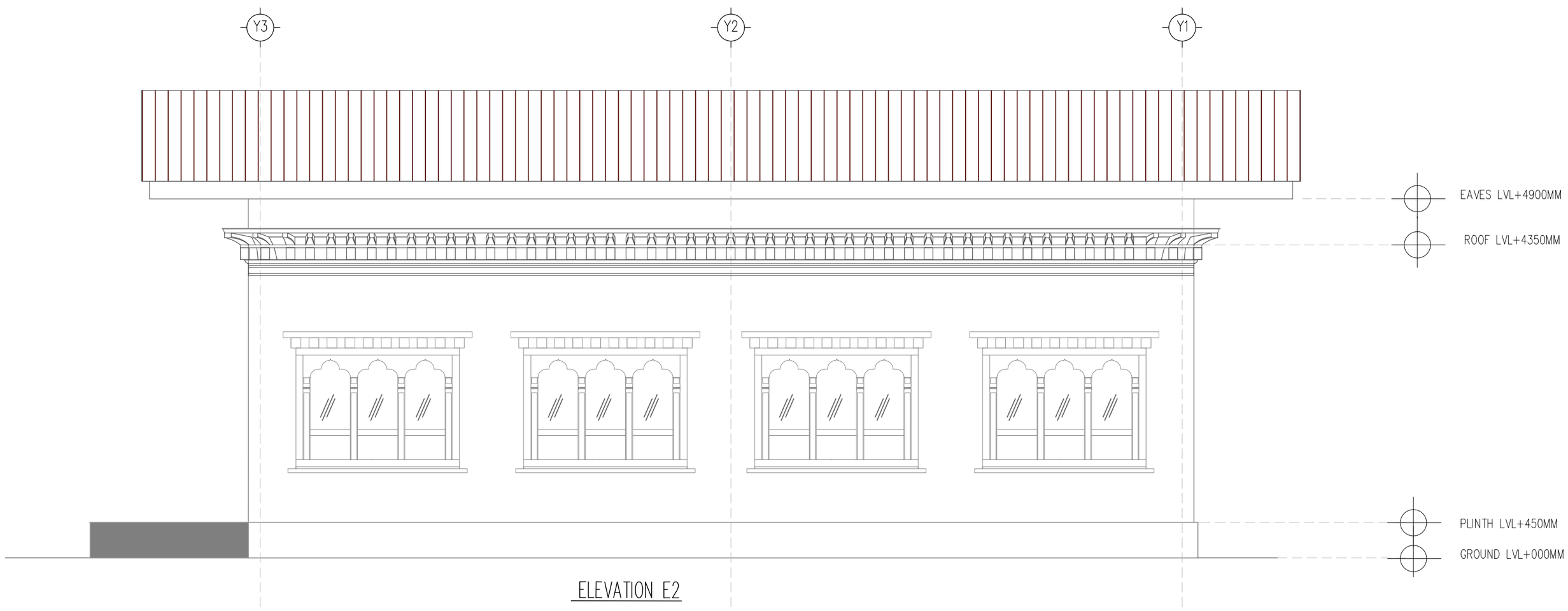
BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		DESIGN & DRAWN	YONTEN JAMTSHO		APRIL 2021	TITLE: LAY OUT PLAN	SCALE NTS PROJECTION
	DRG. No 01	SIZE A3 / REV. 0						



ELEVATION E1

ALL DIMENSIONS ARE IN MILLIMETERS

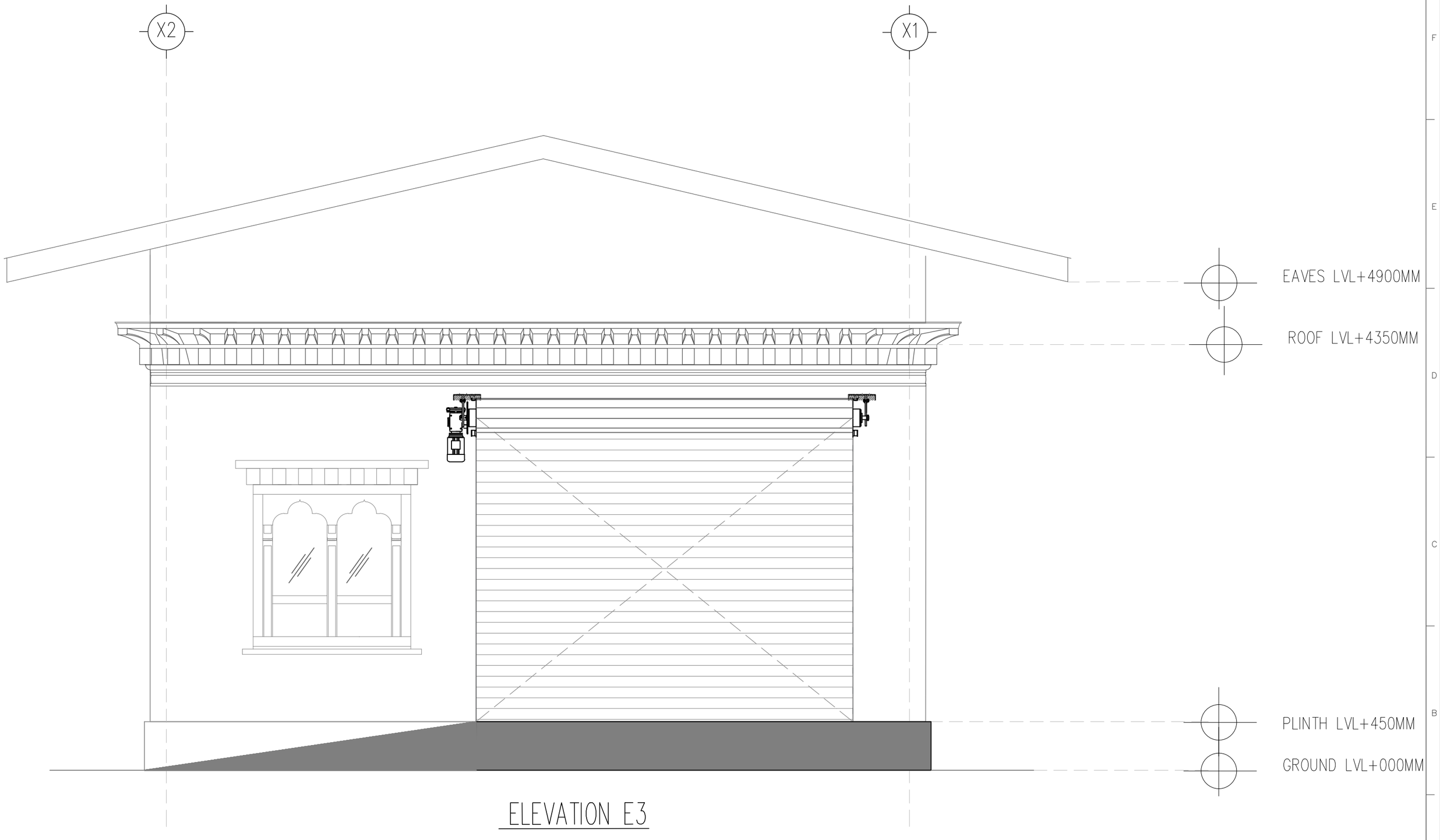
BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT			NAME	SIGN	DATE	TITLE: / SCALE
	DRG. No 02	SIZE A3	REV. 0	DESIGN & DRAWN: YONTEN JAMTSHO		MARCH 2021	LAY OUT PLAN / NTS
							PROJECTION



ELEVATION E2

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 03 SIZE A3 REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021	LAY OUT PLAN	PROJECTION



ELEVATION E3

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT				NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 04	SIZE A3	REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021	LAY OUT PLAN	PROJECTION

ELEVATION E4

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD.
ELECTRIFICATION DIVISION

PROJECT:
UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT

DRG. No 05

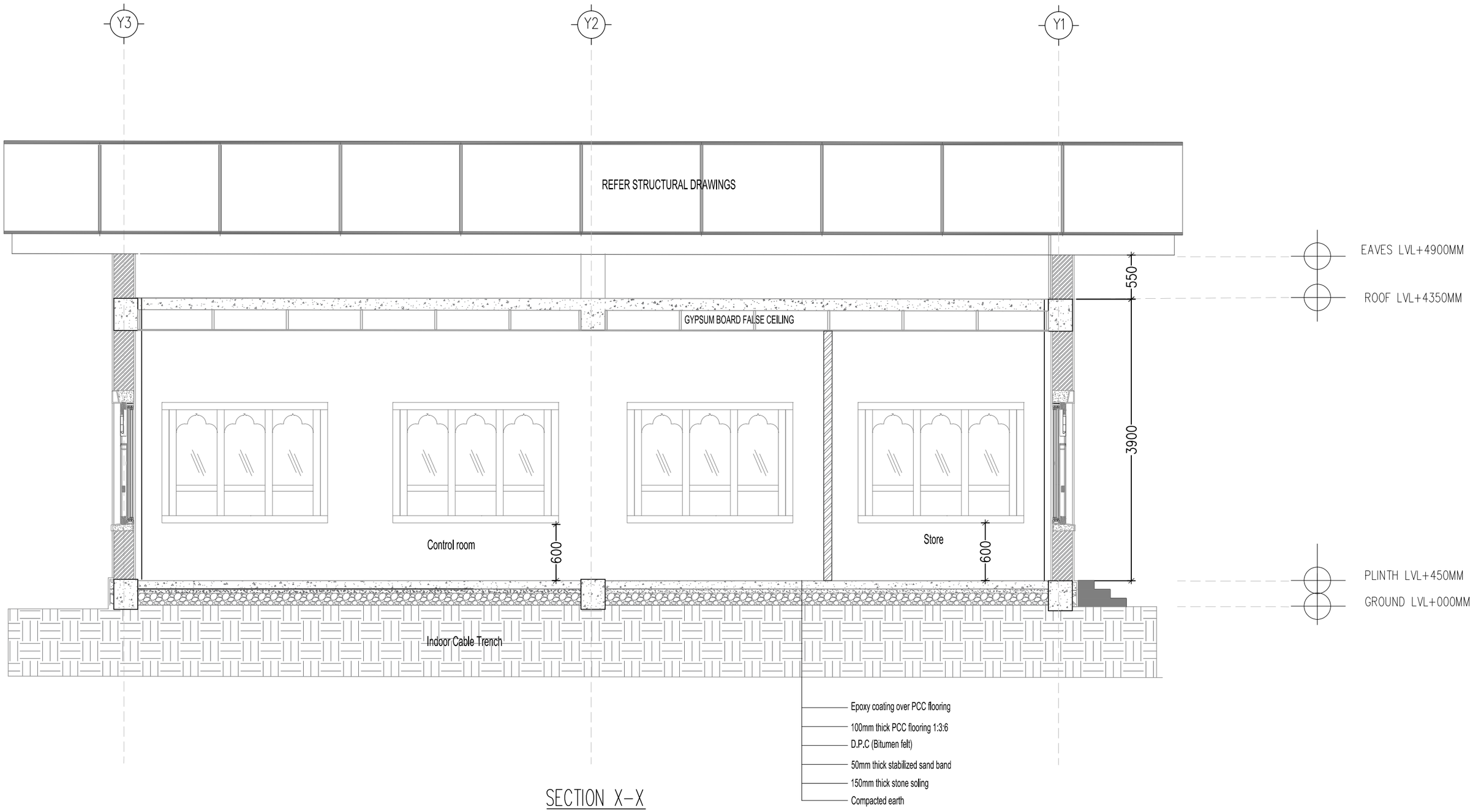
SIZE	REV.
A3	0

	NAME	SIGN	DATE
DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021

TITLE: LAY OUT PLAN

SCALE NTS

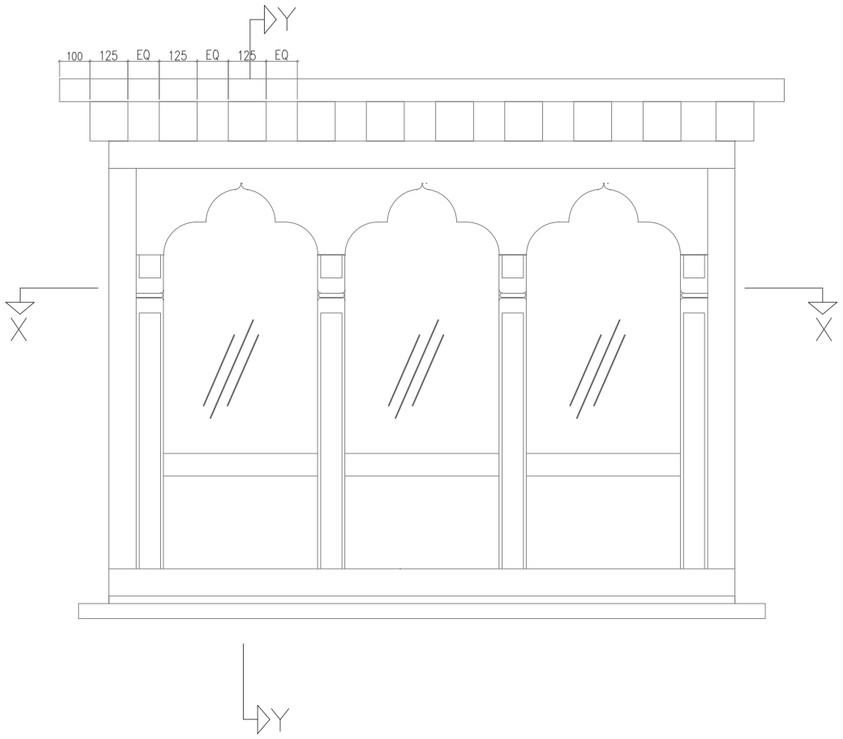
PROJECTION

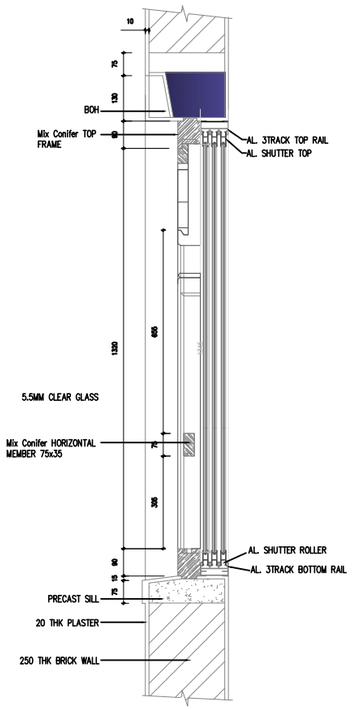


SECTION X-X

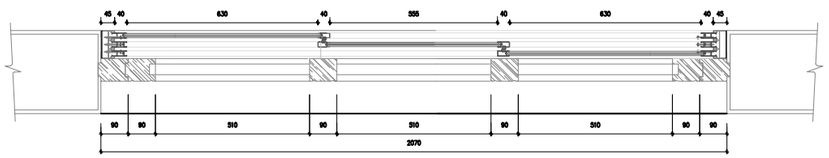
ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 06	SIZE A3 / REV. 0	DESIGN & DRAWN: YONTEN JAMTSHO		MARCH 2021	LAY OUT PLAN	PROJECTION



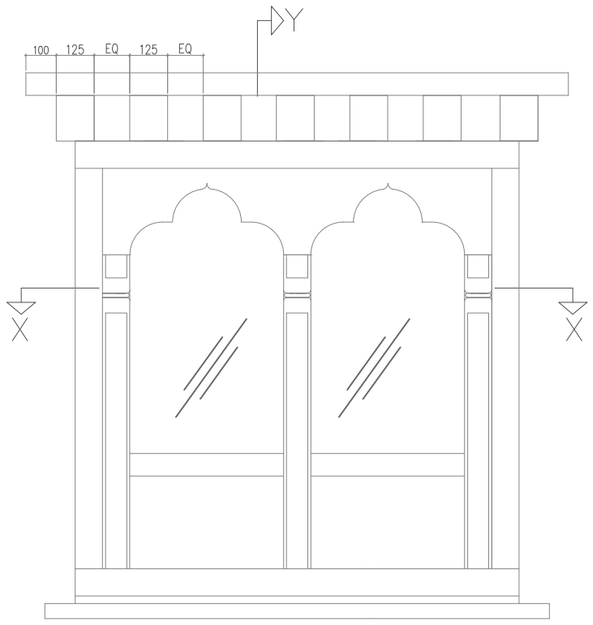


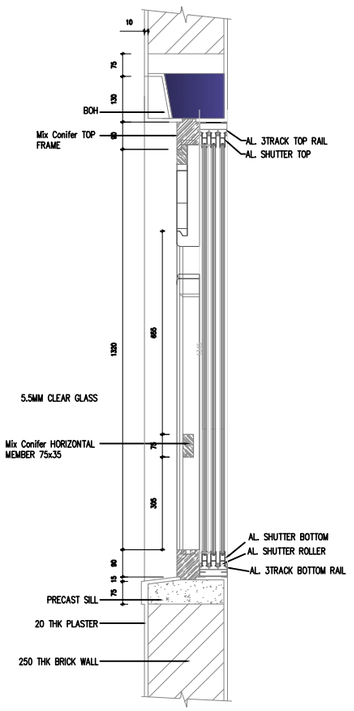
SEC. AT Y-Y



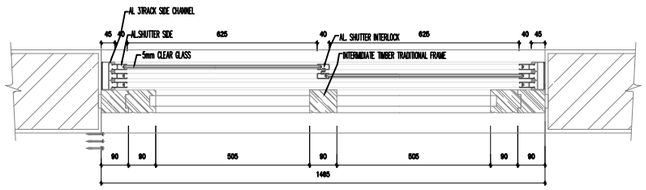
SEC. AT X-X

W1





SEC. AT Y-Y



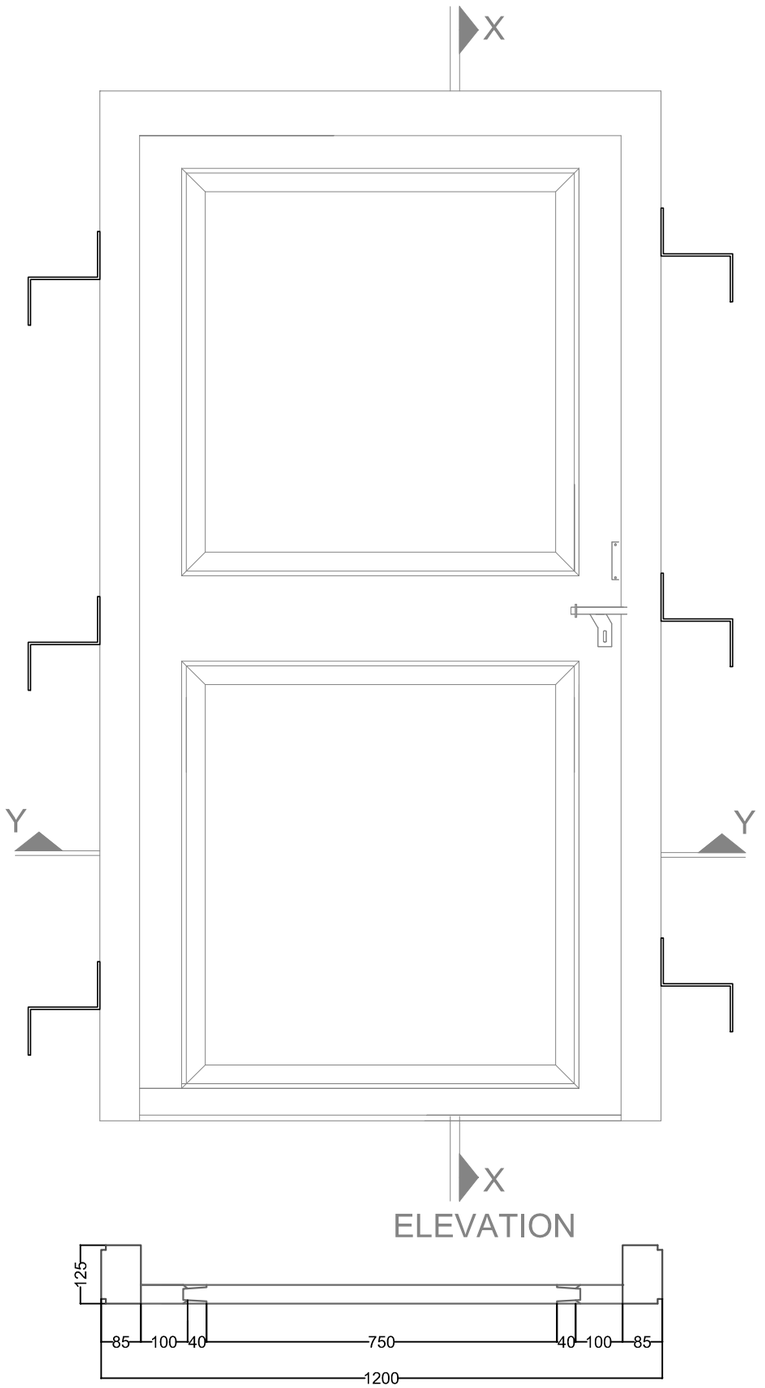
SEC. AT X-X

W2

ALL DIMENSIONS ARE IN MILLIMETERS

BPC	BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:
		DRG. No 07	SIZE A3 / REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO	MARCH 2021	LAY OUT PLAN

SCALE NTS
PROJECTION

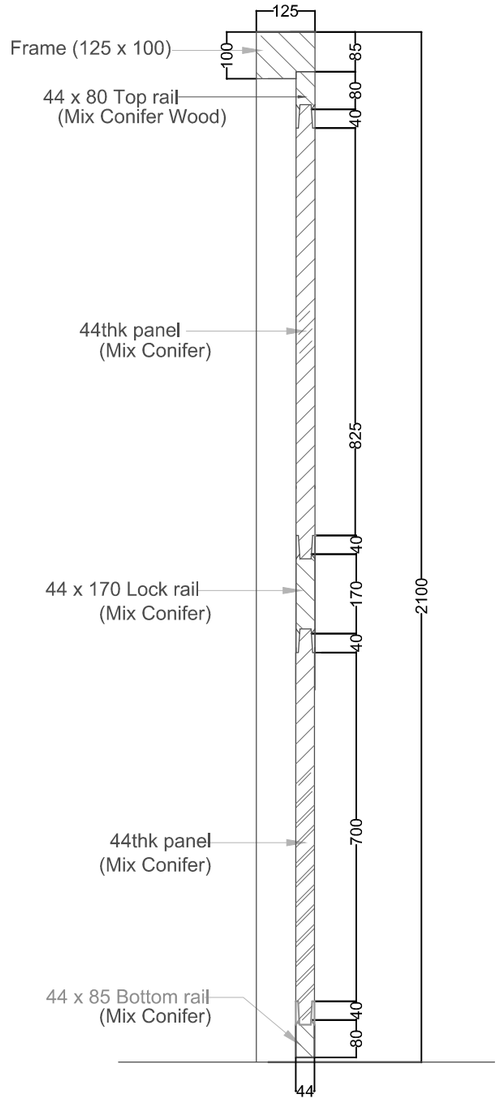


ELEVATION

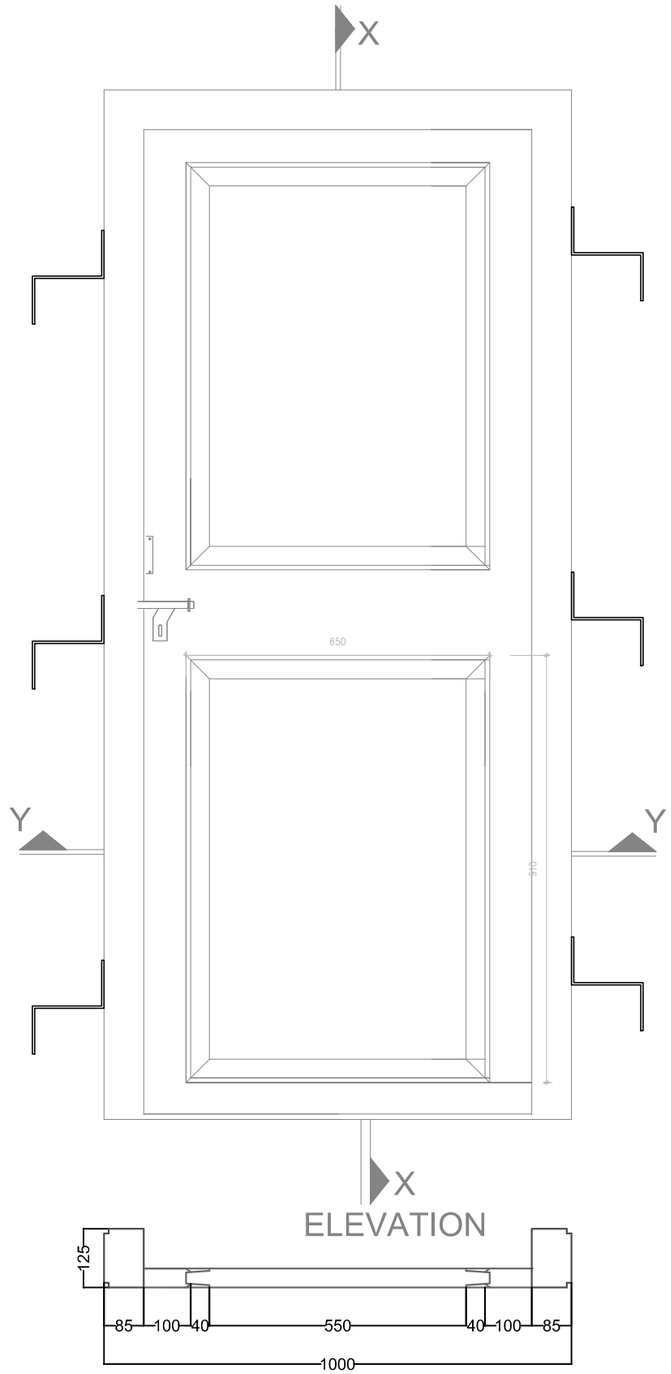
SECTION Y-Y

PLAN

Main Door (2100 x1200 mm)



SECTION X-X



ELEVATION

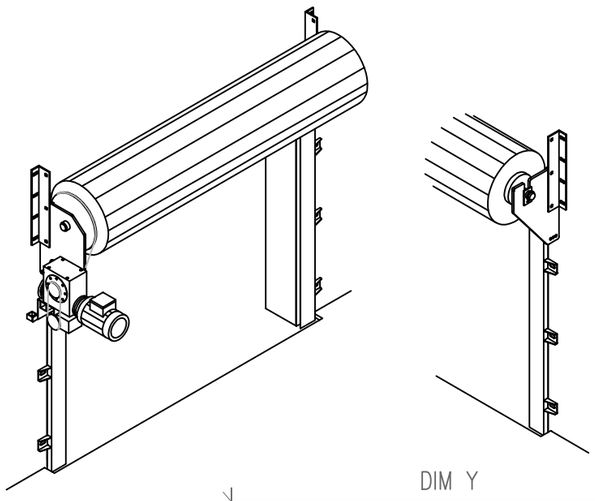
SECTION Y-Y

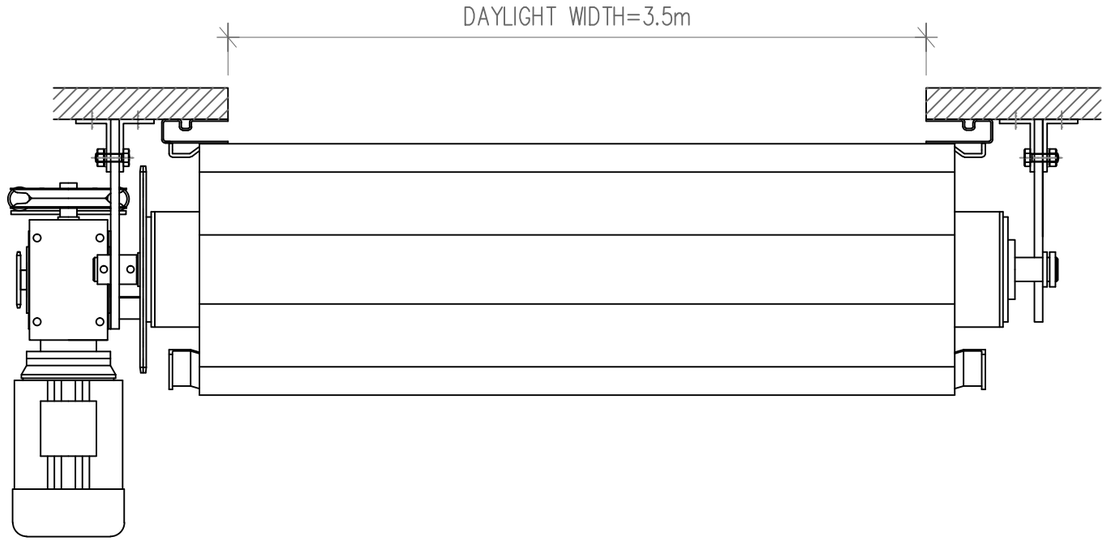
PLAN

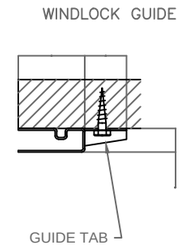
D1 (2100 x1000 mm)

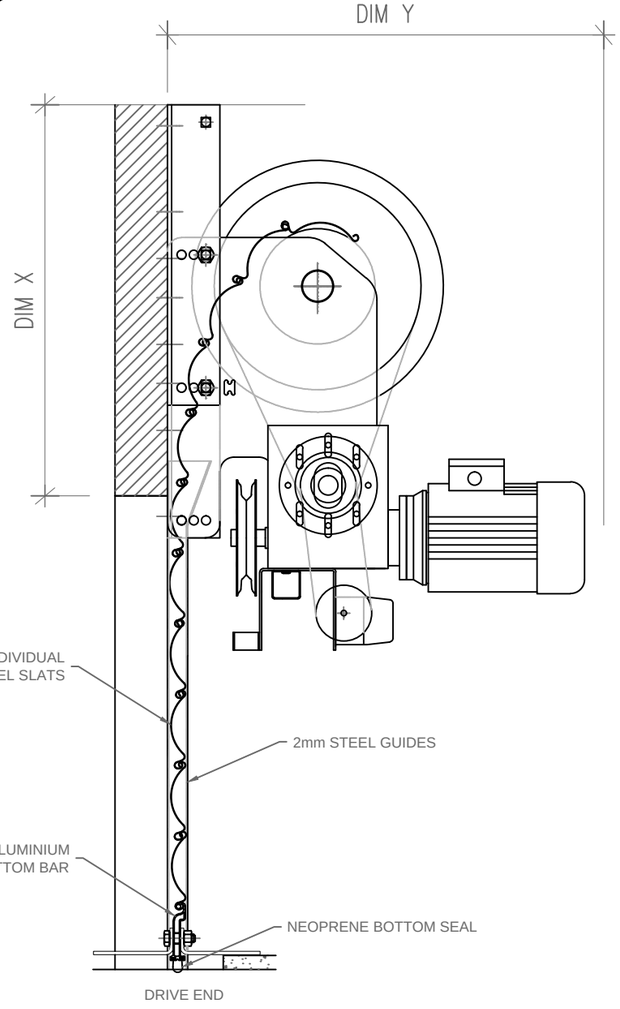
ALL DIMENSIONS ARE IN MILLIMETERS

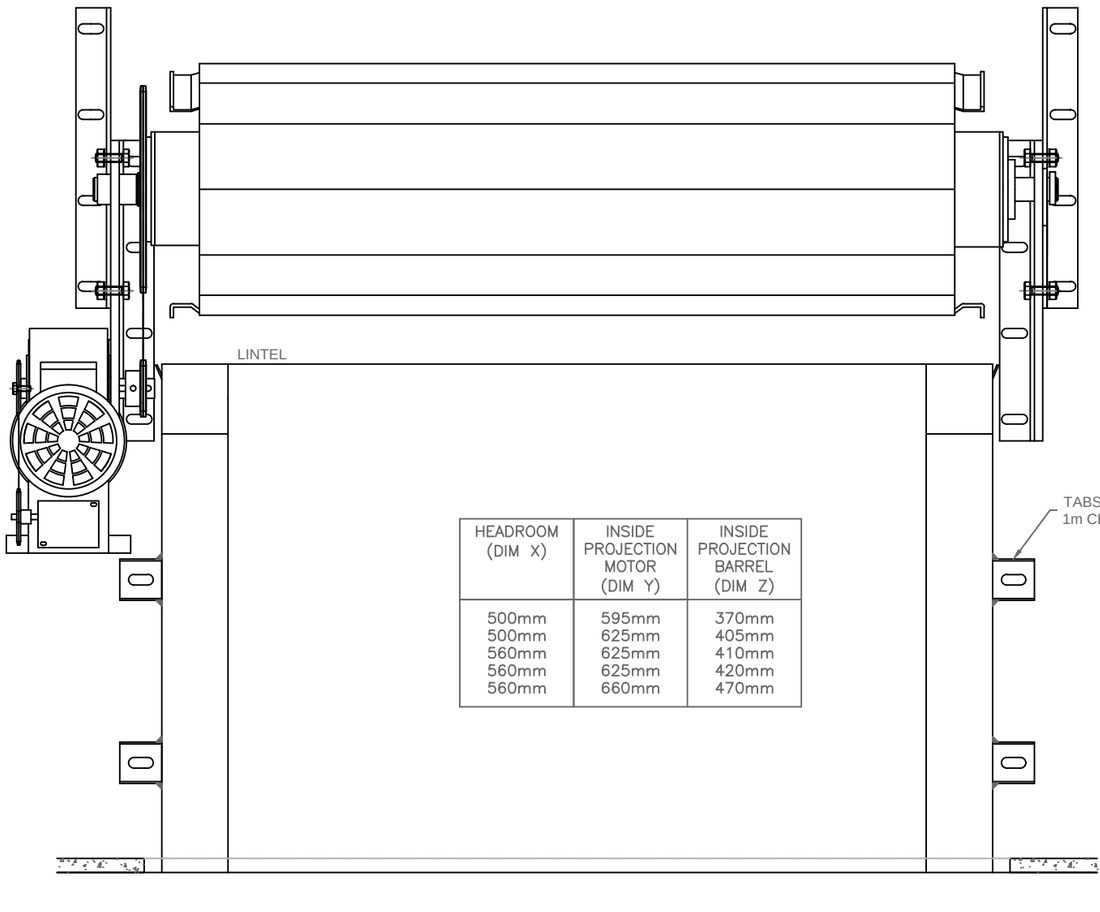
BPC	BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE: / SCALE NTS
		DRG. No 08	SIZE A3 / REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO	MARCH 2021	LAY OUT PLAN / PROJECTION



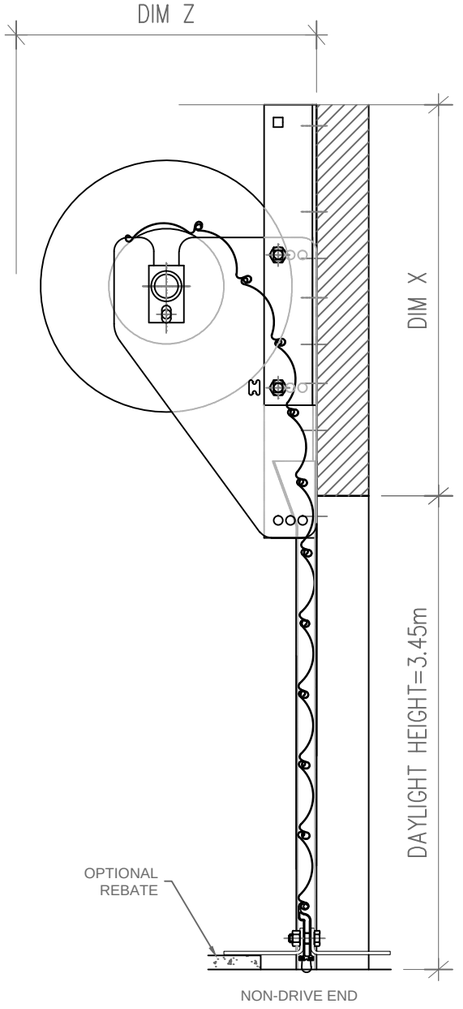








HEADROOM (DIM X)	INSIDE PROJECTION MOTOR (DIM Y)	INSIDE PROJECTION BARREL (DIM Z)
500mm	595mm	370mm
500mm	625mm	405mm
560mm	625mm	410mm
560mm	625mm	420mm
560mm	660mm	470mm



ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD.
ELECTRIFICATION DIVISION

PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT

DRG. No 09

SIZE A3 | REV. 0

	NAME	SIGN	DATE
DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021

TITLE: LAY OUT PLAN

SCALE NTS

PROJECTION

STRUCTURAL DRAWING

CONTROL ROOM BUILDING

PROJECT : Upgradation of Thimphu Mini Hydro Power Plant

LOCATION Junshina, Thimphu

BHUTAN POWER CORPORATION LIMITED
THIMPHU BHUTAN
Electrification Division

GENERAL NOTES

- READ THIS DRAWINGS IN CONJUNCTION WITH ARCHITECTURAL AND OTHER RELEVANT ENGINEERING DRAWING.
- ALL DIMENSIONS ARE IN MILIMETER UNLESS NOTED OTHERWISE.
- DRAWINGS SHALL NOT BE SCALED. ONLY WRITTEN DIMENSIONS ARE TO BE FOLLOWED.

DESIGN CONFIRMS TO:

- IS–456:2000 – CONCRETE DESIGN
- IS–13920:1993 – DUCTILE DETAILING OF REINFORCE CONCRETE STRUCTURES SUBJECTED TO SEISMIC FORCES.
- IS–1893:2002 – CRITERIA FOR EARTHQUAKE RESISTANT DESIGN OF STRUCTURES & BUILDING CODE OF BHUTAN 2003.
- IS–806 – DESIGN OF STEEL STRUCTURES
- SP 34 : 1987 – HAND BOOK ON CONCRETE REINFORCEMENT AND DETAILING
- WIND LOAD IN ACCORDANCE WITH IS 875, PART 3 ASSUMING WIND SPEED OF 44M/S

NOMINAL LOADS USED FOR DESIGN OF STRUCTURE:

- UNIT WEIGHT OF RCC = 25KN/M3
- UNIT WEIGHT OF PCC = 24KN/M3
- UNIT WEIGHT OF BRICK = 20KN/M3
- UNIT WEIGHT OF CEMENT MORTAR = 20KN/M3
- LIVE LOAD FOR ROOF = 0.75KN/M2
- LIVE LOAD FOR STAIRCASE = 3 KN/M2
- LIVE LOAD FOR FLOOR SLAB = 2 KN/M2
- LIVE LOAD FOR CORRIDOR SLAB = 3 KN/M2
- LIVE LOAD FOR TOILETS = 2 KN/M2

FOUNDATION:

- THE DEPTH OF FOUNDATION SHALL EXTENDED TO A MINIMUM OF THE SPECIFIED DEPTH OR TO A STABLE HARD STRATA WHICHEVER IS MORE.
- BEARING CAPACITY OF SOIL FOR DESIGN WORKS= 130KN/M2

REINFORCEMENTS:

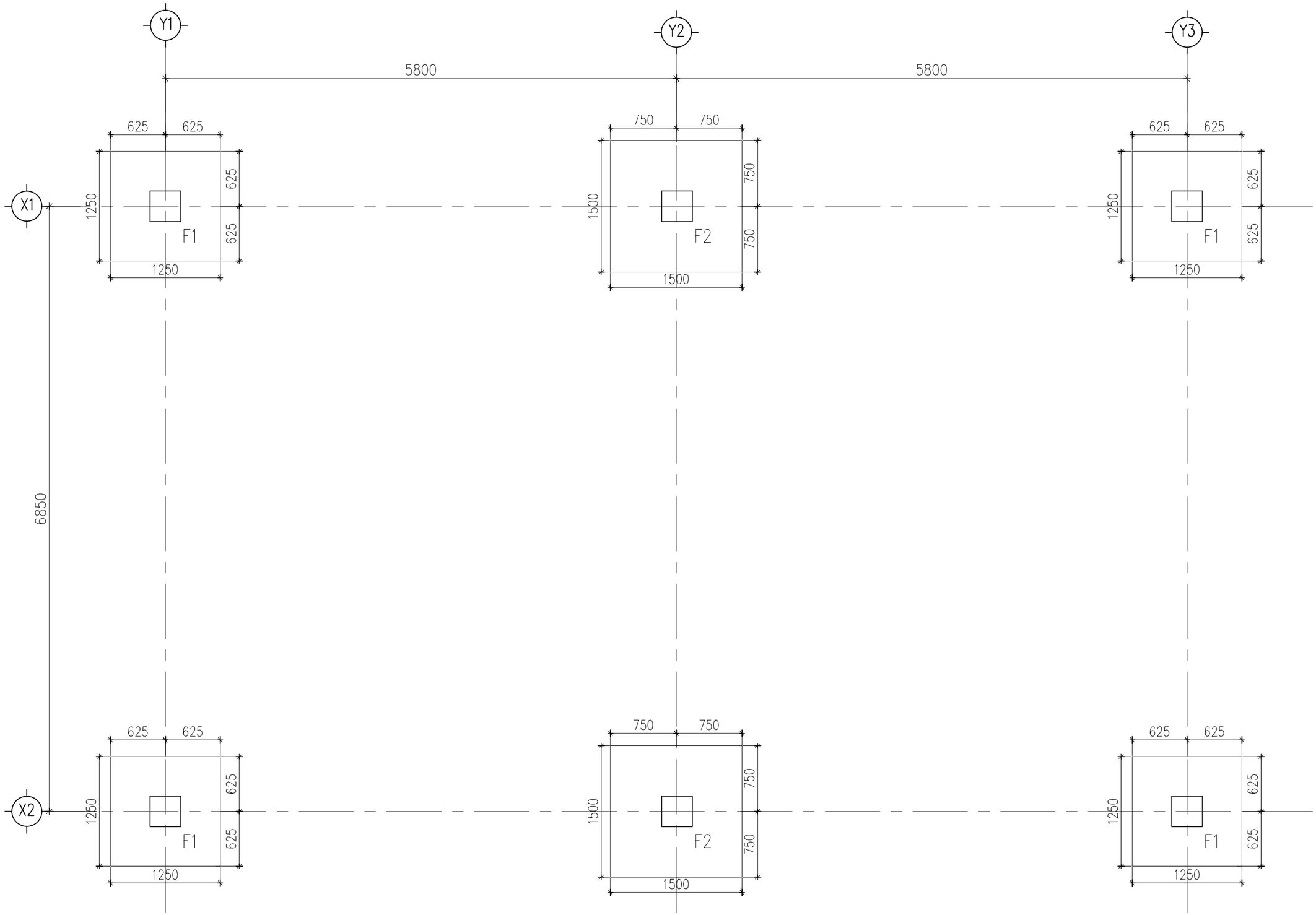
- ALL REINFORCEMENT BARS SHOWN AS ø ARE Fe 500 (TMT).
- SPLICING/LAPPING OF BARS SHALL BE STAGGERED AND IN NO CASE MORE THAN 50% BARS SHALL BE LAPPED AT ANY SECTION.
- LAPPING OF BARS FOR BEAMS & SLABS SHALL BE AVOIDED IN THE MAXIMUM TENSION ZONES.
- REINFORCEMENT SHALL BE SUITABLY ADJUSTED AT SITE TO CLEAR POCKETS, BOLTS, OPENINGS, CUTOUTS ETC... AS CHECKED BY THE ENGINEER IN CHARGE UNLESS SHOWN OTHERWISE IN THE DRAWINGS.

CONCRETE WORKS:

- ALL STRUCTURAL REINFORCED CONCRETE WORKS SHALL BE WITH MIX CONCRETE GRADE OF M20 UNLESS SPECIFIED OTHERWISE.
- AGGREGATE FOR ALL RCC WORKS SHALL BE WELL GRADED AND MAXIMUM SIZE OF 20MM UNLESS STATED OTHERWISE
- WATER CEMENT RATIO SHALL BE MAXIMUM OF 0.55.
- LEAN CONCRETE FOR FILLING UNDER FOUNDATION SHALL BE 1:4:8 WITH AGGT. OF 40MM.
- LOCATION OF CONSTRUCTION JOINTS IF ANY IN STRUCTURAL CONCRETE SHALL BE AS PER THE APPROVAL TAKEN FROM THE ENGINEER–IN–CHARGE BEFORE EXECUTION.
- MINIMUM CLEAR CONCRETE COVER FROM THE OUTSIDE FACE OF THE MAIN BAR AS PER IS 456 2000 SHALL BE AS FOLLOWS.
  - FOUNDATION = 50MM
  - COLUMN = 40MM
  - BEAM = 25MM
  - SLAB AND STAIRCASE = 20MM
- ALL EXPOSED CONCRETE SURFACES SHALL BE NEAT PLASTER FINISHES.
- FOR POSITION AND SIZE OF CUTOUT IN R.C SLAB PLEASE REFER TO THE CORRESPONDING DRAWINGS OF OTHER DECIPLINE, UNLESS SHOWN OTHERWISE.
- DO NOT PLACE ANY CONDUITS AND OTHER PIPES THROUGH BEAMS & COLUMNS UNLESS APPROVAL FROM THE STRUCTURAL ENGINEER
- CONCRETE SHALL BE VIBRATED BY USING NEEDLE VIBRATORS PROPERLY AS PER STANDARD CODE OF PRACTICE.
- ALL CONSTRUCTION SHALL BE CARRIED OUT AS PER THE SPECIFICATION GIVEN IN THE CONTRACT DOCUMENT.

ALL DIMENSIONS ARE IN MILLIMETERS

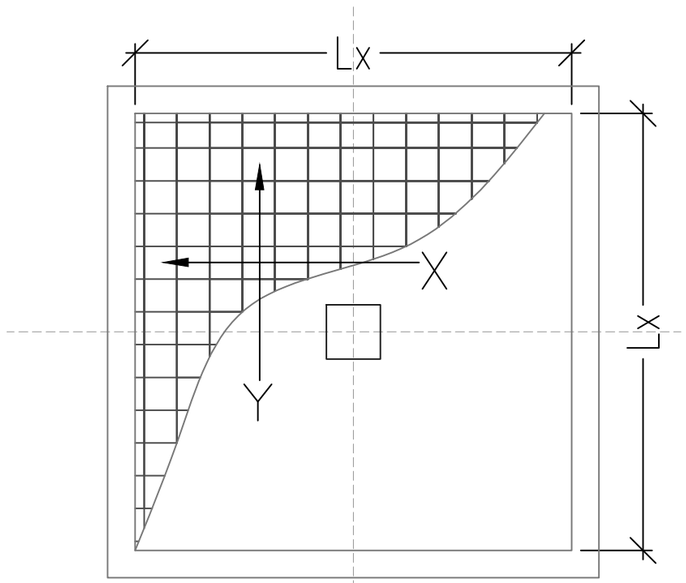
BPC	BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE: STRUCTURAL NOTES
		DRG. No 01	SIZE A3 / REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO	MARCH 2021	SCALE NTS / PROJECTION



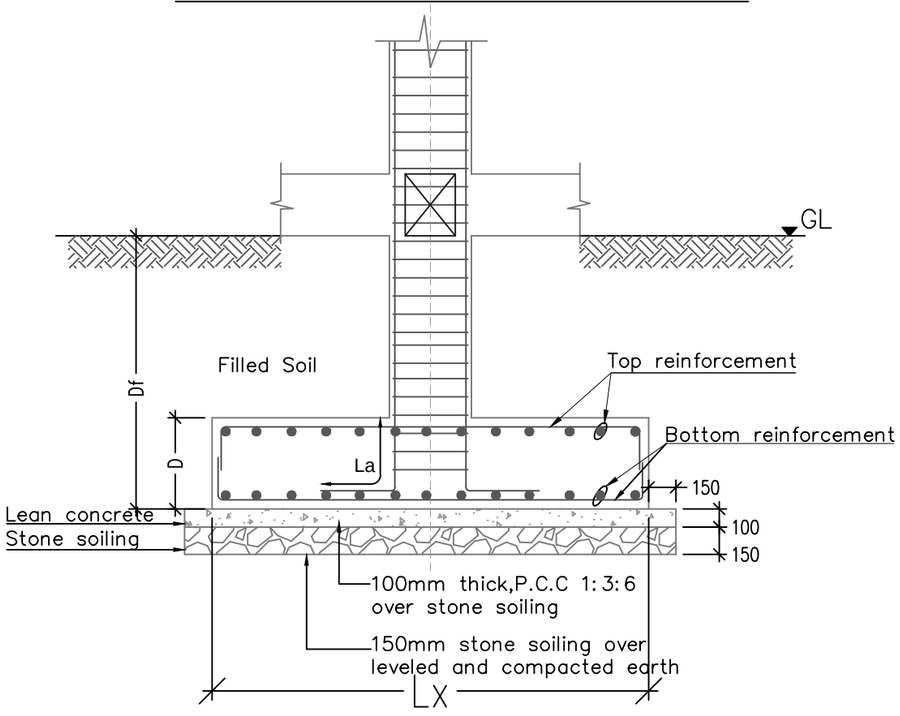
FOUNDATION LAYOUT PLAN

ALL DIMENSIONS ARE IN MILLIMETERS

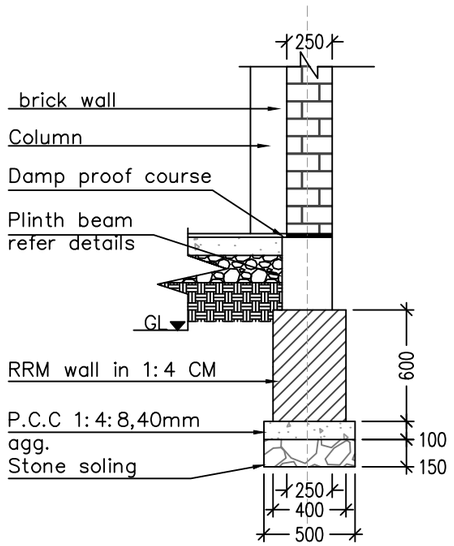
BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:
	DRG. No 02	DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021	AS MENTIONED
	SIZE A3 / REV. 0					SCALE NTS / PROJECTION



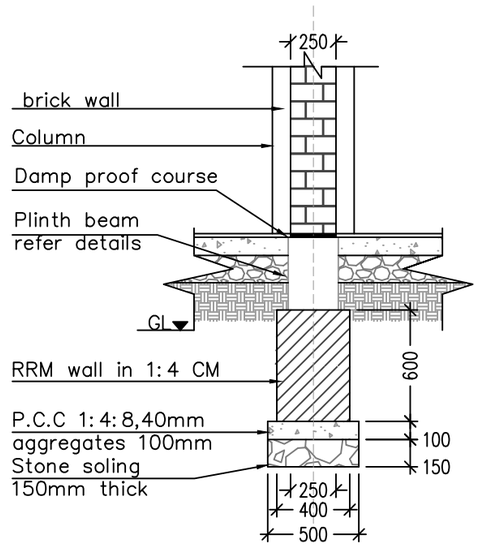
ISOLATED FOOTING REBAR LAYOUT PLAN



SECTIONAL ELEVATION FOR ISOLATED FOOTING



EXTERNAL WALL FOUNDATION
DETAILS FOR 250mm WALL



INTERNAL WALL FOUNDATION
DETAILS FOR 250mm WALL

SCHEDULE OF FOOTINGS

SL/ NO	TYPE OF FOOTING	FOOTING SIZE		DEPTH(D)	BOTTOM REINFORCEMENTS		TOP REINFORCEMENTS		DEPTH OF FOUNDATION(DF)
		LENGTH(Lx)	WIDTH(Ly)		X–DIRECTION	Y–DIRECTION	X–DIRECTION	Y–DIRECTION	
F1	ISOLATED	1250	1250	300	12ø@180mmc/c	12ø@180mmc/c	12ø@200mmc/c	12ø@200mmc/c	1200
F2	ISOLATED	1500	1500	300	12ø@180mmc/c	12ø@180mmc/c	12ø@200mmc/c	12ø@200mmc/c	1200

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD.
ELECTRIFICATION DIVISION

PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT

DRG. No 03

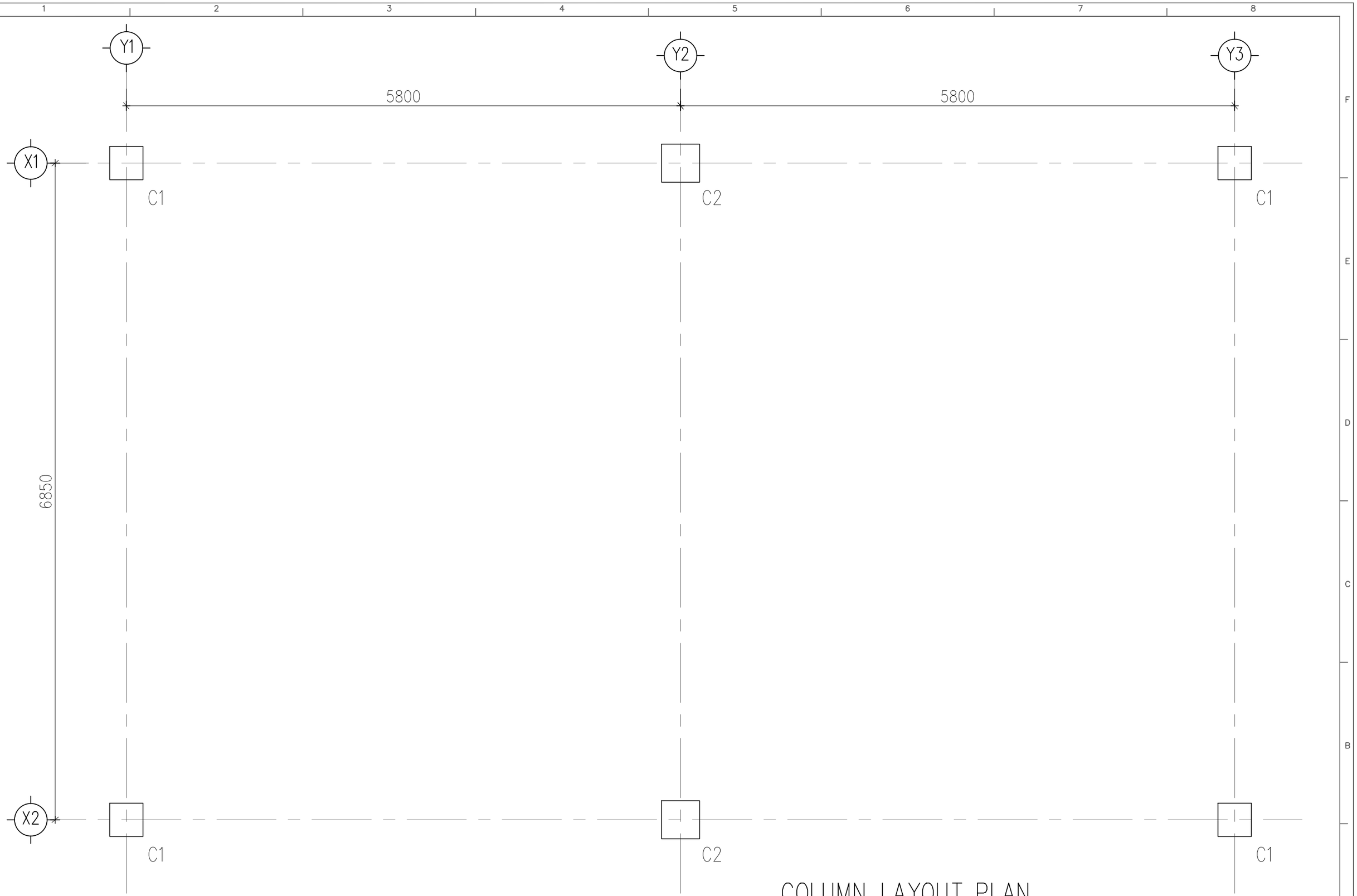
	NAME	SIGN	DATE
DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021

SIZE A3 | REV. 0

TITLE: AS MENTIONED

SCALE NTS

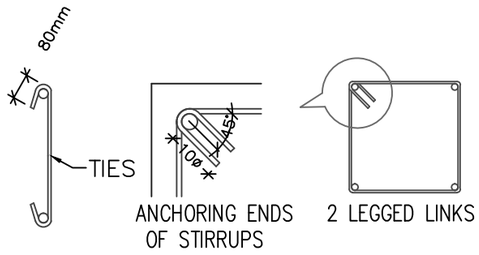
PROJECTION



COLUMN LAYOUT PLAN

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT			NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 04	SIZE A3	REV. 0	DESIGN & DRAWN: YONTEN JAMTSHO		MARCH 2021	AS MENTIONED	PROJECTION

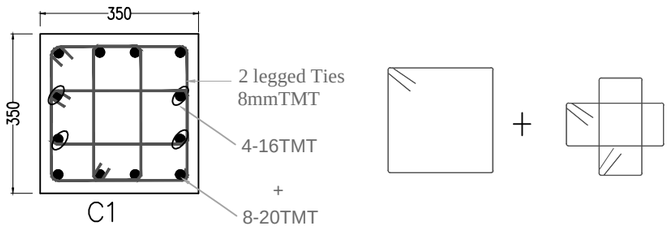


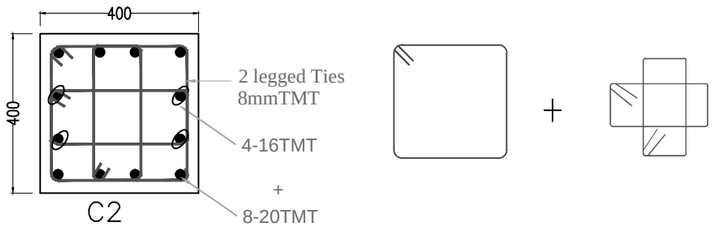
NOTE:–

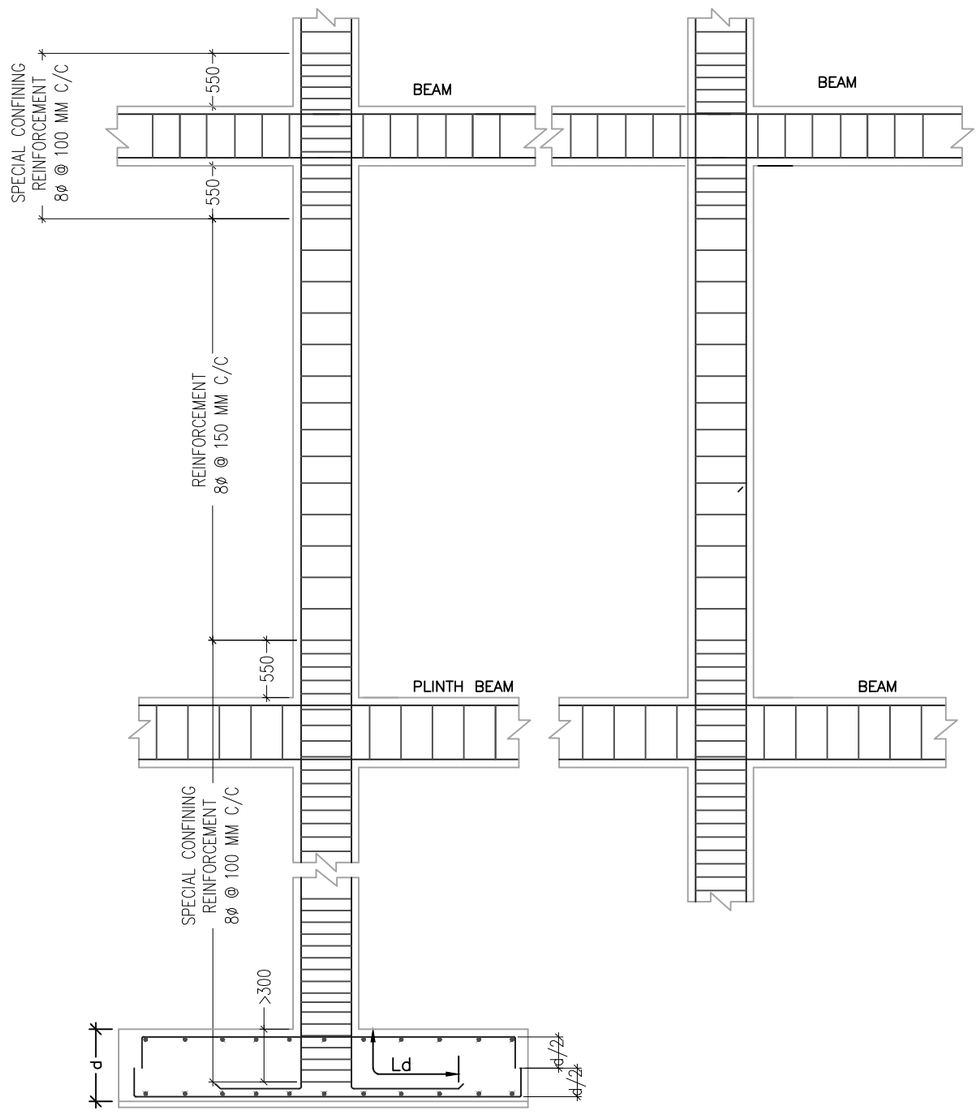
1. No lapping shall be allowed for column bars.
2. Special confining steel shall be provided as shown in the drawing and should continue at least 500mm on either sides of the beams;

SCHEDULE FOR COLUMN

SL.NO	COLUMN	SIZE	REINFORCEMENTS		
			LONGITUDINAL	TIES	
				NORMAL	SPECIAL CONFINING
1	C1	350x350	8–20ø+4–16ø	8ø @ 150 C/C	8ø @ 100 C/C
1	C2	400x400	8–20ø+4–16ø	8ø @ 150 C/C	8ø @ 100 C/C



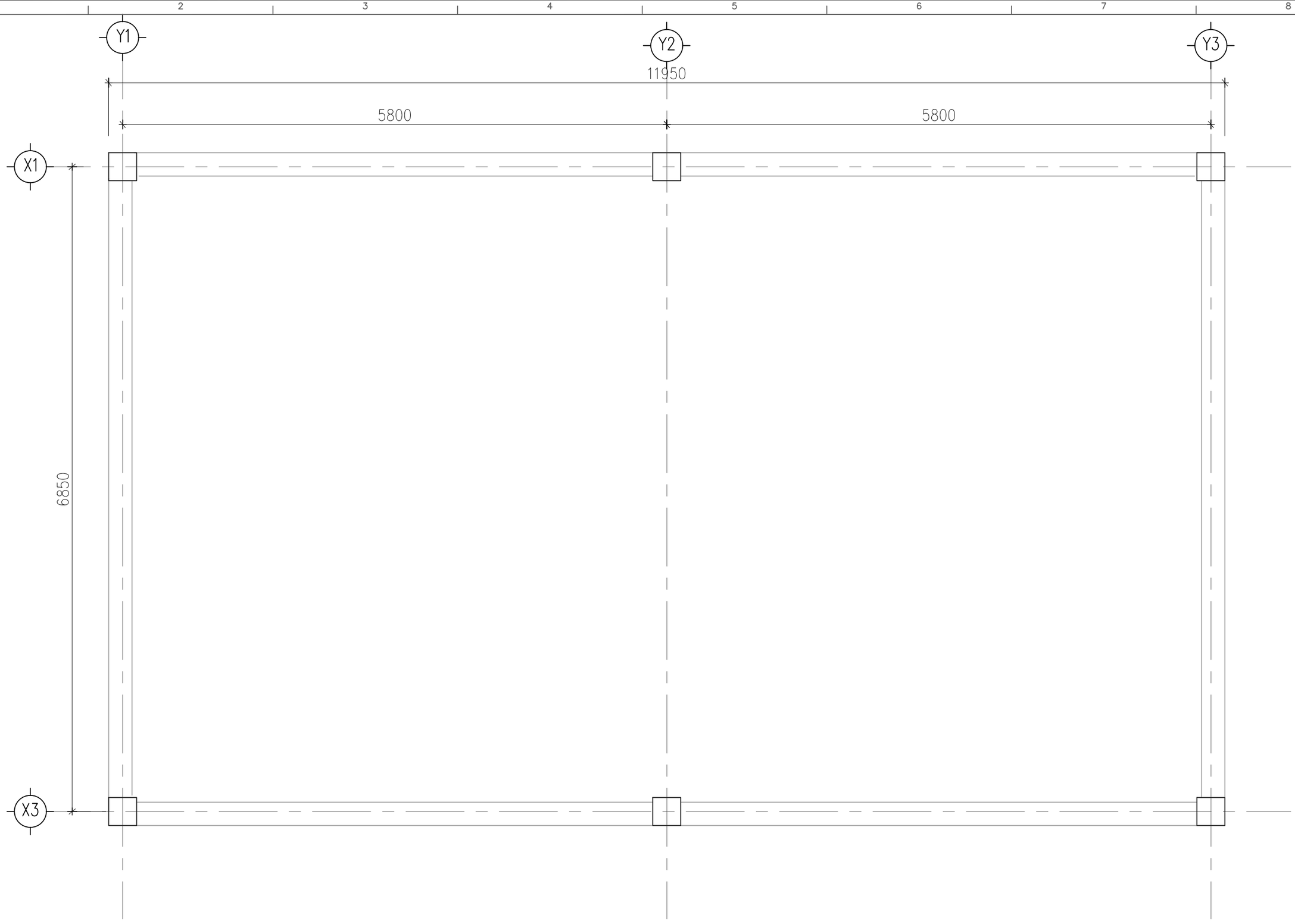




COLUMN & JOINT DETAILING

ALL DIMENSIONS ARE IN MILLIMETERS

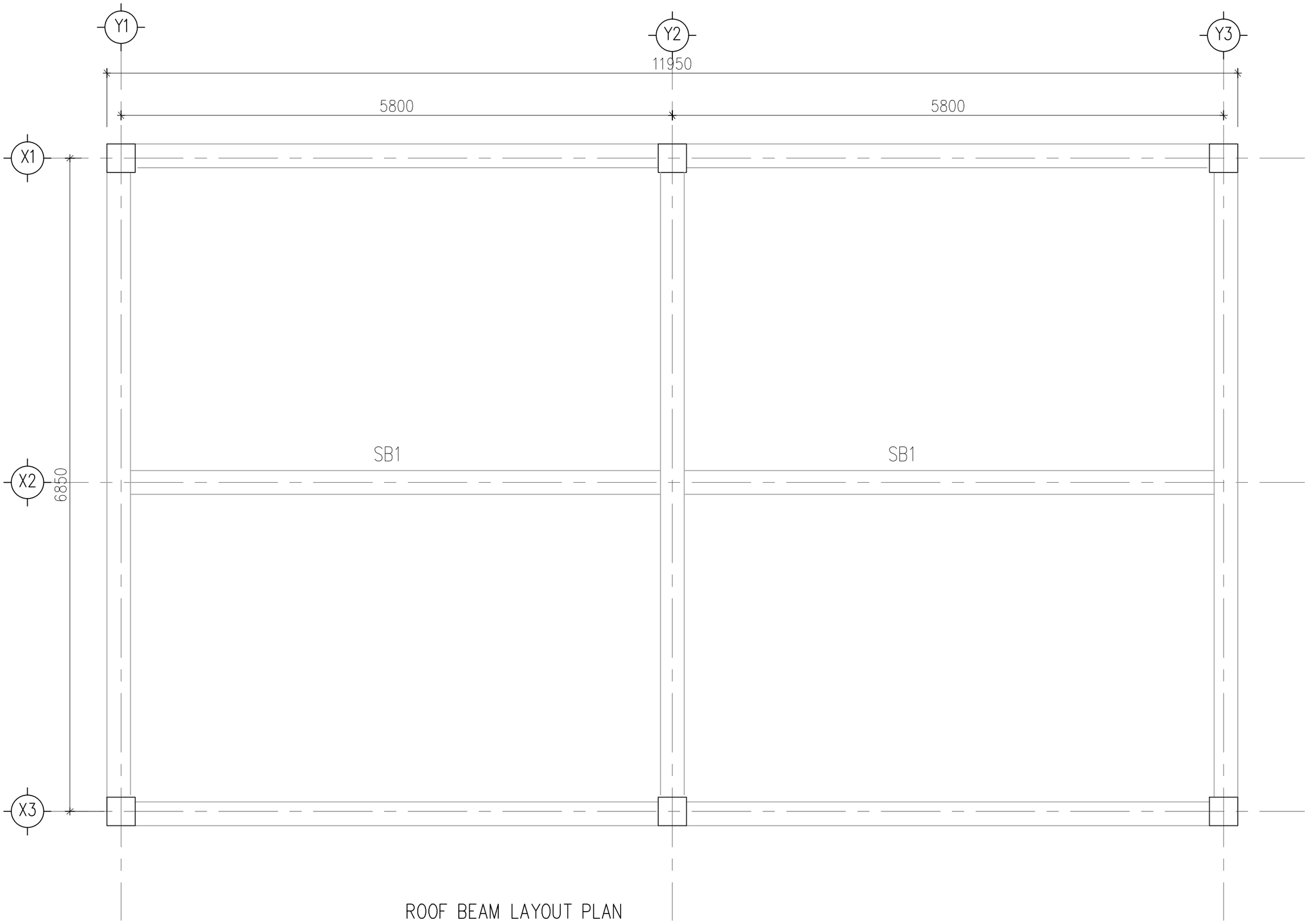
BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT			NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 05	SIZE A3	REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021	AS MENTIONED	PROJECTION



GROUND FLOOR BEAM LAYOUT PLAN

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT			NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 06	SIZE A3	REV. 0	DESIGN & DRAWN: YONTEN JAMTSHO		MARCH 2021	AS MENTIONED	PROJECTION



ROOF BEAM LAYOUT PLAN

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD.
ELECTRIFICATION DIVISION

PROJECT:
UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT

DRG. No 07

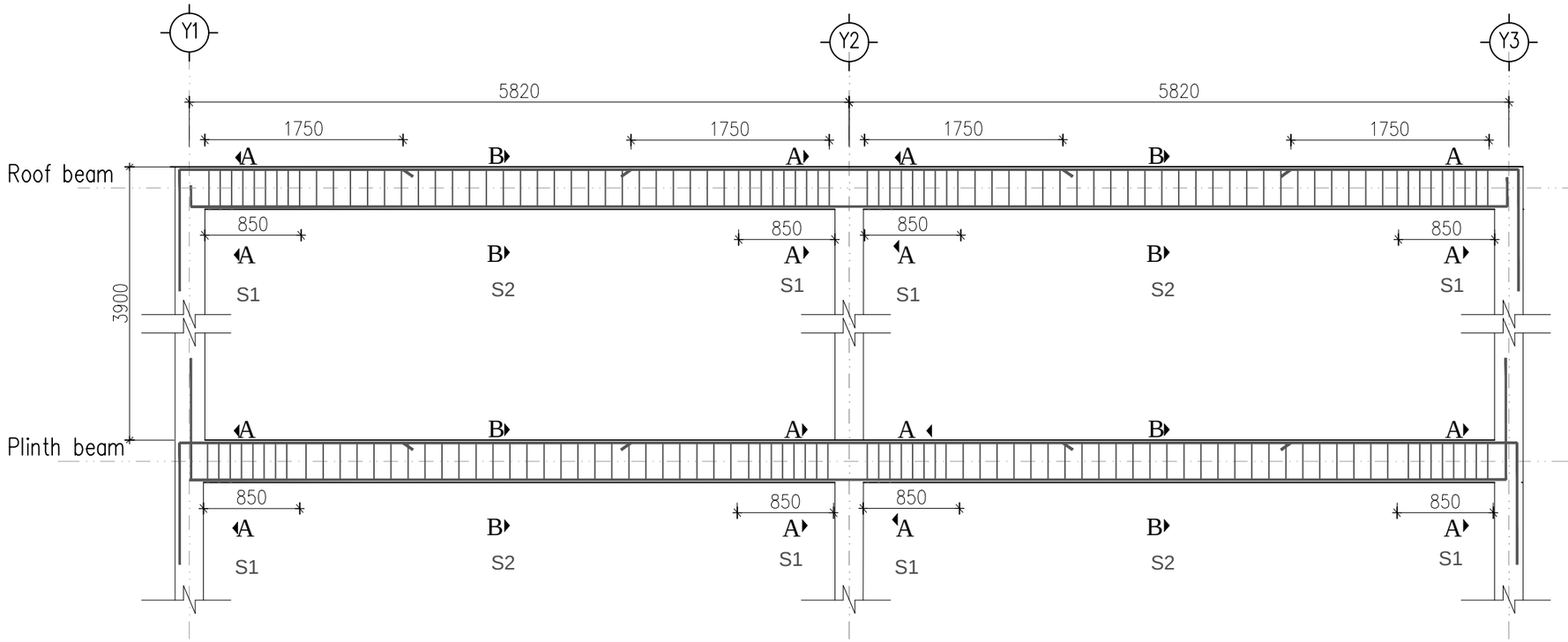
SIZE	REV.
A3	0

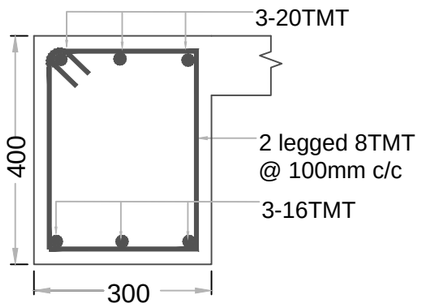
	NAME	SIGN	DATE
DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021

TITLE:
AS MENTIONED

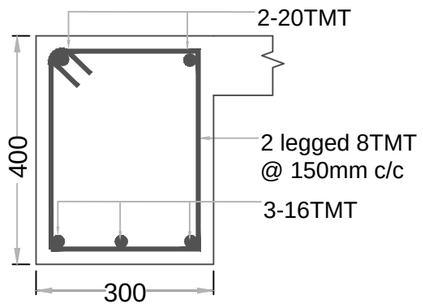
SCALE
NTS

PROJECTION



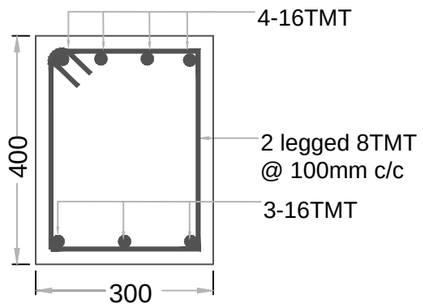


SECTION A-A

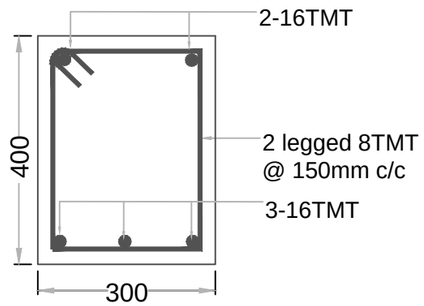


SECTION B-B

ROOF BEAM



SECTION A-A



SECTION B-B

PLINTH BEAM

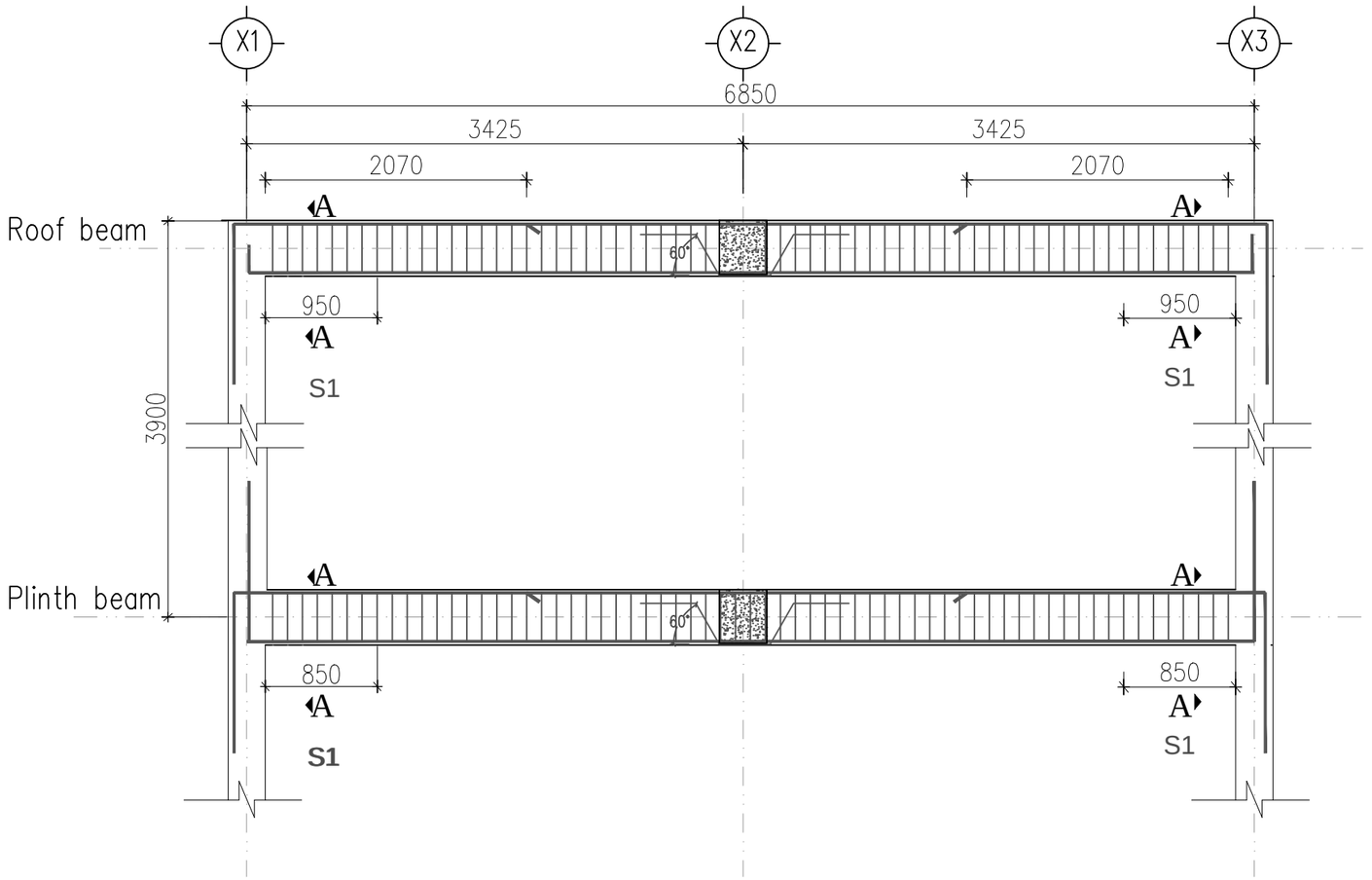
GRID X1 & X3

NOTES:

S1= 8mmø @ 100mm c/c for 2D (Unless stated in the beam section)
S2= 8mmø @ 150mm c/c between two S1 (Unless stated in the beam section)
Curtailment distances are given above the roof beam level
Development length(Ld)=57*diameter of the bar &
Anchorage length (La) = 67*diameter of the bar
S1=2D

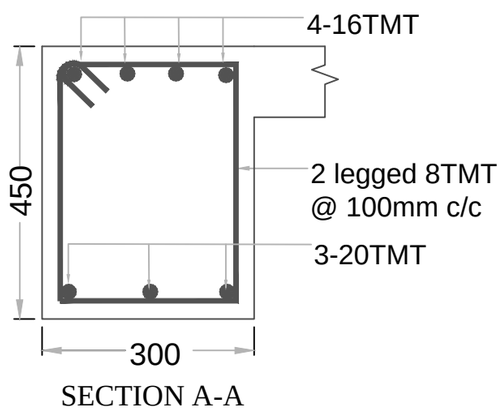
ALL DIMENSIONS ARE IN MILLIMETERS

BPC	BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT			NAME	SIGN	DATE	TITLE: / SCALE
		DRG. No 08	SIZE A3	REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO	MARCH 2021	AS MENTIONED / NTS

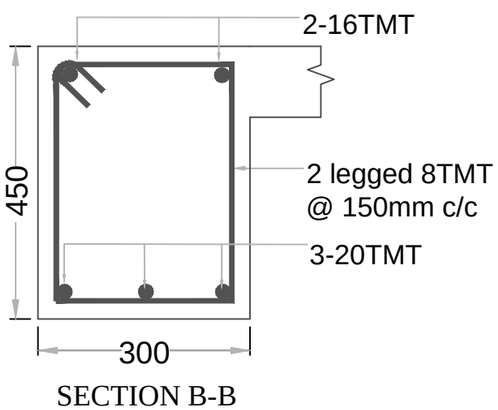


NOTES:

S1= 8mmø @ 100mm c/c for 2D (Unless stated in the beam section)
S2= 8mmø @ 150mm c/c between two S1 (Unless stated in the beam section)
Curtailment distances are given above the roof beam level
Development length(Ld)=57*diameter of the bar &
Anchorage length (La) = 67*diameter of the bar
S1=2D

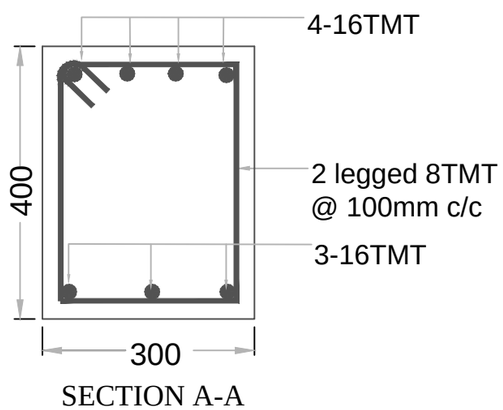


SECTION A-A

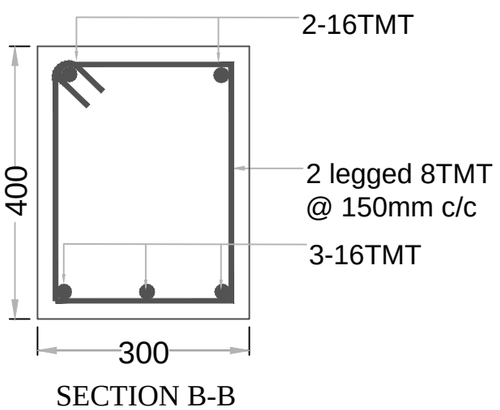


SECTION B-B

ROOF BEAM



SECTION A-A



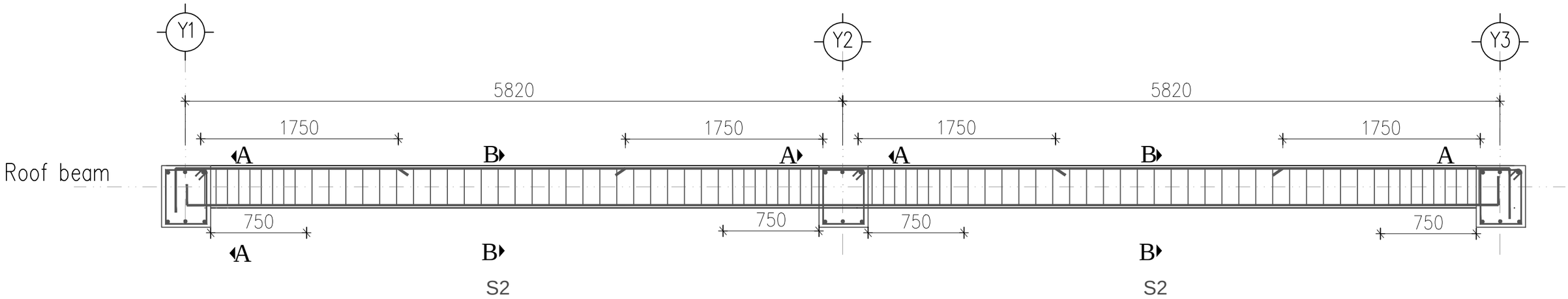
SECTION B-B

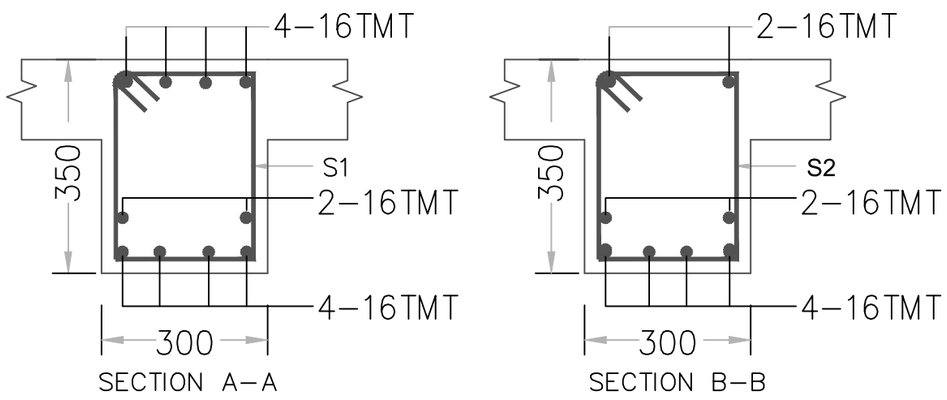
PLINTH BEAM

GRID Y1 & Y3

ALL DIMENSIONS ARE IN MILLIMETERS

BPC	BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT DRG. No 09	SIZE A3	REV. 0	DESIGN & DRAWN	NAME: YONTEN JAMTSHO	SIGN	DATE: MARCH 2021	TITLE: AS MENTIONED	SCALE NTS PROJECTION





NOTES:

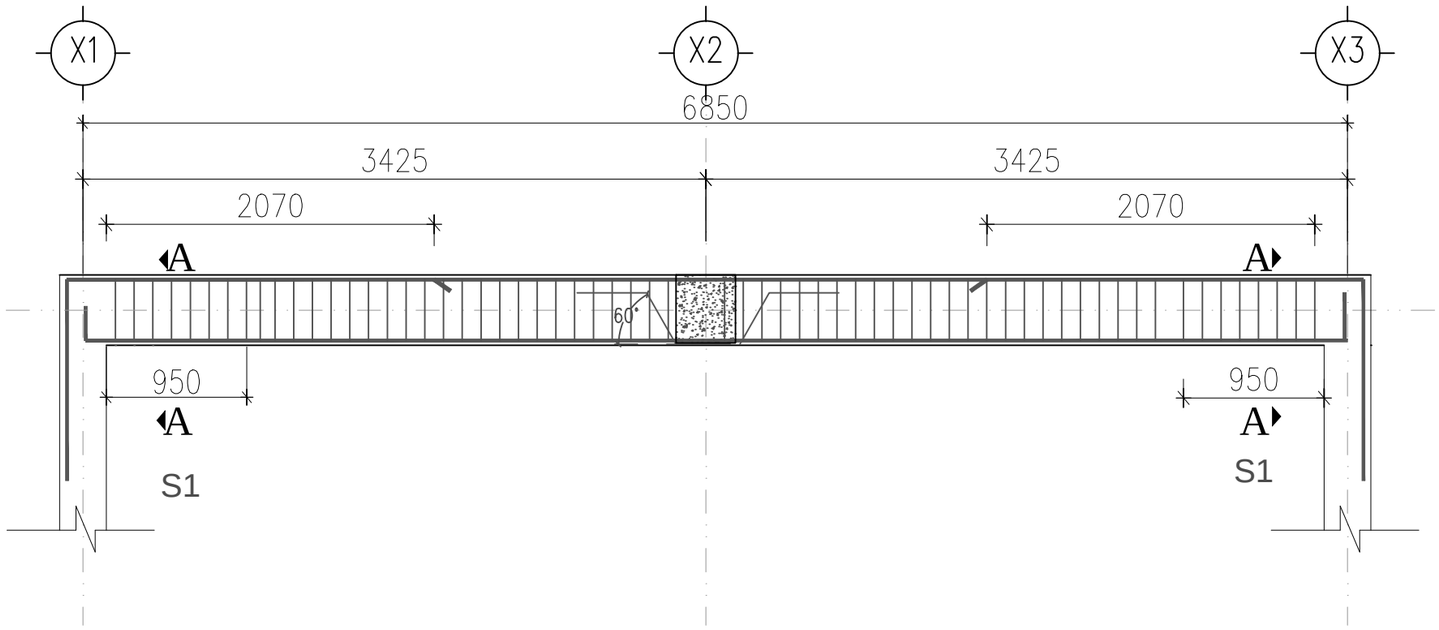
S1= 8mmø @ 100mm c/c for 2D (Unless stated in the beam section)
S2= 8mmø @ 150mm c/c between two S1 (Unless stated in the beam section)
Curtailment distances are given above the roof beam level
Development length(Ld)=57*diameter of the bar &
Anchorage length (La) = 67*diameter of the bar
S1=2D

SECONDARY BEAM SB1 ALONG GRID X2

ALL DIMENSIONS ARE IN MILLIMETERS

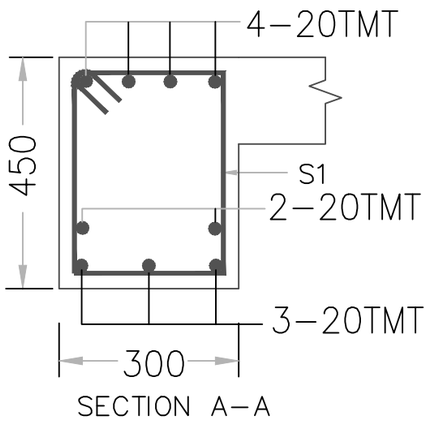
BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 10	SIZE A3 / REV. 0	DESIGN & DRAWN: YONTEN JAMTSHO		MARCH 2021	AS MENTIONED	PROJECTION

Roof beam

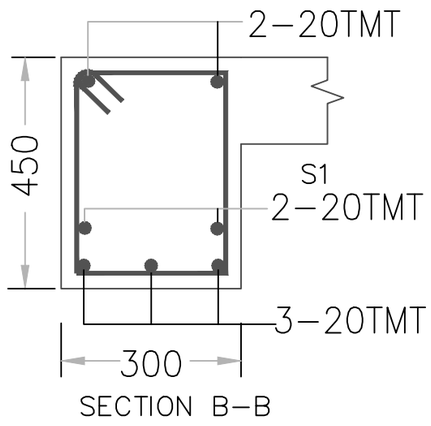


NOTES:

S1= 8mmø @ 100mm c/c for 2D (Unless stated in the beam section)
S2= 8mmø @ 150mm c/c between two S1 (Unless stated in the beam section)
Curtailment distances are given above the roof beam level
Development length(Ld)=57*diameter of the bar &
Anchorage length (La) = 67*diameter of the bar
S1=2D



SECTION A–A



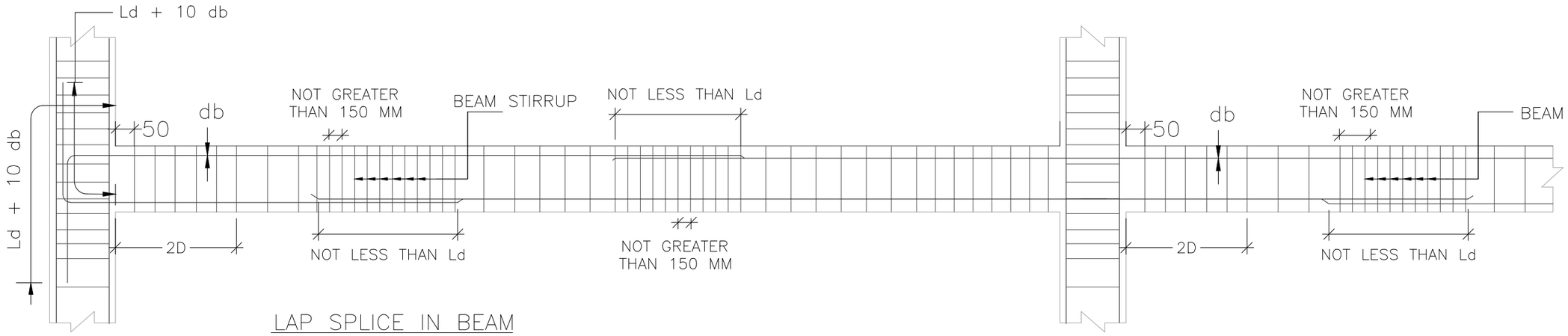
SECTION B–B

ROOF BEAM

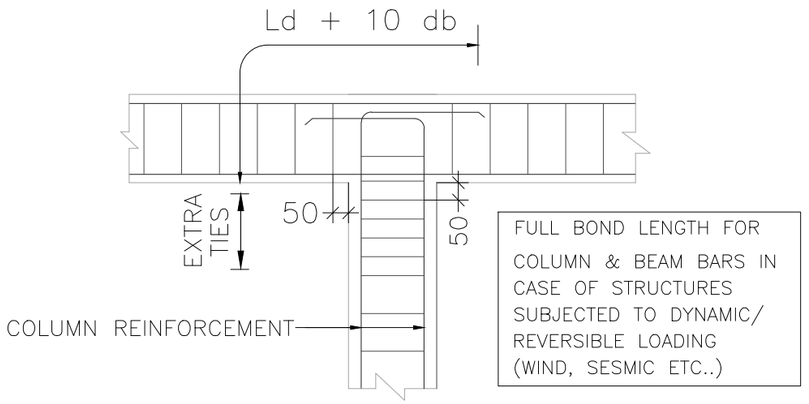
GRID Y2

ALL DIMENSIONS ARE IN MILLIMETERS

BPC	BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:	SCALE NTS
		DRG. No 11	SIZE A3 / REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021	AS MENTIONED	PROJECTION

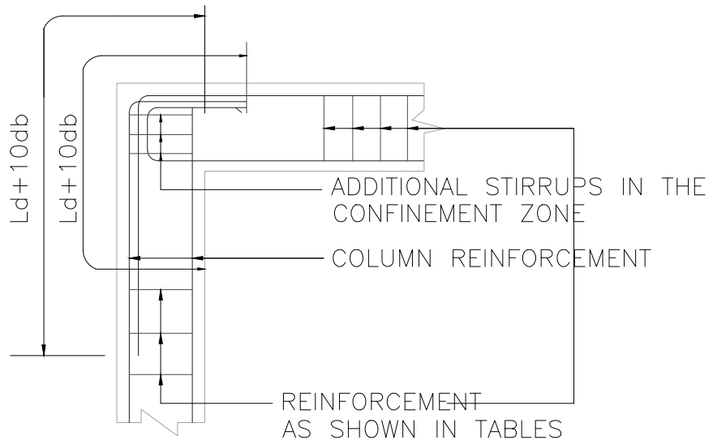


LAP SPLICE IN BEAM

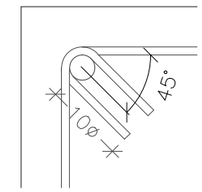


FULL BOND LENGTH FOR COLUMN & BEAM BARS IN CASE OF STRUCTURES SUBJECTED TO DYNAMIC/ REVERSIBLE LOADING (WIND, SESMIC ETC..)

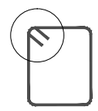
COLUMN TERMINATION DETAILS IN BEAM (ELEVATION)

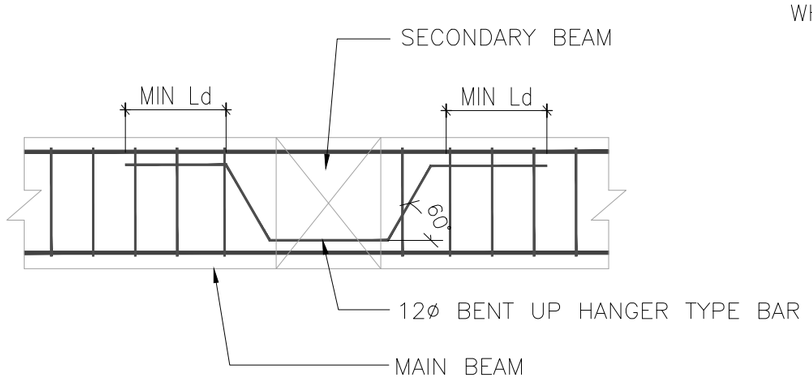


ANCHORAGE OF BEAMS BARS WHERE COLUMN TERMINATES



ANCHORING ENDS OF STIRRUPS





WHERE Ld= DEVELOPMENT LENGTH IN TENSION (Ld=57db)

db= BAR DIAMETER

WHERE Ld+10db =La

WHERE La= ANCHORAGE LENGTH

Bar dia.	Ld	La
10ø	570	670
12ø	684	804
20ø	912	1072
20ø	1140	1340
25ø	1425	2075

NOTE:

- S2=L−2S1=8ø @ 140 C/C
- S1=2D =8ø @ 90 C/C
  (D=OVERALL DEPTH OF BEAM)
- THE FIRST STIRRUPS IS PLACED 50MM FROM THE FACE OF COLUMN

ANCHORAGE OF BEAM BARS IN CORNER JOINT

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD.
ELECTRIFICATION DIVISION

PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT

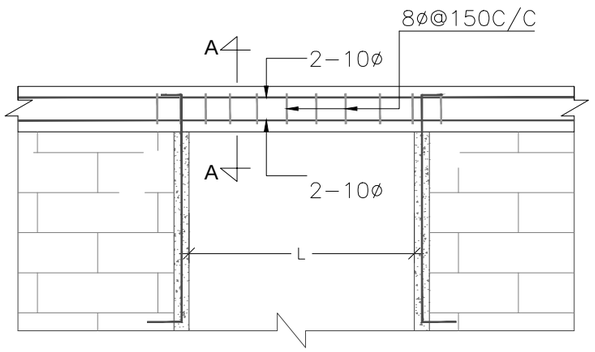
DRG. No 12 | SIZE A3 | REV. 0

	NAME	SIGN	DATE
DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021

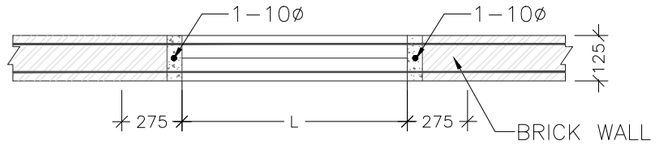
TITLE: AS MENTIONED

SCALE NTS

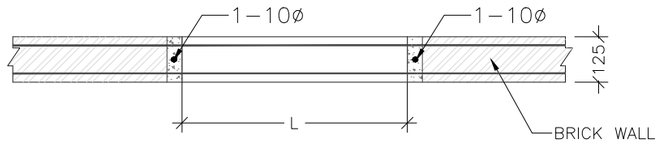
PROJECTION



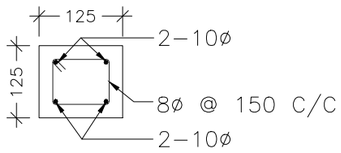
ELEVATION



TOP REINFORCEMENT LAYOUT PLAN



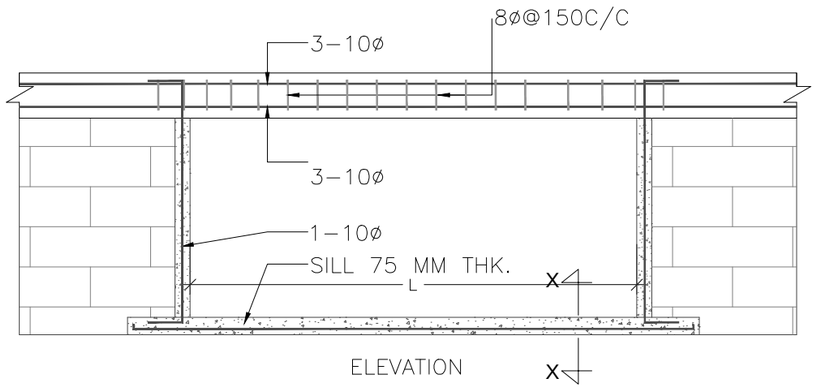
BOTTOM REINFORCEMENT LAYOUT PLAN



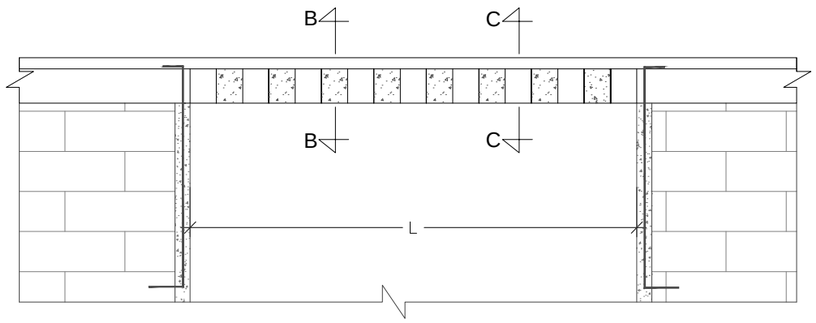
SECTION A-A

LINTEL DETAILS FOR 125MM THICK. WALL

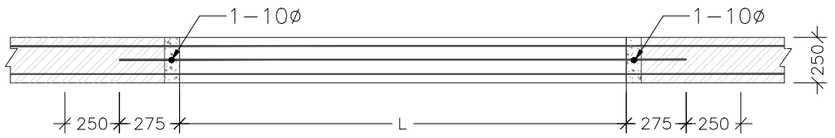
NOTE:
LINTEL SHOULD BE PROVIDED AROUND THE MAIN WALL



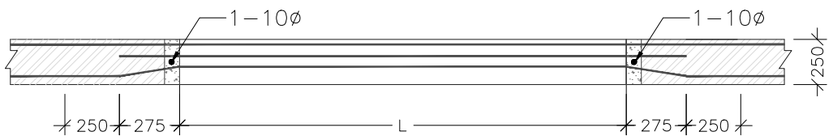
ELEVATION



ELEVATION OF EXTERNAL FACE

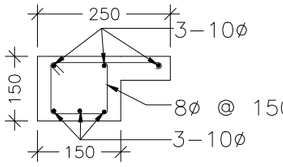


TOP REINFORCEMENT LAYOUT PLAN

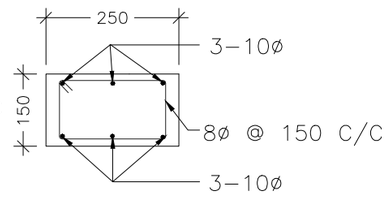


BOTTOM REINFORCEMENT LAYOUT PLAN

LINTEL DETAIL FOR 250 MM THICK. WALL

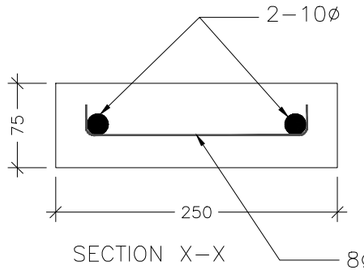


SECTION C–C



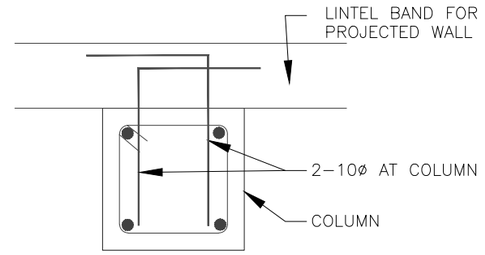
SECTION B–B

LINTEL SECTION DETAILS FOR 250mm THICK WALL

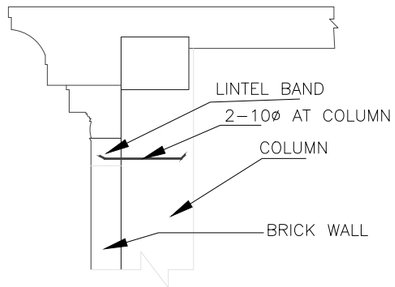


SECTION X–X

SILL BAND



PLAN



SECTION

TYPICAL ANCHORAGE DETAILS FOR LINTEL BAND FOR PROJECTED WALL

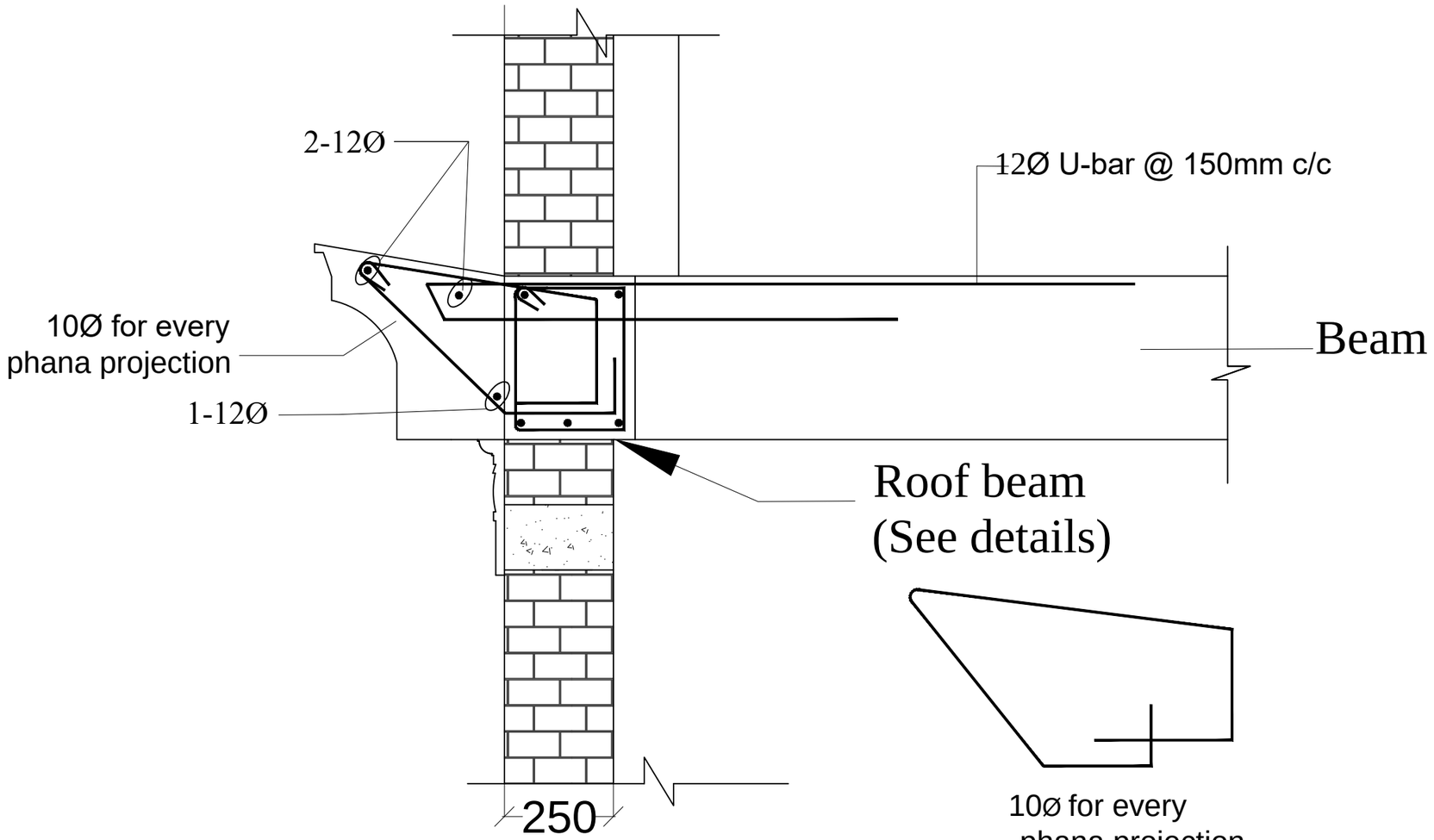
LINTEL BEAM DETAIL

NOTES:

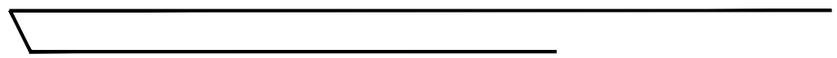
PROVIDE WINDOW LINTEL BAND THROUGH OUT THE PERIPHERY OF THE BUILDING.
AND DOOR LINTEL AS CUT LINTELS.

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 13 SIZE A3 REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021	AS MENTIONED	PROJECTION



10ø for every
phana projection



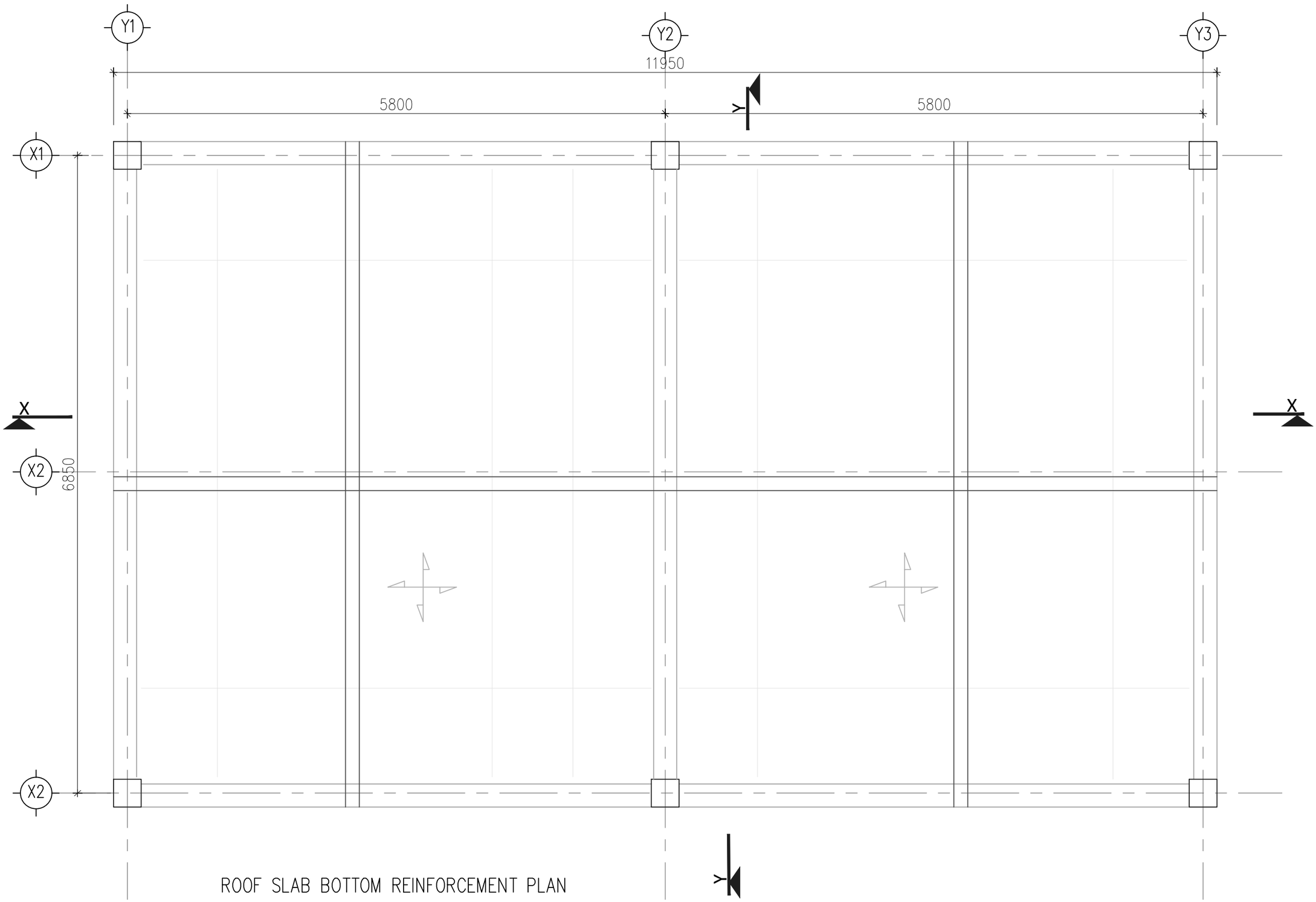
12Ø U-bar @ 150mm c/c

NOTES:

1. The external beam reinforcement shall be laid in the grid.
2. The external beam width shall be extended towards the outside face at all floor levels and roof level to cover the gap and to adjust the cornices keeping the beam reinforcement in the grid and providing the extra bars wherever shown.

ALL DIMENSIONS ARE IN MILLIMETERS

BPC	BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:	SCALE NTS
		DRG. No 14	SIZE A3 / REV. 0	DESIGN & DRAWN: YONTEN JAMTSHO		MARCH 2021	AS MENTIONED	PROJECTION



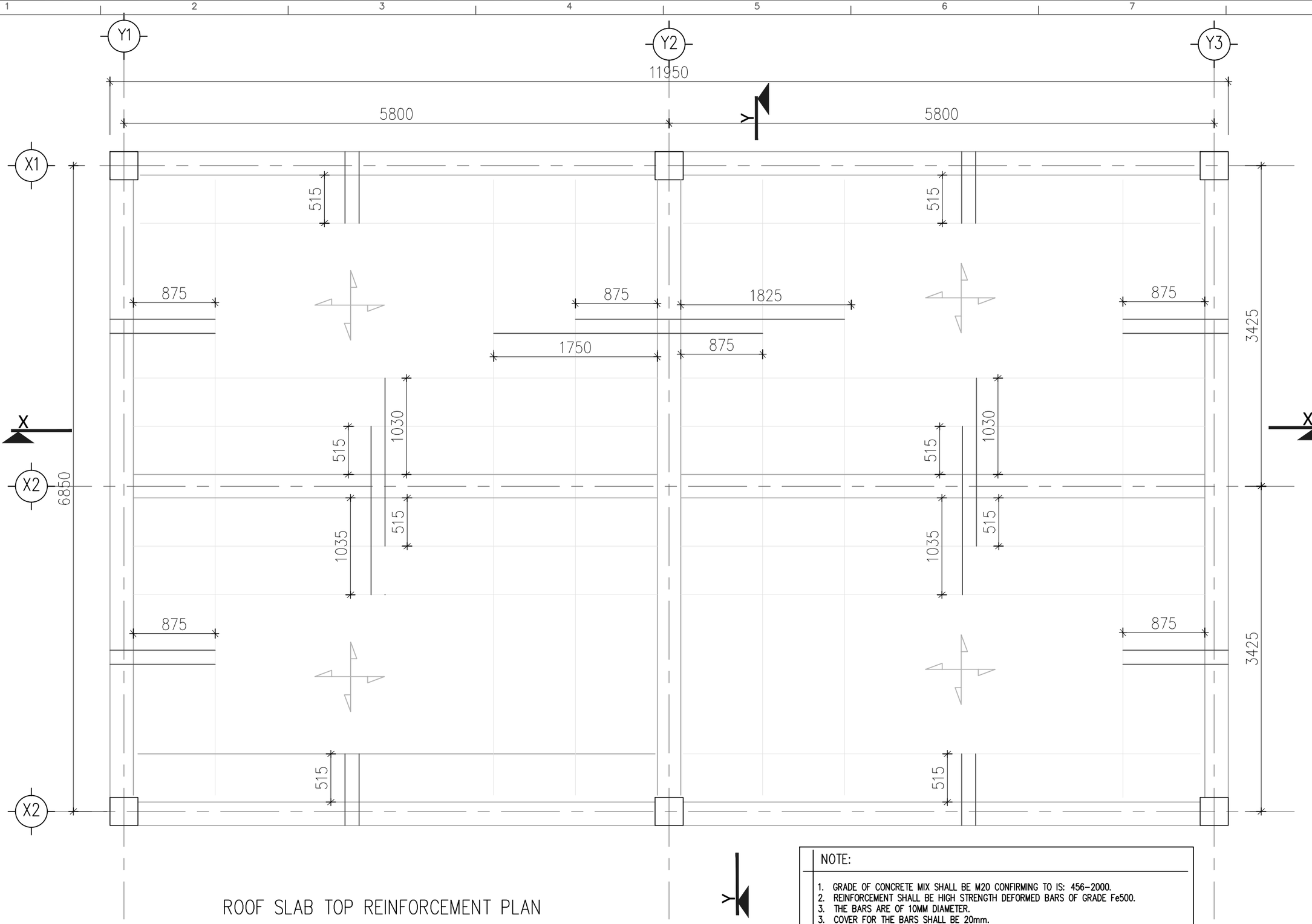
ROOF SLAB BOTTOM REINFORCEMENT PLAN

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT			NAME	SIGN	DATE	TITLE:
	DRG. No 15	SIZE A3	REV. 0	DESIGN & DRAWN: YONTEN JAMTSHO		MARCH 2021	AS MENTIONED

SCALE NTS

PROJECTION



ROOF SLAB TOP REINFORCEMENT PLAN

NOTE:

1. GRADE OF CONCRETE MIX SHALL BE M20 CONFIRMING TO IS: 456-2000.
2. REINFORCEMENT SHALL BE HIGH STRENGTH DEFORMED BARS OF GRADE Fe500.
3. THE BARS ARE OF 10MM DIAMETER.
3. COVER FOR THE BARS SHALL BE 20mm.
4. SLAB THICKNESS = 150mm.
5. TOP REINFORCEMENT= 10TMT @ 150mm c/c
6. BOTTOM REINFORCEMENT= 10TMT @ 180mm c/c

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD.
ELECTRIFICATION DIVISION

PROJECT:
UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT

DRG. No 16

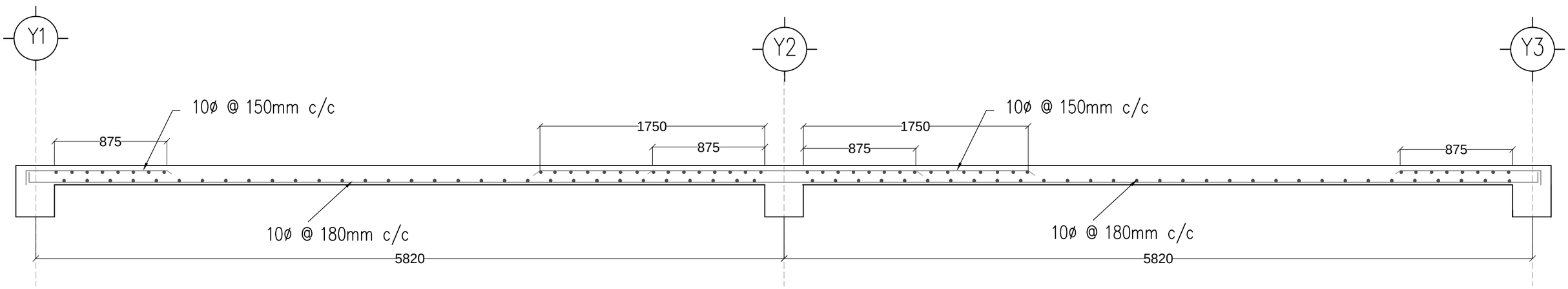
SIZE A3 | REV. 0

	NAME	SIGN	DATE
DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021

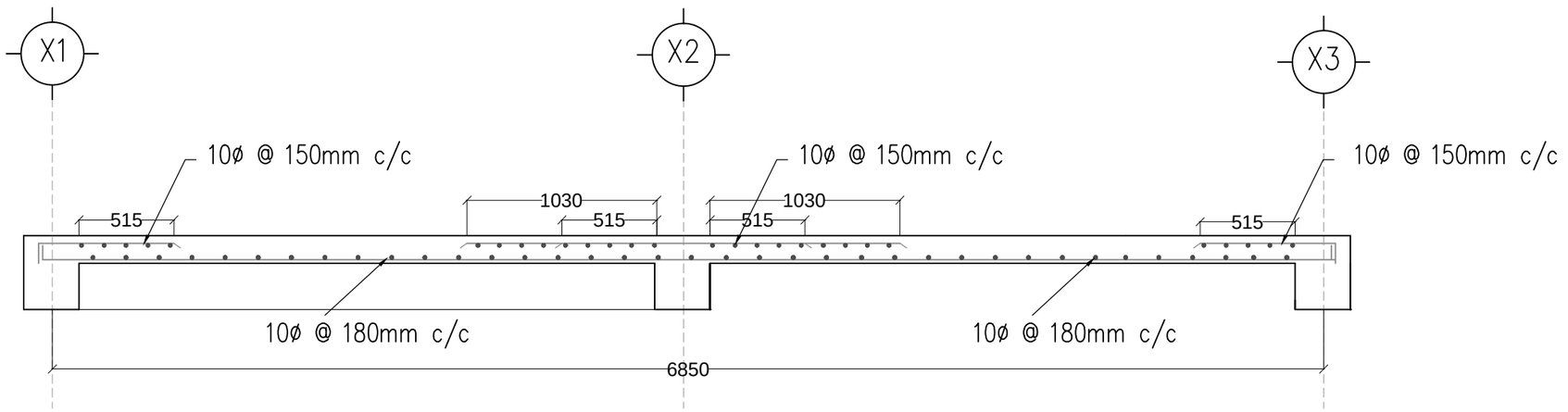
TITLE: AS MENTIONED

SCALE NTS

PROJECTION



ROOF SLAB SECTION THROUGH X–X

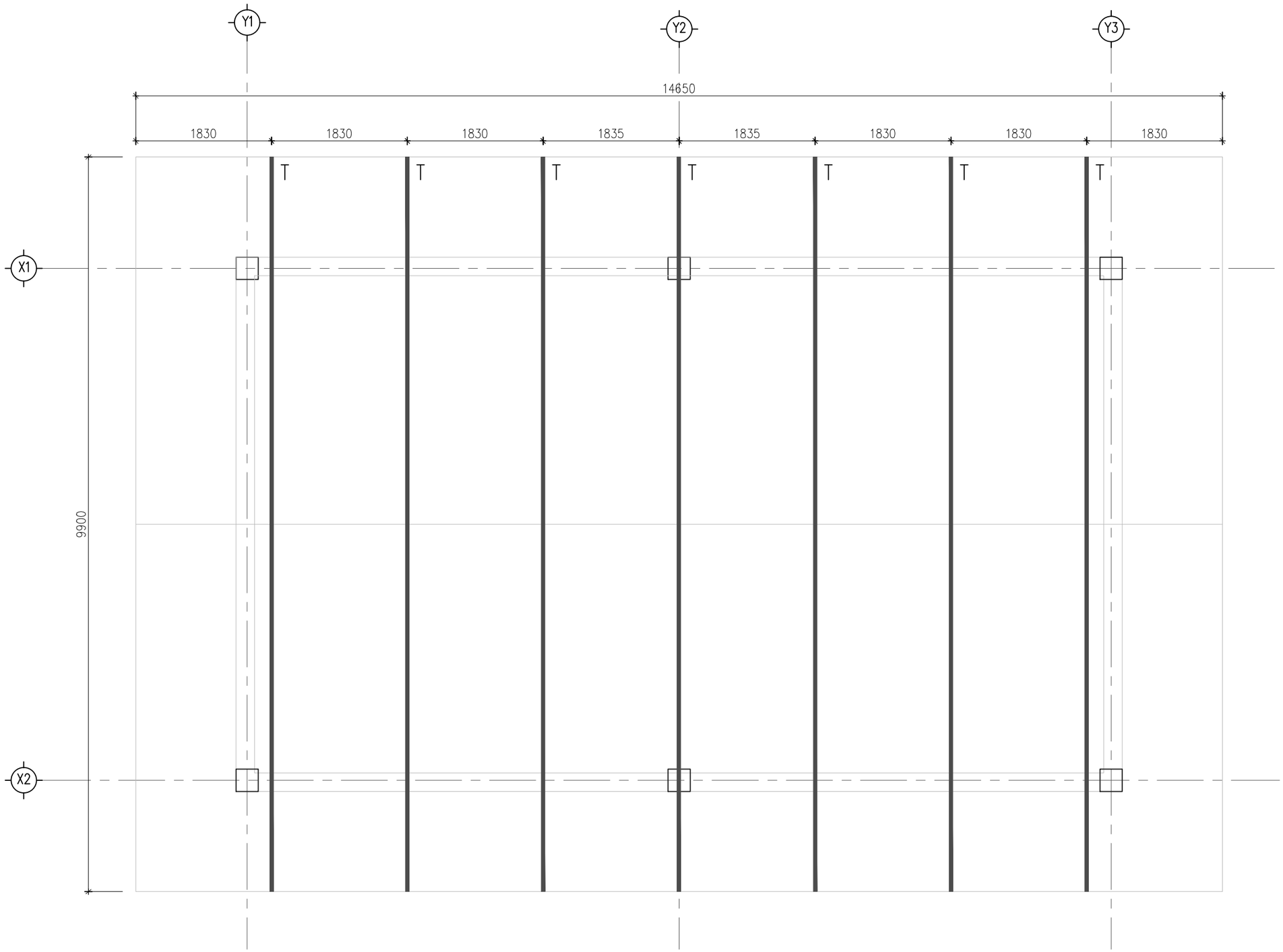


ROOF SLAB SECTION THROUGH Y–Y

NOTES:–
Slab thickness = 150mm
Reinforcements:–
As shown in the drawing.
Concrete grade M20 (Cement 1: Sand 1.5 : Aggregate 3)
Steel Grade Fe500

ALL DIMENSIONS ARE IN MILLIMETERS

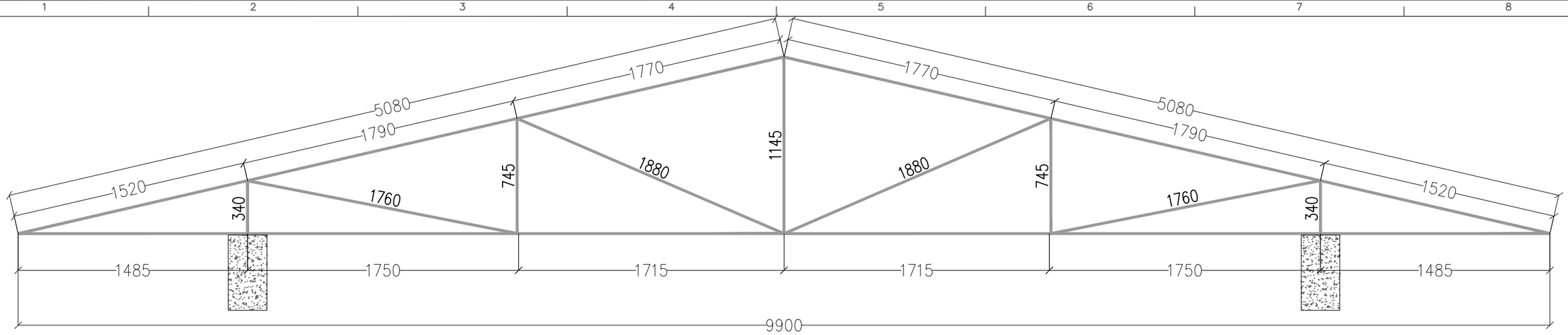
BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 17	SIZE A3 / REV. 0	DESIGN & DRAWN: YONTEN JAMTSHO		MARCH 2021	AS MENTIONED	PROJECTION



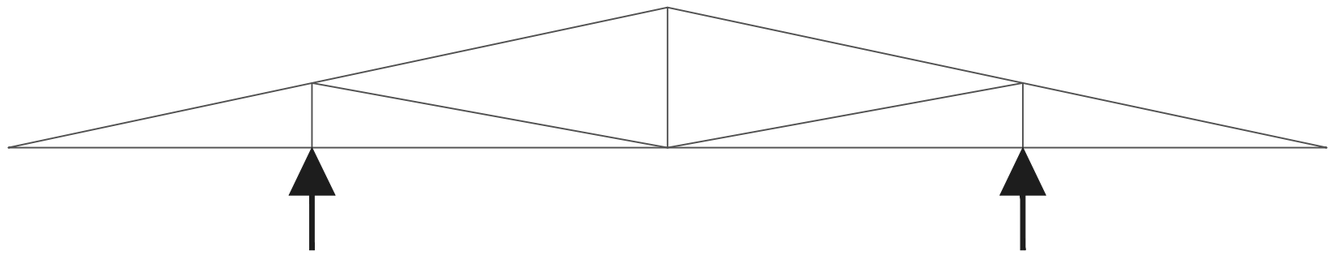
ROOF PLAN

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT		NAME	SIGN	DATE	TITLE:	SCALE NTS
	DRG. No 18	SIZE A3 / REV. 0	DESIGN & DRAWN: YONTEN JAMTSHO		MARCH 2021	AS MENTIONED	PROJECTION



Truss T details



TRUSS MEMBER SIZE

Sl. No	MEMBERS	SIZE
1	Bottom Chords	76.1mm OD, 3.65mm thick, 6.53kg/m
2	Rafters	76.1mm OD, 3.65mm thick, 6.53kg/m
3	Vertical struts	60.3mm OD, 3.65mm thick, 5.1kg/m
4	Inclined struts	60.3mm OD, 3.65mm thick, 5.1kg/m
5	Purlins	60.3mm OD, 3.65mm thick, 5.1kg/m, @ 900c/c

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD.
ELECTRIFICATION DIVISION

PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT

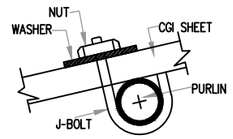
DRG. No 19 | SIZE A3 | REV. 0

	NAME	SIGN	DATE
DESIGN & DRAWN	YONTEN JAMTSHO		MARCH 2021

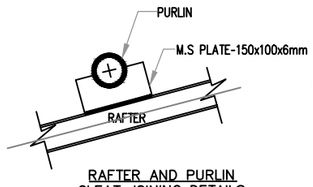
TITLE: AS MENTIONED

SCALE NTS

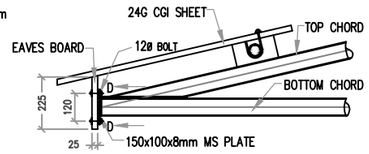
PROJECTION

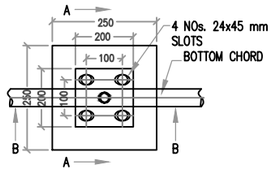


CONNECTION OF CRILI SHEET TO PURLIN

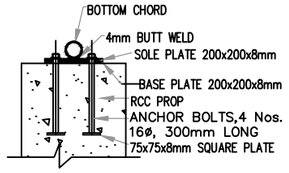


RAFTER AND PURLIN CLEAT JOINING DETAILS

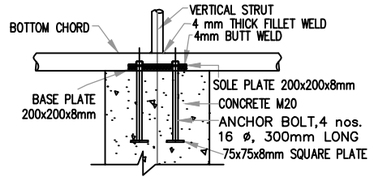




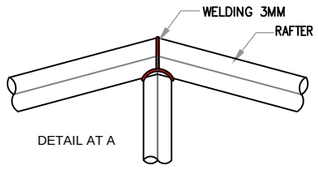
TRUSS HOLDING DOWN DETAILS

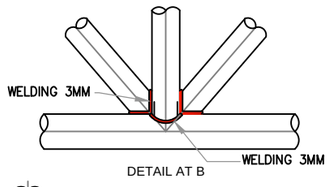


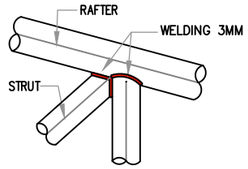
SECTION A-A

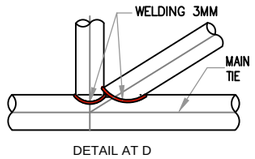


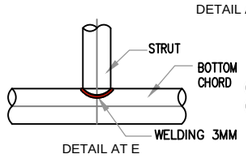
SECTION B-B

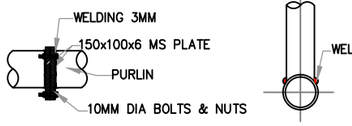




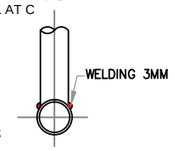


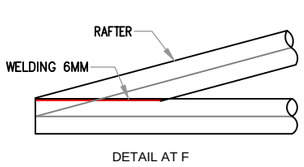


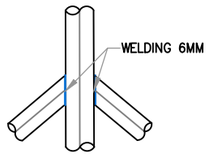


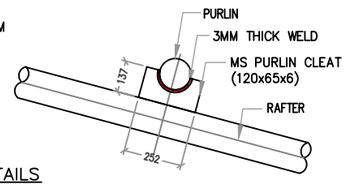


TYPICAL PURLIN & RAFTER JOINERY DETAIL



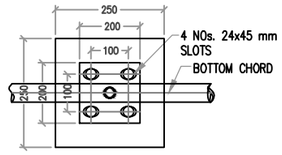




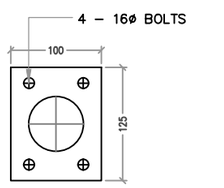


TYPICAL TRUSS JOINERY DETAILS

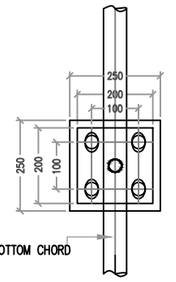
Truss Connection Details



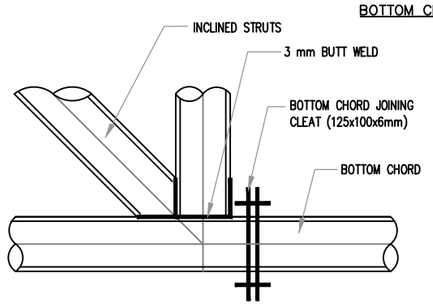
TRUSS HOLD-DOWN IN X DIRECTION



BOTTOM CHORD JOINING PLATE/CLEAT



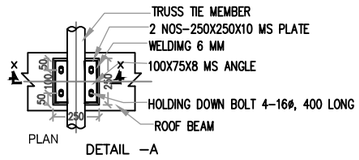
TRUSS HOLD-DOWN IN Y DIRECTION

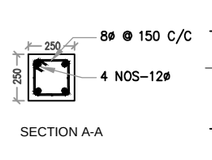


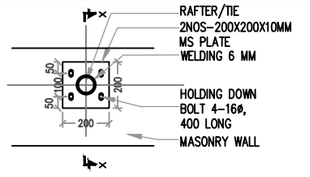
BOTTOM CHORD JOINING DETAILS

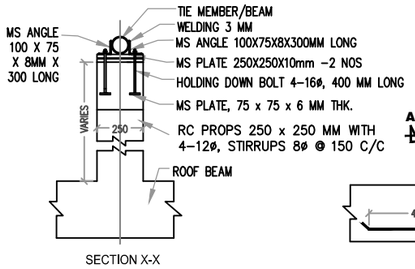
NOTE:
1. ALL THE SECTION DETAILS WILL BE SAME AS SHOWN BY SECTIONS A–A & B–B
2. THE PURLINS ARE SPACED AT 1200mm C/C

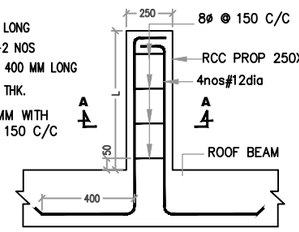
NOTES (FOR ROOF TRUSS):
1. THE GUSSET PLATES ARE MS PLATE OF DIFFERENT THICKNESS AND DESIGN CONFIRMS TO IS 806:1968
2. WELDING SHALL CONFORM TO IS:816
3. ALL ELECTRODES SHALL CONFORM TO IS:814 (PART–1).
4. ALL M.S. BOLTS & NUTS SHALL CONFORM TO IS:1363(PART1–3)
5. WASHERS SHALL CONFORM TO IS:5369,IS:5370, IS:5372/IS:5374
6. HOLE SIZE = DIA OF BOLT + 1.5mm.
7. ALL STRUCTURES AFTER FABRICATION SHALL BE PAINTED WITH ANTI–CORROSIVE PAINTS.
8. ALL STRUCTURAL STEEL CONTACT SURFACES SHALL BE CLEANED OF ANY RUST, OIL, GREASE etc. BEFORE WELDING/PAINTING.
9. WRITTEN DIMENSIONS SHALL BE FOLLOWED & DOUBT MUST BE CLARIFIED BEFORE EXECUTION OF THE WORK.
10. FABRICATION AND ERECTION WORK SHALL BE CARRIED OUT AS CHECKED BY ENGINEER–IN–CHARGE.



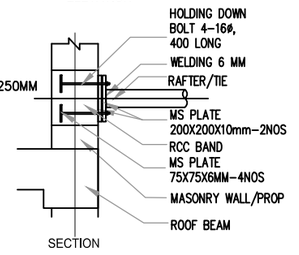








DETAILS OF RCC PROP



ANCHORAGE DETAILS ON WALLS/BAND

ALL DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LTD. ELECTRIFICATION DIVISION	PROJECT: UPGRADATION OF THIMPHU MINI HYDRO POWER PLANT			NAME	SIGN	DATE	TITLE:
	DRG. No 20	SIZE A3	REV. 0	DESIGN & DRAWN	YONTEN JAMTSHO	MARCH 2021	AS MENTIONED

SCALE NTS

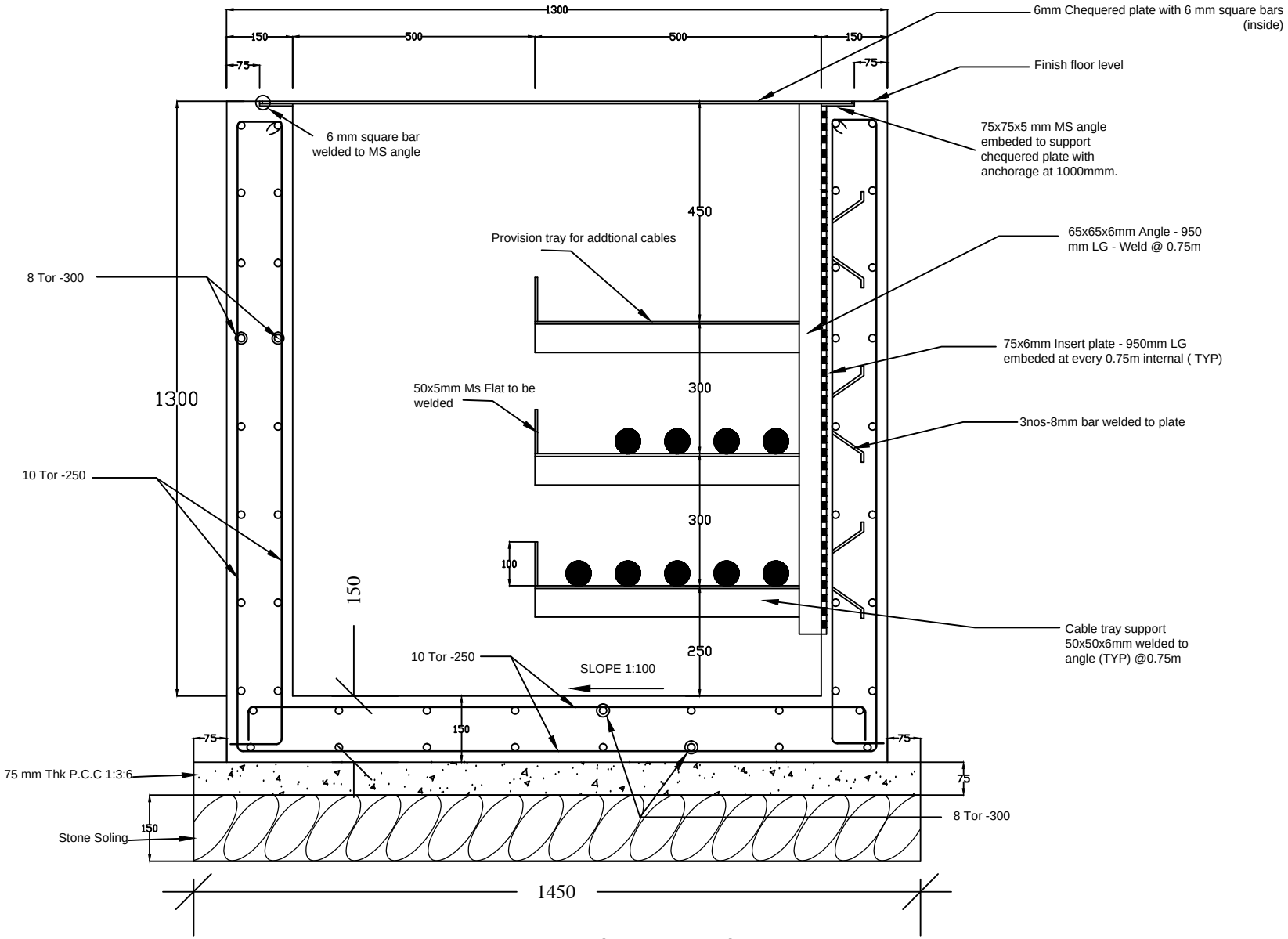
PROJECTION

NOTES:-

1. ALL DIMENSIONS SHALL BE IN MM UNLESS OTHERWISE SPECIFIED.
2. SUITABLE CUT OUTS IN TRENCHES FOR CABLE ENTRY/EXIT FROM EQUIPMENT SHALL BE MADE.
3. R.C.C. MIX SHALL BE IN RATIO OF 1:1.5:3 AS PER IS: 456-2000 AND ALL REINFORCEMENTS ARE OF GR. Fe 500 TO IS: 1786.
4. CLEAR COVER TO REINF. STEEL SHALL BE PROVIDED AS UNDER
   * 40 mm FOR FACE IN CONTACT WITH EARTH FOR RAFT SLAB & VERT. WALL.
   * 25 mm FOR FACE NOT IN CONTACT WITH EARTH FOR RAFT SLAB.
   * 15 mm FOR FACE NOT IN CONTACT WITH EARTH & FOR RIBBED SLAB & PRECAST COVER.
   * 25 mm TO MAIN REINFORCEMENT OF RIBBED BEAM.
6. A SLOPE 1:500 SHALL BE MAINTAINED ALONG THE RUN OF CABLE TRENCH & SLOPE OF 1:100 PERPENDICULAR TO RUN OF CABLE TRENCH.
7. THE MINIMUM PERMISSIBLE BENDING RADII FOR 11 kV CABLES :- 15D ("D "IS THE OUTER DIAMETER OF THE CABLE) SHALL BE MAINTAINED DURING INSTALLATION.

NOTE :- ALL THE DIMENSIONS ARE IN MILLIMETERS

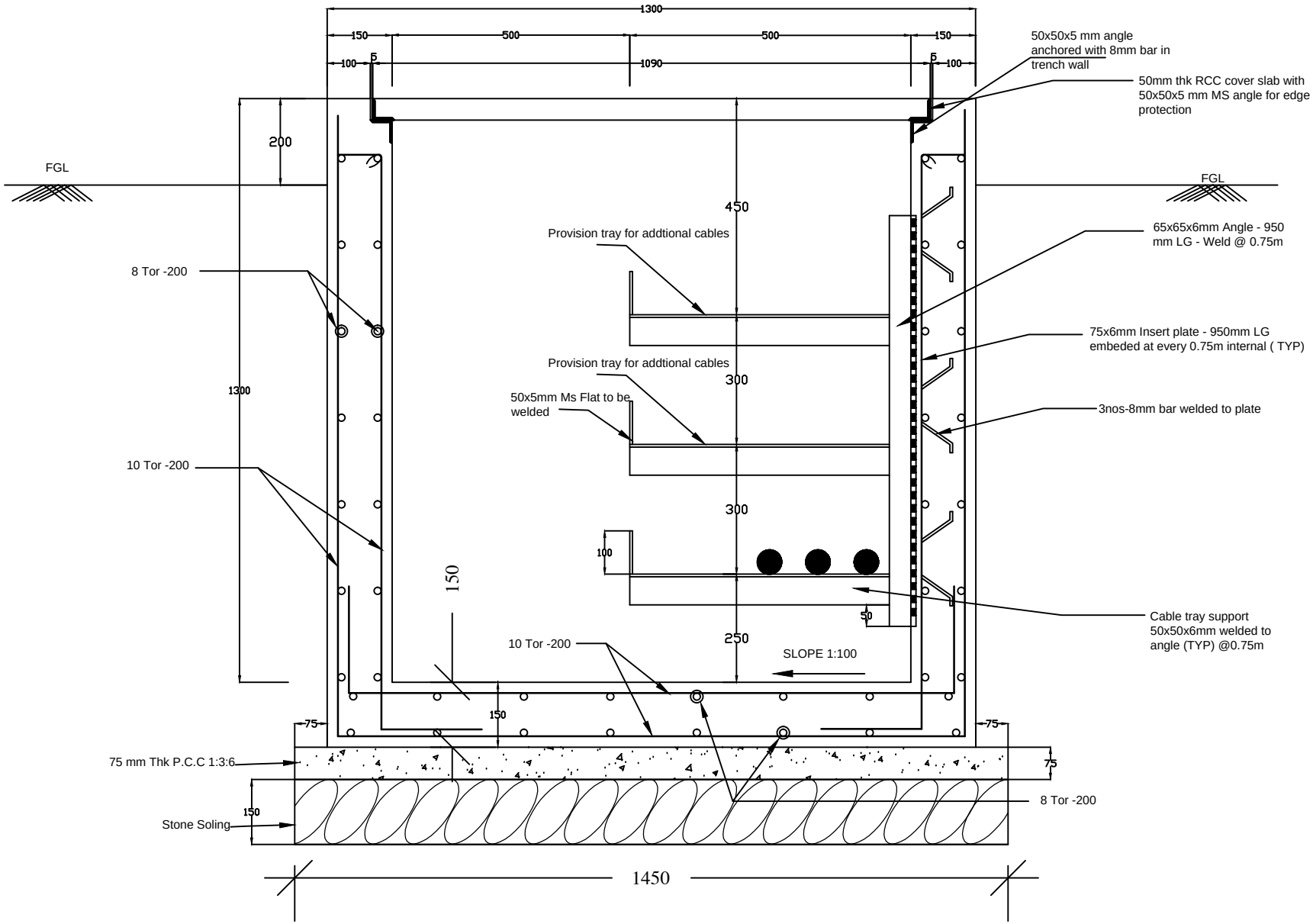
BHUTAN POWER CORPORATION LIMITED ***(REGISTERED OFFICE, THIMPHU)*** **DISTRIBUTION CONSTRUCTION DEPARTMENT** **ELECTRIFICATION DIVISION** **THIMPHU: BHUTAN**	Designed by:	Signature	Checked by:	Approved by:	**Project:** UP-GRADATION OF THIMPHU MINI HYDEL	Revision No :	Date:
	YONTEN JAMTSHO				General Notes — Scale:- NTS — DRAWING NO. 1		04/2021



CABLE TRENCH (INDOOR)

NOTE :- ALL THE DIMENSIONS ARE IN MILLIMETERS

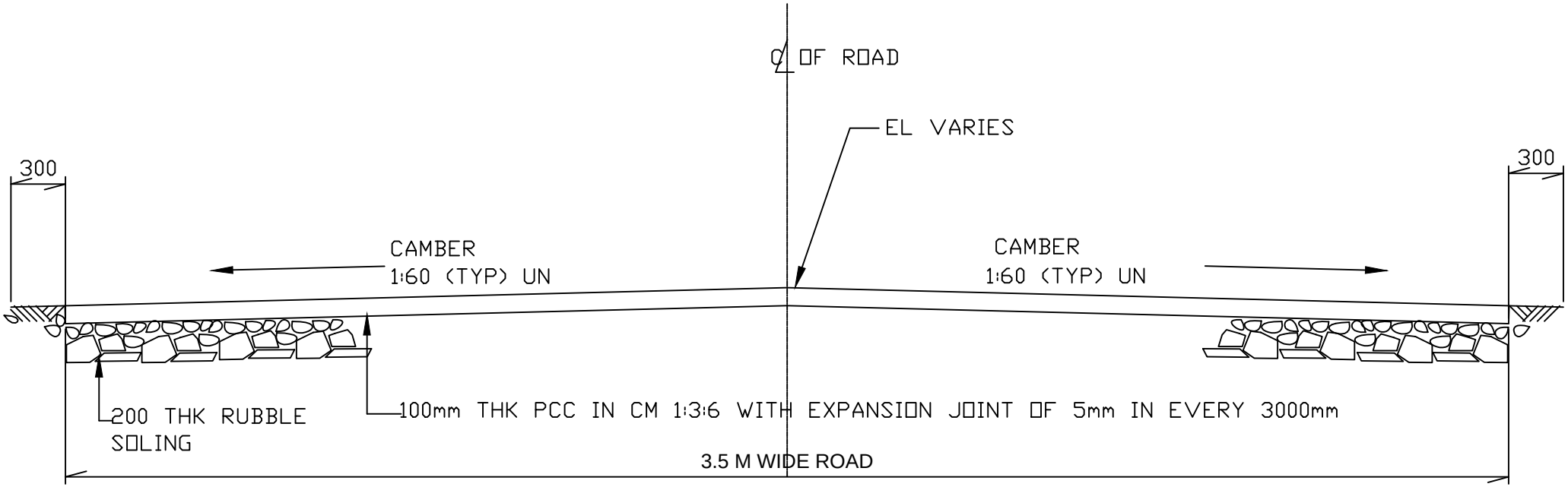
BHUTAN POWER CORPORATION LIMITED *(REGISTERED OFFICE, THIMPHU)* **DISTRIBUTION CONSTRUCTION DEPARTMENT ELECTRIFICATION DIVISION THIMPHU: BHUTAN**	Designed by: YONTEN JAMTSHO	Signature	Checked by:	Approved by:	**Project:** UP-GRADATION OF THIMPHU MINI HYDEL	Revision No :	Date: 04/2021
					INDOOR CABLE TRENCH	Scale:- NTS DRAWING NO. 2	



CABLE TRENCH (OUTDOOR)

NOTE :- ALL THE DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LIMITED ***(REGISTERED OFFICE, THIMPHU)*** **DISTRIBUTION CONSTRUCTION DEPARTMENT** **ELECTRIFICATION DIVISION** **THIMPHU: BHUTAN**	Designed by:	Signature	Checked by:	Approved by:	**Project:** UP-GRADATION OF THIMPHU MINI HYDEL	Revision No :	Date:
	YONTEN JAMTSHO				OUTDOOR CABLE TRENCHC C1-C1	Scale:- NTS DRAWING NO. 3	04/2021



TYPICAL CROSS SECTION OF PCC ROAD (3.5 M WIDE)

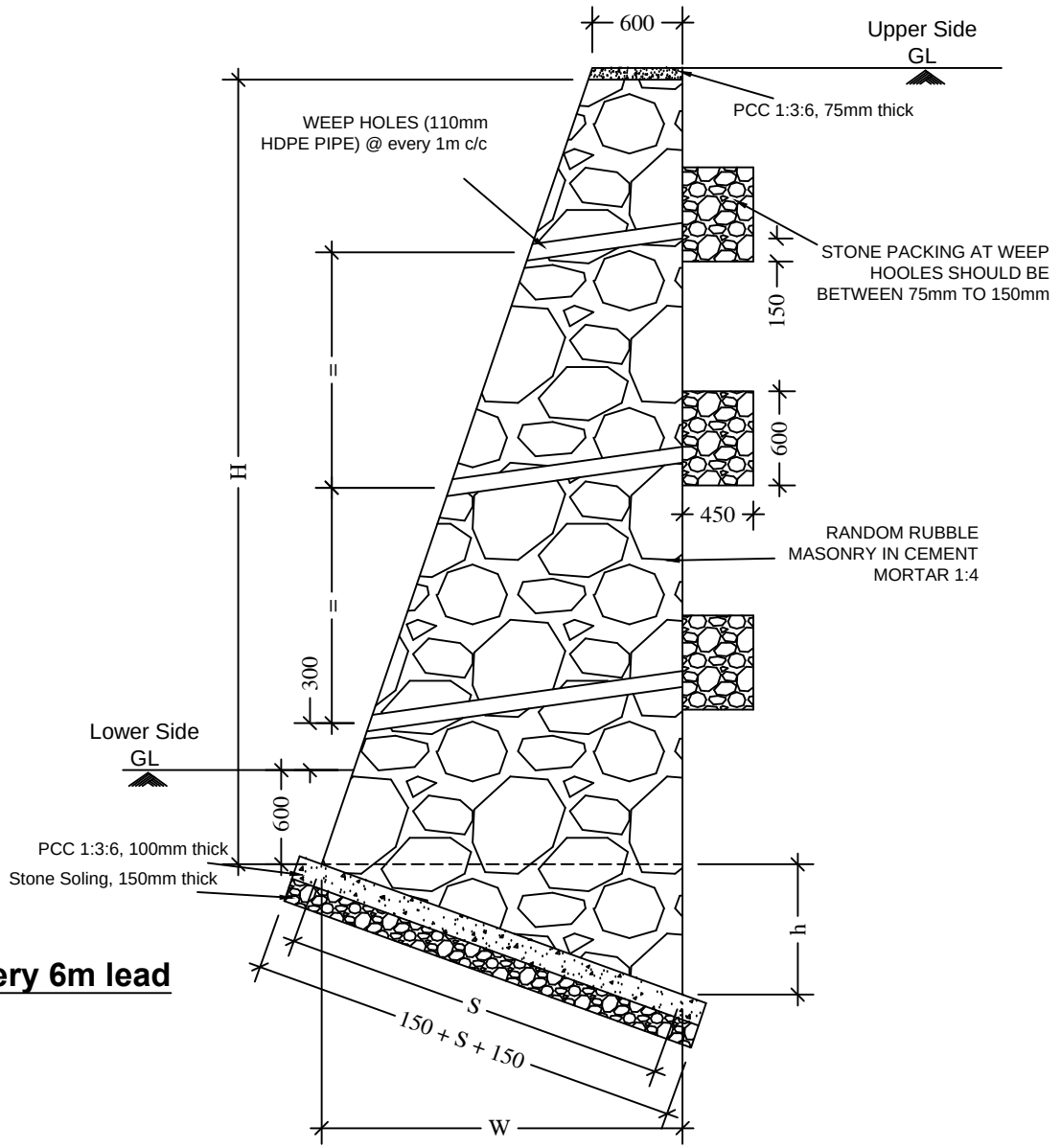
NOTE:

1. ALL DIMENSIONS ARE IN MILLIMETRES UNLESS NOTED.
2. ROAD SHALL HAVE SINGLE OR DOUBLE CAMBER AS PER THE SITE CONDITION

NOTE :- ALL THE DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LIMITED ***(REGISTERED OFFICE, THIMPHU)*** **DISTRIBUTION CONSTRUCTION DEPARTMENT** **ELECTRIFICATION DIVISION** **THIMPHU: BHUTAN**	Designed by:	Signature	Checked by:	Approved by:	**Project:** UP-GRADATION OF THIMPHU MINI HYDEL	Revision No :	Date:
	YONTEN JAMTSHO				PCC Road Detail		04/2021
					Scale:- NTS DRAWING NO. 1		

H	W	h	S
3000	1500	370	1565
3500	1700	455	1760
4000	1900	540	1975
4500	2100	625	2200
4750	2200	670	2300
5000	2300	710	2405



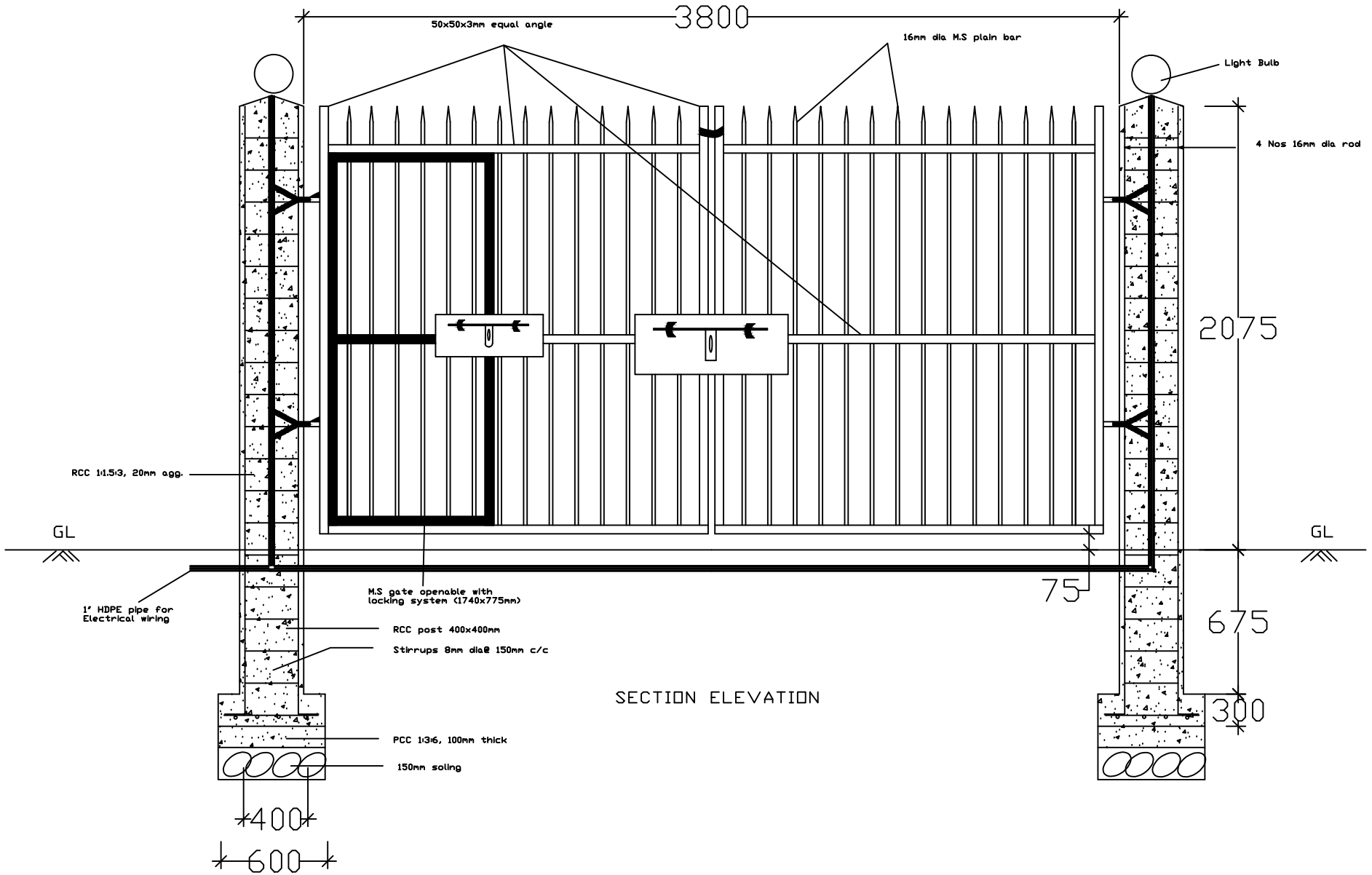
Maintain a seperation gap of 50mm at every 6m lead

TYPICAL SECTION OF RETAINING WALL

NOTE :- ALL THE DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LIMITED ***(REGISTERED OFFICE, THIMPHU)*** **DISTRIBUTION CONSTRUCTION DEPARTMENT** **ELECTRIFICATION DIVISION** **THIMPHU: BHUTAN**	Designed by:	Signature	Checked by:	Approved by:	**Project:** UP-GRADATION OF THIMPHU MINI HYDEL	Revision No :	Date:
	YONTEN JAMTSHO				RRM Wall Detail	Scale:- NTS DRAWING NO. 1	04/2021

GATE



SECTION ELEVATION

NOTE :- ALL THE DIMENSIONS ARE IN MILLIMETERS

BHUTAN POWER CORPORATION LIMITED
(REGISTERED OFFICE, THIMPHU)
DISTRIBUTION CONSTRUCTION DEPARTMENT
ELECTRIFICATION DIVISION
THIMPHU: BHUTAN

Designed by:	Signature	Checked by:	Approved by:
YONTEN JAMTSHO			

Project: UP-GRADATION OF THIMPHU MINI HYDEL

GATE DETAIL

Scale:- NTS

DRAWING NO. 1

Revision No :

Date: 04/2021