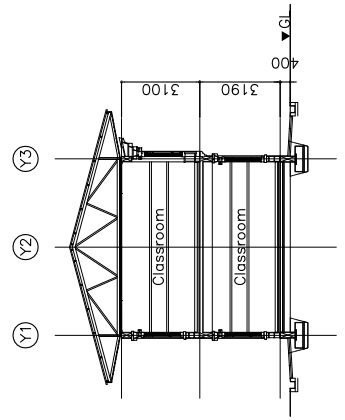
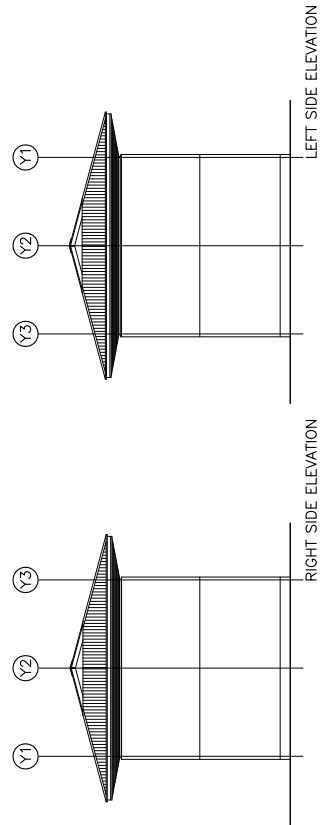
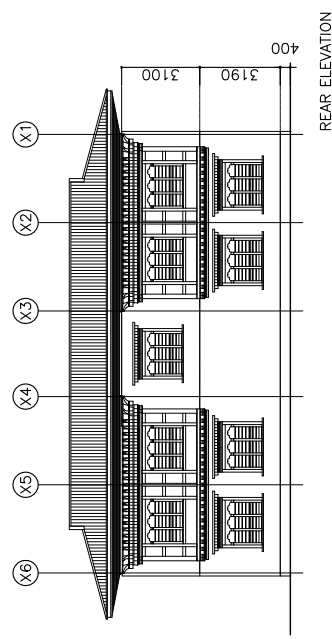
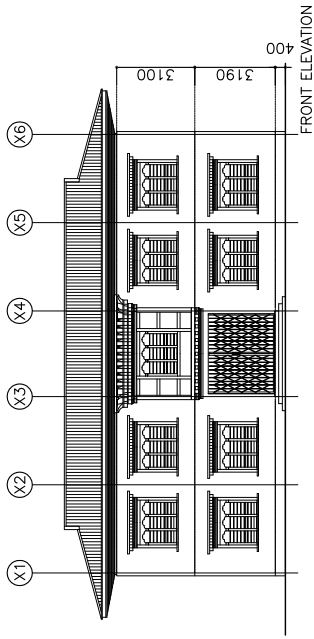
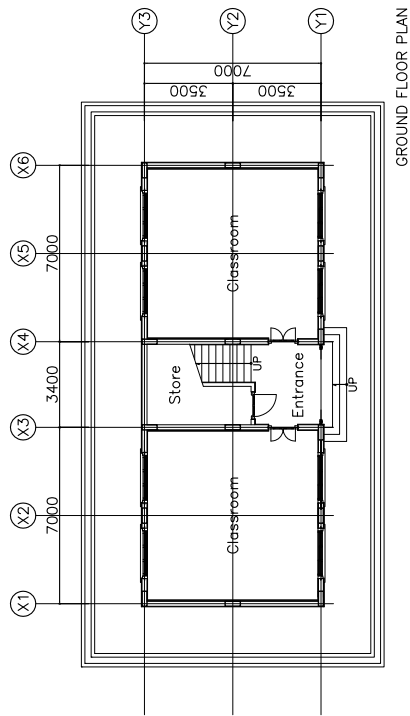
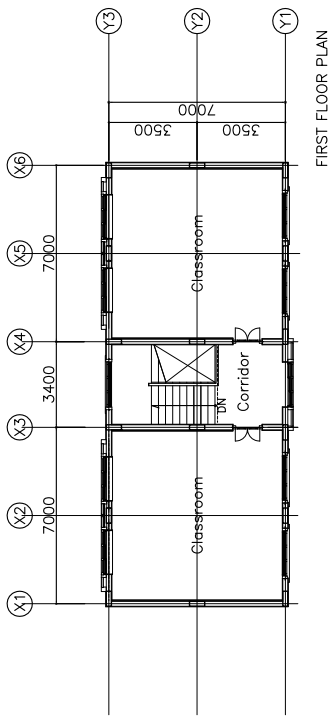
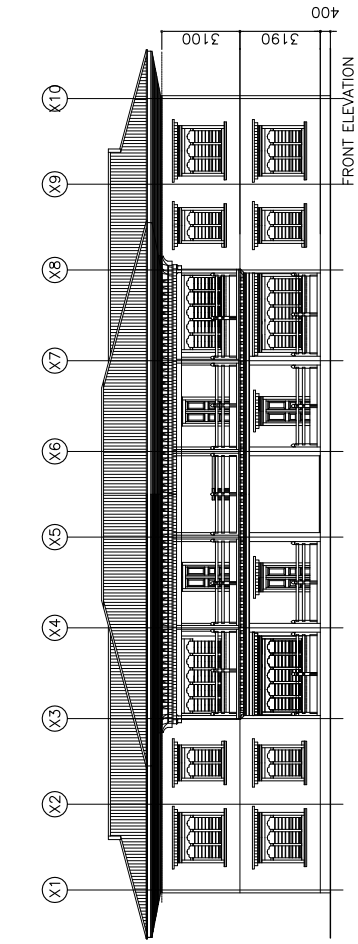


(2) Plans, Elevations, and Sections

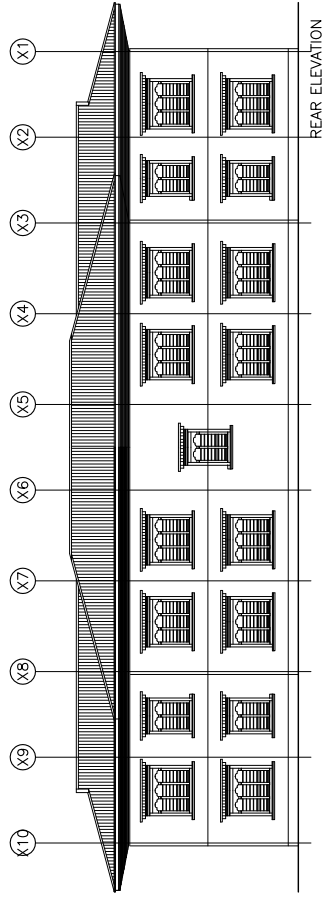
- 1) 4-classroom Block
- 2) 8-classroom Block
- 3) Administration and Library Block
- 4) Laboratory Block
- 5) Multi-purpose Hall
- 6) Kitchen and Store Block
- 7) Toilet Block
- 8) 64-student Hostel
- 9) 96-student Hostel
- 10) Principal's Quarter
- 11) Warden's/Matron's Quarter
- 12) Staff Quarters



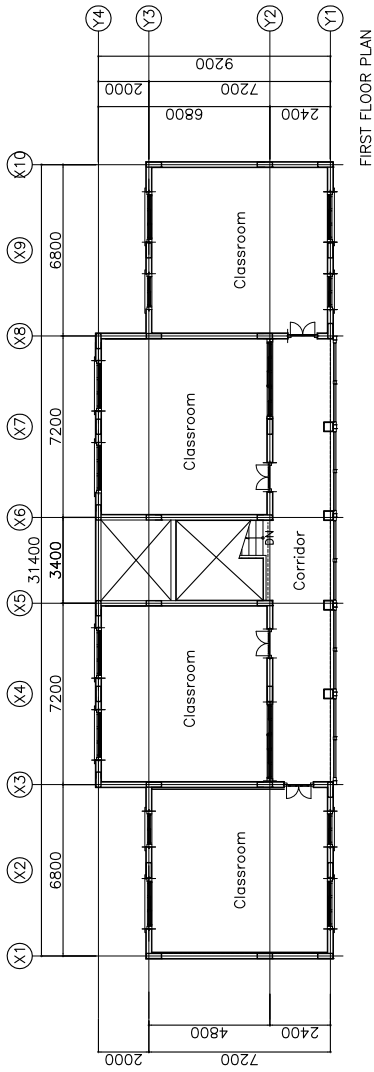
FLOOR PLAN, ROOF PLAN & ELEVATION
4 CLASSROOM BLOCK
S=1:300



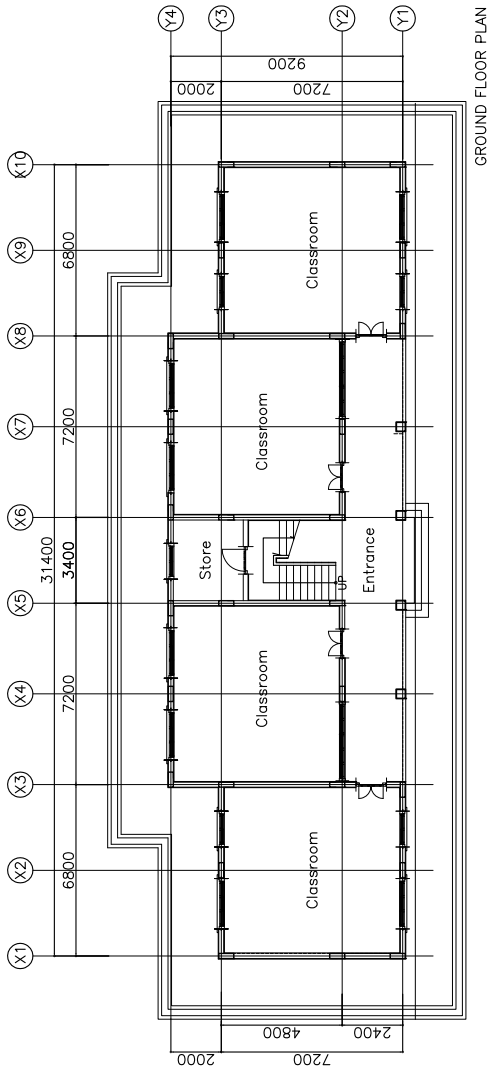
FRONT ELEVATION



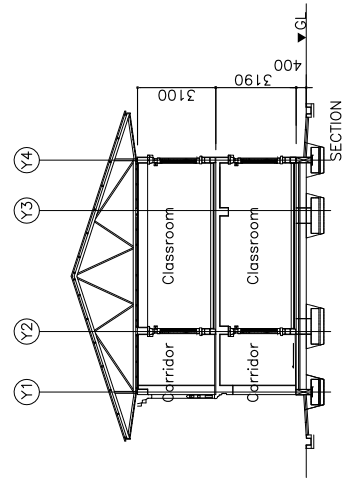
REAR ELEVATION



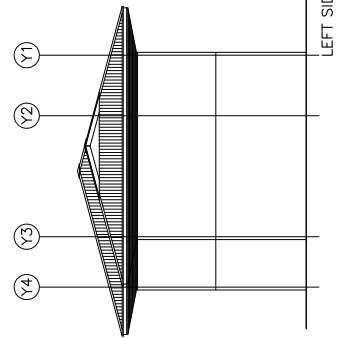
FIRST FLOOR PLAN



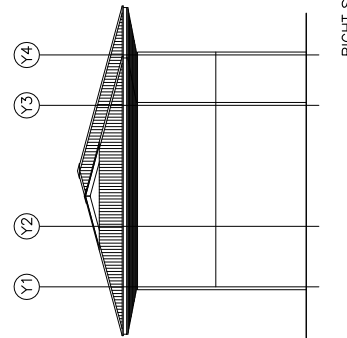
GROUND FLOOR PLAN



SECTION

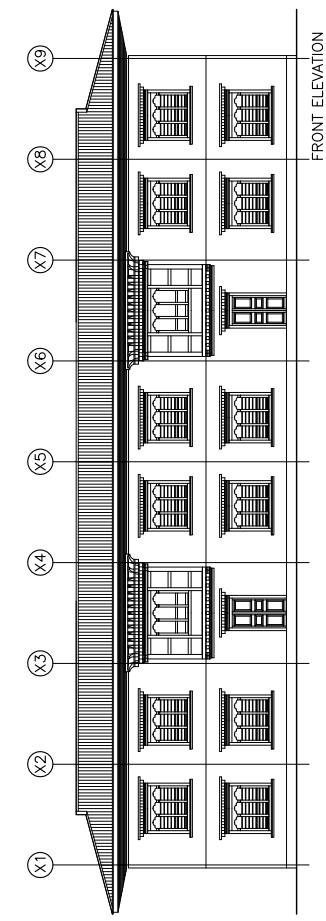


LEFT SIDE ELEVATION

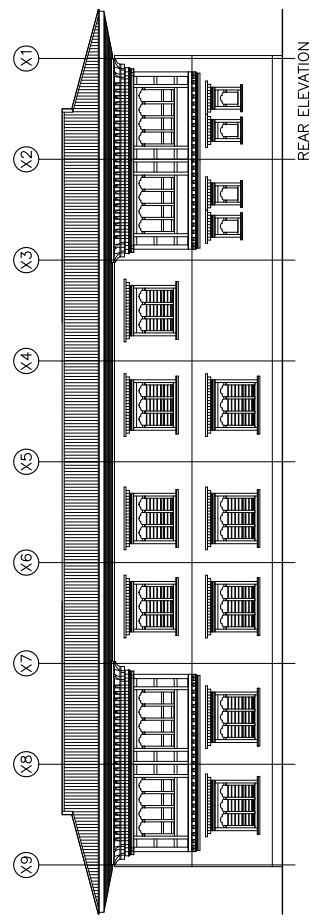


RIGHT SIDE ELEVATION

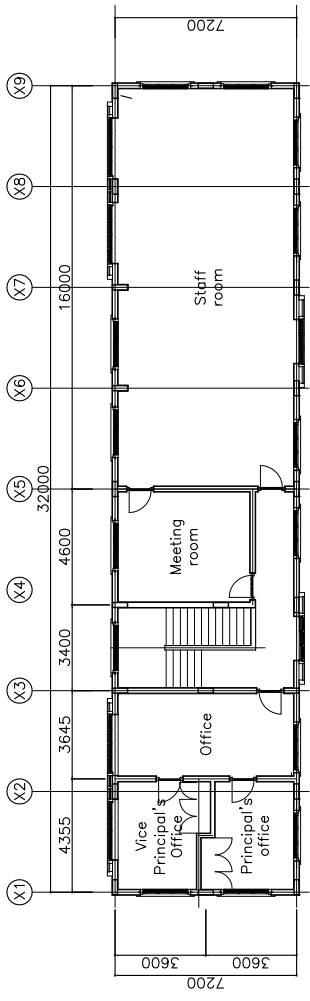
FLOOR PLAN & ROOF PLAN
8 CLASSROOM BLOCK
S=1:300



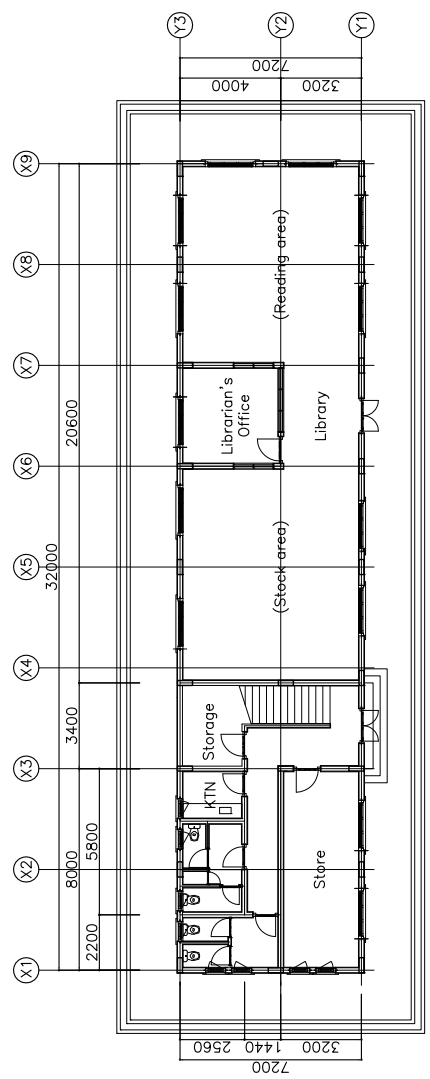
FRONT ELEVATION



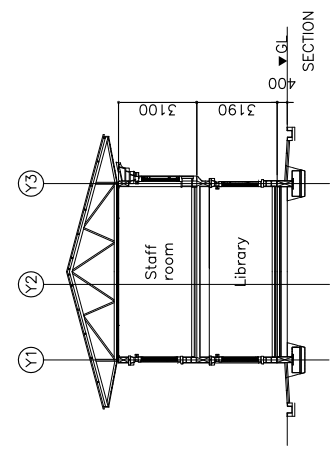
REAR ELEVATION



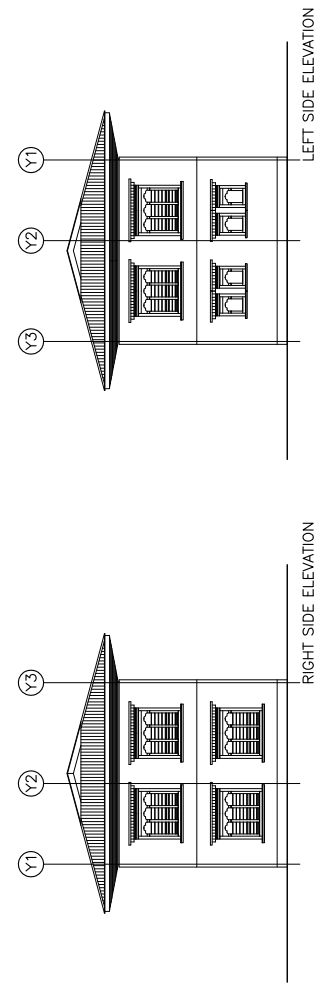
FIRST FLOOR PLAN



GROUND FLOOR PLAN



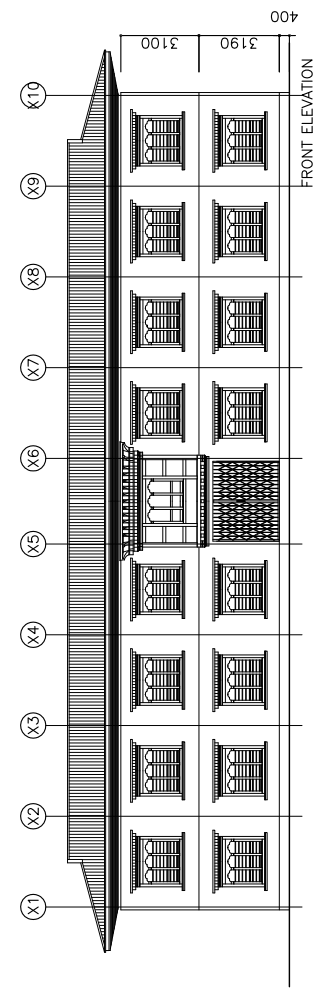
SECTION



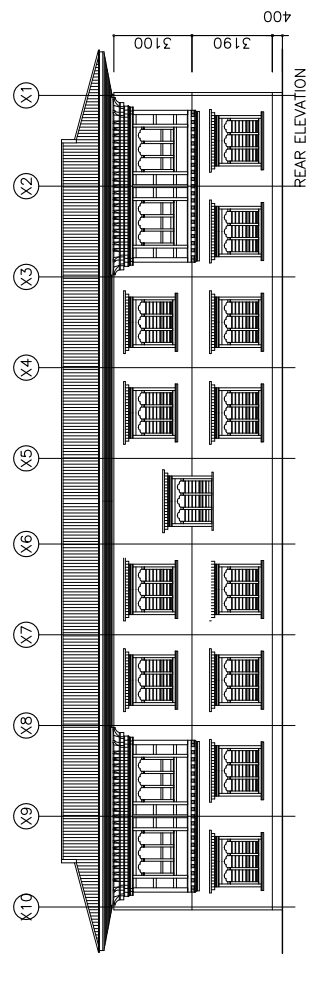
RIGHT SIDE ELEVATION

LEFT SIDE ELEVATION

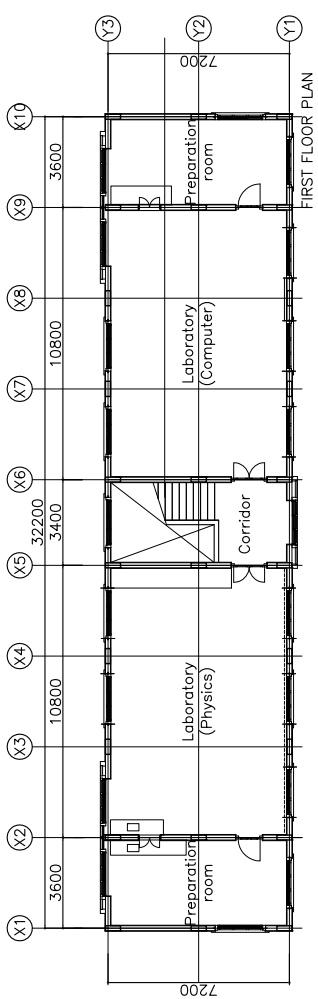
FLOOR PLAN & ROOF PLAN
ADMINISTRATION/LIBRARY BLOCK
S = 1:300



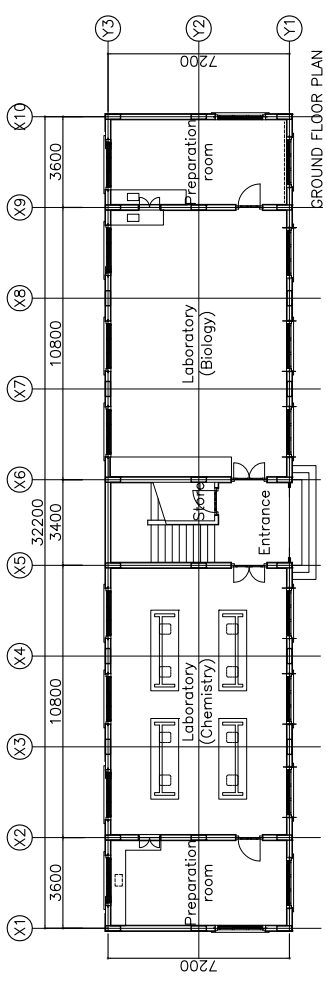
FRONT ELEVATION



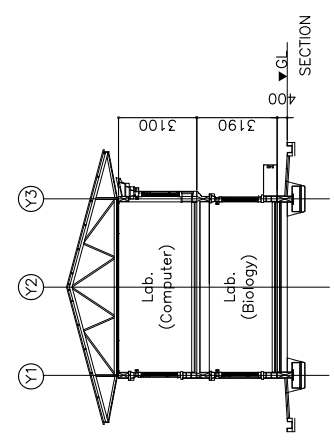
REAR ELEVATION



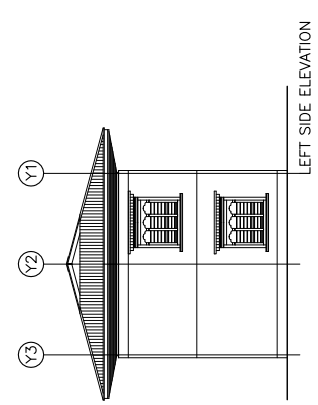
FIRST FLOOR PLAN



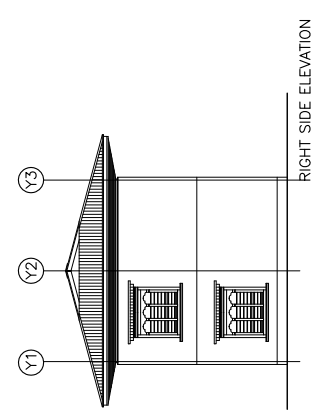
GROUND FLOOR PLAN



SECTION

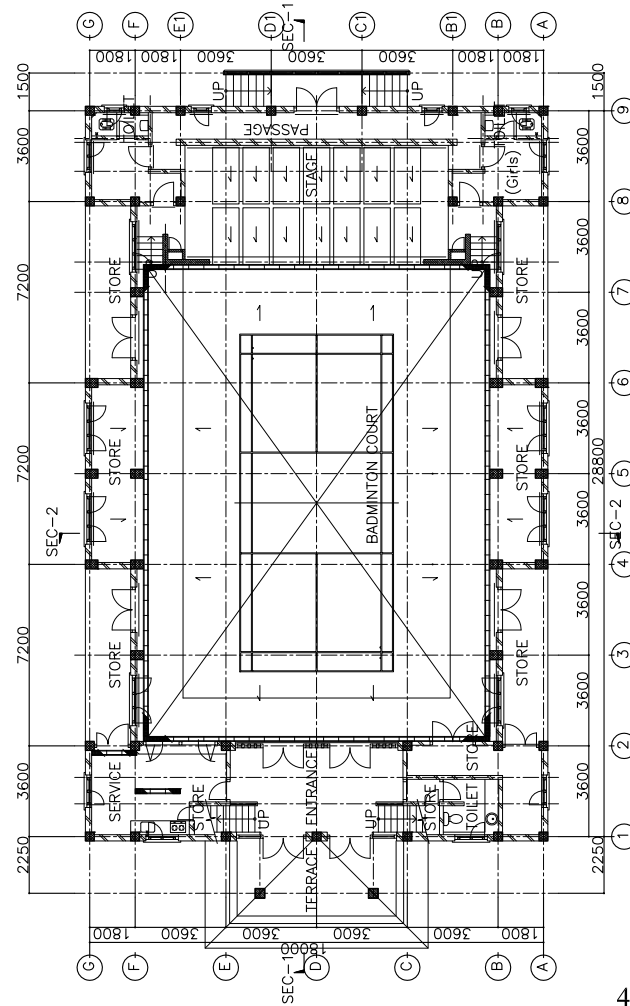


LEFT SIDE ELEVATION

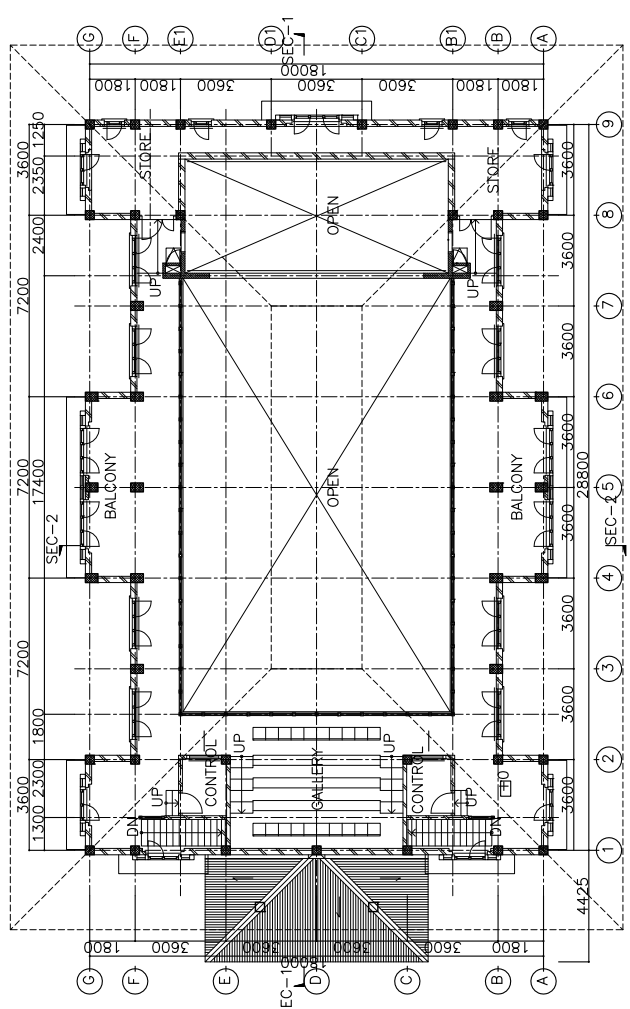


RIGHT SIDE ELEVATION

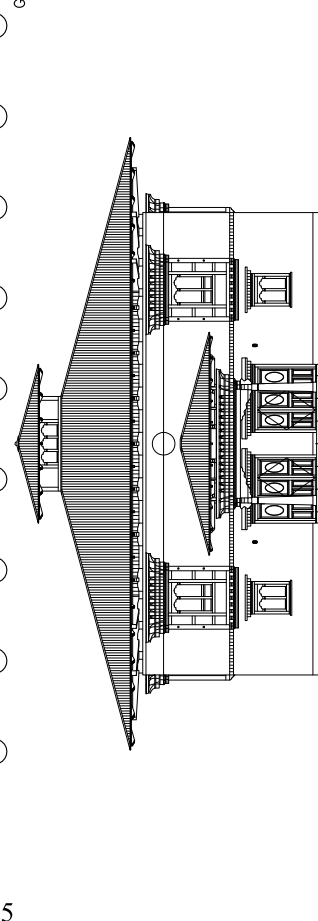
PLAN & ROOF PLAN
LABORATORY BLOCK
S=1:300



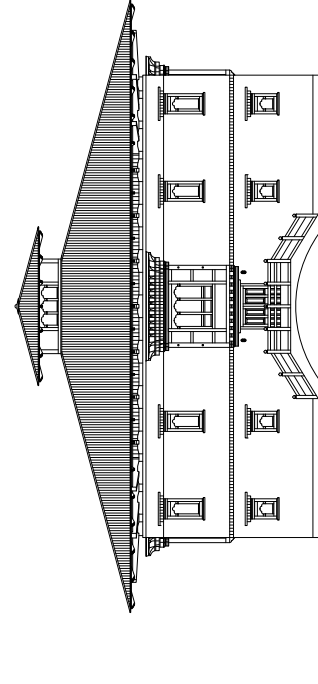
GROUND FLOOR PLAN



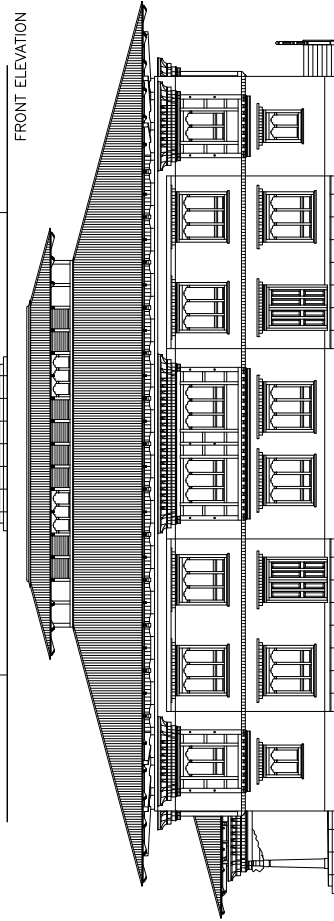
FIRST FLOOR PLAN



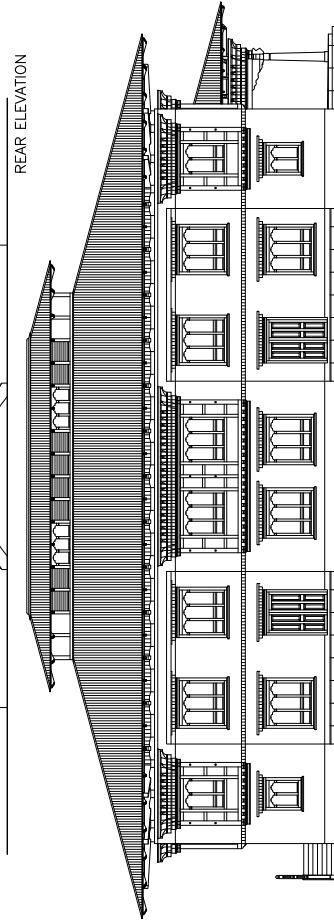
FRONT ELEVATION



REAR ELEVATION

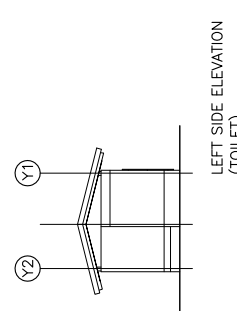
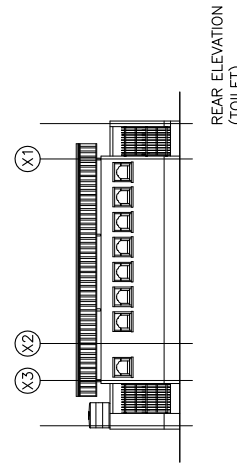
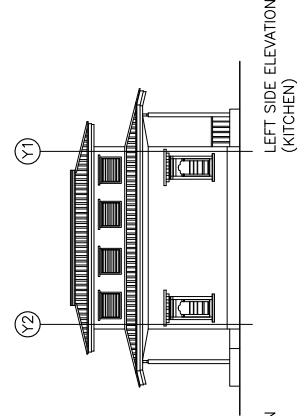
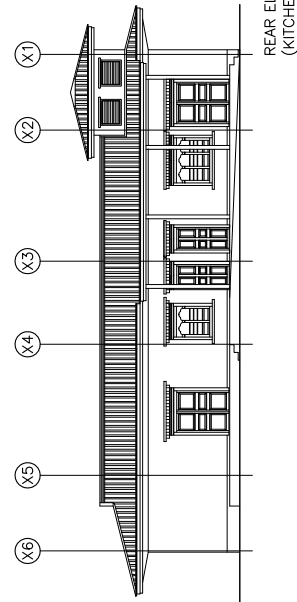
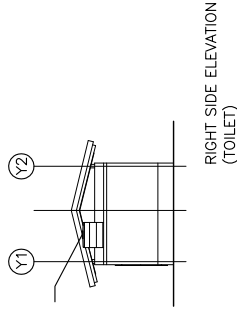
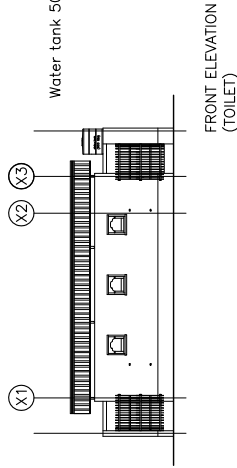
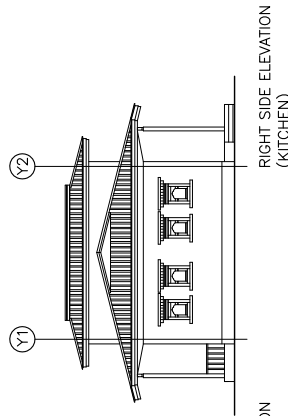
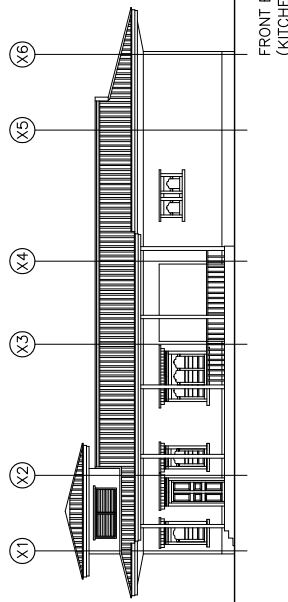
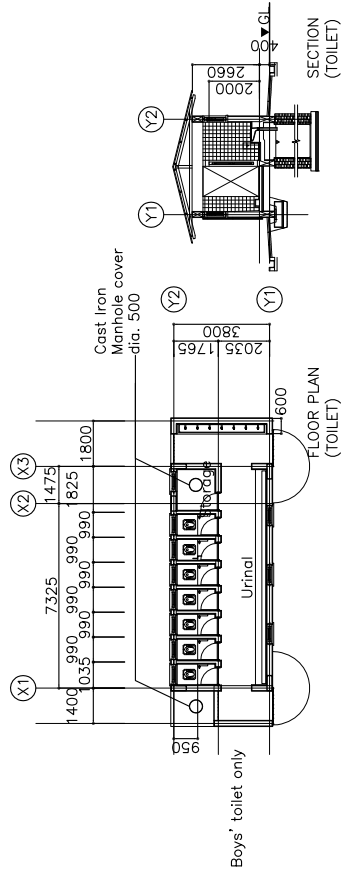
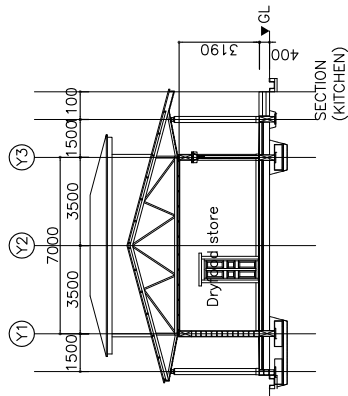
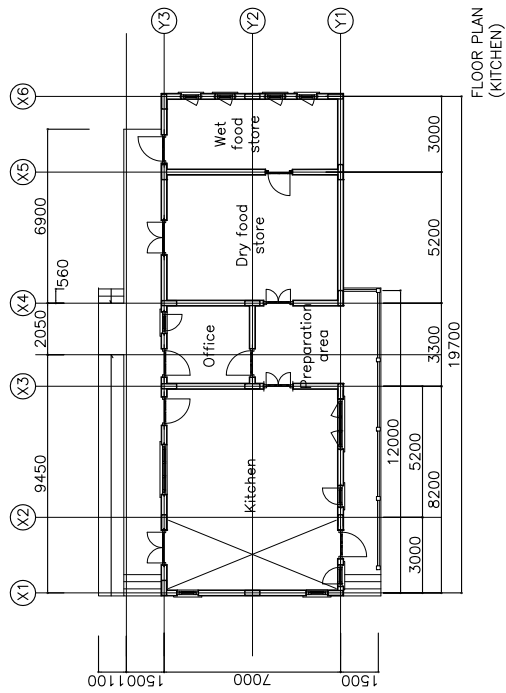


SIDE ELEVATION 1

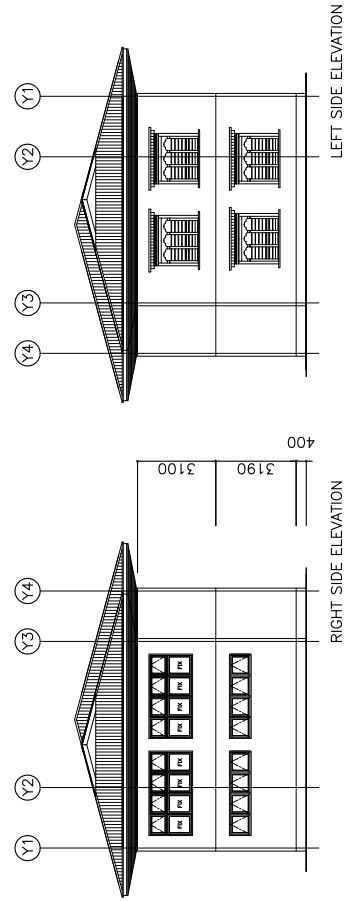
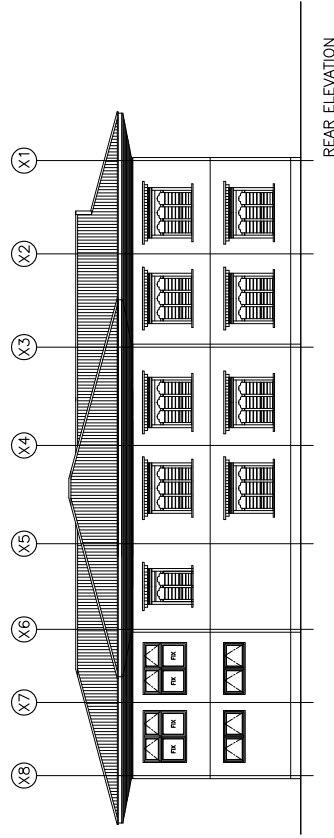
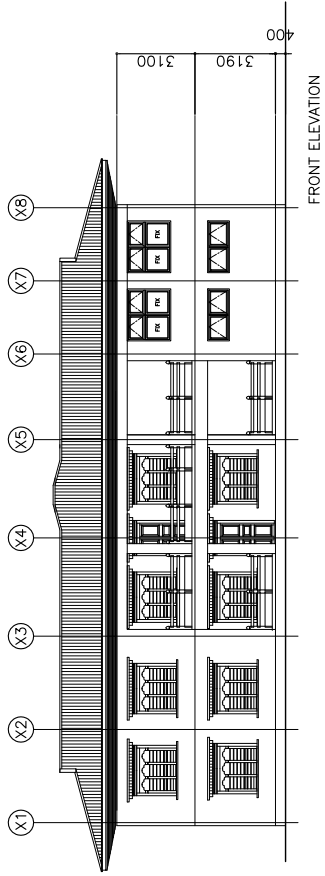
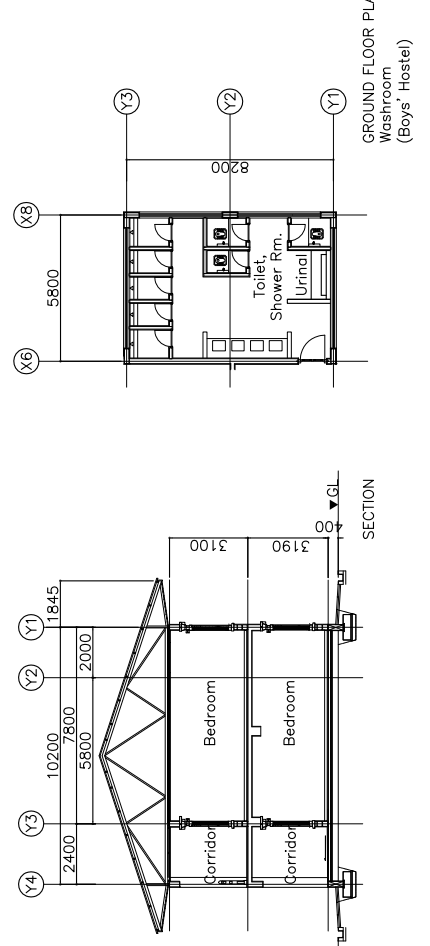
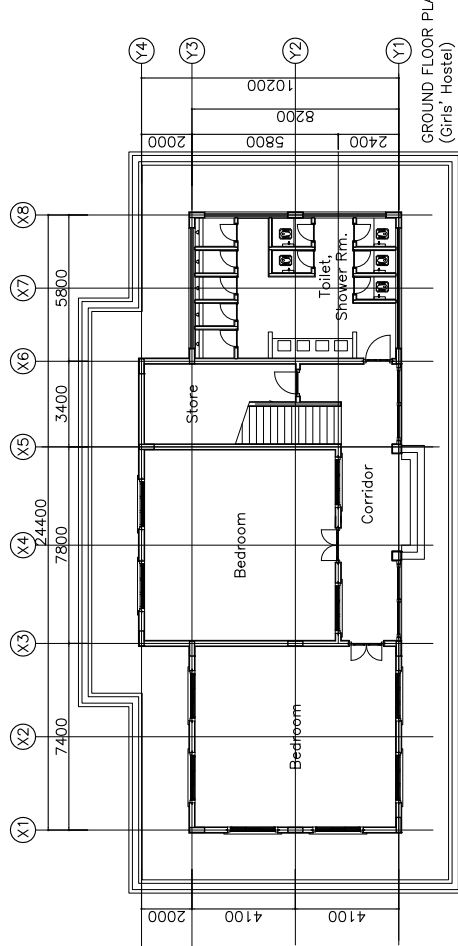
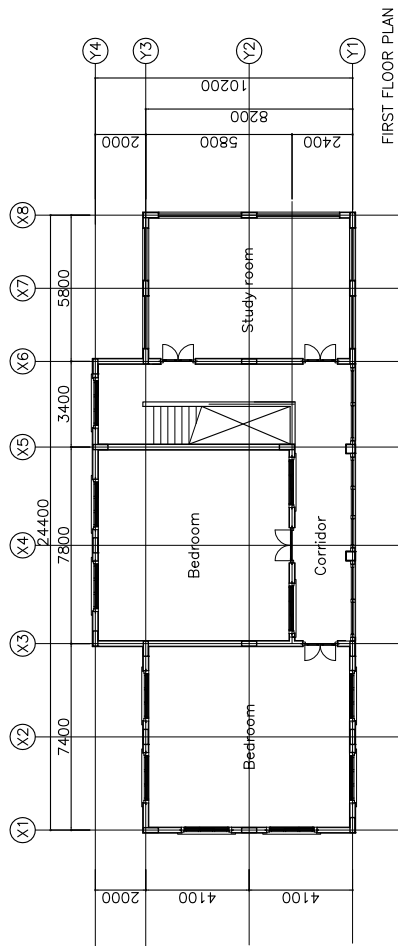


SIDE ELEVATION 2

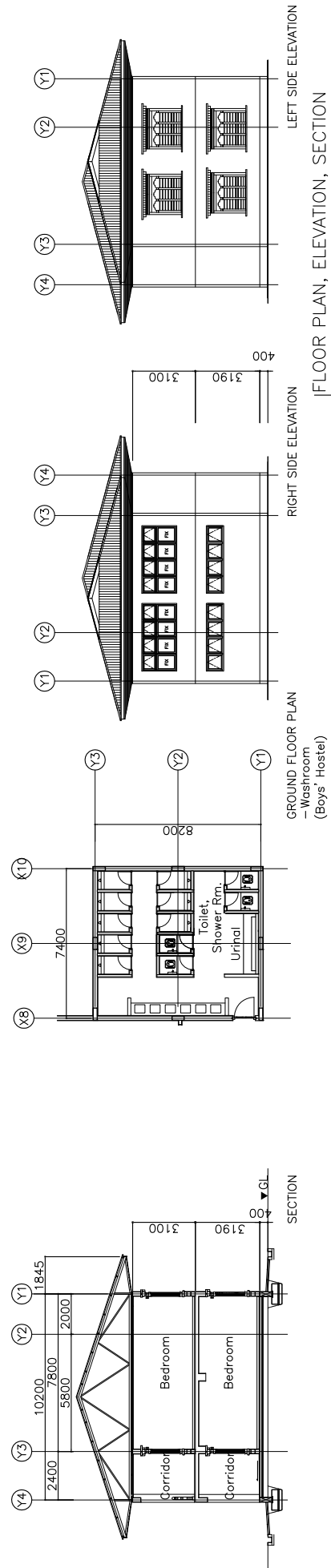
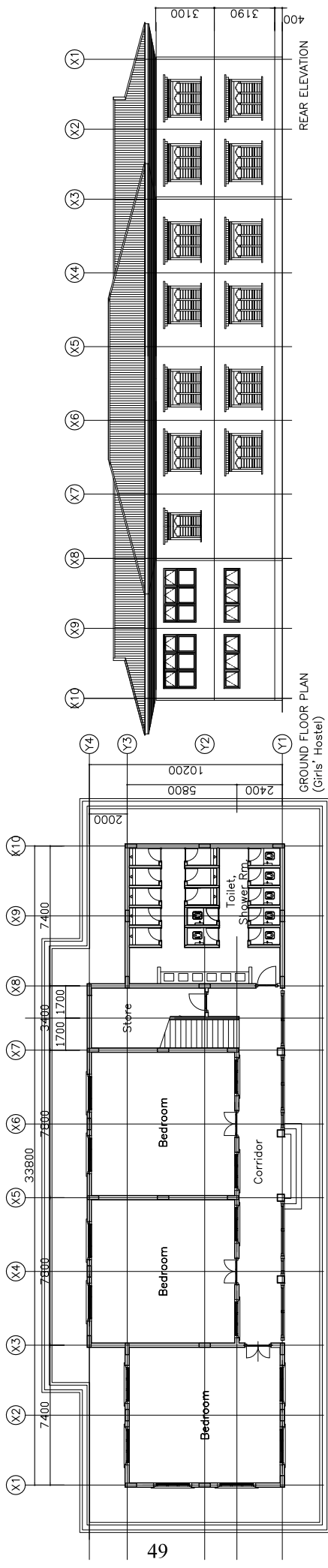
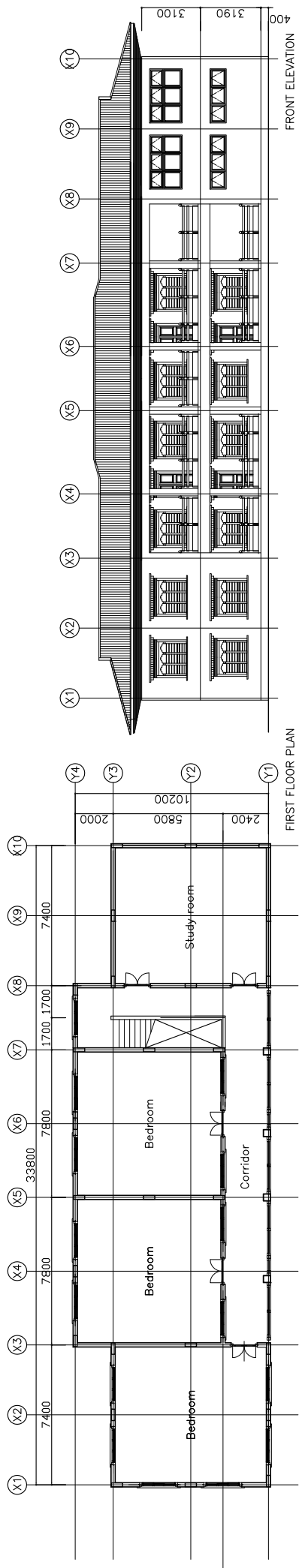
PLAN, ELEVATION,
MULTI-PURPOSE HALL
S=1/300



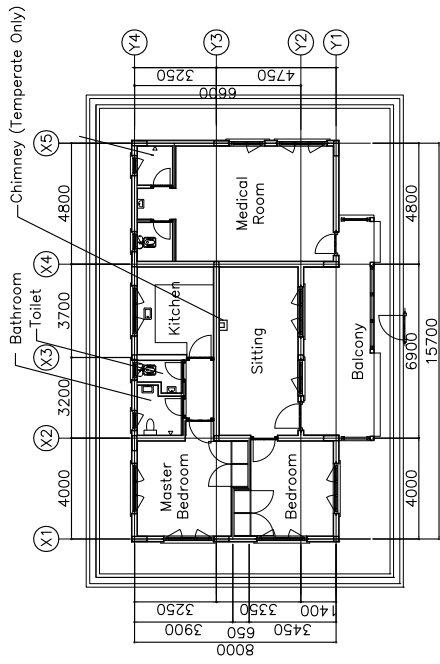
FLOOR PLAN, ELEVATION, SECTION
(KITCHEN, TOILET)
S=1:300



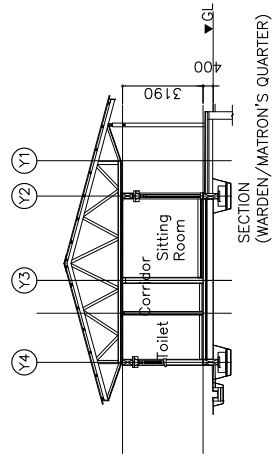
FLOOR PLAN & ROOF PLAN
HOSTEL BLOCK (64 PERSONS)
S = 1:300



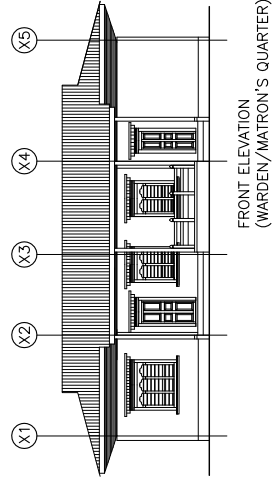
FLOOR PLAN, ELEVATION, SECTION
HOSTEL BLOCK (96 PERSONS)
S = 1:300



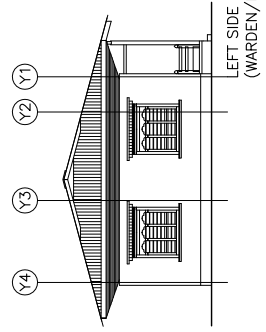
GROUND FLOOR PLAN
(WARDEN/MATRON'S QUARTER)



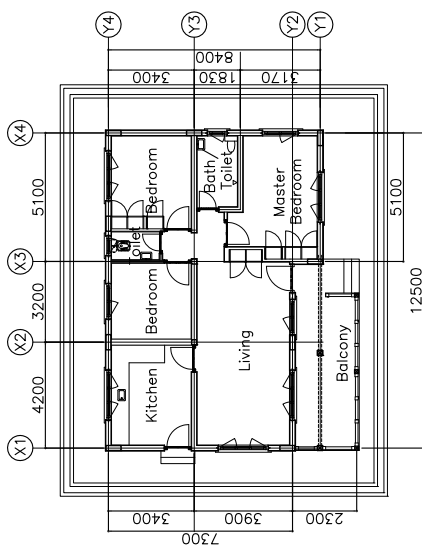
SECTION
(WARDEN/MATRON'S QUARTER)



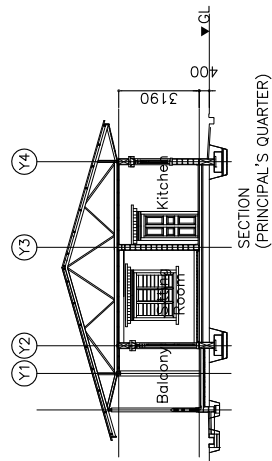
FRONT ELEVATION
(WARDEN/MATRON'S QUARTER)



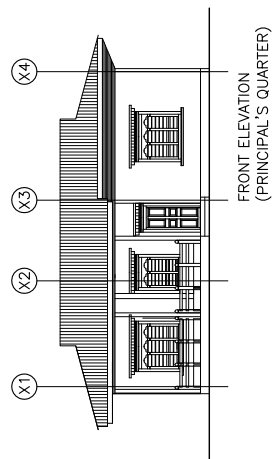
LEFT SIDE ELEVATION
(WARDEN/MATRON'S QUARTER)



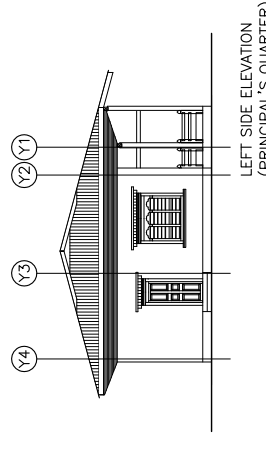
GROUND FLOOR PLAN
(PRINCIPAL'S QUARTER)



SECTION
(PRINCIPAL'S QUARTER)

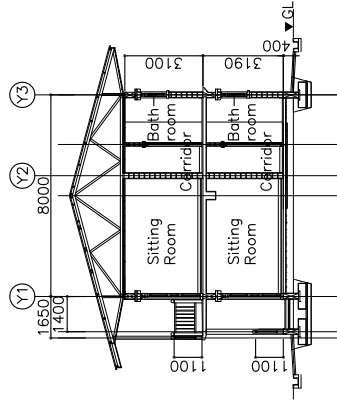
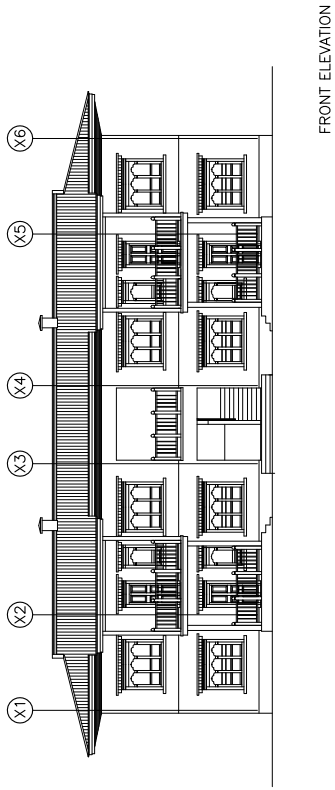
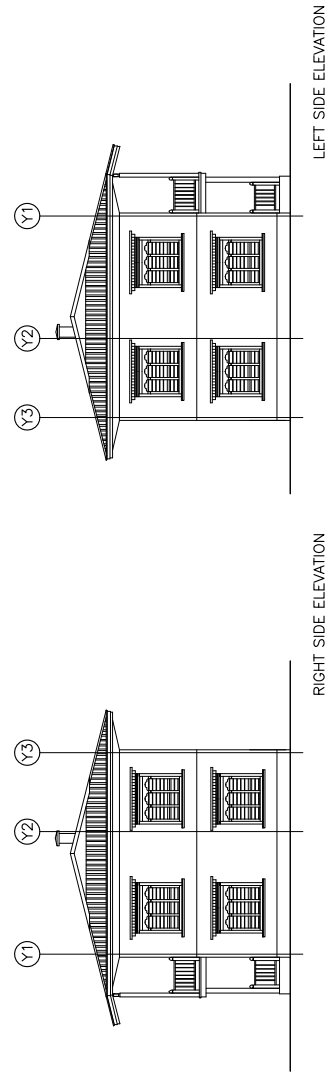
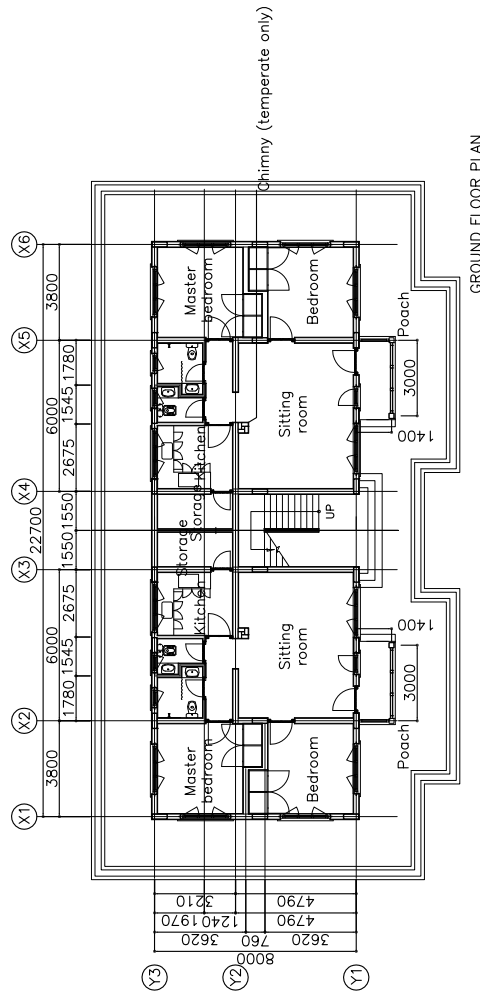
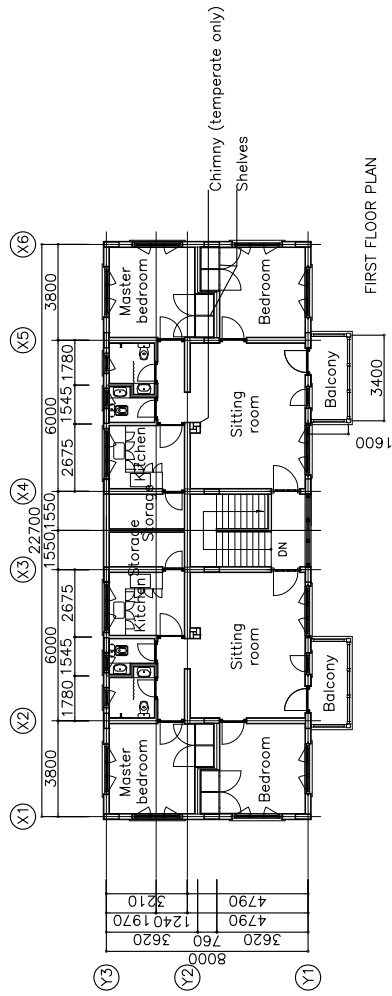


FRONT ELEVATION
(PRINCIPAL'S QUARTER)



LEFT SIDE ELEVATION
(PRINCIPAL'S QUARTER)

FLOOR PLAN, ELEVATION, SECTION
(PRINCIPAL'S QUARTER/
WARDEN, MATRON'S QUARTER) S=1:300



FLOOR PLAN, ELEVATION, SECTION
STAFF QUARTER
S=1:300

(3) Furniture List

Block	Room	Site/School			Kabjisa	Pakshikha	Phobjikha	Darla	Total			
		Number of Classroom	Number of Hostel Room									
					20	16	20	16	72			
					0	24	16	0	40			
		Furniture Name	CODE	Size - Specification	/room	Quantity						
Classroom Block	Classroom	Teacher Table	TA-06	W1170xD600xH720	Pipe frame+wooden top	1	20	16	20	16	72	
		Teacher Cahir	CH-05	W440xD525xH875	Wooden, cloth cover	1	20	16	20	16	72	
		Desk B-Type	DE-02	W1100xD450xH540	Pipe frame+wooden top	18	72	72	72	72	288	
		Desk C-Type	DE-03	W1200xD500xH600	Pipe frame+wooden top	18	72	36	72	36	216	
		Desk D-Type	DE-04	W1200xD500xH700	Pipe frame+wooden top	18	72	36	72	36	216	
		Desk E-Type	DE-05	W1200xD525xH730	Pipe frame+wooden top	18	144	144	144	144	576	
		Stool B-Type	ST-02	300x300xH320	Pipe frame+wooden seat	36	144	144	144	144	576	
		Stool C-Type	ST-03	300x300xH370	Pipe frame+wooden seat	36	144	72	144	72	432	
		Stool D-Type	ST-04	300x300xH400	Pipe frame+wooden seat	36	144	72	144	72	432	
		Chair-E Type	CH-04	SW350xSH452xH782	Pipe frame+wooden seat/back	36	288	288	288	288	1152	
		Green Board	BD-10	W2400xH1200	Commercial item	1	20	16	20	16	72	
		Cloth Notice Board	BD-05	W1800xH1200	Commercial item	1	20	16	20	16	72	
		Administration/Library Block	Principal's office	Full Executive Table	TA-01	W1800xD900xH765	Commercial item, steel	1	1	1	1	3
				Revolving Chair	CH-01	-	Commercial item, steel	1	1	1	1	3
Teacher Cahir	CH-05			See above		2	2	2	2	6		
Wooden Rack Type-3	SH-04			W1100xD300xH2000	Wooden open rack	2	2	2	2	6		
Wooden Rack Type-1	SH-02			W760xD300xH1260	Wooden open rack	2	2	2	2	6		
Half Executive Table	TA-02			W1500xD740xH715	Commercial item, steel	2	2	2	2	6		
Vice-principal's & general office	Revolving Chair		CH-02	-	Commercial item, steel	2	2	2	2	6		
	Teacher Cahir		CH-05	See above		4	4	4	4	12		
	Wooden Rack Type-3		SH-04	See above		2	2	2	2	8		
	Wooden Rack Type-1		SH-02	See above		4	4	4	4	12		
	Conference Table		TA-12	W1200xD600xH750	Wooden	6	6	6	6	18		
	Teacher Cahir		CH-05	See above		14	14	14	14	42		
Meeting room	Green Board		BD-10	See above		1	1	1	1	3		
	Teacher Table		TA-06	See above		24	24	24	24	96		
	Work Station Table		TA-11	W1100xD700xH720	Wooden, side cabinet	12	12	12	12	48		
	Teacher Cahir		CH-05	See above		36	36	36	36	144		
	Wooden Rack Type-1		SH-02	See above		17	17	17	17	68		
	Green Board		BD-10	See above		1	1	1	1	4		
Staff room	Wooden Rack Type-3		SH-04	See above		8	8	8	8	24		
	Reading Table		TA-14	W1400xD750xH720	Wooden	9	9	9	9	27		
	Wooden Chair		CH-07	W380xD400xH830	Wooden	36	36	36	36	108		
	Wooden Rack Type-1		SH-02	See above		5	5	5	5	15		
	Wooden Rack Type-3		SH-04	See above		36	36	36	36	108		
	Periodical Stand		SH-07	W1200xD400xH1200	Wooden	3	3	3	3	9		
Library	Card Catalogue		SH-09	W780xD470xH1250	Wooden	1	1	1	1	3		
	Counter Table		TA-13	W2100xD600xH1010	Wooden, L-shape	1	1	1	1	3		
	Book Trolley		SH-01	W600xD450xH900	Wooden, movable	3	3	3	3	9		
	Half Executive Table		TA-02	See above		1	1	1	1	3		
	Teacher Cahir		CH-05	See above		3	3	3	3	9		
	Wooden Rack Type-1		SH-02	See above		5	5	5	5	15		
Laboratory Block	Physics		Physics Lab. Table	TA-21	W1600xD1100xH970	Wooden, under table shelves	8	8	8	8	24	
			Lab. Stool	ST-05	300x300xH590	Pipe frame+wooden seat	36	36	36	36	108	
			Teacher Table	TA-06	See above		1	1	1	1	3	
			Teacher Cahir	CH-05	See above		1	1	1	1	3	
			Green Board	BD-10	See above		1	1	1	1	3	
			Cloth Notice Board	BD-05	See above		1	1	1	1	3	
	Biology	Biology Lab. Table	TA-20	W1600xD1100xH970	Wooden, under table shelves	8	8	8	8	32		
		Lab. Stool	ST-05	See above		36	36	36	36	144		
		Teacher Table	TA-06	See above		1	1	1	1	4		
		Teacher Cahir	CH-05	See above		1	1	1	1	4		
		Green Board	BD-10	See above		1	1	1	1	4		
		Cloth Notice Board	BD-05	See above		1	1	1	1	4		
	Chemistry	Chemistry Lab. Table		Building work						0		
		Lab. Stool	ST-05	See above		36	36	36	36	144		
		Teacher Table	TA-06	See above		1	1	1	1	4		
		Teacher Cahir	CH-05	See above		1	1	1	1	4		
		Green Board	BD-10	See above		1	1	1	1	4		
		Cloth Notice Board	BD-05	See above		1	1	1	1	4		
	Computer	Computer Table W	TA-PC	W2400xD1400xH720	Wooden, for 4 pupils	9	9	9	9	36		
		Wooden Chair	CH-07	See above		36	36	36	36	144		
		Teacher Table	TA-06	See above		1	1	1	1	4		
		Teacher Cahir	CH-05	See above		1	1	1	1	4		
		Green Board	BD-10	See above		1	1	1	1	4		
		Cloth Notice Board	BD-05	See above		1	1	1	1	4		
Preparation rooms	Teacher Table	TA-06	See above		1	4	4	4	15			
	Teacher Cahir	CH-05	See above		3	12	12	12	45			
	Wooden Rack Type-3	SH-04	See above		3	12	12	12	48			
	Lab. Cupboard	CB-06	W1200xD450xH1850	Wooden, glass doors	2	8	8	8	32			
Multi purpose hall	Dining Table	TA-24	W1500xD600xH700	Pipe frame+wooden top	60	-	60	60	120			
	Dining Bench	CH-09	W1500xD380xH400	Pipe frame+wooden seat	120	-	120	120	240			
Hostel	Bunk Bed	BE-01	L2000xW900xH1600	Pipe frame+wooden bed	8	-	192	128	320			
	Hostel Lockers	CB-01	W550xD600xH1670	Steel	8	-	192	128	320			
Warden/ Matron's Qtr.	Bunk Bed	BE-01	See above		3	-	6	6	12			
	Hostel Lockers	CB-01	See above		3	-	6	6	12			

2-2-4 Comparison between Japan's General Grant Aid and Grant Aid for Community Empowerment

The specifications for facilities in this Project were determined basically aiming to be equivalent to the local specifications (SPBD standard design). However, improvement was made in terms of strength, durability, effective use of interior space, and other performance factors, and comparisons were made between the local specifications and the specifications employed in the Japan's General Grant Aid Project from the standpoint of cost reduction before the selection of the specifications used in this Project. The following Table summarizes the specifications in the Japan's General Grant Aid Project, the specifications in the SPBD standard design, and the specifications used in this Project. The rationale for the selection of specifications is also described.

Table 2-8 Comparison of Specifications among SPBD Standards, Japan's General Grant Aid, and Grant Aid for Community Empowerment

Item		SPBD Standards	Japan's General Grant Aid	This Project	Rationale for Selection
Room dimensions and elements					
Class-room	Dimensions (center line of wall) m	7.0x6.9, 7.2x6.8	7.0x7.0	7.0x7.0, 7.2x6.8	In accordance with SPBD standard classroom
	Area m ²	48.3-49.0 (1.34-.36/person)	49.0 (1.36/person)	49.0 (1.36/person)	
Hostel	Dimensions (center line of wall) m	7.9x7.9	7.8x7.8	7.8x7.8, 7.4x8.2	Effective dimensions equivalent to SPBD standards (shape and dimension allowing conversion to classroom)
	Area m ²	62.4 (3.9/person)	60.84 (3.8/person)	60.68-60.84 (3.8/person)	
Story height of main blocks m		1F-3.19, 2F-3.10	3.20	1F-3.19, 2F-3.10	Air space equivalent to SPBD standards
Ceiling height of main rooms m		3.10 (2.78-2.79 beam to floor)	3.08 (2.70 beam to floor)	3.10 (2.69 beam to floor)	
Building style and structural specifications					
Structural design		Stone masonry (multi-purpose hall is RC framework)	RC framework structure	RC framework structure	Earthquake resistance and labor saving in construction works
Foundation work		Crushed stone and sand	Rubble concrete	Crushed stone and sand (partly rubble concrete)	Cost reduction for foundation work by locating building on the face of cut earth
Footing		RC + stone masonry continuous footing	RC independent footings + foundation beams	RC independent footings + foundation beams	Most rational footing considering structural design and ground conditions
Floor	Roof floor	None (wooden ceiling)	RC roof slab	None (wooden ceiling)	Local specifications pose no performance problems
	2F floor	RC slab + floor beams	RC slab + floor beams	RC slab + floor beams	Specifications suitable to structural design
	1F floor	Unreinforced concrete floor (t=100mm)	RC floor (t=120mm)	Unreinforced concrete floor (t=100mm), joint cutting	Ground conditions ensure that local standard specifications achieve sufficient durability
Wall		Stone masonry bearing wall, brick masonry curtain wall	Hollow CB curtain wall	Hollow CB curtain wall	Possibility of production using local materials and labor saving in construction works. (Bricks have to be imported.)
Roof truss	General	Wooden truss	RC posts + light-gauge steel roof truss	Wooden truss	Possibility of construction works by local workers and ease of on-site quality control
	Multi-purpose Hall	Steel truss + wooden sub-truss	Steel truss + wooden sub-truss	Steel truss + wooden sub-truss	Combination of efficient large-span frame construction and aesthetic design
Roof style		Half-hipped roof (gabled roof for toilet block)	Half-hipped roof (gabled roof for toilet block)	Half-hipped roof (gabled roof for toilet block)	Traditional style

Finish specifications					
Roof		CGI sheet	CGI sheet	CGI sheet	Local standards with ease of procurement and work. Methods have been established.
Eaves ceiling		Wood slat facing	Cement board	Wood slat facing	Cement boards has problems in durability and accuracy, despite the superiority in work efficiency
Internal wall		Lime mortar + painting	Cement mortar + painting	Cement mortar + painting Joint cutting	This is the most commonly used finish on CB wall, and is popular in Bhutan. (Joints for crack prevention is needed.)
External wall		Dressing stone masonry			
Openings	Door	Wooden panel door, double/single	Wooden panel door, double with large and small wings/single	Wooden panel door, double/single	Larger effective space is obtained when doors are kept fully open (as usual in Bhutan) .
	Window	Wooden inward-opening window	Aluminum one-side sliding window	Aluminum one-side sliding window (hostel, main educational blocks) , wooden inward-opening window (others)	Although costly, aluminum one-side sliding windows providing better durability, air tightness, and effective space use will be used in main areas
	Door and window frames	Wooden ornamented frame (inside & outside)	Wooden ornamented frame (only outside)	Wooden ornamented frame (inside & outside)	Required as a traditional element
Floor	Tropical zone	In-situ terrazzo floor	Terrazzo tiles	In-situ terrazzo floor	Ease of repair and quality control by local workers
	Temperate zone	Joists + wood flooring	Joists + wood flooring	Joists + wood flooring	Specifications suitable to climate conditions
Ceiling	Ceiling of lower story (slab face)	Thin mortar + painting	Thin mortar + painting	Thin mortar + painting	It is impossible to ensure the quality of exposed concrete surfaces after in-situ casting
	Ceiling of top story	Wood panel + semi-hard particle board + painting	RC roof slab, thin mortar + painting	Wood panel + semi-hard particle board + painting	Advantage in cost and a certain degree of heat insulation and waterproofing

RC: reinforced concrete
CB: concrete block

CGI: corrugated galvanized iron

2-2-5 Implementation Plan

2-2-5-1 Plan for Implementation by Procurement Management Agent

(1) Basic Issues of Project Implementation

The implementation of this Project will require a cabinet approval by the Government of Japan, which will take place after examination by relevant organizations in Japan based on this Report. Thereafter, signing of the Exchange of Notes (E/N) will take place. Based on the Agreed Minutes on Procedural Details (A/M), supplied as an attachment to the E/N, the Government of Bhutan and the procurement management agent in Japan will sign an agent agreement for entrusting the implementation of the Project. The procurement management agent, acting as the agent of the Government of Bhutan, will procure local firms who will execute the Project (detailed design and work supervision consultant, contractors, and specialized furniture suppliers).

(2) The Consultative Committee

After the signing of the E/N, both countries will establish a consultative committee for the purpose of discussion and coordination regarding the targets of assistance and the contents of the Project. The chair of the Consultative Committee will be the representative from the Government of Bhutan. In this Project, the Consultative Committee will be organized by Japanese Embassy in India and Bhutan's Ministry of Education, with participation of Bhutan's National Planning Commission. From the Japanese side, representatives from JICA Bhutan Office and the procurement management agent will participate as advisors.

(3) Implementation System in Bhutan

The responsible and implementing organization for this Project is Bhutan's Ministry of Education. The Ministry, under the control of the Secretary, will direct the Department of School Education (DSE) to take charge of the overall coordination and operation of the Project. DSE, in cooperation with relevant organizations such as Policy and Planning Division (PPD) of the Ministry, National Planning Commission, and the target Dzongkhags, will supervise the execution of works to be done by the Bhutanese side, the issuance of necessary permission and approvals, and the achievement of agreement of relevant organizations. Bhutan's Ministry of Foreign Affairs is the competent authority regarding the signing of the E/N between the two Governments related to the implementation of this Project.

(4) Procurement Management Agent

Based on the Agreed Minutes on Procedural Details (A/M), supplied as an attachment to the E/N, the procurement management agent will sign an agent agreement with the Ministry of Education, which is the implementing organization of the Project. The agent, according to this agreement, will select the detailed design and work supervision consultant, contractors, and specialized furniture suppliers, and will conclude a contract with each of them. To execute their services, the procurement management

agent will establish the following organization in Bhutan.

- Person in Charge of Project Management, Bid and Fund Management (Japanese) :
 - Acting as the representative of the procurement management agent in charge of the Project, conducts overall management of the Project, execution of bidding, and fund management related to the payment according to contracts;
 - Conducts the evaluation of bid and necessary reporting to relevant organizations regarding the progress of work and other issues; and
 - When a change in the scope of assistance or other alteration becomes necessary due to the condition of fund expenditure, defines the details of alteration through discussion with the Consultative Committee, coordinates activities and compiles alteration procedures.
- Person in Charge of Technical Management (Japanese) :
 - Assists the Project manager in the selection of consultant, contractors, and suppliers, conducts technical checks of ordering specifications and tender documents, and conducts technical evaluation of bids;
 - Supervises and guides the detailed design works by the consultant and confirms the products (drawings, specifications, BQs, and bid documents) ;
 - Confirms the work supervision plan of the consultant and provide necessary guidance and advice;
 - Check the execution of the consultant's work supervision appropriately through periodical reports and site inspections and provide necessary guidance, advice, and instruction for improvement; and
 - Inspects and accepts the reports of the inspection of work progress, completion inspections, and defect inspections performed by the consultant, and confirms the contents of the reports.

In implementing the Project, the procurement management agent receives necessary support from SPBD, the technical division of the Ministry of Education managing school construction, regarding technical aspects such as technical evaluation related to the selection of consultant, contractors, etc., legal examination of the contracts, review of the contents of detailed design.

(5) Detailed Design and Work Supervision Consultant

Following the service agreement with the procurement management agent, the detailed design and work supervision consultant compiles the detailed design and bid documents and assists the procurement management agent in practical aspects of bidding. The consultant appoints supervisors to be stationed full time at project sites, and conducts work supervision during works using these supervisors.

(6) Contractors and Furniture Suppliers

Following the work and procurement contracts with the procurement management agent, contractors

and furniture suppliers execute construction works and procurement of furniture according to the contract documents within the terms of execution.

(7) Project Implementation Organization

The project implementation organization described above is summarized in the diagram below.

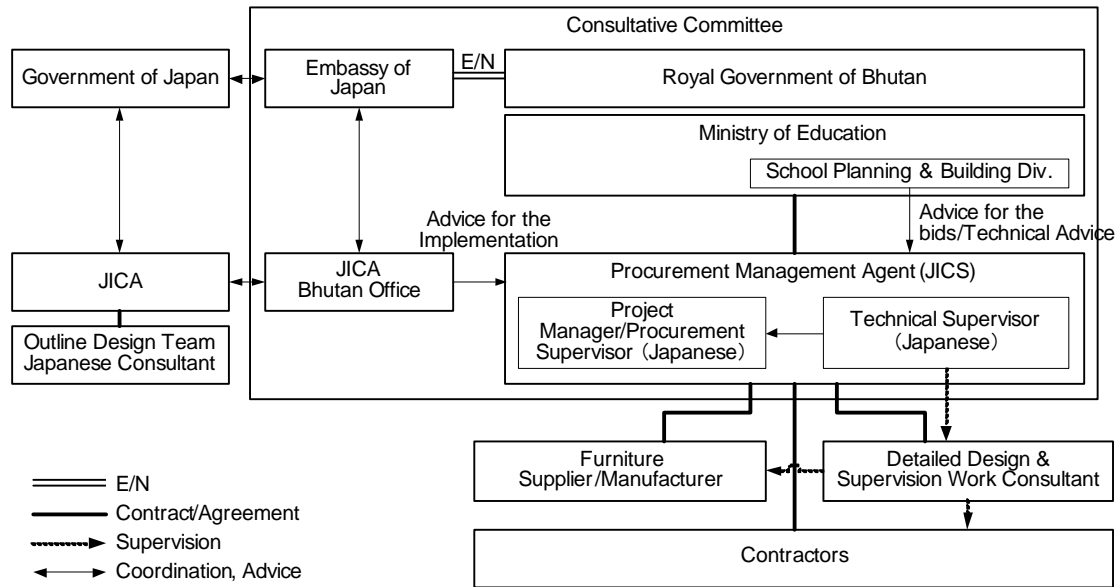


Figure 2-1 Diagram of Project Implementation Organization

2-2-5-2 Precautions in Construction and Procurement (Contract, Dispute Settlement, Etc.)

1) Labor Conditions

Construction works in Bhutan are mostly implemented by use of Indian workers as the major workforce. In particular, the use of Indian skilled workers is indispensable for the implementation of steel frame construction and steel sash construction that are not common in the country. Since the number of foreign workers permitted to be employed is limited in accordance with the contract amount and the permission of the Ministry of Labor and Employment needs to be obtained, it is necessary to review the process scheduling of contractors at the contracting stage of construction to ensure an appropriate labor procurement plan has been prepared and that necessary procedures have been taken.

2) Transportation Conditions

Most of the highways are mountain roads that are frequently blocked due to landslides or rock falls during the rainy season. Although most of the blocked roads will be opened to traffic within one day, the construction period needs to be set with a sufficient period allowing for the transportation of materials because there are no bypass routes. In particular, imported products, without domestic stock,, may be held up for a long time due to traffic situations in India, Thus, special materials such as steel

frames need to be flexibly procured with sufficient timing buffer.

3) Financial Capability of Contractors

The financial strength of contractors involved in construction works in Bhutan is far from sufficient with both the capital and the annual sales being less than 3 million Nu (approximately 100 million yen) even for A-rank registered contractors. It is necessary to divide the contract into sufficiently small lots as well as subdivide the payment terms to ensure smooth payment and prevent delay in procurement of material or labor due to lack of funds.

4) Delay in Construction

The construction schedule is delayed from the contracted period in most cases of construction works in Bhutan. Major factors for the delay include (1) delay in procurement of materials due to lack of funds or blockage of traffic, (2) difference in the quantities of site development works between the plan and the actual work, (3) design change in the midst of construction, and (4) limitation on the number of foreign workers permitted. The progress control needs to be ensured to avoid any delay, such as by making detailed designs to minimize the design change during the construction, and by taking the above-mentioned measures against factors (1) and (4). In addition, it is imperative for permanent supervisors need to periodically grasp the progress to take necessary measures at an appropriate timing and minimizing indiscriminate extension of the construction schedule.

5) Tax Exemption Procedure

The customs duty and the Bhutan sales tax will be refunded by applying for the refund to the Revenue & Customs Office with a certificate of the procurement management agent obtained from contractors. On the other hand, the contractor's tax, which corresponds to the corporate income tax, is not exempted and needs to be paid in accordance with the amount paid. While it is generally paid by the client to the tax authorities by withdrawing the tax deducted at source from the amount paid, it is also possible for contractors to pay the tax under their responsibility while the client (procurement management agent) submit only the detailed payment information and the certificate. Treatment of tax exemption and Contractor's tax must be described in contracts.

6) Contract and Dispute Settlement

In Bhutan, the procedures for settling construction works disputes must be (1) settled by consultation between contract parties, (2) reconciled by an arbitrator, or (3) settled by the court., in this order. Most of actual disputes are settled by consultation or conciliation and few cases are brought into the court. In addition, there are few appropriate lawyers specialized in contracts or lawsuits relating to construction.

It would be appropriate to settle disputes, which cannot be settled by consultation, through the arbitration of the Construction Arbitration Committee established under the Construction Development Board as a dispute arbitration body for construction works. Because the Construction Arbitration Committee includes representatives from the SPBD of the Ministry of Education and is a

body with abundant experience in contract practices, it is effective to obtain supports of the SPBD for legal aids in contracting or disputes.

2-2-5-3 Lot Splitting of a Contract, Bidding Plan

(1) Lot Splitting Plan

Given the upper limit of the appropriate construction size estimated from the financial and the construction capacity of the local contractors at 2,000 m² to 3,000 m², the Ministry of Education, contracts large projects exceeding this limit at one site into several packages. The lot splitting of a contract into appropriate sizes not only reduces the risk of delay in construction due to the shortage of construction capacity but also improves the quality of construction and so on through competition resulting from the construction performed by several contractors at the same site. In this Project, the concrete details will be planned as shown in the following table with the contract split into lots of approximately 3,000 m² in principle. In addition, in order to shorten the entire process of the Project, the construction for the Kabjisa MSS, on which the top priority is placed, will be split into different lots for the site development works and the construction of the facilities, and the site development works will be planned to start ahead at the stage where the detailed layout design has been completed.

Table 2-9 Lot Composition of the Construction Works

Project Site	Lot No.	Type of Work	Component of Work	Educational					Residential					Total Floor Area by Lot m ²	Total Floor Area (cumulative) m ²		
				4-Classroom block	8-Classroom block	Admi. & Library block	Laboratory block	Toilet block	64-bedded hostel	96-bedded hostel	Kitchen & store block	Warden's/matron's quarter	Principal's quarter			Staff quarters	Multi purpose hall
Kabjisa MSS	1	Site development															
	2	Building work	All components	1	2	1	1	2					1	1	9	2,769.52	
Pakshikha MSS	3	Site development /Building work	Educational facilities	2	1	1	1	2			1				1	9	2,915.07
	4	Site development /Building work	Residential facilities							4		2	1	1	8	3,221.62	
Phobjikha MSS	5	Site development /Building work	Educational facilities	1	2	1	1	2							1	8	3,056.93
	6	Site development /Building work	Residential facilities							4	1	2	1	1	9	2,618.08	14,581.22
Darla MSS	7	Site development /Building work	Components of priority a/b	2	1		1								4	1,474.24	16,055.46
Bitekha MSS	8	Site development /Building work	Components of priority a/b	1		1	1			2					5	2,058.00	18,113.46

* Lot 8 will be planned as a spair in preparation for a change in the scope of the Project at the stage of implementation.

(2) Bidding Plan

The bidding will be executed as an international competitive bidding in accordance with the procurement guidelines of the Ministry of Foreign Affairs of Japan and the JICS Procurement Guidelines in consideration of the local general procedures and conditions.

1) Detailed design/work supervision consultants

There are several architectural/civil engineering consultant offices in Bhutan that have experience in the design work relating to educational facilities and can provide the detailed design/work supervision services for projects of sizes comparative to this project. In this Project, from the perspective of the efficiency and the integration of service contents, the entire process from detailed design to work supervision will be entrusted to a single consultant selected by a proposal in the manner of the method adopted by the Ministry of Education. The selection will be implemented in the following procedure.

- Public announcement of proposals and submission of letters of interest
- Pre-qualification, preparation of short list
- Distribution of the terms of reference (form of proposal, form of agreement, etc.)
- Evaluation of the proposals (technical evaluation - 60%, cost evaluation - 40%)
- Negotiations, agreement

2) Contractors

Contractors will be selected by open bidding among qualified bidders, as in the manner of the local public procurement. In Bhutan, there is a rank-specific contractor registration system by an official body and it is common that national bidding will be implemented with the qualification for participation in the bidding restricted by designating the rank of bidders without any pre-qualification procedure. International biddings held by other donors are also implemented with requirements for qualification, such as financial status, work experience, machines and materials in possession, and personnel qualifications, provided and examined at the time of the bidding. Because this Project requires considerable period for the construction works and hence the time required for the bidding needs to be streamlined as much as possible to contain the entire progress of the project work within an appropriate time frame, it is appropriate to implement the bidding by the method of examining the requirements for qualification at the same time as the bidding.

3) Furniture suppliers

The school furniture will be procured through an open bidding by qualified bidders for furniture manufacturers and/or furniture suppliers following standard procurement practices in Bhutan. The furniture required at all the sites will be procured in a lump sum in consideration of the production capacity and the technical capability of the local suppliers.

2-2-5-4 Detailed Design/Work Supervision Plan

The consultant firms, who will take charge of the detailed design and the work supervision for this Project, will conclude a agreement with the procurement management agent and execute their services under the guidance of the Japanese engineers of the procurement management agent. In executing the services, the consultant will develop the detailed design and prepare required bid documents in close consultation with the implementation body, Ministry of Education, as well as in due light of the points of this outline design. In addition, the consultant firms will dispatch resident supervisors to each site to provide supervision and guidance for the contractors and to implement various inspections at the stage of construction, maintaining communication with relevant organizations including the Ministry of Education and the Dzongkhag Education Offices. The services and the implementation scheme of the consultant are as follows.

1) Detailed design Stage

At detailed design stage, the consultant will carry out the following works with engineers specialized in architectural, structural, and electrical design; draftsmen; and quantity surveyors allocated under the management of the Project manager.

- Consultation on the specifications for the detailed design: At the start of the detailed design, the contents of the outline design will be sufficiently understood and detailed specifications will be reviewed in consultation with the Japanese engineer of the procurement management agent and SPBD of the Ministry of Education.
- Site inspection: Each site will be surveyed to reconfirm the details of the layout plan in the outline design (topographic features, condition on infrastructures, etc.). In addition, the soil condition will be visually observed and, if it is considered that there is a problem in securing the design bearing capacity of soil (150kN/m²), geological survey (plate bearing test, etc.) will be conducted.
- Preparation of detailed layout plan: Building layout plans, site reclamation plans, and external work plans will be prepared at a detail level required for the estimation and construction of the site development works and the external work in light of the result of the site inspection.
- Preparation of detailed design drawings: Design drawings (architectural, structural, sanitary and electrical drawings) for the respective planned facilities will be prepared at a detail level required for the estimation and construction in conformance with the standard design of the Ministry of Education. In the preparation, efficient execution will be ensured by making the maximum use of the outline design and the data of the standard design of the Ministry of Education.
- Preparation of technical specifications: Complementary specifications particular to this Project will be prepared by using the standard specifications of the Ministry of Works & Human Settlements and SPBD in principle.

- Preparation of bill of quantities: A bill of quantities (BQ) will be prepared using the data of the outline design or the standard design of the SPBD, reviewed based on the design documents prepared.
- Preparation of contract documents: Contract documents consisting of the invitation for bids (including general conditions), particular conditions, descriptions of works, forms of contract, and bid forms will be prepared with reference to the draft contract conditions of the outline design. The contract documents for each lot of construction works and for procurement of furniture will be required.
- Assistance for bidding: Assistance will be provided on the practical aspect of the bidding implemented by the procurement management agent.

2) Work Supervision Stage

At the work supervision stage, the consultant firms will execute the following services with full-time supervising engineers dispatched to each site under the management of the Project manager.

- Preparation of standard documents for work supervision: In order to implement the work supervision at different sites in an integrated manner, a form of checklists, test reports and inspection reports will be prepared with the focus points for work supervision.
- On-site supervision: Supervising engineers will be based at the sites to engage in inspections for quality assurance, observation of the progress of work, and security of construction works and to periodically report the results to the procurement management agent.
- Visiting supervision: A roundup supervisor will be assigned to periodically travel to all the sites to manage the progress of the entire project and to provide instructions to the full-time supervisors to ensure a uniform quality.
- Spot supervision: Engineers specialized in architectures, structures, and electric installations will be dispatched on a spot basis in accordance with the progress of construction to instruct the full-time supervisors and to conduct major inspections relating to their respective specialized fields.
- Piecework inspection: A piecework inspection will be conducted with instructions obtained from the procurement management agent in response to the request for payment from contractors and the result will be reported to the procurement management agent.
- Completion inspection: A completion inspection will be performed at the completion of the construction and the result will be reported to the procurement management agent.
- Defect inspection: A defect inspection will be performed at the expiration of the defect liability period and, if any defects are detected by the inspection, repair works performed by the contractors will be supervised. In addition, the inspection results will be reported to the procurement management agent.

The work supervision scheme assumed for this Project is as shown in the following diagram.

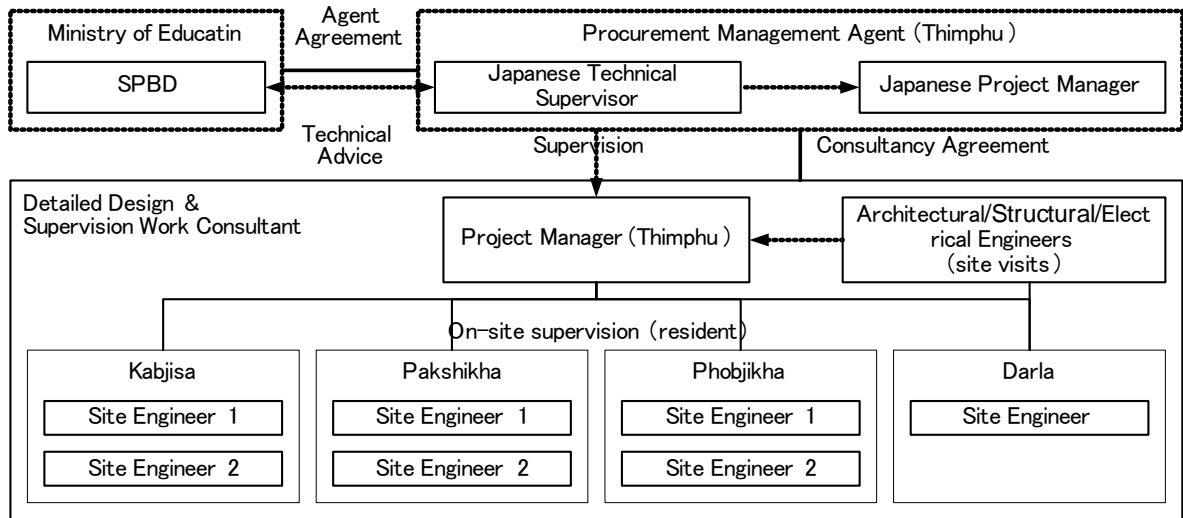


Figure 2-2 Work supervision Scheme

2-2-5-5 Quality Control Plan

The facilities in this Project will be constructed by local contractors in compliance with the local standard design and the local construction method. The quality control will be implemented in accordance with the following standards with emphasis on the structural parts that impact the basic performance such as strength and durability with a consideration not to excessively burden the local consultants and contractors. The test methods, material standards, and such shall be as per the Indian Standard (IS), the Specifications for Building & Road Works issued by the Standards & Quality Control Authority, Ministry of Works & Human Settlements, or the SPBD Specifications for Civil/Electrical Works of the Ministry of Education that are generally applied in Bhutan.

Table 2-10 Quality Control Items

Item	Method	Governing standard, etc.
Ground	<ul style="list-style-type: none"> After the excavation, the ground condition at the design excavation level will be visually inspected. Where it is likely that the bearing capacity of soil fall short of the required level (150kN/m²), the bearing capacity of soil will be tested by the standard penetration test or the plate bearing test. 	
Building site	<ul style="list-style-type: none"> The site will be inspected in the presence of the consultants and the contractors by use of survey equipment with benchmarks established and a rope stretched around the building site. 	
Reinforcing bars/steel profiles	<ul style="list-style-type: none"> The quality will be verified by reviewing the mill sheets by suppliers and types. To be stored by bundling by types on a platform established at a level 150 mm or higher above earth. 	IS-1786
Inspection of arrangement of re-bars	<ul style="list-style-type: none"> The arrangement of re-bars will be inspected visually in the presence of the consultants and the contractors before the concrete placement for the quantity, position, and accuracy; types of fittings and embedment length; and the installation condition of spacers. 	
Cement	<ul style="list-style-type: none"> The quality will be verified with test result reports obtained from manufacturers. To be stored in a pile with a maximum of eight layers on a wooden floor established at 150 mm to 200 mm above earth in a lockable roofed warehouse. 	IS-269
Aggregate	<ul style="list-style-type: none"> The particle size distribution will be investigated by a sieving test using an IS-compliant sieve. To be visually inspected for the maximum particle size, silt content, water content, etc. every time upon delivery. To be stored on a floor constructed with lumber, steel plate, brick, plastic sheet, or such, in a compartment divided by types. 	IS-2720
Concrete	<ul style="list-style-type: none"> The concrete will be mixed by volume in the standard formulation without specifying the design mix and will be matured in the trial mix for 28 days to assess whether it has the prescribed strength. The water volume will be determined by implementing a slump test at every placement and will be controlled under the maximum value specified in the specifications. Two sets, six samples (15cm X 15 cm) of the concrete cubes will be collected for testing 7days/28days compressive strength at an authorized laboratory to make sure that the average strength of the three samples for 28 days exceeds the design strength. The temperature will be measured at the site and the concrete placement will not be implemented in principle when the ambient temperature is lower than 4.5°C. 	Standard specifications IS-7320 IS-516 Standard specifications
Concrete blocks	<ul style="list-style-type: none"> The prescribed strength will be assessed by performing a compressive strength test at a factory or a authorized laboratory. However, given that the concrete blocks will be used for a non-bearing wall, the test shall be performed once for each manufacturer. To be stored piled up with a maximum height of 1.2 m covered with a plastic sheet. 	IS-2185
Timber	<ul style="list-style-type: none"> To be stored piled with a space of 25 mm or more provided between the layers on a platform established at 150 mm or higher above the floor. The timber will be naturally dried for four to six weeks per thickness of 25 mm after transportation into the site. The moisture content of the timber processed at site will be controlled at 18% to 20% maximum. 	Standard specifications

The above major control items will be summarized as a check sheet to be used across all sites by the work supervision consultant in advance, reviewed both by the full-time supervisors of the consultants and by the engineers of the contractors at each phase, and stocked by filing.

2-2-5-6 Material Procurement Plan

The construction equipment and materials to be used for this Project conform to the local specifications and standards, and most of them are materials commonly used for construction of schools and can easily be procured domestically. However, since the aluminum products will be imported from neighboring countries, these orders need to be placed at an appropriate time with proper procurement management so that a delay in procurement may not pose a problem to the construction schedule.

Table 2-11 Procured Material Classification Table

Material	Local procurement	Procurement from a third country	Remarks
Sand/aggregate	○		High quality river sand and aggregate/crashed stones are produced abundantly.
Cement	○		Domestic Portland cement is stably supplied.
Reinforcing bars/steel profiles	○ (General-purpose item)	○ (Special-purpose item)	Reinforcing bars and general-purpose steel profiles are locally procurable. The assembled products such as truss will be procured from India.
Scaffolding materials	○		Steel panel scaffolds and domestic plywood are available.
Concrete block	○		With two factories located in the country, there are no problems in the quality and the supply quantity.
Timber	○		Domestic timber is abundantly available. Sawing and processing of timber is generally done at site.
Aluminum windows		○	To be procured from India or Bangladesh.
Roof material	○		Galvanized corrugated steel sheets are widely distributed and easily procured in the country.
Paint	○		Both general paints (import item) and traditional paints can be locally procured.
Wiring/piping materials	○		Import items will be locally procured.
Plumbing/mechanical/electrical equipment	○		Import items will be locally procured.
Furniture (Wooden/steel)	○		Manufacturable at a domestic factory and locally procurable with no problems.

2-2-5-7 Implementation Schedule

In the case that this Project is approved to be implemented under the grant aid of the Government of Japan, the Project will be implemented through the following stages after the exchange of notes (E/N) is concluded between the two countries.

Table 2-12 Required Items in the Implementation Schedule

Item	Description	Required period
1. Agent agreement	Conclusion of agent agreement, preparation for the start of service including the setup of the office and accommodations	1.0 month
2. Selection of consultants	Selection of consultants by the proposal and conclusion of an agreement	2.0 months
3. Detailed design	Site inspection, and development of detailed designs, specifications, BQ, and contract documents	4.5 months
4. Selection of contractors	Selection of contractors by open bidding with qualification requirements provided, and conclusion of contract (bidding will be implemented with the work divided into seven lots)	2.5 to 3.0 months/Lot
5. Construction of facilities	Preparatory works (1.0 month) , site development/retaining wall construction (2.0 to 8.5 months depending on the description of work) , facilities construction works (12.5 to 18 months)	14.5 to 21.5 months/site
6. Selection of furniture supplier	Selection of the supplier by open bidding with qualification requirements provided, conclusion of contract (one company)	2.5 months
7. Furniture procurement	Manufacturing/procurement of furniture (4.0 months/site) — transportation/installation (2.0 to 3.5 months according to the procurement size and the transportation distance)	12.0 months in total

Since this Project is a construction work where several buildings will be constructed collectively including the site development, the standard construction period at each site exceeds 20 months. In order to contain the entire progress of the Project within an appropriate time frame, it is necessary to start the construction as early as possible and to implement the major construction lots concurrently with appropriate fund management. In light of the above requirements, the implementation schedule at the stage of construction will be planned in accordance with the following principles.

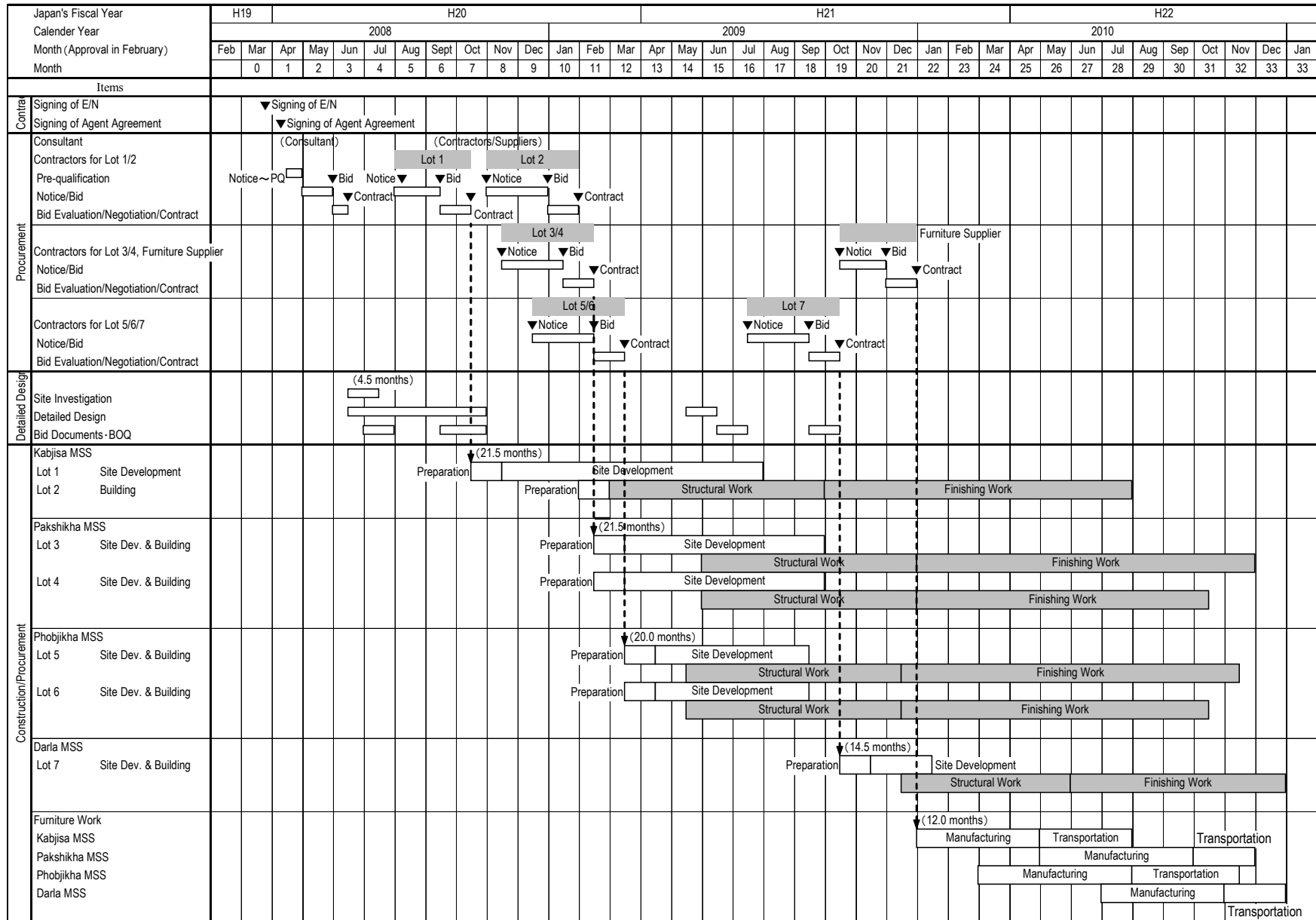
- The site development work and the retaining wall construction will be separated for the Kabjisa MSS, which include a massive construction quantity, and the order for the site development work will be placed ahead at a stage where the detailed layout design associated with the relevant site has been completed.
- For the major construction lots, Lots 2 to 6, orders will be placed in turn by sites with the time staggered by approximately one month in light of the progress of the bidding to be performed by the procurement management agent.
- The order for Lot 7 and the furniture procurement will be placed at a stage where the site development and foundation work for major lots, for which changes in the construction quantities are expected to result in increase or decrease in the amount to be settled, have been completed, in preparation for the adjustment of funds for the latter stage of the Project.

Table 2-13 Lot Ordering Time

Bid Stage	Project Site	Lot No.	Type of Work	Size of Bidding Lot				Remarks	
				No. of block	Total floor area m ²	% of total floor area	% of Project cost		
1	Kabjisa	1	Site development		-			In order to shorten the entire progress of the project work, only the site development works will be ordered ahead.	
2	MSS	2	Building work	9	2,769.52	17.2%	21.2%		
		Pakshikha MSS	3	Site development/Building	9	2,915.07			
	Phobjikha MSS	4	Site development/Building	8	3,221.62	38.2%	37.0%		
		5	Site development/Building	8	3,056.93				Simultaneously ordered
6	Site development/Building	9	2,618.08	35.3%	31.2%				
3	Darla MSS	7	Site development/Building	4	1,474.24	9.2%	6.8%	To be ordered after the site development works of the previous lot has completed.	
	All Sites	-	Furniture Procurement	-	-	-	3.8%		

The table on the following page shows the project implementation schedule with the above schedules summarized.

Table 2-14 Project Implementation Schedule



2-3 Obligations of the Recipient Country

The undertakings to be taken by the Bhutanese side associated with the implementation of this Project are as follows:

- 1) To secure land necessary for the construction of facilities and disassembly/removal of obstacles including existing buildings as needed.
- 2) To prepare temporary buildings to be used during the construction works as needed.
- 3) To construct/improve access roads required for the construction works as needed.
- 4) To construct/improve external facilities not included in the Project such as boundary fences, gates, and sports fields as needed.
- 5) To provide facilities for the distribution of water supply from the water source to the site including connection to the water reservoir tank.
- 6) To provide facilities for the distribution of electricity (four three-phase lines, 220/440V) into the sites with installation of transformers and incoming panels in case of sites receiving high-voltage power.
- 7) To secure proper budgets and personnel required for appropriate and effective operation and maintenance of the facilities provided under the Project.
- 8) To procure general furniture, equipment, fixtures, and supplies not included in the Project.
- 9) To provide necessary measures to ensure the safety of the Japanese personnel engaged in the Project.
- 10) To provide necessary facilities to the Japanese and third country personnel engaged in the Project for their entry into Bhutan and stay therein.
- 11) To exempt customs duties, domestic taxes including Bhutan Sales Tax, and other taxation imposed in Bhutan for the operators engaged in the Project.
- 12) To ensure smooth discharging, tax exemption procedures, and customs clearance procedures for the equipment and materials procured under the grant aid.
- 13) To bear the commissions to the Japanese bank for banking service based upon the Banking Arrangement.
- 14) To obtain permits and approvals required for the implementation of the Project such as environmental clearance and building permits.

The implementation body for the obligations on the Bhutanese side, the Ministry of Education, has experienced implementation of a Japanese grant aid project and has already implemented a part of obligation works at the two sites in Kabjisa and Pakshikha expected in the general grant aid.

Accordingly, the Ministry of Education is considered to be free from particular problems in implementing the above obligations.

Table 2-15 shows the details of the works to be borne by the Bhutanese side. Of these, the development of access roads for construction vehicles and the removal or relocation of existing structures obstructive to the construction works need to be completed before the commencement of the construction works at the sites concerned. In addition, it is required to plant the slope appropriately after the completion of the facilities for the sake of conservation of the ground where the site was developed.

Table 2-15 Site-specific Obligation Works of the Recipient Country

Item	Site	Description
Items to be implemented before commencement of the construction		
Removal/relocation of existing structures, etc.	Kabjisa	Removal of 1 existing water reservoir tank, 1 utility pole, and electric wires (all not in use)
	Darla	Removal of existing 3 1-storied class room buildings and the retaining wall
	Phobjikha	Relocation of a part of the existing buried water supply pipes (approximately 250 m)
Access road improvement	Kabjisa	Gravel pavement of a part of access road connecting the main road and the site (approximately 1 km)
	Phobjikha	Construction of an access road/bridge connecting the neighboring road and the site (approximately 75 m)
Items to be implemented before the completion of the construction		
Electric lead-in/connection	Pakshikha	Electric lead-in for an area of approximately 150 m in length from the neighboring feeding point (required capacity: 300 kVA)
	Phobjikha	Electric lead-in for an area of approximately 200 m in length from the assumed feeding point (required capacity: 300 kVA; if the region is not electrified before completion of the construction works, a generator will be installed.)
Water service connection	3 sites	Water connection for areas from the water sources to the water receiving tanks within the sites (approximately 0.5 km of Kabjisa, approximately 3.5 km for Pakshikha, approximately 1.5 km for Phobjikha)

2-4 Project Operation/Maintenance Plan

2-4-1 Operation plan

In Bhutan, decentralization of educational administration is underway. While the Ministry of Education takes charge of planning and coordination in relation to the national level education plannings, facilities development, allocation of human resources, etc., the Dzongkhag Education Office will take charge of the actual operation and management of primary and secondary education. In the Dzongkhag Education Office, the District Education Officer (DEO) and the Assistant DEO (ADEO) are assigned to be engaged in supervision/guidance of the operation and management of schools, assignment of teachers, distribution of students, and budget allocation at the dzongkhag level. For secondary education, however, every school is operated with a certain level of independence except for assignment of teachers, distribution of teaching materials, etc., which are directly controlled by the Dzongkhag, and the operating budget is also allocated on the school by school basis.

Each school is operated with teachers and other staff headed by the school principal. In addition, the School Management Board (SMB) is organized with the school principal, the Gweog Head, regional influential people, representatives of parents, teachers, and so on as members, to discuss and determine basic issues associated with school management such as operation plans and budgeting, and to settle various problems including development and maintenance of facilities in cooperation of the schools. The facilities developed in this Project will also be operated and maintained under the control of the DSE of the Ministry of Education and the Dzongkhag Education Office, by the joint effort of the teachers and other staff of the schools and the School Management Board with the school principals at the core.

Teachers in primary and secondary schools in Bhutan are allocated based on the following criteria.

- The number of students per teacher shall be less than 32 in principle.
- The single teacher per-grade plan shall be adopted for grades up to PP-III, where class teachers are responsible for all the subjects. The departmental plan shall be adopted for grades IV or higher, where one teacher is responsible for two or more subjects.
- One teacher shall be responsible for 34 periods or more/week (the principal and vice principal shall be responsible for 12 periods or more/week and 22 periods or more/week, respectively).

Furthermore, in secondary-level schools, support staff members are assigned in addition to teachers to assist with the school management. In the case of the five secondary schools (two LSS schools, three MSS schools) where the site inspection was implemented, the support staff typically consists of an office assistant, a library assistant, laboratory assistants (one for a LSS and two for a MSS), and a caretaker for schools without boarding facilities; also with a warden and/or matron (often served concurrently by teachers) and cooks with boarding facilities, whose salaries are provided from Dzongkhag educational budget. In the Darla MSS, one of the schools targeted in this Project, a staff member called Multi Skilled Instructor (MSI) is assigned to engage in development and daily

maintenance of school facilities as well as providing technical-education guidance to students through the Vocational Club, etc.

In this Project, since classrooms and hostels are newly established or extended, additional teachers and other staff of schools need to be assigned to operate and maintain those facilities in a proper manner. The number of teachers and other staff of the schools will be planned based on the following criteria.

- Teachers: One teacher for 32 students will be assigned in accordance with the guideline of the Ministry of Education.
- School staff: In addition to the standard staff for the existing secondary schools, 1 MSI, who will play a central role in the maintenance, and 3 laboratory assistants including a staff member, who will assist the operation and maintenance of the newly established computer room, will be assigned to the respective schools.

As shown in the estimation result (Table 2-16), an increase of 38 teachers and 25 support staff is necessary to operate the facilities developed in this Project. As for the increase in teachers, 1 principal will need to be assigned to the newly established school in Pakshikha, and teachers with appropriate qualifications need to be assigned to the respective schools in accordance with the number of classes by the educational levels.

Table 2-16 Number of Teachers and School Staff Newly Required for the Project

School	Kabjisa MSS			Pakshikha MSS			Phobjikha MSS			Darla MSS		
	Projected enrolment: 720			Projected enrolment: 576			Projected enrolment: 720			Projected enrolment: 1,265		
Type of personnel	Number of teachers and school staff			Number of teachers and school staff			Number of teachers and school staff			Number of teachers and school staff		
	Existing	Planned	Newly employed	Existing	Planned	Newly employed	Existing	Planned	Newly employed	Existing	Planned	Newly employed
Teachers	20	23	3	0	18	18	14	23	9	32	40	8
Staff												
Office assistant	1	1	0	0	1	1	0	1	1	2	2	0
Lib. assistant	1	1	0	0	1	1	0	1	1	1	1	0
Lab. assistant	1	3	2	0	3	3	0	3	3	2	3	1
MSI	0	1	1	0	1	1	0	1	1	1	1	0
Warden/Matron	0	0	0	0	2	2	0	2	2	0	0	0
Cook	2	0	-2	0	3	3	0	3	3	0	0	0
Caretaker	1	1	0	0	1	1	1	1	0	2	2	0
Total	6	7	1	0	12	12	1	12	11	8	9	1
Grand total	Number of teachers required: 38						Number of staff required: 25					

The number of teachers employed in public ordinary schools in Bhutan increased significantly in excess of the increase in the number of students from 2006 to 2007, by 8.2% against 3.9%. With the number of graduates from the National Institutes of Education amounting to 491 (2006), a sufficient

number of newly employed teachers are available. Accordingly, it should be easy to acquire teachers required for this Project. In addition, with the number of teachers all over the country and in the target Dzongkhags already exceeding the number of teachers specified in the guideline of the Ministry of Education, i.e. one for 32 students, it is also possible to cover the required teachers without entailing additional budget by appropriately re-assigning the existing teachers.

Table 2-17 Existing Number of Teachers Assigned to the Dzongkhags Targeted by the Project

Dzongkhag	Number of students (in public schools as of 2007) [A]	Number of teachers (in public schools as of 2007) [B]	Number of students per teacher [A]/[B]	Number of surplus teachers against the ratio of standard number of students/teacher [B]-[A]/32
Punakha	4,639	186	24.9	41
Chukha	14,778	490	30.2	28
Wangdue	7,418	275	27.0	43
National total	146,046	5,027	29.1	463

Source: General Statistics 2007, Ministry of Education

2-4-2 Maintenance Plan

The daily maintenance of the school facilities will be implemented under the command of the school principal with the participation of teachers, other school staff, and students. In a school with a Multi Skilled Instructor (MSI), the maintenance of the buildings, facilities, furniture, will be implemented under the guidance of the MSI. In addition, the School Management Board including parents and regional relevant parties as members will provide support for the development and the maintenance of the facilities as needed.

Although no special techniques are required to operate and maintain the facilities developed in this Project, in order to maintain the buildings in a favorable condition for the long term, it is necessary to perform daily cleaning and inspections and appropriate repair against wear, destruction, and deterioration.

- Periodical cleaning : Daily cleaning of the classrooms and the hostels will be performed by the students themselves under the guidance of the teachers. In addition, the administrative space and the common space will be cleaned by the caretakers assigned to the schools and periodically cleaned by the students and teachers simultaneously as extracurricular social service activities.
- Routine repair of facilities : Since this Project intends to minimize the maintenance cost by using maintenance-free materials and finish in principle, no routine maintenance or repair is required of the facilities for several years after the delivery as long as daily management is provided appropriately by strictly enforcing periodical inspections and cleaning. After several years, periodical repairs will be required such as repair/repainting of the painted area

(approximately once/10 years) and inspection/adjustment (approximately once/year) of doors and windows.

- Maintenance of building equipment : For the building equipment, it is important to perform daily operation and maintenance and periodical inspections before emergency maintenance or replacement of parts becomes necessary. Although the building equipment provided in this Project are mostly those widely used in the country with no complicated systems, it is desirable to establish a scheme for daily management such as simple maintenance/repair and replacement of parts, with technical staff such as a Multi Skilled Instructor assigned at sites located far apart from principal cities. In addition, sanitation and cleaning need to be provided for septic tanks at a frequency of approximately once every five years.
- Maintenance of external facilities/planting: It is important to appropriately conserve the ground against deterioration due to rainwater because the sites targeted by this Project are all located on slope land. The ground stability needs to be ensured by appropriately maintaining the planting in the slopes as well as performing inspection and cleaning of rain water gutters and pits at a frequency of approximately twice a year in addition to the daily cleaning of the building surroundings.

The operating budget associated with the operation and maintenance of the facilities is allocated from the educational budget of the Dzongkhags in accordance with the application for budgets submitted by schools. The school-specific operating budget other than the personnel expense, teaching materials/library expense, and so on which are collectively allocated by the Dzongkhag, is approximately 568,000 Nu/year (average amount of the budget granted to 24 secondary schools in three Dzongkhags targeted by the Project, except for the stipend granted to boarders: approximately 1.65 million yen) per school, including the maintenance expense for facilities/equipment amounting to 311,000 Nu (approximately 900 thousand yen). In addition, the Dzongkhag Education Office secures approximately 5% of the operating budget for secondary education as provident fund to enable supplementary allocation according to the application for budgets submitted by schools in the case that a school falls short of the operating budget. Funds including those for expansion of facilities and large-scale maintenance will be raised by drawing up an investment budget separately based on the fiscal plan formulated at the Dzongkhag level.

In addition to the above government budget, schools collect School Development Fund (SDF) from their students as funds for various school activities, operation and maintenance of facilities, and so on. The amount collected is uniform throughout the nation — 30 Nu/year for students in grades PP to VI, 100 Nu/year for students in grades VII to VIII, and 200 Nu/year for students in grades IX to X. Based on this rates, the SDF size of the four schools targeted by this Project is estimated to be 50,000 to 90,000 Nu (150 thousand to 260 thousand yen) per year.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

The breakdown of costs borne by the Bhutanese side based on the allocation of works between the two countries is estimated as follows in accordance with the estimation conditions described in Subsection (2) below.

(1) Cost borne by the Bhutan side

The cost borne by the Bhutanese side will be calculated after completion of the detailed design. The following table shows a reference estimation amount as of the outline design.

Table 2-18 Cost Borne by the Bhutan side

Item	Estimated cost ('000 Nu)	(million yen)
Cost for removal/relocation of existing structures, etc. (for three sites except for Pakshikha)	299.5	0.9
Access road development cost (Kabjisa, Phobjikha)	1,734.6	5.0
Cost for electric lead-in/water service connection works (for three sites except for Darla)	1,459.4	4.3
Total	3,493.5	10.2

(2) Estimation conditions

- 1) Estimation as of September 2006
- 2) Foreign exchange rate 1US\$=120.67 yen, 1US\$=41.45 Nu (local exchange rate)
1 Nu=2.91 yen
- 3) Construction period As shown in the project implementation schedule.
- 4) Other conditions This Project will be implemented in accordance with the grant aid scheme of the Government of Japan.

2-5-2 Operation and Maintenance Cost

The costs required for operation and maintenance of the facilities after the completion of this Project are estimated as below.

2-5-2-1 Operating Expenditure

1) Personnel Expenses

As a result of implementing this Project, 38 teachers and 25 school staff will need to be newly assigned in the four schools targeted. Of those, given the number of teachers across the country and in the target Dzongkhags already exceed the number of teachers specified in the guideline of the Ministry of Education, i.e., one for 32 students, the required teachers can be covered without entailing additional budget by appropriately re-deploying the existing teachers within the same Dzongkhag or across the Dzongkhags.

On the other hand, however, since the school staff is expected to be employed by individual schools, all the personnel required need to be newly employed. The costs to employ/assign the newly employed 25 staff as mentioned in “2-4-1. Operation Plan” are estimated as the follows:

Table 2-19 Estimated Personnel Expenses for School Staff

Dzongkhag	School	Number of staff increased	Necessary expense* '000 Nu/year [A]	Personnel expenses budget for the target Dzongkhag (August 2007)	
				'000 Nu [B]	Ratio of expense required for the increased staff [A]/[B]
Punakha	Kabjisa MSS	1	69.6	33,874	0.2%
Chukha	Pakshikha MSS	12	835.2	85,280	1.1%
	Darla MSS	1	69.6		
Wangdue	Phobjikha MSS	11	765.6	45,668	1.7%
Total		25	1,740.0	164,822	1.1%

*The base salary for clerical and administrative staff (5,800 Nu/month) was applied as a unit average personnel expense.

2) Facilities Operating Cost

The expenses required for the operation of the facilities will be estimated in accordance with the following principles.

- Water supply cost: The water sources for the schools targeted by the Project are a spring, a stream, or surface water, which can be used for free. Accordingly, no operating cost will be entailed.
- Sewerage expense: Public drainage is unavailable in any of the sites covered in the Project, and all the drainage is disposed of within the sites via septic tanks. Accordingly, no operating cost will be entailed.

- Fuel expense: The fuel expense for cooking in boarding schools shall be estimated on the assumption that electricity will be used for cooking. In addition, fuels for cooking and heating in the residences are required. However, since such costs are usually borne by the residents, they will be excluded from the estimation.
- Communication charge: Such communication equipment as telephones is installed as needed at the cost of the Bhutanese side. Accordingly, this expense will not be estimated.
- Electricity charge: Electric facilities are installed in all the sites in the Project. The minimum electricity charge required for the operation of the facilities will be estimated on the assumption of ordinary use of the facilities as school facilities. The estimation was made based on the following conditions. The estimation result is as shown in Table 2-20.
 - Given that the school days are 5.5 days/week including half a day on Saturdays of 280 days per year except for the winter holidays and the term-end holidays, facilities are estimated to operate 220 days. However, the number of days the boarding facilities (hostel, kitchen/store block, and multi-purpose hall) are operated shall be 280 days per year.
 - The electricity charge in the quarters for principals, teachers, and wardens/matrons will be borne by the residents in principle, thus it shall be excluded from this estimation.
 - The electricity charge shall be estimated based on the unit rate (1.85 Nu/kWh) expected to be applied from July 2009 onward, which has been officially announced by the Bhutan Power Corporation, with the low voltage electricity charge (completely variable fee system that is free from fixed cost such as the minimum charge) applied.

Table 2-20 Estimated Charge of Electricity Consumed

Building-specific estimated electricity consumption	Electricity consumption per day kW h/day		Electricity consumption per year kWh/year		Estimation Assumptions
	Temperate	Tropical	Temperate	Tropical	
4-classroom	4.69	6.22	1,031.80	1,368.40	• Number of operating days per year: 220 days (280 days for dormitories) • Average demand factor: Wall outlet circuit — 0.1 Others — 0.85 • Service hours: General appliances — 2.0 h/day Lighting for administration/living — 6.0 h/day Ceiling fan — 1.5 h/day (Assumed to be used for 6.0 h/day for two months in summer)
8-classroom	10.19	13.25	2,241.80	2,915.00	
Administrative /library block	20.10	23.77	4,422.00	5,229.40	
Laboratory block	28.92	33.00	6,362.40	7,260.00	
Toilet block	1.60	1.60	352.00	352.00	
Multi-purpose hall	19.51	19.51	5,462.80	5,462.80	
Kitchen/store block	111.01	111.83	31,082.80	31,312.40	
Hostel (64 persons)	13.84	-	3,875.20	-	
Hostel (96 persons)	-	23.82	-	6,669.60	

Site-specific estimated annual electricity charge	Electricity consumption per year kWh/year [A]	Annual electricity charge entailed ('000 Nu) [A] x 1.85 Nu/kWh
Kabjisa MSS (tropical) 4-classroom block x 1, 8-classroom building x 2, administrative office/library block, Laboratory block, toilet x 2	20,391.80	37.73
Pakshikha MSS (tropical) 4-classroom block, 8-classroom block x 1, administrative office/library block, Laboratory block, toilet x2 hostel (96) x4, multi-purpose hall, kitchen/store block	82,298.80	152.25
Phobjikha MSS (temperate) 4-classroom block x1, 8-classroom block x2, administrative office/library block, Laboratory block, toilet x2 hostel(64) x4, multi-purpose hall, kitchen/store block	69,050.20	127.74
Darla MSS (tropical) 4-classroom block x 2, 8-classroom block x 1, Laboratory block	12,911.80	23.89
Total	184,652.60	341.61

2-5-2-2 Operation and Maintenance Cost

The costs required for the maintenance of the facilities and furniture of the Project are estimated as follows. The maintenance cost will be allocated for routine maintenance, such as the partial repair of the painting on the external wall, interior/exterior steel and wooden parts; the repair of a part of roofs; the replacement of damaged fittings; the replacement of bulbs for lighting fixture; the replacement of a part of components of plumbing equipment; and the replacement of structural components of furniture. On the other hand, the cost for major repairs required in the long term will be covered separately by the investment budget of the Ministry of Education or on the Dzongkhag level.

Table 2-21 Estimated Operation and Maintenance Cost

School name	Annual operation and maintenance cost ('000 Nu)			
	Maintenance cost of buildings*	Maintenance cost of building equipment*	Maintenance cost of furniture*	Total
Kabjisa MSS	69.6	31.3	38.7	139.6
Pakshikha MSS	136.5	54.8	63.5	254.8
Phobjikha MSS	152.3	55.9	67.1	275.2
Darla MSS	33.4	15.3	23.9	72.6
Total	391.7	157.3	193.2	742.2

* With reference to the data on the regular maintenance cost of buildings in Japan, the routine facility maintenance costs of the facilities in the Project were estimated as below.

Maintenance cost of buildings: Construction cost for the building × 0.2%

Maintenance cost of building equipment: Construction cost for the building equipment × 1.0%

Maintenance cost of furniture: Cost for the furniture × 1.5%

2-5-2-3 Total Operation and Maintenance Costs

In summary of the above estimation results, the increased amount of the annual operation and maintenance cost required from the implementation of the Project is estimated as follows:

Table 2-22 Estimation Result of Annual Operation and Maintenance Cost ('000 Nu)

Dzongkhag	School	Increased amount of electricity charge	Increased amount of facility maintenance cost	Increased amount of school staff personnel cost	Total increased amount of operation and maintenance cost [A]	Dzongkhag secondary education operating budget* for fiscal 2007/2008 [B]	Ratio of increased amount to the budget [A]/[B]
Punakha	Kabjisa MSS	37.7	139.6	69.6	246.9	34,412	0.7%
Chukha	Pakshikha MSS	152.3	254.8	835.2	1,242.3	88,178	1.4%
	Darla MSS	23.9	72.6	69.6	166.1		
Wangdue	Phobjikha MSS	127.7	275.2	765.6	1,168.5	40,231	2.9%
Total		341.6	742.2	1,740.0	2,823.8	162,821	1.7%

* Excluding the investment expense for the facility improvement.

The operation and maintenance cost for secondary schools is posted as secondary education operating expenditure including personnel expenses in the Dzongkhag educational budget and the estimated increased amount equals to 0.7% to 2.9% of the aforementioned budget of each Dzongkhag for fiscal 2007/2008 and the total estimated increased amount equals to 1.7% of the total educational budget of three Dzongkhags. With the secondary education budgets (operating cost) of Dzongkhags increased by more than 20% in annual average (increased by 24.4% in the national average for past three years) according to the booming demand for secondary education in recent years, the increase in the budget required from the implementation of the Project is considered to be able to be covered without particular difficulties.

Chapter 3. Project Evaluation and Recommendations

Chapter 3 Project Evaluation and Recommendations

3-1 Project Effect

Present state and problems	Measures in the Project	Direct effects and expected improvement	Indirect effects and expected improvement
<ul style="list-style-type: none"> • The capacity of facilities is absolutely in short of the demands increased by the growth in primary education enrolment and the extension of basic education to include lower/middle secondary education. The overcrowding of existing schools is aggravating. • Hostels of existing boarding schools are overcrowded due to the shortage of accommodation capacity. One bed is used by 2 students and meals are served outdoors in some schools. • Many existing facilities are converted old houses or temporary constructions built by local inhabitants. Deterioration from aging is considerable, and learning environment is inadequate in terms of area, lighting, and hygiene. • Many of the schools upgraded to secondary schools lack laboratories and other facilities needed for secondary education. It is difficult to provide appropriate teaching according to curriculums. 	<ul style="list-style-type: none"> • Construction of school facilities according to standard specifications at 4 secondary schools (Kabjisa MSS, Pakshikha MSS, Phobjikha MSS, and Darla MSS). <ul style="list-style-type: none"> - Classrooms (72) - Administration rooms - Library/laboratories - Principal's/staff quarters - Hostel and Warden/Matron's quarters - Kitchen/multi-purpose hall - Toilets • Provision of educational and hostel furniture in the above facilities 	<ul style="list-style-type: none"> • The number of facilities providing lower secondary education will increase from 19 to 21 schools, and the number of facilities providing middle secondary education will increase from 13 to 16 schools in the 3 target dzongkhags. • The number of classrooms with appropriate learning environment in target schools will increase by 72 from 20 to 92, and the capacity (number of students that can be accommodated) will increase by 2,592. • Hostels with the capacity of 640 students will be constructed at 2 schools in the areas lacking permanent boarding facilities. Appropriate living environment will be provided to boarders there. • Special rooms (laboratories and library) will be provided in target schools corresponding to the level of schools, and education according to formal curriculums will be possible. 	<ul style="list-style-type: none"> • The basic education enrolment rate in Bhutan will increase from 78.2% net enrolment rate and 87.8 gross enrolment rate. • The provision of appropriate learning and living environment will improve the effectiveness of students' learning. • The increase in the capacity of boarding facilities will promote enrolment of students in remote areas. The number of students entering schools outside the dzongkhag will decrease. • The provision of staff quarters and staff rooms will improve the work environment of teachers, facilitating the recruitment and allocation of high-quality teachers. • The provision of incidental facilities will help promotion of co-curricular activities recommended by the Ministry of Education and improve the quality of education.

3-2 Recommendations

To ensure the enduring effective use of the educational facilities provided in this Project and the appropriate operation and management of these facilities in the future, the Bhutanese side should consider the following issues.

3) Sustainable Supply of Budget for School Operation

The budget for the operation of secondary schools constructed and improved in this Project will not cause a significant increase from the budget currently allocated to each school. However, Bhutan plans further expansion and enrichment of secondary education facilities. In contrast with primary education facilities that can be operated using minimal budgets with the cooperation of local inhabitants, the increase in secondary education facilities will require a substantial increase in the ordinary budget of the Government. In particular, personnel expenses occupying a large percentage in the school operation budget will need to be addressed with persistent budgetary measures, which should take into consideration the increase in budget needed for the realization of mid-term strategies stated in the Five Year Plan, such as the special allowances to teachers in remote areas, upgrading of qualifications, reinforcement of supporting personnel, and the increase in the number of teachers (at least 1 teacher per 24 students).

4) Appropriate Deployment of Teachers

The need for teachers and personnel associated with the implementation of this Project should be addressed through recruitment or re-deployment in appropriate timing so that the Ministry of Education and Dzongkhag Education Offices will be able to deploy teachers immediately after the completion of facilities. In particular, schools that will be upgraded in the level of education and newly constructed schools will need appropriate deployment of teachers with qualifications and abilities suitable to the level of education and subjects. While typical middle secondary schools are currently staffed with office work personnel, librarians, and laboratory assistants, this Project plans the employment of computer engineers and multi-skilled instructors in charge of facility maintenance, in addition to the above personnel, to ensure the effective use of the facilities provided in the Project. Persons with appropriate skills should be employed in these positions. Regarding the deployment of these teachers and personnel, adequate coordination should be ensured at the levels of dzongkhags and the Ministry of Education from the standpoint of not only providing workforce to target schools but also easing disparities among regions and among schools.

5) Implementation of Maintenance and School Improvement Activities

To ensure that the facilities provided in this Project will be maintained appropriately and used effectively for a long time, continuous organized maintenance activities should be conducted through the cooperation among the parties involved in school operation: the schools, communities, and local education administrations (Dzongkhag Education Offices). Schools should be staffed with multi-skilled instructors, so that each school can perform routine facility maintenance requiring no

special skills or budget. At the dzongkhag level, a system should be established for the regular reservation and supply of the maintenance budget, which is currently allocated on an as-required basis, as well as the provision of support to schools using engineers employed by dzongkhags. A system for supervision and guidance of school maintenance activities using periodical monitoring is desirable. At many schools, volunteer works and club activities related to school improvement are conducted as part of co-curricular programs, and planting, garden maintenance, paving, and other works are performed independently in this form. Technical and financial supports at the dzongkhag level should be provided to promote school improvement activities conducted at the school level.