Grant aid cooperation has been provided by Japan many times in the past in the form of general grant aid and cultural grant aid. The projects incorporated the following:

1) The Project for Construction the National Learning Resource Centre for Teacher Training in Science and Mathematics Education

Grant aid cooperation was provided for the construction of a center for the reeducation and training of primary and secondary school science and mathematics teachers, and for installation of equipments to be used in conducting experiments and training. (The Exchange of Notes was signed by both governments in October 1988). 20.4 billion yen was granted by the Japanese Government. The Project was completed in March, 1990.

2) The Project for Assistance to Secondary Education Instructional Equipment Program

This grant aid project concerns the installation of equipment for science, engineering and home economics classes in 210 secondary schools in Region V and Region VIII. The secondary schools included in Phase I and Phase II of the Project for constructing primary and secondary schoolbuildings have also been included in the Project. (The Exchange of Notes was signed by both governments in April, 1991. 540 million yen was granted by the Japanese Government. This Project is to be completed in March 1992).

3) Rural Environmental Sanitation Project (Phase II)

This is a grant aid project to service the water and sanitary facilities in Regions I and VI. It will concern the construction of water facilities and primary school toilets. One of the primary schools included in the Phase VI project is also included in this project.

3-2-4 Evaluation of the Requested Facilities and Equipment

The facilities requested by the Philippine government for this project are classrooms and toilets for primary schools, and classrooms, science

laboratories and toilets for secondary schools. The construction of classrooms is given utmost priority as the lack of classrooms is a serious problem throughout the country. Thus, it is assumed that the contents of this project are appropriate. The equipment requested are the minimum education necessities, such as desks and chairs for the teacher and pupils, blackboards and shelves. Thus, the request is acceptable.

3-2-5 Basic Cooperation Policies

From the above, the effects, actuality and the country's capabilities in putting the project into operation have been confirmed. As the effects of the project comply with the grant aid system, it has been judged that the project may be carried out in accordance with Japan's grant aid program. With this grant aid program in mind, a basic design study will be conducted after evaluating the contents of the project.

3-3 Project Description

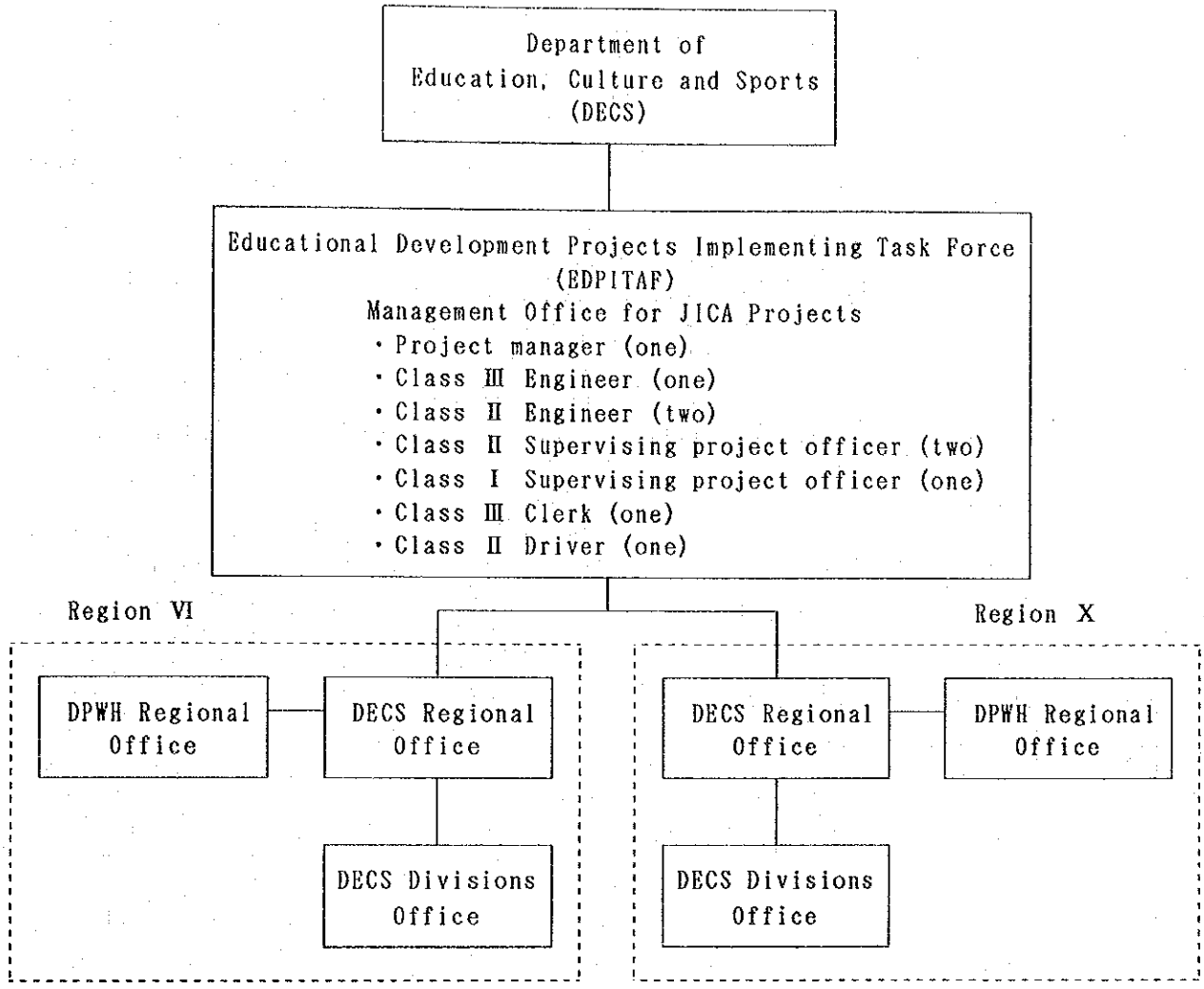
3-3-1 Executing Agency and Operational System

This Project will be implemented under the supervision of the Educational Development Projects Implementing Task Force (EDPITAF) of DECS, with the cooperation of the DECS regional offices at Regions VI and X, and under the guidance of DECS.

EDPITAF will establish a managing office for JICA projects, consisting of a project manager, three engineers, three supervisors, a level III clerk and one driver.

The above two groups will form and operating and management office and will take care of supervising the Project and running operations after the Project has been completed. Fig. 3-1 shows the organization Chart.

Figure 3-1 Project Implementation Organization



3-3-2 Standards for Selecting Project Schools

The standards for selecting the regions and the schools for the Project will take in those regions where schools were damaged by typhoons. Other standards are as follows:

1. Schools having sufficient space to build on.

2. Schools that have a serious lack of classrooms.

3. Schools that do not expect to receive aid from USAID or ADB.

4. Schools that have roads leading to them for the delivery of prefabricated material.

5. Primary schools that conduct education for all grades (grades 1 through 6).

6. As priority will be given to secondary schools that have become public, vocational training will be excluded.

7. Schools in remote islands, where the delivery of material is difficult, will be excluded.

Upon applying these standards to primary and secondary schools in Regions VI and X requested by the Philippine Government, 72 schools were selected for the Phase IV Project.

3-3-3 Selection of Building Size for Each Project School

In order to meet land conditions and the activities of each school, 4 types of school facility sizes were established. The number of classrooms each school lacked ranged from 3 to 20. To meet the requirements for classrooms and land conditions, a 2-classroom (A Type), a 3-classroom (B Type), a 4-classroom (C Type) and a 5-classroom (D Type) are to be assigned. Science laboratories in combination with classrooms are designed for all secondary schools.

Considering the school's hygiene and sanitary education to be given to the students, toilets that meet the improved specifications of DECS will be set up in a separate part of the school. As for the primary school already included in the Regional Sanitation Project, the toilets will not be constructed.

Table 3-6 shows the conditions of the Projects schools. Table 3-7 shows the schoolbuilding type that corresponds to the classroom shortage of each Project school.

Table 3-6(1) Conditions of the Project Primary Schools

Recipient Schools	Enrolement 1991 -92	Enrolement 1992 -93	No. of Teachers & Adm. staff	No. of Class Rms Science (a) Workshop	School Type	Road Condition	Aprox Site Dimention Length x Width(m)	Site Terrain	Soil Type	Leveling Required	Water Supply	Electricity Available
Region VI												
E-01. Don E. Ladrigo Memorial ES	1,168	1,280	41	11	C	Good	45.00x20.00	Flat	Rocky/Sandy	None	Artesian Well	Yes
E-02. Sapian Central ES	1,190	1,488	30	19	C	Good	45.00x20.00	Flat	Sandy Loam	None	Artesian Well/Rainwater	Adj.
E-03. Sibalon ES	895	900	36	13	C	Good	43.75x20.00	Flat	Sandy Loam	None	Artesian Well	Adj.
E-04. Pontaverdra Central ES	1,816	2,100	38	36	C	Good	88.90x20.00	Flat	Sandy Loam	None	Pipeline/Well/Rainwater	Yes
E-05. Carles Central ES	928	1,020	37	14	C	Fair	41.40x15.35	Flat	Sandy	None	Well w/ Pump	Yes
E-06. Rizal ES	1,789	1,968	52	40	C	Good	43.00x21.00	Flat	Sandy Loam	None	Pipeline	Yes
E-07. Banate Central ES	1,467	1,500	43	31	C	Good	31.20x 8.50	Flat	Sandy Loam	None	Artesian Well/Rainwater	Yes
E-08. Batuan ES	310	325	10	3	C	Good	40.40x26.40	Rolling	Clayey	None	Deep Well	Yes
E-09. Balasan ES	1,115	1,350	38	23	C	Good	57.30x20.00	Flat	Sandy Loam	None	Well w/ Pump	Yes
E-10. Dona Vicenta Hontiveros ES	333	348	9	5	C	Good	49.50x32.10	Flat	Clayey	None	Well	Yes
E-11. Sigma Central ES	1,035	1,235	42	23	B	Good	77.40x10.00	Flat	Sandy Loam	None	Artesian Well	Yes
E-12. Aras-Asan ES	297	350	11	6	B	Fair	62.40x31.00	Flat	Sandy	None	Artesian Well	Adj.
E-13. Cawayan ES	395	435	14	12	B	Good	44.20x15.00	Flat	Sandy	None	Well	Yes
E-14. Julita ES	444	458	13	9	B	Fair	42.00x20.00	Sloped	Clayey	Not Much	Artesian Well	Adj.
E-15. Lacaron ES	274	300	10	4	B	Fair	44.30x20.00	Hilly	Clayey	None	Well w/ Pump	Adj.
E-16. Badiang ES	400	500	8	9	B	Good	51.75x15.50	Flat	Sandy Loam	None	Well w/ Pump	Yes
E-17. Jalaud ES	334	400	14	8	B	Good	54.00x20.00	Flat	Loam	None	Well w/ Pump	Adj.
E-18. Tiring Central ES	350	360	18	8	B	Good	60.00x41.10	Flat	Sandy	Not Much	Pipeline/Artesian Well	Yes
Region X												
E-19. Surigao Pilot School	2,066	2,197	45	41	C	Good	43.00x15.90	Flat	Sandy	None	Pipeline	Yes
E-20. Magpayang ES	369	382	12	5	C	Good	46.50x37.00	Rolling	Clayey	Not Much	Well	Yes
E-21. Vasquez ES	376	380	12	6	C	Good	60.00x25.00	Flat	Sandy	None	Pipeline	Adj.
E-22. Pili ES	254	275	7	5	B	Fair	32.00x20.00	Flat	Sandy	Not Much	Spring Pipeline	Yes

Table 3-6(2) Conditions of the Project Secondary Schools (1)

Recipient Schools	Enrolement 1991 -92	Enrolement 1992 -93	No. of Teachers & Adm. staff	No. of Class Rms Science (a) Workshop	School Type	Road Condition	Aprox Site Dimention Length x Width(m)	Site Terrain	Soil Type	Leveling Required	Water Supply	Electricity Available
Region VI												
S-23. Carlos Lopez NHS	613	674	19	12(0)	SD	Fair	100.00x50.00	Rolling	Clayey	Not Much	Deep Well	Yes
S-24. Casanayan NHS	572	600	15	10(0)	SD	Fair	56.00x20.00	Flat	Sandy	None	Deep Well	Adj.
S-25. Carit-an BHS	648	670	20	8	SD	Fair	86.50x20.00	Rolling	Clayey	Extensive	Well	Adj.
S-26. Puti-an NBHS	537	590	16	6(2)	SB	Fair	60.00x15.50	Hilly	Sandy Loam	Extensive	Well	None
S-27. Nalook BHS	438	482	12	6(0)	SD	Fair	115.00x86.96	Flat	Sandy Loam	None	None	None
S-28. Laua-an BHS	403	420	14	10(0)	SD	Good	150.00x49.50	Flat	Loam	None	Well	Adj.
S-29. Dulangan NHS	350	700	9	7(2)	SD	Fair	100.00x40.00	Rolling	Clayey	Not Much	None	Adj.
S-30. Capagao Newly Nationalized HS	364	410	9	6(2)	SD	Poor	48.00x20.00	Hilly	Clayey	None	None	Adj.
S-31. Camiros BHS	356	400	13	8(0)	SD	Fair	120.00x40.00	Rolling	Loam	Much	Adjacent Pipe	Adj.
S-32. Binaliuan BHS	376	400	13	8	SD	Fair	50.79x20.00	Flat	Clayey	None	Deep Well	Adj.
S-33. Badiangan NHS	315	347	8	6(1)	SC	Poor	40.00x15.00	Hilly	Clayey	Much	Natural Spring	Adj.
S-34. Taft NBHS	478	500	16	8(6)	SD	Fair	54.00x20.00	Flat	Clayey	None	Well	Adj.
S-35. Dapdap BHS	360	396	9	6(2)	SD	Fair	61.50x20.00	Rolling	Clayey	None	Spring/Adjacent Well	Adj.
S-36. Tina BHS	328	360	12	7	SD	Fait	48.20x43.40	Rolling	Clayey	None	Artesian Well	None
S-37. Batad BHS	893	1,000	20	13	SC	Fair	36.50x20.00	Hilly	Clayey	Not Much	Well w/ Pump	Adj.
S-38. Camalingan BHS	357	387	12	9(2)	SD	Fair	80.00x20.00	Flat	Clayey	None	Adjacent Well	None
S-39. Barasanan BHS	253	280	12	8(0)	SC	Poor	38.25x25.00	Hilly	Clayey	Extensive	Adjacent Well	Adj.
S-40. San Rafael NBHS	259	300	8	5(0)	SD	Good	65.00x20.00	Flat	Sandy	Not Much	Well w/ Pump	Yes
S-41. Binabaan BHS	486	550	18	11	SC	Fair	50.00x27.70	Rolling	Clayey	Not Much	Adjacent Well/Rainwater	None
S-42. Carvasana BHS	301	376	13	6(4)	SC	Fair	69.10x23.20	Flat	Clayey	None	Deep Well	Adj.
S-43. Northern Bugasong HS	234	350	8	4(0)	SC	Good	54.00x20.00	Flat	Sandy Loam	None	Deep Well	Adj.
S-44. Dacuton NBHS	512	560	13	9	SC	Fair	67.00x42.90	Rolling	Sandy Loam	Not Much	Artesian Well	None
S-45. Alibunan BHS	314	400	11	6(3)	SC	Fair	150.00x120.00	Flat	Clayey	None	Adjacent Well	None
S-46. Bungsuan NNHS	363	400	11	5	SC	Fair	55.10x15.00	Hilly	Clayey	Much	Rainwater/Adjacent Well	None
S-47. Acao BHS	234	257	7	3(0)	SC	Fair	45.70x18.00	Rolling	Clayey	Much	Deep Well	Yes
S-48. Cabungahan NHS	322	500	10	6(4)	SC	Fair	52.20x20.00	Rolling	Clayey	Not Much	Well	Adj.

Table 3-6(3) Conditions of the Project Secondary Schools (2)

Recipient Schools	Enrolement 1991 -92	Enrolement 1992 -93	No. of Teachers & Adm. staff	No. of Class Rms Science (a) Workshop	School Type	Road Condition	Aprox Site Dimention Length x Width(m)	Site Terrain	Soil Type	Leveling Required	Water Supply	Electricity Available
S-49. Lucero NHS	277	333	10	7(3)	SC	Fair	50.00x20.00	Rolling	Clayey	Not Much	Adjacent Well	Adj.
S-50. Balijuagan HS	260	300	10	4(0)	SD	Fair	68.00x78.00	Hilly	Clayey	Extencive	Adjacent Well	None
S-51. Bololacao BHS	447	500	15	8	SC	Fair	58.47x20.00	Rolling	Clayey	Not Much	Artesian Well	None
S-52. Luca NBHS	500	550	17	7	SC	Good	150.00x120.00	Flat	Sandy Loam	None	Deep Well	Yes
S-53. Napnapan BHS	310	360	11	6	SB	Good	60.00x16.30	Flat	Clayey/Loam	None	Deep Well	Yes
S-54. Sido-San Juan BHS	278	320	9	6	SB	Good	76.80x20.00	Flat	Clayey	Not Much	Artesian Well	Yes
S-55. R. G. Hechanova MHS	435	560	19	7	SB	Fair	39.50x30.00	Flat	Loam	None	Deep Well	Yes
S-56. Barroc BHS	313	355	12	8	SB	Good	53.40x21.25	Flat	Sandy	None	Adjacent Well	Yes
S-57. Bulabud BHS	274	300	8	6(2)	SB	Good	50.00x15.00	Hilly	Clayey	Extensive	None	Yes
S-58. Don Benjamin Jalandoni, Sr. Memorial HS	294	324	8	6(3)	SB	Fair	55.00x20.00	Flat	Loam	None	Artesian Well	None
S-59. Puyas BHS	178	200	9	4(1)	SB	Good	90.00x80.00	Rolling	Clayey	None	Deep Well	Adj.
S-60. Calmay BHS	309	350	8	5	SB	Fair	48.35x20.00	Flat	Sandy	Not Much	Artesian Well	Yes
S-61. Fr. Julain C. Rago Memorial HS	305	400	10	6	SB	Fair	50.00x15.00	Rolling	Clayey	Not Much	Well	None
S-62. Egana BHS	352	400	10	7	SA	Fair	118.00x44.00	Flat	Sandy	None	Well w/ Hand Pump	Yes
S-63. Lawigan BHS	400	485	14	8	SA	Fair	44.20x15.85	Rolling	Sandy	None	Spring Pipeline	Yes
S-64. Ardemil NBHS	158	250	5	2	SB	Fair	72.40x45.00	Flat	Clayey/Loam	None	Deep Well w/ Pump	Yes
Region X												
S-65. Sta. Cruz BHS	546	640	18	9(2)	SD	Good	Unlimited	Flat	Loam	None	Underground Basin	None
S-66. Ipil BHS	358	500	11	6	SD	Good	73.85x20.00	Flat	Sandy	None	Open Well	Yes
S-67. Balite BHS	304	350	10	4(2)	SC	Good	40.20x22.80	Flat	Sandy	Not Much	Pipeline	Yes
S-68. Masgad BHS	200	250	6	4(0)	SB	Good	50.30x20.80	Hilly	Clayey	Much	Spring/Free-Flow	Yes
S-69. Cantapoy BHS	250	280	7	5(2)	SB	Fair	48.00x13.70	Flat	Rocky	Not Much	Pipeline	Adj.
S-70. Canpo BHS	571	650	19	12	SB	Fair	57.50x20.00	Flat	Clayey	Not Much	Well w/Pump/ Free-Flow	Yes
S-71. Timamana BHS	209	221	7	7	SA	Good	59.80x41.00	Flat	Clayey	None	Pipeline	Yes
S-72. Matin-ao BHS	412	452	14	7	SA	Good	51.00x28.00	Flat	Sandy/Clayey	None	Adjacent Well	Yes

Table 3-7 Schoolbuilding Type Correspond to Classroom Shortage of Each Project School

Primary School				Secondary School							
Number of Classroom Shortage	School No.	Building Type	Remarks	Number of Classroom Shortage	School No.	Building Type	Remarks	Number of Classroom Shortage	School No.	Building Type	Remarks
3	E－16	B		3	S－63	SA		7	S－35	SD	
	E－17	B			S－64	SB	* to provide one classroom for each grade		S－36	SD	
	E－18	B							S－38	SD	
4	E－11	B		4	S－62	SA			S－39	SC	* Not enough site space
	E－12	B			S－71	SA			S－40	SD	
	E－13	B			S－72	SA			S－50	SD	
	E－14	B		5	S－53	SB		8	S－33	SC	* Not enough site space
	E－15	B			S－54	SB			S－34	SD	
	E－22	B			S－55	SB			S－66	SD	
5	E－10	C			S－56	SB		9	S－29	SD	
	E－21	C			S－57	SB			S－30	SD	
6	E－ 8	C			S－58	SB			S－31	SD	
	E－ 9	C			S－59	SB		10	S－28	SD	
	E－20	C			S－60	SB			S－32	SD	
7	E－ 7	C			S－61	SB		11	S－27	SD	
					S－68	SB			S－37	SC	* Not enough site space
8	E－ 6	C			S－69	SB		12	S－25	SD	
					S－70	SB			S－26	SB	* Not enough site space
12	E－ 2	C		6	S－41	SC			S－65	SD	
	E－ 3	C			S－42	SC		15	S－24	SD	
	E－ 4	C			S－43	SC					
	E－ 5	C			S－44	SC		16	S－23	SD	
	E－19	C			S－45	SC					
20	E－ 1	C			S－46	SC					
					S－47	SC					
					S－48	SC					
					S－49	SC					
					S－51	SC					
					S－52	SC					
					S－67	SC					

*Note: Type A - 2 classrooms, Type B - 3 classrooms, Type C - 4 classrooms, Type D - 5 classrooms, S - science laboratory

3-3-4 Project Area Location and Conditions

The two regions to be covered by the Project are Region VI (Western Visayas) and Region X (Northern Mindanao). Project schools are scattered throughout the entire area of Region VI and part of Region X stretching 300 km from north to south and 440 km from east to west The schoolbuildings of 22 primary and 50 secondary schools (72 schools in all) will be constructed under this project.

The infrastructure for the Project will include electric and water supplies and drainage facilities. The electric power in both regions is 220 V. Presently, 34 project schools have no electricity. As for the water supply, 9 schools are receiving city water. 51 schools use water from wells, and 12 schools have no water supply facilities. For schools not having water or electric supplies, the Philippine Government will install them before the start of Project construction.

As drainage facilities are not fully installed, the sewage from toilets will pass through septic tanks and be infiltrated into the ground. Rain water and other drainage will also use the ground infiltration method.

Table 3-8 shows the number of Project schools in each school district in Regions VI and X.

Table 3-8 Number of Project Schools in Each School District in Regions VI and X

Division	Primary School	Secndary School	Total
Region VI			
Aklan	2	5	7
Antique	3	6	9
Capiz	3	9	12
Roxas City	1	1	2
Iloilo	8	20	28
Iloilo City	1	1	2
Subtotal	18	42	60
Region X			
Surigao del Norte	2	7	9
Surigao City	2	1	3
Subtotal	4	8	12
Total	22	50	72

3-3-5 Outline of Facilities and Equipment

1) Differences from the Phase III Project

The basic design will follow that of the Phase III project. However, the following items were altered after discussions with the Philippine side:

* In order to improve the use of the science laboratory, the counter will be lengthened, a sink will be added, and closets will be built under the counter.
* In order to prevent burglaries, the door will be constructed away from the windows.
* In order to prevent crime, lights will be installed in the ceiling of the outside corridors.
* In order to prevent excessive rainwater from splashing near the entrance to the toilet, the roof of the toilet will be changed from a one-side slope to a gable type.
* As wooden material is hard to obtain, wooden furniture will be substituted by steel and plywood furniture.

2) Outline of the Facilities

As stated in Section 3-3-3, the number of classrooms will be selected from the 4 types according to the number of students, and the land and schoolbuilding conditions. Table 3-9 is an outline of the schoolbuilding types.

Table 3-9 Outline of Schoolbuilding Types

Building Type	Building Method	Number of Classrooms	Total Floor Area (m^2)
A Type	Prefabricated Unit Method	2	108
B Type	"	3	162
C Type	"	4	216
D Type	"	5	270
Science Laboratories	"	1	90
Toilet	Local Method	One for males and one for females	24.5

3) Outline of Equipment Plan

The equipment to be installed in Project schools will be the basic educational equipment specified by DECS's local specifications. The outline is shown in Table 3-10.

Table 3-10 Outline of Equipment to be Provided

School	Type of Room	Name of Equipment Unit
Primary Schools	Classrooms	-Teachers' desks, chairs and closets -Students' desk-chairs (large, medium and small) and closets -Blackboards and bulletin boards
Secondary Schools	Classrooms	-Teachers' desks, chairs and closets -Students' desk-chairs and closets -Blackboards and bulletin boards
	Science Laboratories	-Demonstration workbench -Experimental tables and stools -Students' closets -Blackboards and bulletin boards -Storage lockers and steel shelves

3-3-6 Maintenance Plan

The maintenance and management of Project facilities will be conducted by the local offices of the Department of Public Works and Highways (DPWH) in Regions VI and X. The costs will be allotted by DECS.

Since 1980, DECS has been able to secure funds, Maintenance and Other Expenditures (MOOE), for simple repair work, and Capital Outlay (CO) for repair and construction work, and has been conducting repair work at various schools under the guidance of DPWH. When repairs or maintenance becomes necessary, a request is made by the school principal and is forwarded to DECS's regional office for evaluation. After being evaluated, the request is then sent to DECS's Central Office. DPWH's Central Office is then notified of the costs. After being approved by the Department of Budget and Management, the final budget is decided upon. Based on the budget, DECS's Central Office will determine the amount to be allocated to each school and DPWH's Engineering Section will set up the maintenance and repair program which each

school principal will be notified of.

The construction contractors will be chosen by DPWH's Engineering Section and the maintenance and repair work will be conducted under the supervision of DECS and DPWH.

Since 1990, DECS has been able to carry out procedures for small-scale repair work and maintenance quickly with the cooperation of each school district's PTA and local agencies.

The 3-11 shows the flow of school maintenance and repair work. Table 3-12 shows the actual costs for maintenance and repair at DECS's local offices in Regions VI and X for the past 3 years.

Table 3-11 Flow of Maintenance and Repair Work

Responsible Department	Work Flow Order and Content
DECS	1. Examine the necessity of repair work requested by each school's principal and submit necessary budget and work proposal to DECS's local office.
DECS	2. DECS's local office examines the proposal and submits to DECS's Central Office a list of the schools needing repair work.
DECS	3. DECS's Central Office notifies DPWH of DECS's budget.
DPWH	4. DPWH's Central Office submits a proposal to DBM's Infrastructure Program.
DBM	5. Examine the submitted proposal and budget request and notifies DPWH the limit of available budgetary funds.
DPWH	6. DPWH's Central Office notifies DECS's Central Office of the amount of the budget.
DECS	7. Determine amount of money to be allocated to each school according to the needs of the school and the priority and notifies DPWH.
DPWH	8. DPWH's Central Office delivers the budget document to its Engineering Section.
DPWH	9. DPWH's Engineering Section sets up the repair and maintenance program according to the budget document and notifies each school principal of the program.
DECS	10. Notify each school of the repair and maintenance program.
DECS	11. Manage overall repair and maintenance work.
DPWH	12. Manage repair and maintenace work until its completion.
DPWH	13. Deliver repaired or maintained school facilities to DECS.
DECS	14. Accept repaired or maintained school facilities from DPWH.

Table 3-12 Actually Spent Maintenance and Management Expenditures of DECS's Local Offices In Regions VI and X

Year	Amount (Unit: Peso)		
	Region VI	Region X	Total
1990	263,193,671.95	102,392,752.76	365,585,824.71
1991	336,429,901.35	82,885,466.50	419,315,367.85
Total	599,623,573.30	185,278,219.26	784,901,192.56

With the addition of new school facilities, teachers to supervise and operate the facilities will become necessary as will the need for securing maintenance costs.

This Project was proposed as part of the Philippine Government's School Construction Plan, and the teaching staff and maintenance costs are planned as part of the entire Project.

The major objective of this Project is to rebuild the schools destroyed by typhoons and thus, as previously stated in the Operation and Management Plan section, maintenance and operations may be adequately carried out with the same number of staff and the same budget as before.

As for the maintenance costs, the equipment and facilities have been chosen so that the actual maintenance may be conducted at low costs. The main structures should be maintenance free; thus, the total costs should be quite low. However, wooden doors, jalousies, color-crete floors and plywood walls that are to be obtained locally will have to be regularly maintained to have them last over a long period of time.

Table 3-13 shows the operation, management and maintenance costs per schoolbuilding.

Table 3-13 Operation, Management and Maintenance Costs for One Schoolbuilding (C Type)

Item	Material Costs (pesos)	Labor Costs (pesos)	Maintenance Frequency	Remarks
Wooden Doors & Jalousies	2,300	990	Once every other year	Recommended to paint once every two years to prolong jalousie life
Floor (color-crete)	1,200	160	Once a month	To maintain color texture, monthly waxing is required
Plywood wall & ceiling painting	980	550	Once every five years	Basically, the wall is maintenance free; it will necessary to paint stains and smudges.
Painting of elevated water tank support	400	180	Once every other year	Special cares shall be given to schools located close to the sea coast.
Pump	22,000		Once every seven year	Unit required replacement at seven year intervals.

CHAPTER 4. BASIC DESIGN

CHAPTER 4 BASIC DESIGN

4-1 Design Policies

From the viewpoint of the Project's peculiarity in which many schoolbuildings must be constructed in a short period of time, Project construction procedures, in addition to the examination of construction methods at the design stage, is a very important subject for the Project.

Since the Project's schoolbuildings will accommodate those students who are presently unable to attend existing schools because of overcrowding, consideration must be given to the design criteria and to the relationship between Project facilities and existing schoolbuildings, giving special attention to Project construction to avoid interfering with present school activities, in the preparation of the Basic Design.

Based on the contents of the Government of the Philippines' request and the series of discussions held with concerned officials of the Government, the following Basic Design policies were established:

1) Design Policies for Natural Conditions

By taking into consideration the natural conditions in the Philippines, such as the typhoons that frequently occur every year, the tropical climate, and the area characteristics of Regions VI and X, the Basic Design shall be prepared as follows:

1. The design must be prepared with emphasis placed on typhoon-resistant capabilities.

   Every year the Philippines suffers from the effects of typhoons. School facilities in Regions VI and X in the Project Area were severely damaged by typhoons. The schoolbuildings to be built under the Project will be used as places of refuge for the area residents. The buildings must therefore by designed to be typhoon resistant structures that will last for many years. There is no need for these buildings to be of high-grade quality nor have elaborate decorative designs.

2. Examination of the Natural Environment and Meteorological Conditions.

The Philippines has a tropical climate; its annual average temperature is 26 to 27℃. The schoolbuildings, as a general principle, shall be designed to have large openings for natural ventilation purposes.

To provide comfortable classroom environment, electrical wiring for fan installation (fans to be installed by the Philippine side) shall be planned.

Open corridors with roofs should be built to offer students and teachers shelter when moving from classroom to classroom on rainy days. The corridors shall be designed to prevent raindrop splashes, mud, and dirt from entering.

Some schoolbuildings will be built near seasides. For the design of these buildings, the probability of salt damage must be taken into consideration.

During the field survey period, some schoolbuildings were found to have termite damage. During the design stage, antitermite treatment of wooden portions must be considered.

The annual rainfall of 1991 in Iloilo of Region VI was 2,352.4 mm and Surigao of Region X was 3,654.2 mm. In these regions, it will be necessary to consider taking measures against flooding, such as the adoption of elevated foundations.

As a general principle, natural lighting must be fully utilized. Electric lighting shall only be used on occasions when classes are conducted during dark, rainy days. To obtain sufficient natural light at the center of classrooms is a very important factor for the building design. For this reason, building beam spans shall be limited to 8 m. Wooden jalousies shall be painted white to increase the lighting efficiency.

2) Design Policies for Social Conditions

The design snall be prepared by respecting the Philippines' school

facility design standards and by taking into consideration the living mode of the people.

In the Philippines, school facilities are not only used for children's education but for the meeting places for area residents, and as places of refuge during calamities. Therefore, to create larger spaces, movable partitions must be designed for installation between classrooms.

By taking into account the possibility that double-shift classes or meetings may take place at night, all schoolbuildings shall be designed to have lighting systems.

According to the Philippines' accessibility laws, Batas Pambansa Bilang 344, the installation of sloped accesses and special toilets for handicapped students shall be planned. Furthermore, by considering students' safety, round-shaped columns shall be used for corridor structures and the use of independent columns in classrooms shall be avoided.

3) Design Policies for the Situations of Local Construction Field

In the Philippines there is the National Building Code that corresponds to the Building Design Standards in Japan. Similar to Japan, it is necessary to obtain various permits by submitting formal applications to start building construction.

There are some high level local construction contractors and consultant firms. A careful screening would be necessary prior to hiring them as subcontractors.

A number of construction workers are available in the Philippines. However, it would be necessary to dispatch engineers from Japan to supervise the construction of prefabricated structures. The work skill level of local construction workers is equal to that found in other Southeast Asian countries, such as Thailand, Indonesia, etc. With proper guidance, the workers can accomplish a high level of work.

4) Policies for Using Local Firms, and Local Equipment and Materials

The levels of local construction contractors and consultant firms are high. Use of local contractors for building construction, finish work, and facility installation will be possible. If technical manuals are provided, local consultants will be able to assist in supervising construction work.

Except for the prefabricated materials required for securing the typhoon-resisting capabilities of Project schoolbuildings, Project use materials and equipment shall be procured locally for the purpose of easy maintenance and management of school facilities after Project completion. Most of the necessary materials and equipment are available in Regions VI and X. Some items that are required to be of higher grade or are needed in greater quantities than are available in Regions VI and X will be procured in Manila.

5) Design Policies for Project Implementing Agency's Maintenance and Management Capabilities

By taking into consideration the Philippine Governments financial difficulties, building structures shall be planned by giving top priority to a maintenance-free concept to allow minimum maintenance and management costs and easy maintenance and management after completing Project facilities. Furthermore, consideration shall be given to the use of local materials, except prefabricated materials, for effecting easy repairs to damaged or deteriorated facilities.

6) Design Policies for Scope and Level of Project Facilities and Equipment to be Provided

The contents of the Project include the construction of classrooms and toilets for primary schools and classrooms, science laboratories, and toilets for secondary schools. These facilities will provide basic educational spaces in the Philippines and they should be designed to be comfortable for daily class activities. For the design, emphasis shall be placed not only on their looks but on their quality and quantity. They should be designed not only for class use but for multipurpose use such as places of refuge during natural calamities.

The equipment plan shall be made to provide basic units necessary for classroom activities. By considering the use frequencies of equipment units

for daily classroom activities, practicality and durability shall be emphasized when preparing the design.

7) Design Policies for Project Construction Period

The Project is to construct 72 primary and secondary schoolbuildings in Regions VI and X which stretches approximately 300 km in a north-south direction and 440 km in an east-west direction. The construction work must be completed within the limited time span.

An effective Project construction plan shall be carefully prepared -- the construction of building foundations and toilets may be undertaken while the prefabricated materials are being manufactured in Japan.

As there will be many schoolbuilding under construction at the same time, the entire Project Area will be divided into ten areas for Region VI and four areas for Region X for a total of 14 areas and the Project construction in each area will be carried out by one work group.

4-2 Examination of Design Criteria

To meet various site conditions and the size of each Project school, four types of schoolbuildings were designed. Each one of them was adopted according to each school's classroom shortage situation and site condition.

Optimum room sizes were decided upon by referencing the Philippines' design standards and Japanese design standards. For reducing costs, it is extremely important to establish appropriate prefabricated unit sizes and shorten the construction period.

By taking into consideration the number of students to be assigned in each class and the furniture arrangement, a classroom size was decided upon as being 8 m x 6.75 m (54 m^2) and a science laboratory as being 8 m x 11.25 m (90 m^2).

Toilets are planned according to local building methods as described in DECS's improved specifications. A toilet for males is 11.375 m^2 and one for females is 13.125 m^2.

The features of Project schoolbuildings are shown in Table 4-1.

Table 4-1 Features of Project Schoolbuildings

Building Type	Name of Room	No. of Units	Area (m²)	Remarks
Primary School Type B	Classrooms	3	162	40 students per room
	Toilet (male)	1	11.875	
	Toilet (female)	1	13.125	
Subtotal			186.5m²	For 1 school
	*exception of 1 school		162.0m²	
Total			1,654.0m²	9 schools 1,080 students
Primary School Type C	Classrooms	4	216	40 students per room
	Toilet (male)	1	11.375	
	Toilet (female)	1	13.125	
Subtotal			240.5m²	For 1 School
Total			3,126.5m²	13 schools 2,080 students
Total Floor Area of Primary Schools:			4,780.5m²	22 schools 3,160 stuents
Secondary School Type SA	Classrooms	2	108	42 students per room
	Science Lab	1	90	
	Toilet (male)	1	11.375	
	Toilet (female)	1	13.125	
Subtotal			222.5m²	For 1 school
Total			890.0m²	4 schools 336 students
Secondary School Type SB	Classrooms	3	162	42 students per room
	Science Lab	1	90	
	Toilet (male)	1	11.375	
	Toilet (female)	1	13.125	
Subtotal			276.5m²	For 1 school
Total			3,871.0m²	14 schools 1,764 students
Secondary School Type SC	Classrooms	4	216	42 students per room
	Science Lab	1	90	
	Toilet (male)	1	11.375	
	Toilet (female)	1	13.125	
Subtotal			330.5m²	For 1 school
Total			4,957.5m²	15 schools 2,520 students
Secondary School Type SD	Classrooms	5	270	42 students per room
	Science Lab	1	90	
	Toilet (male)	1	11.375	
	Toilet (female)	1	13.125	
Subtotal			384.5m²	For 1 school
Total			6,536.5m²	17 schools 3,570 students
Total Floor Area of Secondary Schools:			16,255.0m²	50 schools 8,190 students

4-3 Basic Plan

4-3-1 Site and Layout Plan

Building arrangement must be made by taking into account the following aspects:

1) A new building shall be arranged as being functional as one school complex together with existing facilities. This arrangement plan shall be made by taking into consideration the movement of people between the new building and the existing facilities.

2) A new building shall be arranged on flat land, avoiding dipped areas, from the viewpoint of the building structure's safety.

3) To utilize natural ventilation, a new building shall be arranged by taking into account the prevailing wind direction. Furthermore, the building arrangements shall be made by considering the distance from the distance between the existing building and the new building for allowing drafts to pass between them and for avoiding wind force concentration during typhoon periods.

4) A new building's longitudinal direction shall be decided upon by taking into consideration the sunshine entering the classrooms.

5) A new building shall be arranged as not to adversely affect existing facilities. The building shall be arranged to allow for the economical installation of facilities and electrical supply lines.

6) Different types of structures shall not be arranged continuously. the toilet facility shall be built separate from the prefabricated main structure. New facilities shall be arranged by taking into account the movement of people so that they will be functional together with the existing facilities.

4-3-2 Architectural Design

a. Floor Plan

When the prefabricated unit construction method is used, the setting of the adequate size module is a very important matter for reducing construction costs and time. DECS's school construction manual specifies that the size of one classroom shall be 6 m x 8 m. The Japanese standard is about the same and the classroom size is appropriate.

For Project schoolbuildings, the minimum size of the module was decided upon as being 2.25 m wide, and classrooms as 8 m x 6.75 m (2.25 m x 3) and science laboratories as 8 m x 11.25 m (2.25 m x 5).

The toilets that are to be built based on Philippine standards shall be arranged separate from the prefabricated main structure. Taking into account odor problems, the toilets will be located away from other buildings.

Science laboratories shall be arranged to keep water supply and drain pipe installation work to a minimum. All Project buildings shall be arranged from the viewpoint of overall school facility use.

By taking into consideration the Project site areas' population, the number of students, the environmental conditions, and the condition of existing buildings, the floor plans of the four basic buildings and the science laboratory were prepared.

Each school's arrangement plan shall be made to suit the needs of the school and area conditions by using these floor plans.

An open corridor is designed to allow teachers and students to move easily between classrooms and offices.

A comparison of Project facility features to those having Philippine standard is given in Table 4-2.

Table 4-2 Comparison of Project Facility Features to Those Having Philippine Standards

	Name of Room	Philippine Standard	Project Facility Standard	Difference
PRIMARY SCHOOL	Classroom	1.2 ㎡/student (minimum requirement)* but actual figure is 1.17㎡/student	1.35㎡/student (40 student/class)	· Typhoon-resisting capability · Unit area per student was increased to meet possible future inrcease of students per class-room · Sliding partition is adopted to permit combining two class-room. · Major structure is maintenance free type · High ceilings are adopted to allow natural ventilation
	Toilet	One urinal per 50 males. Two urinals for additional 100 males. One toilet bowl per 50 students. One sink per one toilet bowl. One water faucet per two classrooms.	Male Toilet: · One handicapped person use. · One urinal (4 persons use). · One sink (2 persons use). Female Toilet: · One handicapped person use. · Two toilet bowls. · One sink (2 persons use).	· Adopted Philippine Standard, but added handicapped person use toilet units
	Corridor	No rule exists for the outside corridor. 2.0m wide for inside hallway for a school having less than 500 students.	1.5m wide for outside corridor	· Similar to Philippine Standards

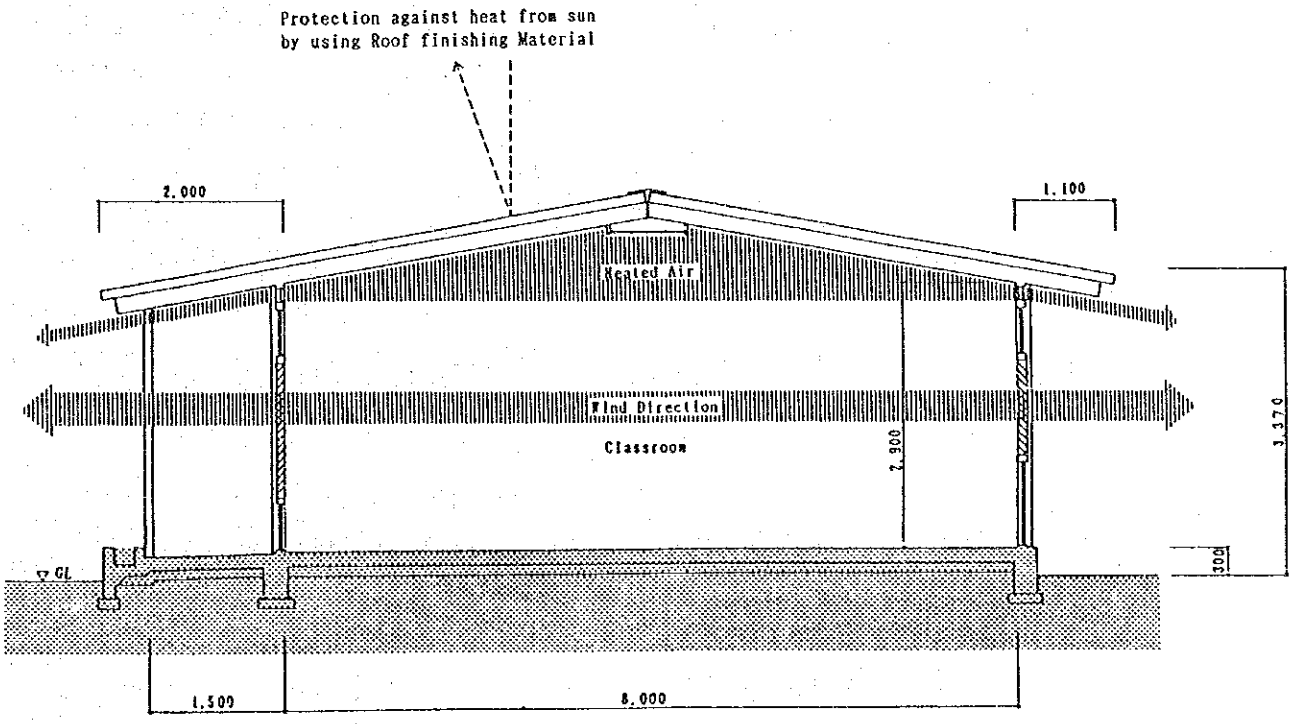
	Name of Room	Philippine Standard	Project Facility Standard	Reference
SECONDARY SCHOOL	Classroom	1.4 ㎡/student (minimum requirement) but actual figure is 1.11㎡/student	1.28㎡/student (42 students/ class)	· Same as for Primary Schools · Unit area per student is slightly smaller than Philippine standard, but one classroom can accommodate 42 students.
	Science Laboratory	2.4 ㎡/student (minimum requirement)	2.14㎡/student (42 students/ class)	· Typhoon-resisting capability · Designed to install one steel shelf unit in each laboratory. · Designed to install sink units for experiment
	Toilet	Same as primary school standards	Same as primary school standards	· Same as Philippine Standards, but added handicapped person use toilet units
	Corridor	Same as primary school standards	Same as primary school standards	· Similar to Philippine Standards

b. Section Plan

As a general principle, the section plan for the Phase IV Project followed the one for the Phase III project. By taking into consideration the tropical climate of the Philippines, the graded ceiling was adopted to keep the air stratum as thick as possible above the classroom.

The length of the eaves was decided upon from the viewpoint of the effects of intercepting direct sunshine, providing Protection against rain, and offering strength against uplifting wind forces. Eaves on the open corridor side are to be 2.0 m long -- 1.5 m from the building's wall to the corridor columns, and 0.5 m from the columns to the tip of the eaves. Eaves on the other side of the building are to be 1.1 m long. The standard section of Project buildings are shown in Fig. 4-1.

Fig. 4-1 Standard Section of Project Building



c. Structure Plan

1. Basic Requirements

The main purpose of the Project is to restore or rebuild 72 schoolbuildings that were damaged by large typhoons in Regions VI and X. The following three aspects specifically required for the Phase IV Project's structure plan were also applicable in the Phase I, Phase II, and Phase III projects:

(1) Typhoon-resistant capabilities
(2) Durability
(3) Short construction period

Based on the experience gained during the Phase I, Phase II, and Phase III projects, steel-frame prefabricated panel structures are thought to be most suitable for meeting the above requirements. The panel units are to be fabricated with factory made steel frames. The panel units made in Japan will be shipped to each Project site and assembled there to make a permanent structure. By using this method, construction quality control and a short construction period can be accomplished.

From the viewpoint of the above concept, the structure plan was made to ensure the typhoon-resistant capabilities and durability of the buildings as follows:

2. Design Policies

a) Design Loads and External forces

Basically, the National Structural Code of the Philippines was used to determine the design loads for Project schoolbuildings. From the viewpoint of typhoon-resistant capabilities, the design loads were decided upon by taking into account not only the loads specified in the Philippine Code, but also the actual building damage conditions and loads specified in the Standards of the Japan Society of Architects.

"The Building Design Load Manual and Its Interpretation" published by the Japan Society of Architects specifies the external force factors for local wind forces. The Philippine Code does not specify the local wind force for building design. However, the design load condition equivalent to that specified by the Japanese Code was adopted for the Project.

Examples of typhoon damages to buildings are shown in "The Building Damages in Hachijo Island caused by Typhoon No.13 in 1975" published by the Japan society of Architects. Typhoon No.13 was about the same scale as the typhoons that caused extensive damages in the Project Area in 1987. Many similarities were found between the above record and the recorded damages in the Philippines. Therefore, the design loads for Project schoolbuildings were decided upon after carefully examining the above publication.

b) Building Structure Plan

Project buildings must have sufficient strength to support fixed loads, live loads on roofs, wind loads, and seismic loads. The ways in which building structures will resist against each load are described below:

(1) Vertical external forces (fixed loads, live loads on roofs) will be taken by the prefabricated module unit (8 m x 2.25 m per unit). The module units are to be weatherproof lightweight shaped steel frames.

(2) Longitudinal direction horizontal external forces (wind forces and seismic forces) will be taken by the vertical braces on the side frames and the fixed-partition walls, and the rigid frames of each module unit.

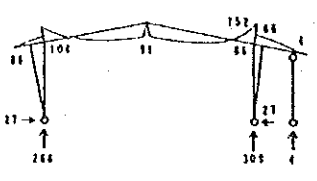
(3) Beam direction horizontal external forces (wind forces and seismic forces) will be taken by the rigidity of the wall panels. In general, the beam direction of steel frame structures is the weaker structure direction against horizontal external forces. Therefore, vertical bracings are used to take the external forces.

From an esthetic viewpoint, the exposed vertical bracings are not desirable. Thus, the external forces will be taken by the internal rigidity of the wall panels instead of installing vertical bracings.

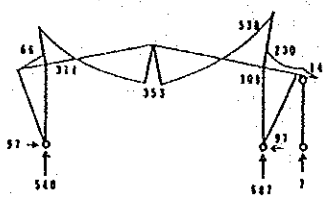
Mat foundations will be constructed around the buildings. The thickness and reinforcement of the foundations will be decided upon to suit the condition of each Project school site. For example, according to the Building Damages in Hachijo Island Caused by Typhoon No. 13 in 1975, it was reported that wind forces lifted buildings from their concrete block foundations.

For Project schoolbuildings, the large lifting forces of winds and the column pulling forces by an overturning moment acting on the schoolbuildings may occur special attention shall be paid to the method of fixing building structures to foundations.

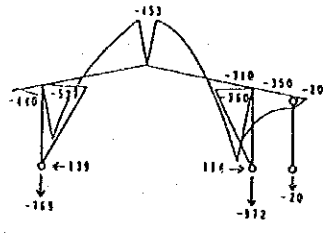
The results of the stress analyses of the rigid frame structure against beam direction horizontal external forces are shown below.



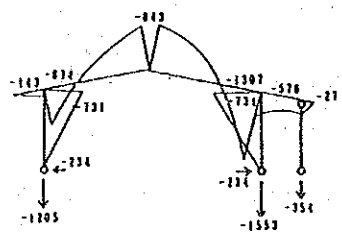
Fixed load



Roof Area Live Load



Wind Load
(Open Windward and Leeward)



Wind Load
(Only Windward Open)
* Vertical Component Only

Unit: kg·m

c) Design of Each Structure Member

The most influential force exerted on the buildings will be the wind force. Thus, special attention must be paid to wind forces when designing structure members.

Eaves and Roof Ridges:

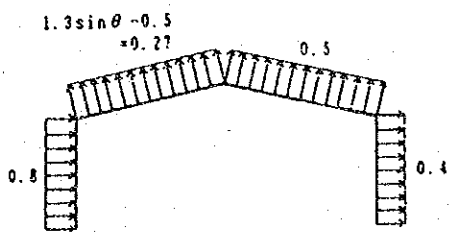
During the field survey period, in particular, many damaged eaves and roof ridges were observed. Special attention must be paid when designing these building parts because they will receive the impact from highly concentrated wind forces. Judging from the actual typhoon damage conditions, it is necessary to include the external force factors into the design load conditions.

One method for reinforcing eaves and roof ridges is to utilize deform preventive materials.

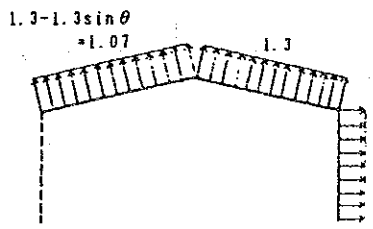
The installation of these members shall be taken into consideration in the detailed design of Project buildings.

Wall Panel's Strength Against External Forces:

"The Building Damages in Hachijo Island Caused by Typhoon No.13 in 1975" reported on the damaged buildings whose roofs were completely blown away by the lifting wind forces that might have resulted after the collapse of the walls. Wind force coefficients for closed and open wall types are shown in the following figure:



Closed



Open Windward

As the above figure shows, the failure of walls will create enormous wind forces in the building which might result in its complete destruction. Thus, it is necessary to pay special attention to wall panel strength against external forces. Since it is planned to utilize removable wooden jalousies that are to be made in the Philippines, the details of window joints must be carefully examined.

Joints Between Wall Panels:

Careful examination must be made not only of the strength of the panel itself, but the strength of the panel joint must also be examined. For the panel joint design, it is necessary to consider special means, such as increasing the design safety factor of the panel itself in order to avoid panel failure at the joints.

d. Building Facility Plan

(1) Electrical Facility Plan

Electrical facilities are planned to be installed in all Phase IV Project schools. All materials for the electrical facilities will be procured in the Philippines.

Lighting fixtures, outlets, and fans will be installed. For fan installation, electrical wiring and switches will be installed -- fan units will be installed by the Philippine side.

Table 4-3 The Designed Number of Fluorescent Lighting Fixtures, Ceiling Fans, Switches and Outlets for Each Room

Type of Room	Fluorescent Lighting Fixtures	Incandescent Lighting Fixtures	Ceiling Fans	Switches	Outlets
Classroom	4	0	2	2	4
Science Laboratory	6	0	3	3	6
Corridor	0	2	0	1	0
Toilets (Males)	2	0	0	1	0
Toilets (Females)	2	0	0	1	0

(2) Water Supply Facility Plan

The same as for the Phase I, II and III projects, pipe supply or well water will be lifted by electric power or manual pumps into 4 m

high elevated tanks. The water will then be supplied to the wash basins in toilets, water closets, urinals and the science laboratory sinks by gravity flow.

The water supply facility includes the following items:

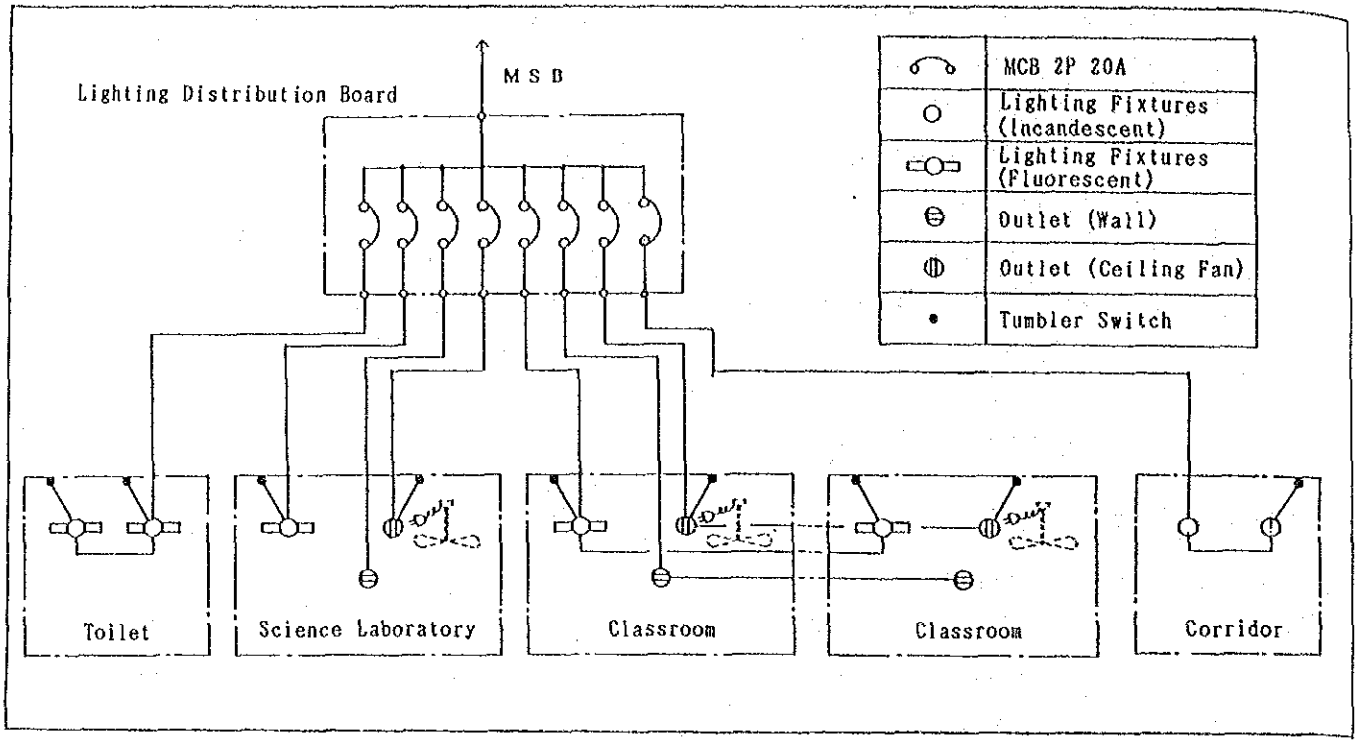
. Elevated tanks:	F.R.P. tanks, 2.0 m^3 capacity
. Supporting structures:	Fabricated with steel angle bar
. Pumps:	Motor operated pumps and hand pumps (for schools having no power supply)
. Piping material:	PVC pipe and ductile iron pipe for tank connection portions.

(3) Sewerage Facility Plan

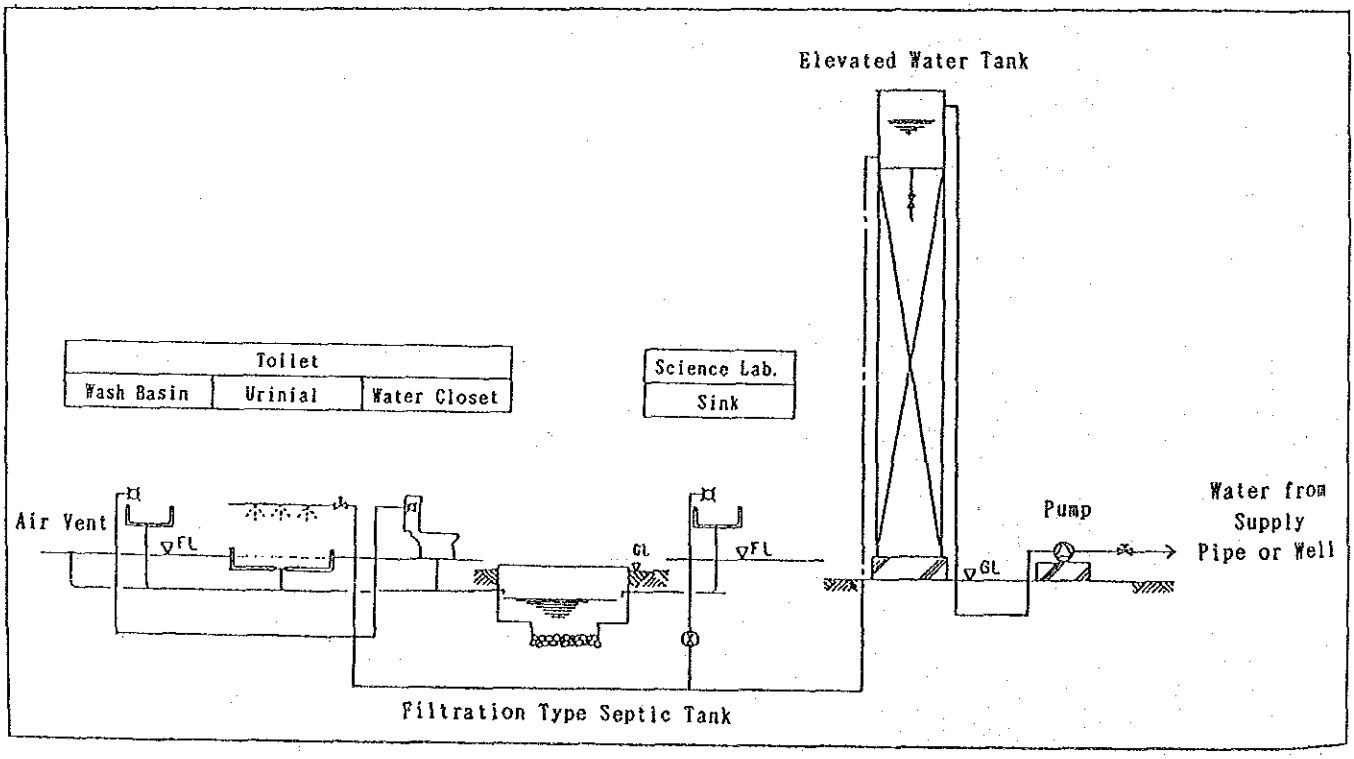
It will be necessary to install sewage treatment facilities for sewage from toilet wash basins, urinals and water closets and water from the sinks in the science laboratories. It is designed to treat sewage and waste water by simple infiltration type septic tanks. The sewerage facility includes the following items:

. Water closets:	Western type
. Urinals:	Multiple unit type, tiled
. Wash basin:	Reinforced-concrete with tile
. Piping material:	PVC pipe
. Septic Tanks:	Infiltration type, made of reinforced concrete

Lighting and Outlet Wiring Diagram



Water Supply and Sewerage System Diagram



e. Schoolbuilding Material Plan

1. Basic Requirements

As in the Phase III project, in view of durability and short construction period requirements, prefabricated materials procured in Japan, such as steel structures and roofing materials, the long sandwiched insulated panels are adopted for the Project. Since no problems are foreseen in the use of local materials for the interior walls, local dressed plywood is to be used as the finish material of interior walls and ceilings, and colored mortar cement for interior floors.

2. Major Materials to be Used

a) Structure Material

Weatherproof, lightweight shaped steel that provides longer life than regular steel is to be used for the main members of buildings.

b) Roofing Material

Most of the schools in the Philippines are roofed with zinc plated sheets. Unfortunately, most of them are corroded. Thus, aluminum-zinc alloy plated steel sheets that have a stronger anti-corrosion resistance than zinc plated steel sheets were selected. Also, uncoated aluminum-zinc alloy plated steel sheets have a better capability to reflect sunshine than the zinc plated steel sheets. It is expected that the selected roofing material will be helpful in preventing temperature rises in the rooms.

c) Windows

Sliding glass windows that are used extensively in Japan are rarely found in Philippine primary and secondary schoolbuildings -- wooden jalousies are most commonly used in the Philippines. Wooden jalousies are unique, ingenious contrivances that utilizes the merits of non-shattering, easily maintainable and manageable wood and yet allows effective natural ventilation. Therefore, it was decided to use wooden

jalousies for the schoolbuildings; they are suitable for the Philippine environment.

d) Walls and Ceilings

It was decided to use long insulation sandwich panels for exterior wall material by taking into account their high insulating qualities. Local dressed plywood will be used for partition walls and ceilings. Some movable walls are designed for Project schoolbuildings. Since the movable walls require highly accurate finish work, they are to be procured in Japan.

The finish materials to be used for Project schoolbuildings are listed in Table 4-4.

Table 4-4 Finish Materials to be Used for Project Schoolbuildings

EXTERIOR	PHILIPPINE METHOD	THIS PROJECT'S METHOD	REASON FOR ADOPTION
Roofs	Zinc plated corrugated steel sheets	Aluminum-zinc alloy plated steel sheets	Stronger anti-corrosion resistance
Roof edges	No underlay, O.S. finish	Waterproof plywood. S.O.P. coating	Easy maintenance and adoption of looal material
Walls	Concrete blocks. mortar finish	Long-sized insulating sandwich panels	Insulating effect
Windows	Wooden jalousies coated with S.O.P.	Wooden jalousies coated with S.O.P.	Easy maintenance
Doors	Wooden doors	Wooden doors coated with S.O.P.	Durability and easy maintenance
Baseboards	Cement mortar steel trowel finish	Cement mortar steel trowel finish	Durability and easy maintenance
Corridor floors	Cement mortar steel trowel finish	Cement mortar steel trowel finish	Durability and easy maintenance
Septic tanks	Reinforced Concrete particially made of concerete blocks	Concrete block made (inside, and outside tank tops are to be waterproof mortar steel trowel finish)	Durability and easy maintenance

EXTERIOR	PHILIPPINE METHOD	THIS PROJECT'S METHOD	REASON FOR ADOPTION
Classrooms and Science Laboratories			
Floors	Reinforced concrete, mortar finish	Colored cement mortar steel trowel finish	Durability
Walls	Concrete blocks, mortar finish	Partition walls--decorative plywood S.O.P. Side plank--long-sized insulating sandwich panels	Durability, insulating effect, easy construction, and adoption of local materials
Ceilings	No ceiling, O.S. finish(truss structures)	Decorative plywood	Easy to install
Other parts		Work benches with sinks Mortar steel trowel finish (science laboratories only) Dadoes--- CHB mortar, E.P. coating	Easy maintenance and accurate finish work
Male and Female Toilets			
Floors	Mortar finish	Mosaic tile	Easy maintenance
Walls	Concrete blocks, V.P. laying	Concrete blocks, Mortar steel trowel finish, V.P. laying	Easy maintenance
Ceiling	No ceiling, O.S.finish	Plywood, O.P. finish	Easy maintenance

4-3-3 Equipment Plan

In order to fulfill the education conditions after the opening of the Project schools, proper accommodations must be installed. Upon completion of the classrooms, science laboratories and toilets in the Project schools, various types of equipment will be used.

Based on the contents of the Philippine Government's request for the Project and the results of the field surveys, the basic equipment necessary for school use will be provided as part of the Project. It was decided that the desks and chairs for primary school classrooms would be the double-seated types. It was planned to provide three different sizes of desks and chairs to suite the different body sizes of the students. Single person desk-chairs that are generally used in the Philippines will be furnished to secondary school classrooms.

For the science laboratories, three-person type tables were decided upon. One workbench (to be used for teacher demonstrations) will be installed in each of the science laboratories. Judging from the purposes for which they are to be used, it was planned to provide practical, strong equipment; elaborate equipment was avoided. Wooden furniture was used in Phases I, II, and III. However, wooden products have become difficult to obtain due to indiscriminate deforestation in the Philippines, thus steel and plywood furniture will be used in Phase IV.

The equipment types and number of units to be provided for each Project school classroom are shown in Table 4-5. The equipment types and number of units to be provided for each different size Project school are shown in Table 4-6.

Table 4-5 Equipment Types and Number of Units to be Provided for Each Project School Classroom

Primary Schools

Name of Room	Name of Item	No. of Units for One Room
Classroom	· Teacher's desk	1
	· Teacher's chair	1
	· Teacher's filling cabinet	1
	· Student's chair-desks (large size)	8
	· Student's chair-desks (medium size)	8
	· Student's chair-desks (small size)	8
	· Student's closets	8
	· Blackboard	1
	· Bulletin board	1

Secondary Schools

Name of Room	Name of Item	No. of Units for One Room
Classroom	· Teacher's desk	1
	· Teacher's chair	1
	· Teacher's filling cabinet	1
	· Student's chair-desks	42
	· Student's closets	8
	· Blackboard	1
	· Bulletin board	1
Science Laboratories	· Experiment tables	14
	· Student's closets	5
	· Demonstration workbench	1
	· Stools (1 for Teacher, 42 for Students)	43
	· Blackboard	1
	· Bulletin board	1
	· Storage shelve	1
	Steel shelve	1

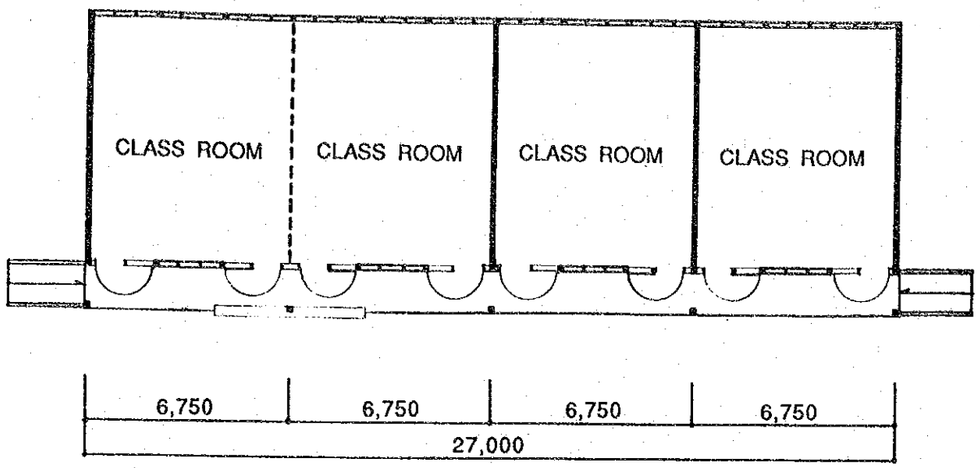
Table 4-6 Equipment Types and Number of Units to be Provided for Each Different Size Project School

Furniture	Primary Schools					Secondary Schools									Total of All Project Schools
	B Type Three Classrooms (9 schools)		C Type Four Classrooms (13 schools)		Subtotal	SA Type Two Classrooms (4 school)		SB Type Three Classrooms (14 schools)		SC Type Four Classrooms (15 schools)		SD Type Five Classrooms (17 schools)		Subtotal	
	For one school	9 schools	For one school	13 schools		For one school	4 schools	For one school	14 schools	For one school	15 schools	For one school	17 schools		
Teacher's desk	3	27	4	52	79	2	8	3	42	4	60	5	85	195	274
Teacher's chair	3	27	4	52	79	2	8	3	42	4	60	5	85	195	274
Teacher's filling cabinet	3	27	4	52	79	2	8	3	42	4	60	5	85	195	274
Student's chair (Large)	24	216	32	416	632										632
Student's chair (Mediun)	24	216	32	416	632										632
Student's chair (Small)	24	216	32	416	632										632
Armchair						84	336	126	1,764	168	2,520	210	3,570	8,190	8,190
Student's closet	24	216	32	416	632	21	84	29	406	37	555	45	765	1,810	2,442
Workbench						14	56	14	196	14	210	14	238	700	700
Experiment Table						1	4	1	14	1	15	1	17	50	50
Stool						43	172	43	602	43	645	43	732	2,150	2,150
Blackboard	3	27	4	52	79	3	12	4	56	5	75	6	102	245	324
Bulletin board	3	27	4	52	79	3	12	4	56	5	75	6	102	245	324
Storage shelf						1	4	1	14	1	15	1	17	50	50
Steel shelf						1	4	1	14	1	15	1	17	50	50

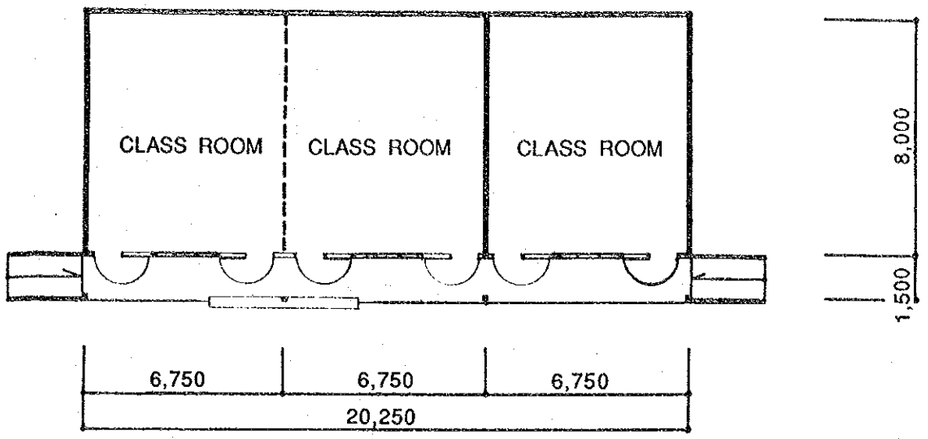
4-3-4 Basic Design Drawings

Drawing List

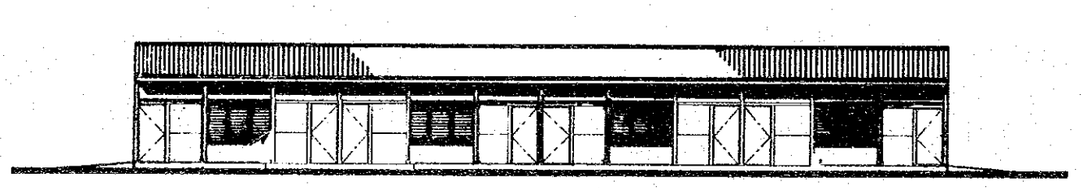
No.	Title
01	Primary School B & C Types: Plans, Elevations and Sections
02	Secondary School SC Type: Plan, Elevations and Sections
03	Secondary School SA, SB and SD Types: Plans
04	Toilet: Plan, Elevations and Section
05	Primary School B and C Types' Equipment Arrangement
06	Secondary School SA, SB, SC, and SD Types' Equipment Arrangement



ELEMENTARY SCHOOL C-TYPE PLAN



ELEMENTARY SCHOOL B-TYPE PLAN



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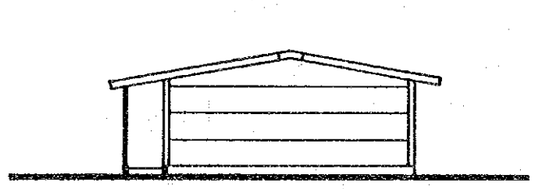

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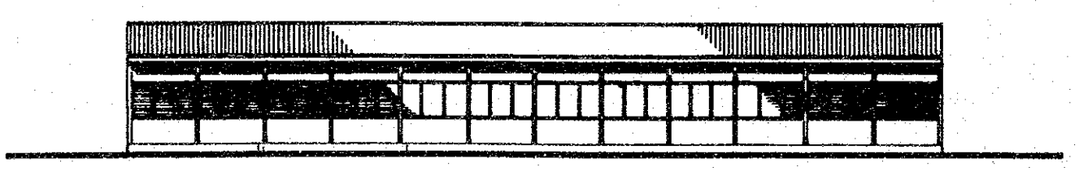

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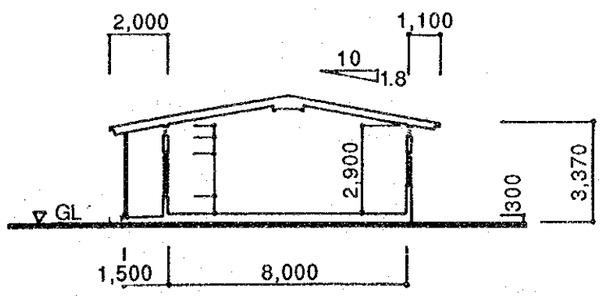

SECTION

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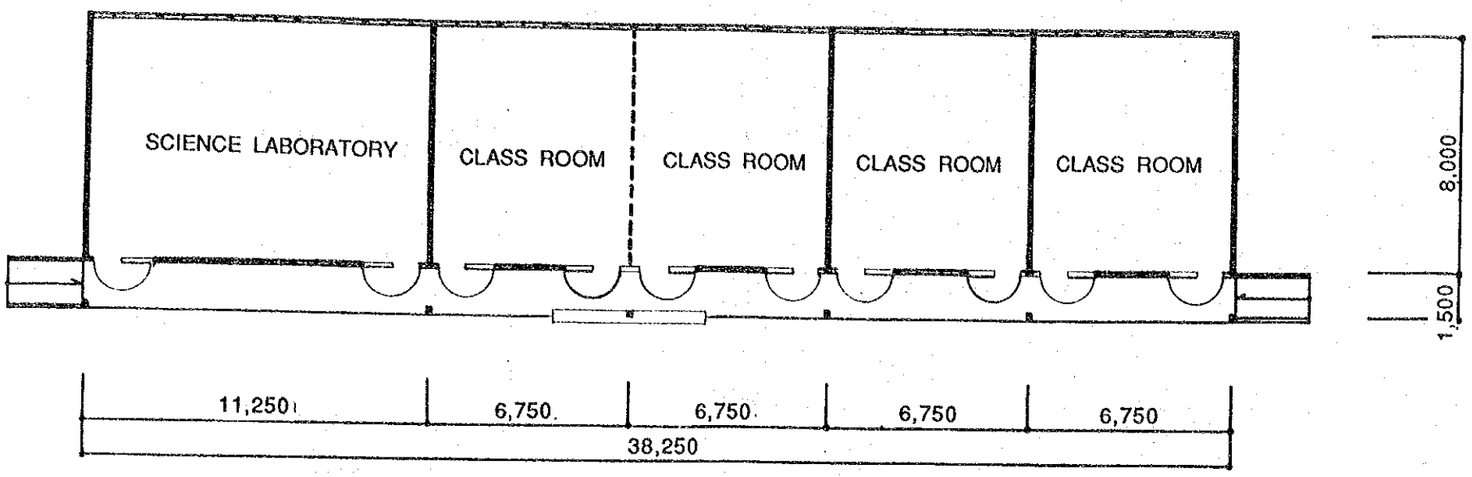
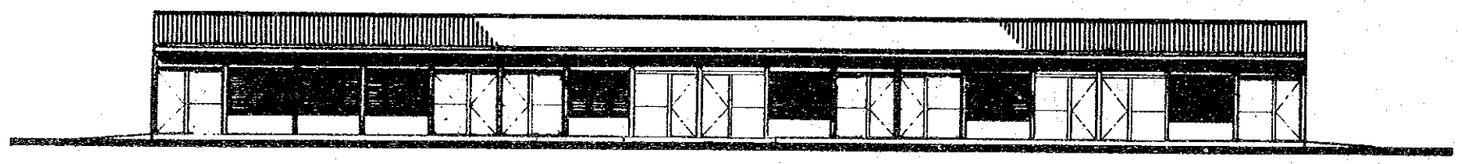
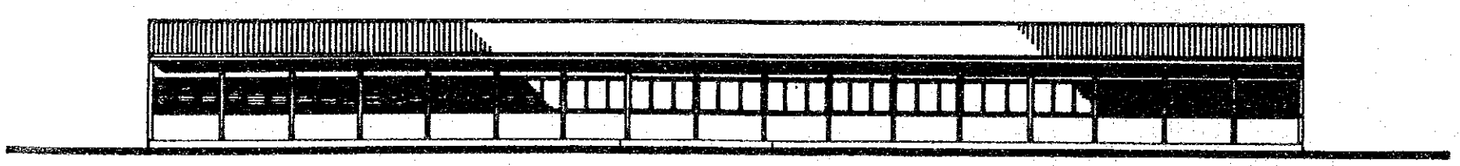


SECONDARY SCHOOL SC-TYPE PLAN



ELEVATION

ELEVATION



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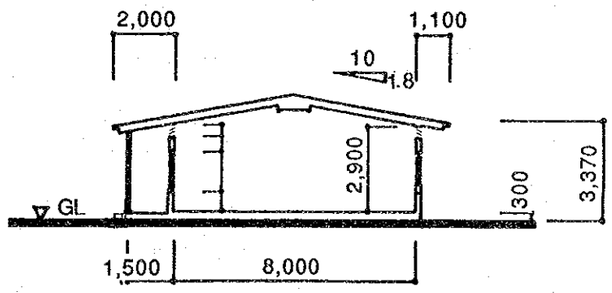

SECTION

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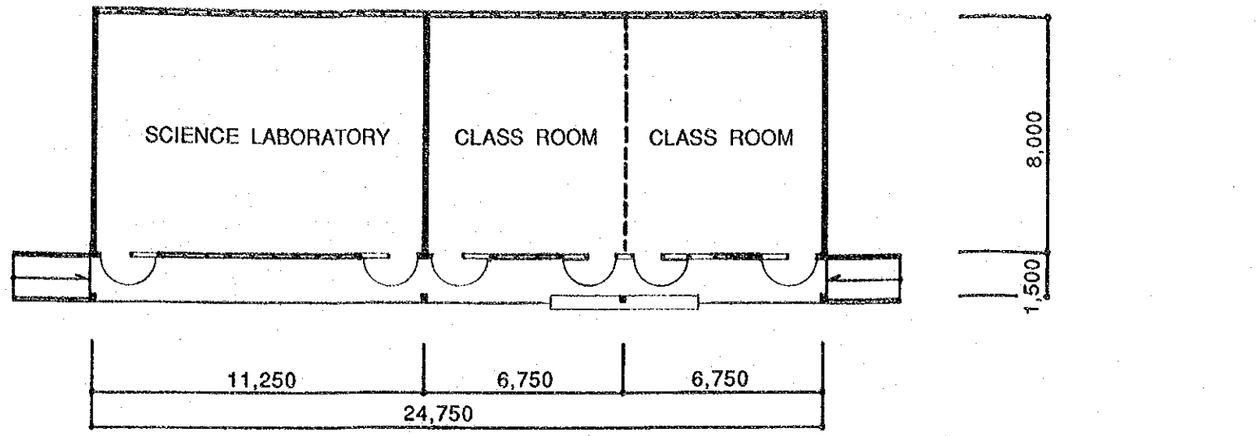
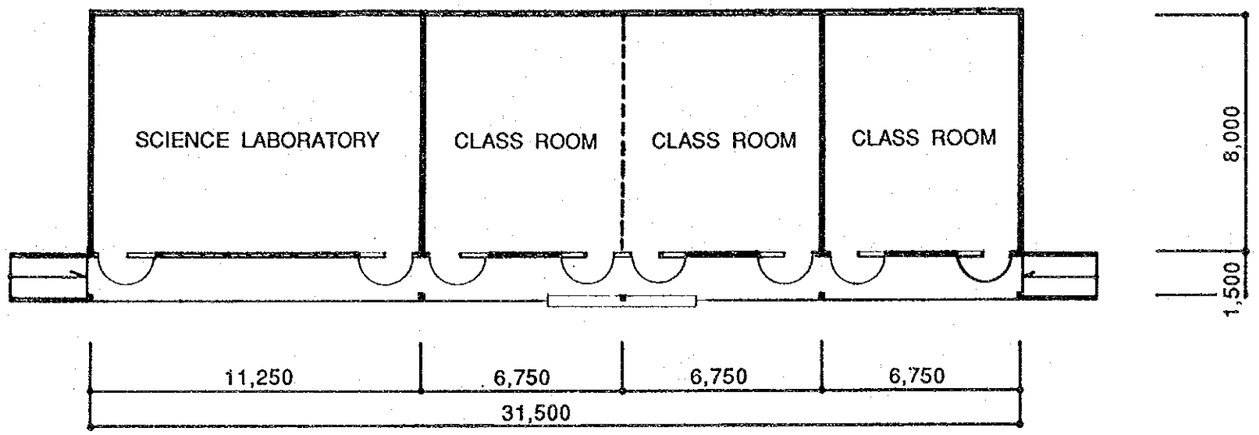
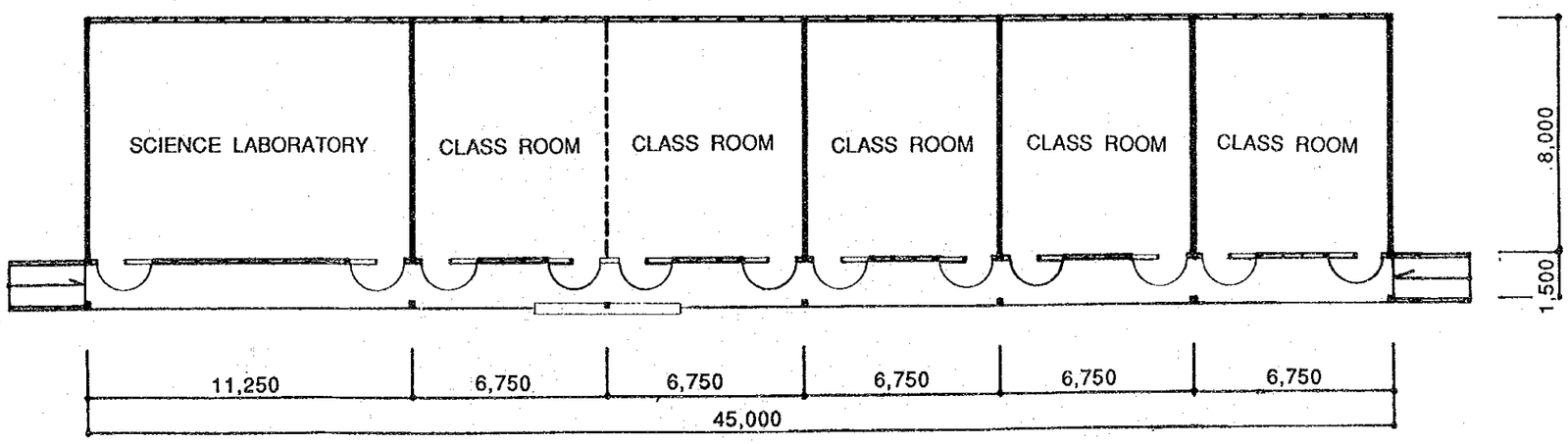


SECONDARY SCHOOL SA-TYPE PLAN

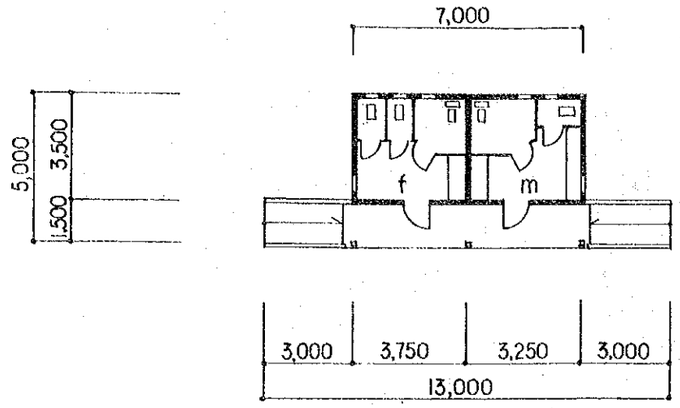


SECONDARY SCHOOL SB-TYPE PLAN

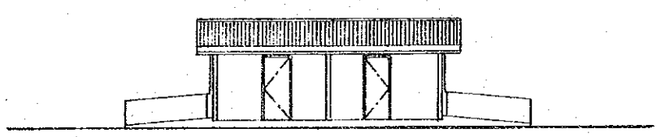


SECONDARY SCHOOL SD-TYPE PLAN

0 1 5 10m



PLAN



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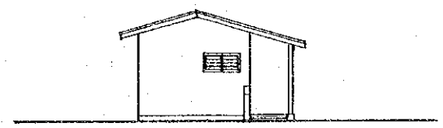

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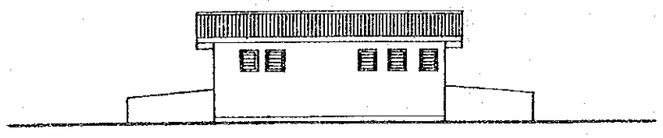
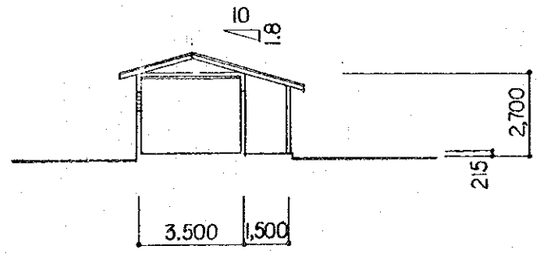


ELEVATION



SECTION

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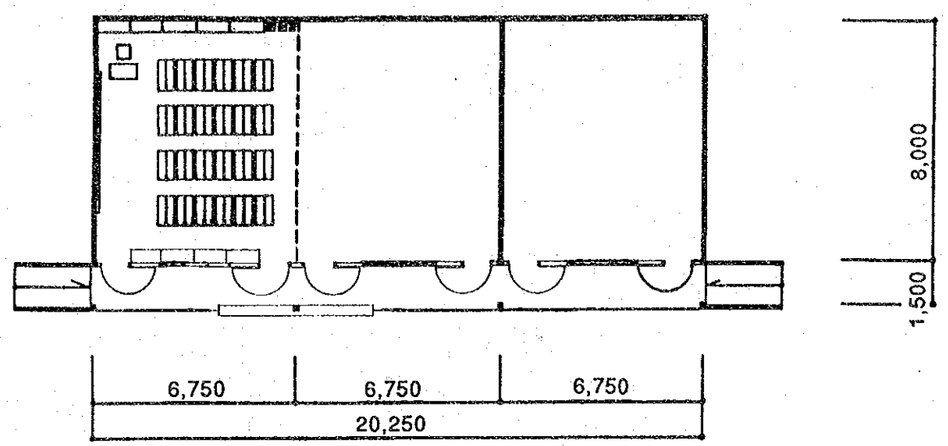
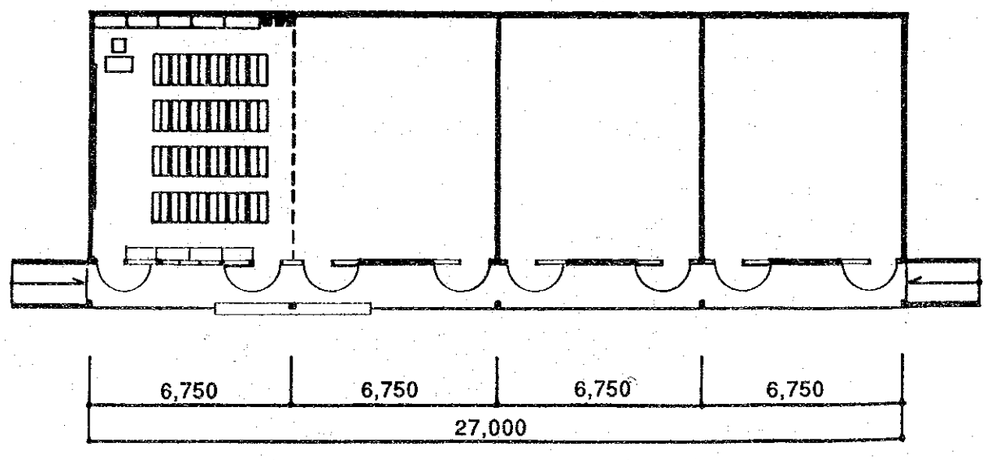
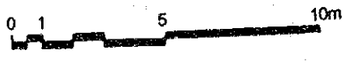
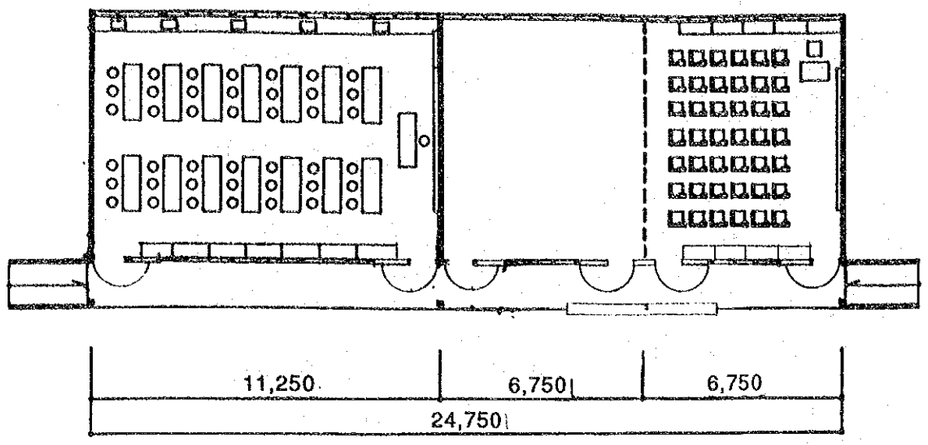


ELEMENTARY SCHOOL B-TYPE EQUIPMENBT PLAN

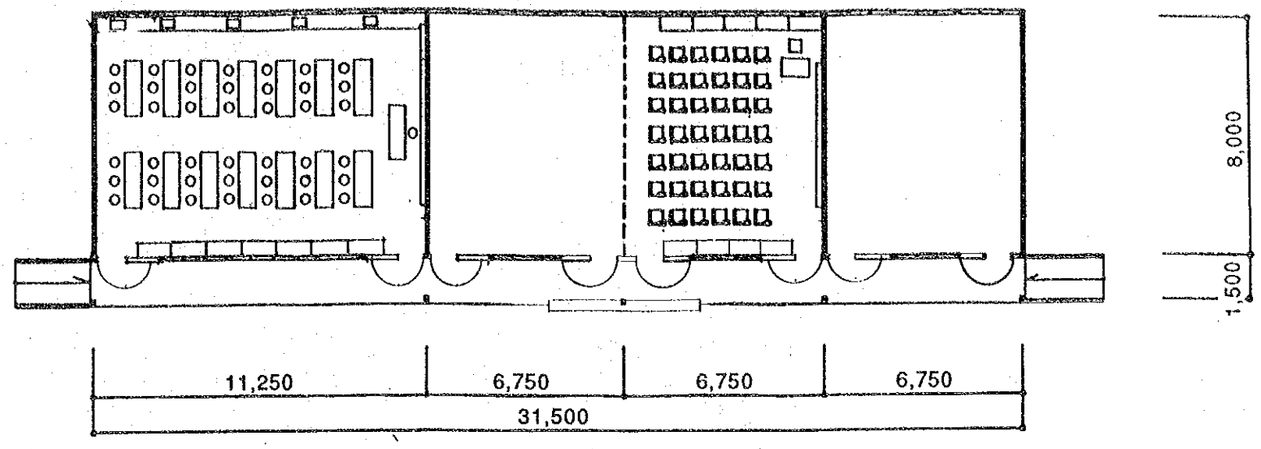


ELEMENTARY SCHOOL C-TYPE EQUIPMENBT PLAN

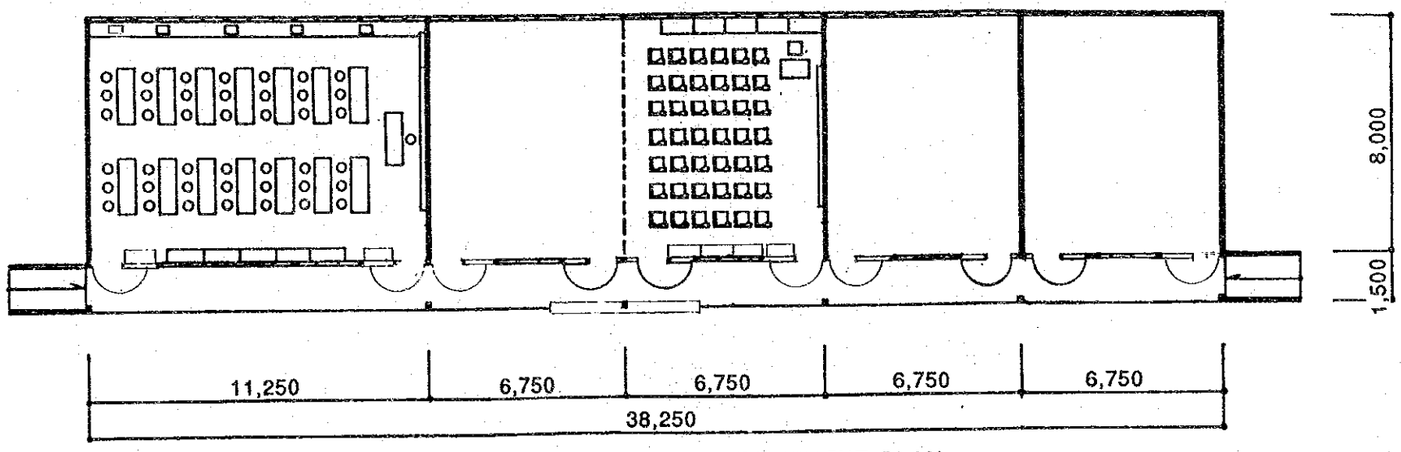




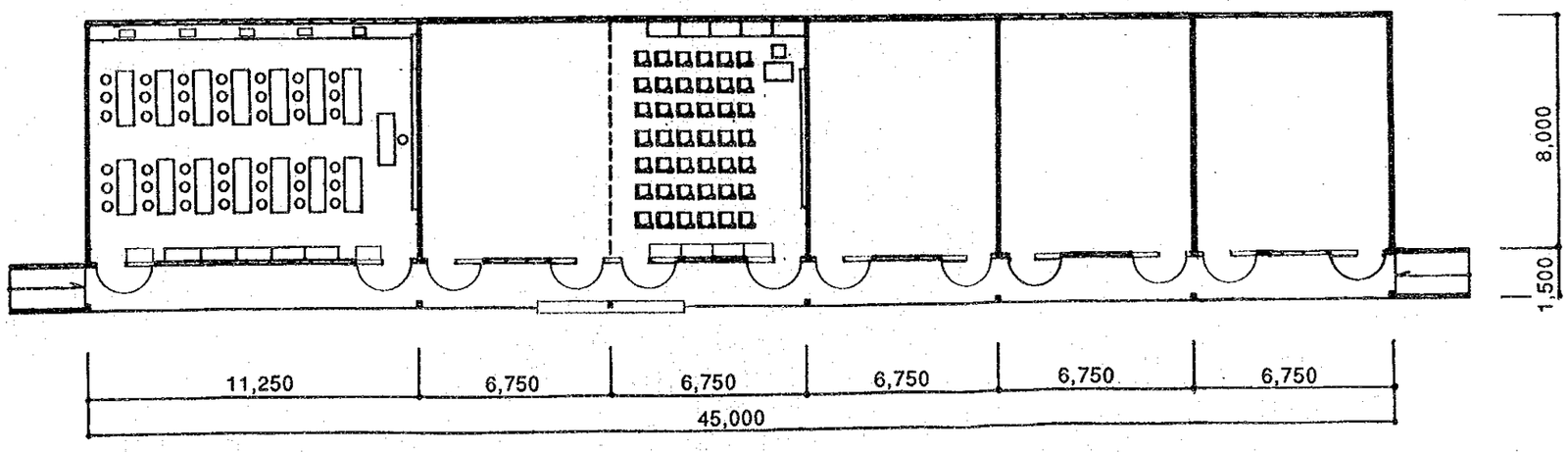
SECONDARY SCHOOL SA-TYPE EQUIPMENT PLAN



SECONDARY SCHOOL SB-TYPE EQUIPMENT PLAN



SECONDARY SCHOOL SC-TYPE EQUIPMENT PLAN



SECONDARY SCHOOL SD-TYPE EQUIPMENT PLAN

0 1 5 10m

4-4 Implementation Plan

4-4-1 Implementation Method

A peculiarity of the Project is the construction of school facilities at widely scattered sites in Regions VI and part of Region X that stretches some 530 km in a north-south direction and 440 km in an east-west direction during a very short period of time. The construction plan must be able to meet this peculiarity.

1) Two schools will be set up as the Project's model schools. One will be in Iloilo and the other will be in Roxas City, the construction bases in Region VI.

   The group-leader class engineers who will carry out the Project construction at each site will be provided with on-the-job training in the following subjects:

   I. The accurate foundation concrete placing method and the method for fixing prefabricated material by anchor bolts. Both of these methods are important in the building of typhoon-resistant schoolbuildings.

   II. Training in prefabricated structure construction methods and finishing methods will be conducted for fourteen days by engineers dispatched from Japan. Actual job experience coupled with the used of the construction manual will be of great value to the engineers when performing future construction work.

2) As construction work will be conducted at various sites simultaneously, the supervisors shall communicate with each other frequently so that the plan can be carried out smoothly.

3) Regarding the construction materials and equipment to be procured in Japan, adequate quality control and inspection should be carried out in Japan to prevent troubles from arising at the construction sites.

4) To guide Japanese contractors in making the technology transfer of prefabricated structure construction techniques to local contractors and

workers.

5) The schedule for the foundation construction work should be set up according to the arrival dates of the prefabricated material at the sites.

6) The maintenance of security and the prevention of theft within the construction sites throughout the entire construction period is of utmost importance.

7) As the existing electric power supply to the Project sites is inadequate, small generators will be used. Most of the schools have a water supply. As Project water usage will be small, water for construction purposes will be stored in drum cans or drawn by hand pumps.

8) To ensure the success of Project construction, it will be absolutely necessary to maintain close cooperation with the local contractors. The clarification of the roles of a prime contractor and the subcontractors, and the establishment of an appropriate staff plan should be made for the smooth progress of the construction work.

As described in Section 4-1 (Basic Design Policies), it will be necessary to utilize local consultants and contractors and dispatched specialists from Japan. The construction management by the Philippine side will be carried out by EDPITAF with the cooperation of DECS and DPWH as explained in the previous sections of this report concerning the Executing Agency and Operational Structure.

4-4-2 Construction Management System

As the seventy-two Project schools are scattered throughout the entire area of Region VI and part of Region X, it is important to have adequate management of the construction schedule and quality control.

The consultant firm and construction contractors should establish the Project construction headquarters in Manila. Each region shall be divided into 14 construction areas. A construction base should be established in each

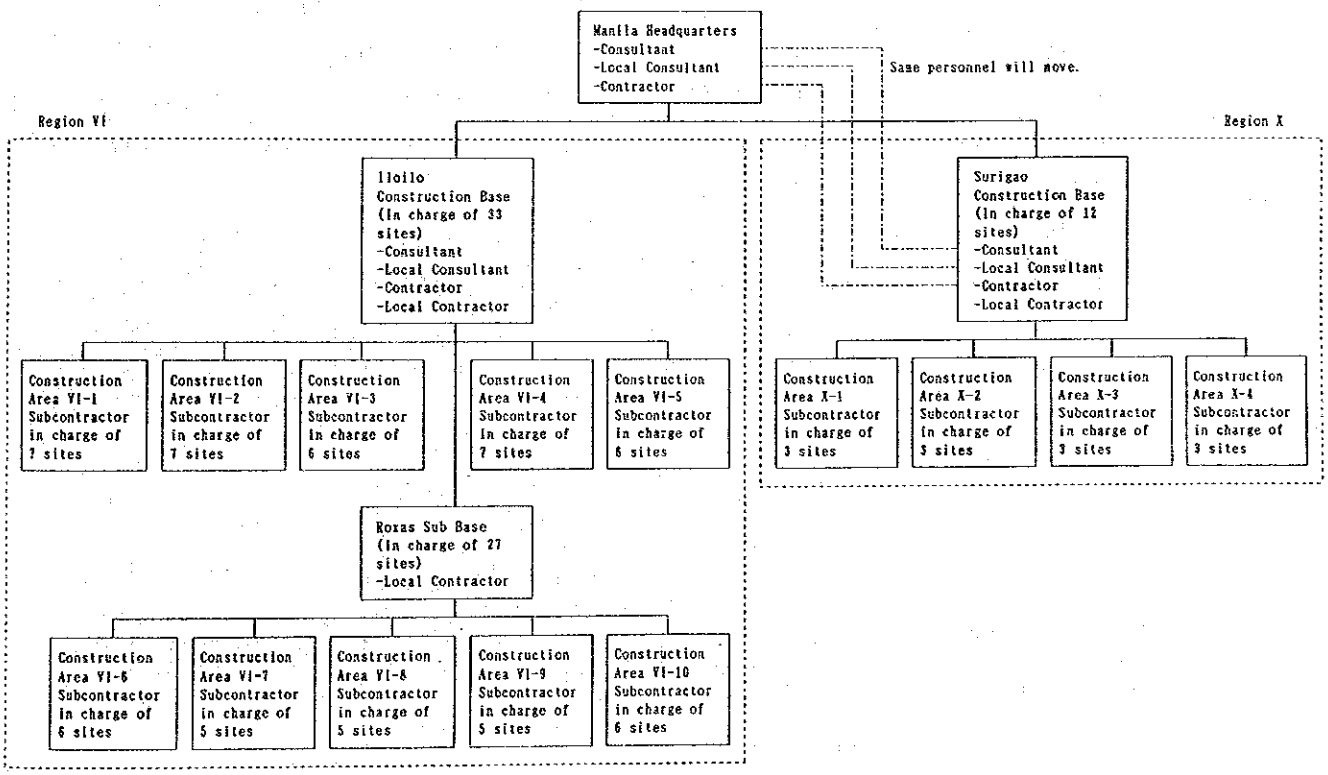
region to supervise construction work in the areas (Region VI's construction base in Iloilo and Region X's construction base in Surigao City).

To assist the construction base in Iloilo, a construction sub base will be set up in Roxas City (Region VI) to direct the construction.

By having construction management bases in five cities, smooth delivery of equipment and materials to each site can be made and the periodic close construction management by consultants, construction contractors and local engineers will be possible.

The Project construction management organization chart is shown in Table 4-7.

Table 4-7 Project Construction Management Organization Chart



4-4-3 Equipment and Material Procurement Plan

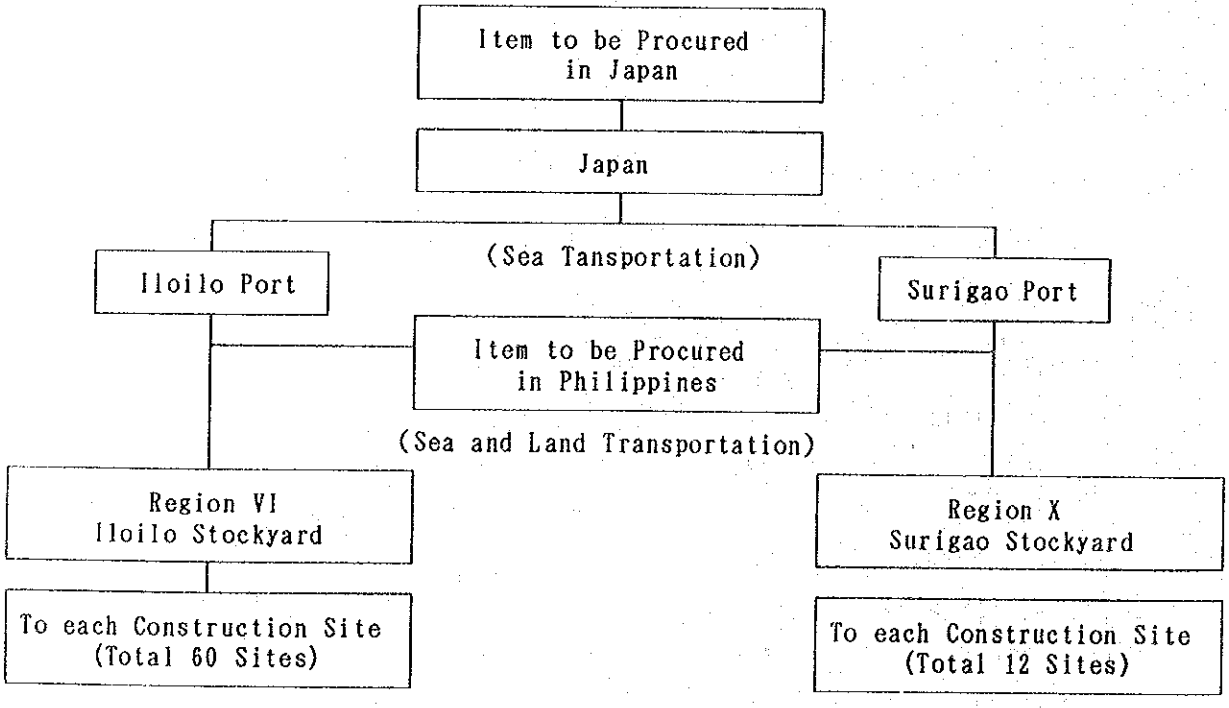
(1) Equipment and Material Procurement Policies

The prefabricated materials needed to secure the Project's typhoon-resisting capabilities will be procured in Japan. Since there are no technical problems concerning local construction materials, such as reinforcing bars, cement, gravel, concrete blocks, etc., and utility fixtures and furniture, they will be procured locally for the sake of easy maintenance and management of school facilities after project completion. Most of these materials and equipment can be procured in each Region. Items requiring to be of higher grade, or are needed in larger quantities than available in each Region, will be obtained in Manila.

There is a sufficient work force available in the Philippines. For work requiring special techniques, such as assembling prefabricated materials, it will be necessary to dispatch the manufacturer's engineers from Japan.

The transportation plan for procured equipment and materials is shown in Table 4-8.

Table 4-8 Transportation Plan for Procured Equipment and Materials



(2) Sea Transportation Plan

By taking into account the economical manufacturing process of almost 14,000 m^3 of prefabricated frames and the progress of the foundation construction work in the Philippines, a sea transportation plan shall be drawn up to provide smooth construction progress during each construction stage.

It is planned to disembark the prefabricated construction material procured in Japan at Iloilo and Surigao International Ports. Since the ports are the representative international ports of the Philippines, the 5,000 to 8,000 ton class ship planned on being used for the Project will have no problem entering.

(3) Inland Transportation Plan

The material and equipment disembarked at the Iloilo and Surigao International Ports will be transported to each Region's stockyard for temporary storage by heavy vehicles. Although the principal highway is in good condition, there are problems concerning access roads and the allowable loads and widths of bridges. In particular, the failure of a bridge during the rainy season may affect the Project's construction schedule. Various means of transportation, such as using manual labor to carry uncrated materials and equipment should therefore by employed.

To prevent damage during transportation, compact sized wooden crates of from 700 kg to 3 tons should be used. Load heights should be limited to 2 m because many of the roads are unpaved and the power line crossing over the roads very low.

(4) Material and Equipment Storage Plan

The prefabricated construction materials that are disembarked at the Iloilo and Surigao International Ports will be inspected by customs and kept in a bonded warehouse for a short period of time. They will then be transported by land to the Project's two stockyards (one in Iloilo for Region VI and the other in Surigao for Region X). Equipment and materials procured in each region and in Manila will also be stored in these stockyards for later delivery to each Project site depending upon the progress of construction

work.

4-4-4 Implementation Schedule

1) Project Construction Boundaries

The construction boundaries to be undertaken by the Japanese and Philippine sides are shown in Table 4-9.

Table 4-9 Project Construction Boundaries to be Undertaken by the Japanese and Philippine Sides

Work Item	Japanese Side	Philippine Side
1. Securing of Project sites.		○
2. Site clearing prior to commencing Project construction work.		○
3. Incidental work, such as gardening and fencing.		○
4. Construction of access roads to Project sites prior to the commencement of Project construction work.		○
5. Installation of facilities for distribution of electricity, water supply, drainage and other incidental facilities to Project sites when needed.		○
6. Obtaining building, occupancy and all necessary permits for the Project with respect to the laws and regulations of the Philippine Government.		○
7. Securing the necessary budget and personnel for the proper and effective maintenance of Project schoolbuildings and equipment.		○
8. Procurement of Project use equipment and materials in Japan and their shipment to Project sites in the Philippines.	○	
9. Procurement of Project use equipment, materials and labour in the Philippines and their transportation to Project sites.	○	
10. Construction of Project facilities.	○	
11. Exempting Taxes and all other levies and duties and ensuring prompt unloading and customs clearances at the port of disembarkation in the Philippines for Project use materials and equipment.		○
12. Exempting Japanese nationals involved in the Project from customs duties, internal taxes and other fiscal levies which may be imposed in the Philippines with respect to the supply of the equipment and services under the verified contracts.		○
13. According Japanese nationals whose services may be required in connection with the supply of the products and the services under the verified contracts for their entry into the Philippines and stay therein for the execution of the Projects.		○
14. Bearing of commissions to the Japanese foreign exchange bank for the banking services based on the Banking Arrangement in accordance with the standard grant procedure.		○
15. Bearing all expenses other than those to be borne by the Grant, necessary for the construction of the schoolbuildings as well as for the transportation and installation of the equipment.		○
16. Effective operation and management of the facilities and equipment to be provided under the Grant Aid.		○

2) Implementation Schedule

The preparation of the Project Implementation schedule will be made based on the premise that the measures to be taken by the Philippine and Japanese governments will be carried out smoothly in accordance with procedures established by the Grant Aid Program of the Government of Japan.

Project implementation will start when the Exchange of Notes for the Project is signed by both governments. The preparation of the detailed design, the tendering for the construction work, the fabrication of building frames, the shipping of equipment and materials, and the facility construction work will then follow in five steps.

* Detailed Design:

After the confirmation of the consultant contract agreement by the Government of Japan, the consultant will prepare the tender documents based on the Basic Design Study Report. The specifications and detailed items for Project facilities should be decided upon as a result of discussions to be held with the actual users of Project facilities.

As for the boundaries between the measures to be undertaken by the Philippine and Japanese governments for the Project under the Grant Aid Program of the Government of Japan, they should be clarified during the early stage of the detailed design period on the Exchange of Notes.

Both governments will take the necessary steps to promote the forming of the organization structure of the Project's implementation agency, and to secure the necessary funds for the Project to meet the requirements of the Grant Aid Program. It will take approximately two months to prepare the detailed design.

* Tendering for Project Construction Work

The tender period is that time which is required for tender announcement, prequalification evaluation of tenders, tender opening, and tender evaluation prior to reaching contract agreement.

The methods for tendering and for reaching contract agreement should be carefully decided upon after discussions are held with representatives from both governments. There will be an approximately 40 days tender period.

* Fabrication and Transportation of Frame Structures

The preparation of the detailed drawings will commence immediately after the contract agreement is reached. After the completion and approval of the detailed drawings, the frame structures for Project schoolbuildings will be fabricated at manufacturing plants. After the construction contract agreement is negotiated, it will take at least five months to effect the first shipment of frames. The ship transporting the frames will depart from the Port of Yokohama and will sail to Iloilo and Surigao.
The shipping time from the manufacturing plant to the Project sites (this includes the time for effecting land transportation and obtaining custom clearance) will take from 20 to 30 days.

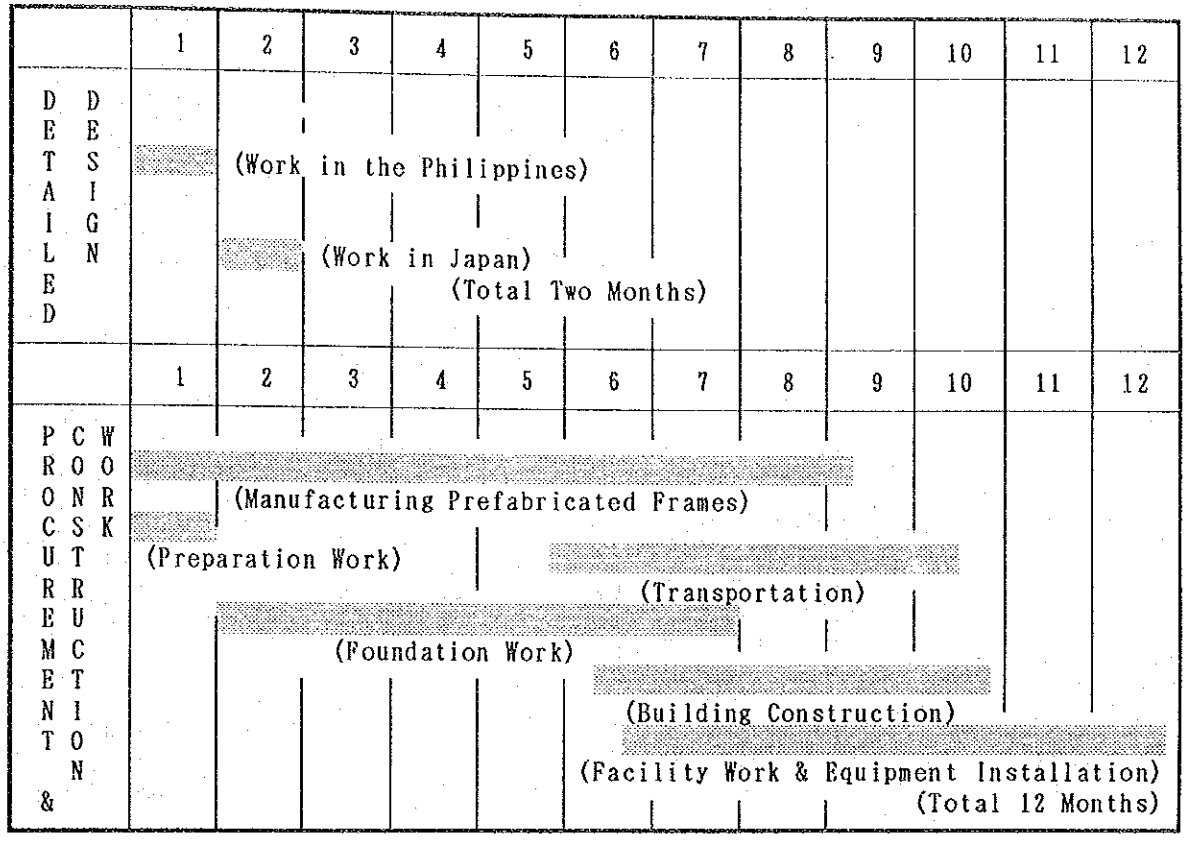
* Construction

The first material shipment will be made approximately five months after the contract agreement is signed. It would be desirable to complete the construction of most of the schoolbuilding foundations during the five month period that will be necessary to prefabricate and ship the frame structures. During this period, it would also be desirable to proceed with the construction of toilets using the Philippine method. Weather conditions permitting, the foundations can be completed in approximately four weeks.

In Regions VI and X, it would be most desirable to complete the earth and foundation construction work during the dry season (March through October). From ten to fourteen days will be needed to erect the prefabricated frame structures. Once construction personnel become familiar with the job, one week per site should be sufficient to complete the erection work.

The Project implementation schedule is shown in Table 4-10.

Table 4-10 Project Implementation Schedule



4-4-5 Construction Costs to be Borne by the Philippine Side

Construction costs to be borne by the Philippine side is estimated as being 10,000,000 pesos. The breakdown of the costs is as follows:

Land Clearance:	2,140,000 pesos
Removal of Existing Buildings:	860,000
Water Supply Work:	1,750,000
Power Supply Work:	5,250,000
TOTAL	10,000,000 pesos

CHAPTER 5. PROJECT EVALUATION AND CONCLUSION

CHAPTER 5 PROJECT EVALUATION AND CONCLUSION

The Government of the Philippines has been promoting the education and manpower development and has been making every effort to improve the education conditions. However, the number of primary and secondary schools are still insufficient. Some 2.61 million school-age children cannot receive an education.

In addition to the above situations, typhoons, especially the ones in 1987, inflicted heavy damage to many primary and secondary schools. And now, the lack of classrooms has become more and more of a serious problem. The construction of primary and secondary schoolbuildings is an urgent matter for the Government of the Philippines.

(1) Project Effects

Under the above-mentioned situations, including the construction of the schoolbuildings for 72 primary and secondary schools in Region V (Bicol Region) as the Phase I project, 69 primary and secondary schools in Region VIII (Eastern Visayas Region) as the Phase II project, and 72 primary and secondary schools in Region II (Cagayan Valley), Region IV (Southern Tagalog) as the Phase III Project, and 72 primary nd secondary schools in Region VI (Western Visayas) and Region X (Northern Mindanao) as the Phase IV Project, the five-year schoolbuildings construction plan for 285 schools located throughout the country will have the following effects:

(a) Increase Opportunities for Children to Attend School

790 classrooms have either been or are being built under the Phase I, II and III projects. 233 classrooms are for primary schools; 557 are for secondary schools. Assuming that one classroom can accommodate 40 students, these classrooms can accommodate 32,714 students. Under the Phase IV Project, a total of 274 classrooms will be constructed: 79 of them for primary schools and 195 for secondary schools. These classrooms will accommodate 11,350 students. As a result, 44,064 students will be able to use the classrooms built under the Phase I, II, III and IV projects. Thus,

the Projects will represent a meaningful contribution towards increasing the opportunities for children to attend school.

(b) Contribution to Area Residents

The Project's school facilities will not only be used for classroom purposes (including classes that will be conducted in two or three shifts) but also as places of refuge for area residents during periods of natural calamities and as meeting places. This additional use of the Project's school facilities will be a beneficial contribution to the area residents.

(c) Activation of Rural Economies

The construction of numerous schoolbuildings in the rural areas of the Philippines will provide employment opportunities for area residents. The local procurement of construction materials and equipment other than prefabricated building frames will make a significant contribution towards stimulating the rural economies of the Philippines.

(2) Conclusion

The chronic shortage of school facilities in the Philippines is a serious problem for the country. Furthermore, the problem has been compounded by the damage inflicted on school facilities by typhoons.

In the Medium-term Philippine Development Plan, the National Economic and Development Authority described that the improvement of school education is an important mainstay of the country's manpower resources development, and that it is of utmost importance to determine how best to improve the quality of education while, at the same time, promoting industrial development and economic growth.

It is believed that the implementation of the Project will be indispensable for the achievement of the country's education development plan; it will greatly contribute to the promotion of the national development plan.

Project school facility construction will also alleviate the chronic school facility shortage thereby enabling many children to receive a proper education which, in turn, will contribute to the improvement of the country's education conditions. Therefore, it is considered to be appropriate to implement the Project under the Japanese Government's Grant Aid Program.

As the management and maintenance of the Project's school facilities has been planned within the scope of the Philippine Government's five-year schoolbuildings construction plan it is judged that the amount of budgetary funds and the number of staff personnel will be sufficient to handle the job.

(3) Recommendations

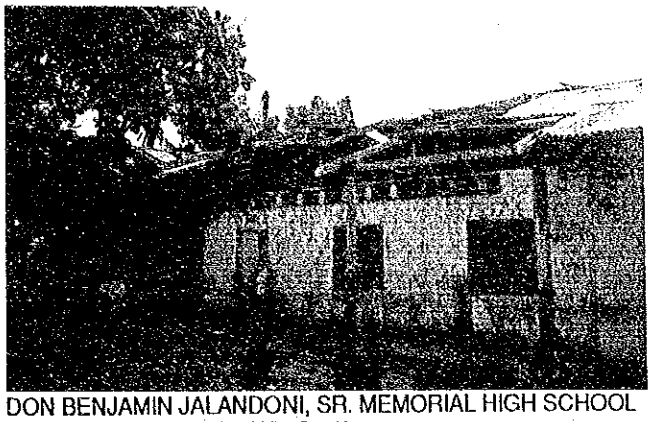
1. The Project shall be implemented with the cooperation of both Japan and Philippines. Therefore, it will be of great importance that the construction work to be borne by the Philippine side is definitely carried out for successful Project implementation. In particular, site preparation and the construction of access roads to the Project sites must be completed prior to the commencement of schoolbuildings construction. Furthermore, DECS and DPWH must maintain close cooperation and establish a solid Project implementation system.

2. Even though the school facilities' major structures are designed after making a thorough examination of the principals of minimum maintenance and management costs, i.e., maintenance free facilities, it would be desirable to give more consideration to the maintenance system. For example, the students could clean the school facilities as part of the school's education program.

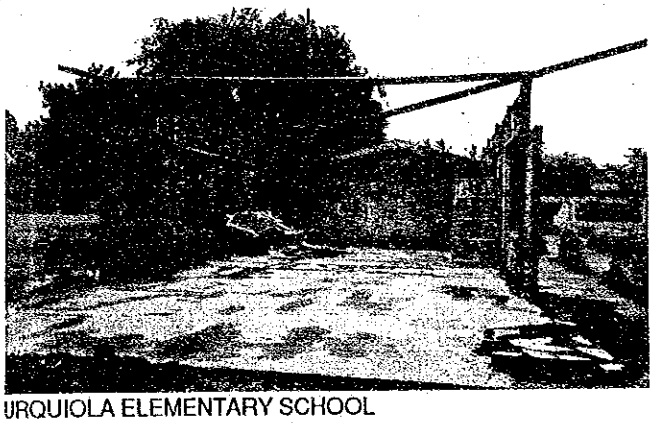
APPENDICES

APPENDICES

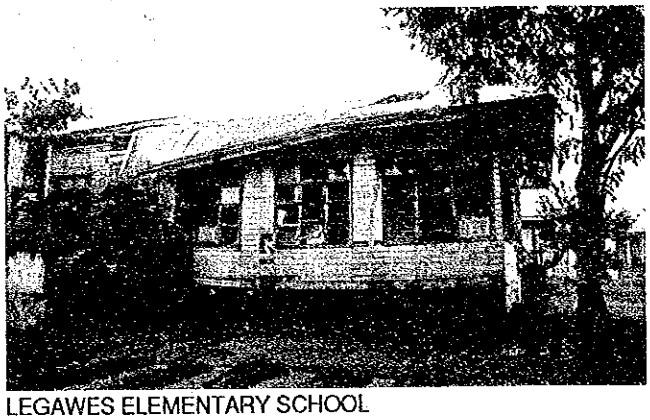
BANATE CENTRAL ELEMENTARY SCHOOL
(RECIPIENT SCHOOL : NO. E-7)



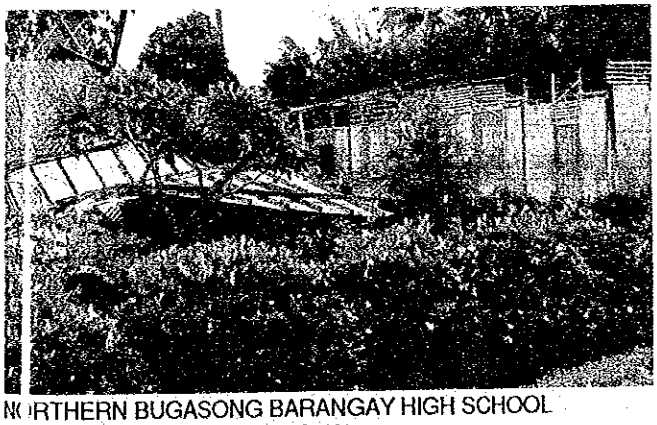
DON BENJAMIN JALANDONI, SR. MEMORIAL HIGH SCHOOL
(RECIPIENT SCHOOL : NO. S-58)



URQUIOLA ELEMENTARY SCHOOL



LEGAWES ELEMENTARY SCHOOL



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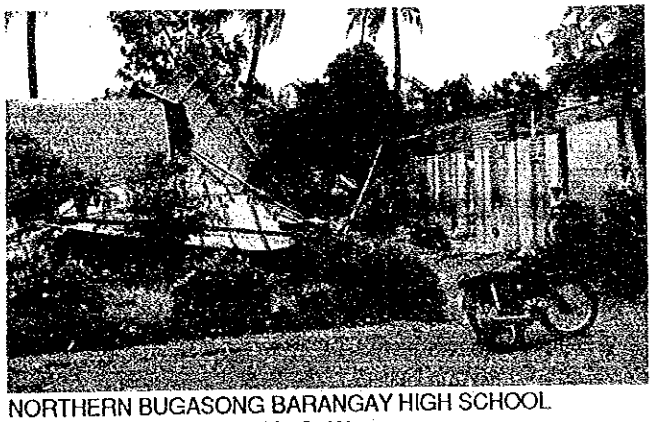

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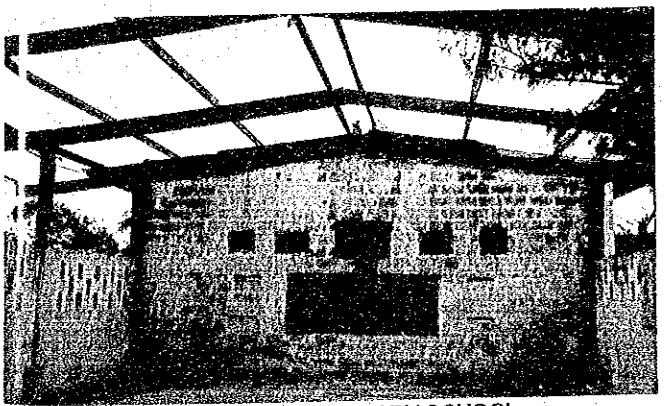
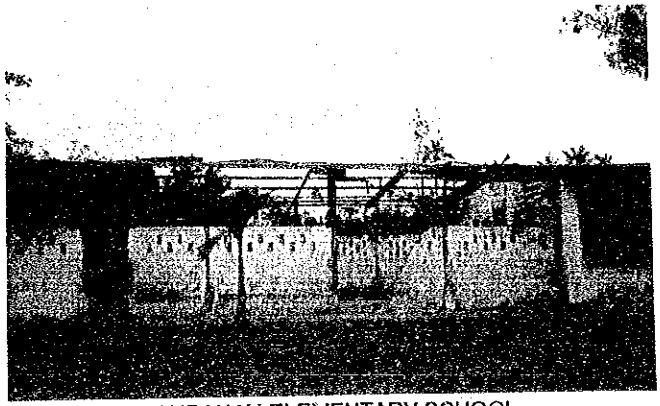


BOTONG CABAUBANAN ELEMENTARY SCHOOL



BOTONG CABAUBANAN ELEMENTARY SCHOOL

BAF ASANAN BARANGAY HIGH SCHOOL
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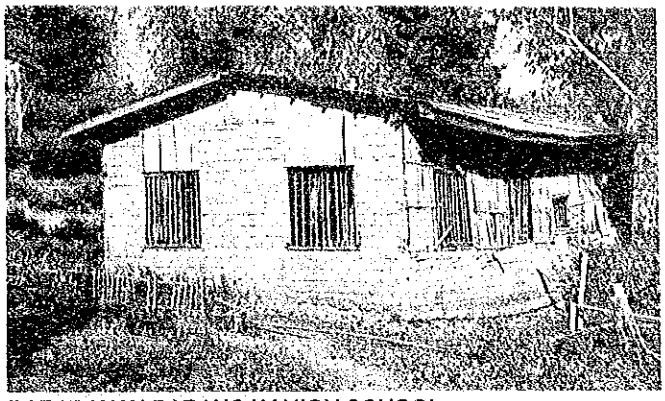

BARASANAN BARANGAY HIGH SCHOOL
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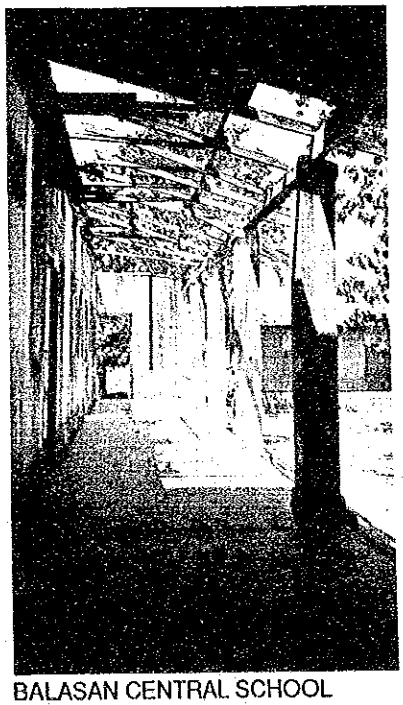
LAWIGAN BARANGAY HIGH SCHOOL
(RECIPIENT SCHOOL : NO. S-63)

BALASAN CENTRAL SCHOOL
(RECIPIENT SCHOOL : NO. E-9)

BARASANAN BARANGAY HIGH SCHOOL
(RECIPIENT SCHOOL : No.S-39)

LAWIGAN BARANGAY HIGH SCHOOL
(RECIPIENT SCHOOL : NO. S-63)

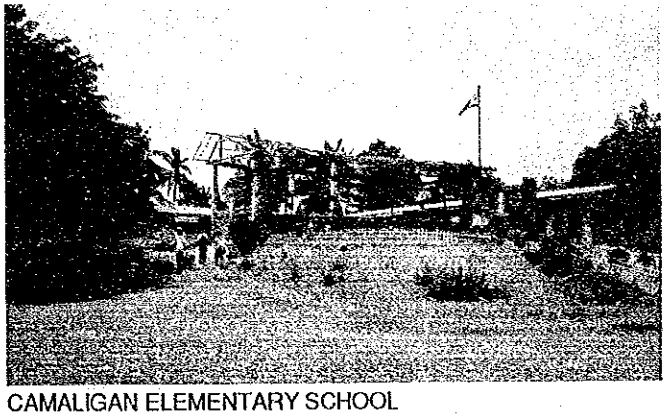


BALASAN CENTRAL SCHOOL
(RECIPIENT SCHOOL : NO. E-9)

DON E. LADRIDO MEMORIAL ELEMENTARY SCHOOL
(RECIPIENT SCHOOL : NO. E-1)

DON E. LADRIDO MEMORIAL ELEMENTARY SCHOOL
(RECIPIENT SCHOOL : NO. E-1)

VAZQUEZ ELEMENTARY SCHOOL
(RECIPIENT SCHOOL : NO. E-21)



CAMALIGAN ELEMENTARY SCHOOL

VAZQUEZ ELEMENTARY SCHOOL
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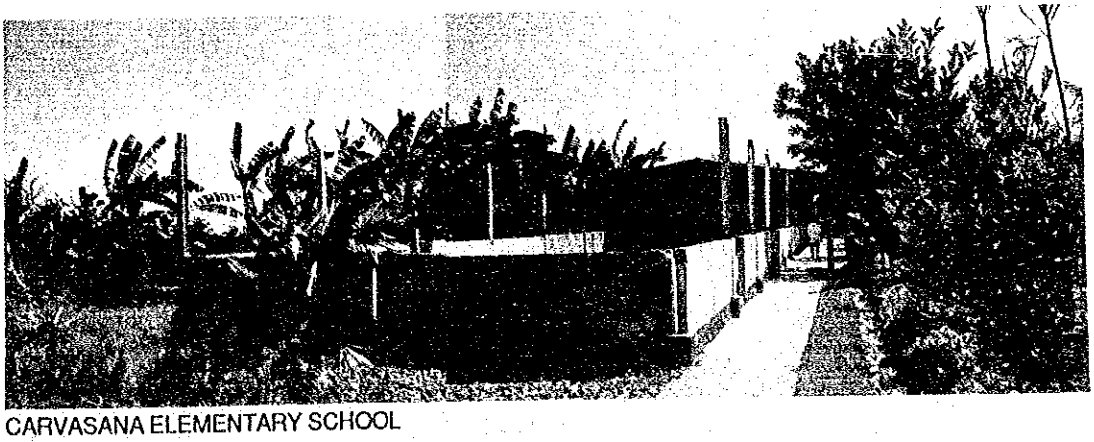

CARVASANA ELEMENTARY SCHOOL