

## **2-2-2 Basic Design**

### **2-2-2-1 Selection of Schools and Setting Up of Component Sizes for the Project**

#### **(1) Criteria for Site Selection**

During the Basic Design study, it was agreed by both the Vietnamese and Japanese sides that the Project schools should be selected from among the original 90 schools which the Government of Vietnam requested aid for, and in accordance with the following criteria:

Both countries have agreed, after reviewing the Project designs based on the "Sample Design for Primary Schools," that the increases in Project construction costs should be covered by a reduction in the number of Project schools.

Upon a request of the Japanese side, on July 16, 2003, the Vietnam side officially selected TQ-10 (The Xuan Quang school) to delete from the Project. Thus, after the deletion of TQ-10, the Project schools have been chosen from among 89 schools.

Only schools which fulfill all the criteria listed below were selected for the Project.

- 1) The present and future demand for primary education facilities is quantitatively estimated by a set of data such as the number of school-aged children, the rates of population growth, enrollment ratio, completion rates, etc...
- 2) No other program or plan for new / undergoing classroom construction by the Ministry of Education and Training, local government, other donors, NGOs and so forth.
- 3) The ownership of land for construction is legally secured.
- 4) No constraints against construction such as occupation of out-of-law houses.
- 5) Access road for the movement of materials and for the construction works is properly constructed.
- 6) Topographically safe and appropriate-sized for construction.
- 7) No foreseen natural and environmental or social hazard.
- 8) Sufficient teachers, budget allocation and necessary cooperation from concerned people for the proper operation and maintenance of the facilities are secured.
- 9) Temporary classrooms during the period of construction can be prepared in the case of reconstruction.

Schools which fulfill the criteria listed below are given priority in selection.

- 10) Urgently needs the rehabilitation because of over aging and / or damage of the existing buildings.
- 11) Urgently needs the construction of additional classrooms due to overcrowding.
- 12) Incomplete schools which are not provided with higher grade classes and are distant from the complete schools.

From the results of the site surveys, the discovery of the following differences in school conditions led to the development of the above selection criteria:

a) Incomplete Schools:

There are nine "incomplete schools" (schools not having all class grade levels from 1 to 5; as compared to "complete schools" which have at least one class for all grade levels) among the surveyed schools. The Study Team confirmed from interviews with the school people that "incomplete schools" exist because of decisions made by the school managements to keep the distance of commuting time short and convenient for the lower grade children. As the enrollment rate at the schools in the target area is almost 100%, no special consideration for changing "incomplete schools" to "complete schools" is necessary.

## **(2) Calculating Classroom Shortages**

To calculate the number of classroom shortages, the following has been considered:

1) Consideration of Future Population Changes

As shown in Fig. 2-1, the number of school-aged children in the four provinces has been decreasing each year due to family planning. Although there are some areas where students are increasing due to a population inflow, the trend in population decreases is predicted to continue in the future. Thus, if the number of necessary classrooms were calculated on the present number of students, there would be a more-than-needed surplus of classrooms at the time of Project completion. For these reasons, the calculation of the necessary number of classrooms will be based on the projected number of students at each school in the Project completion target Vietnamese academic year 2006.

The projected change of the number of students at each Project school can be found in Table 2-1.

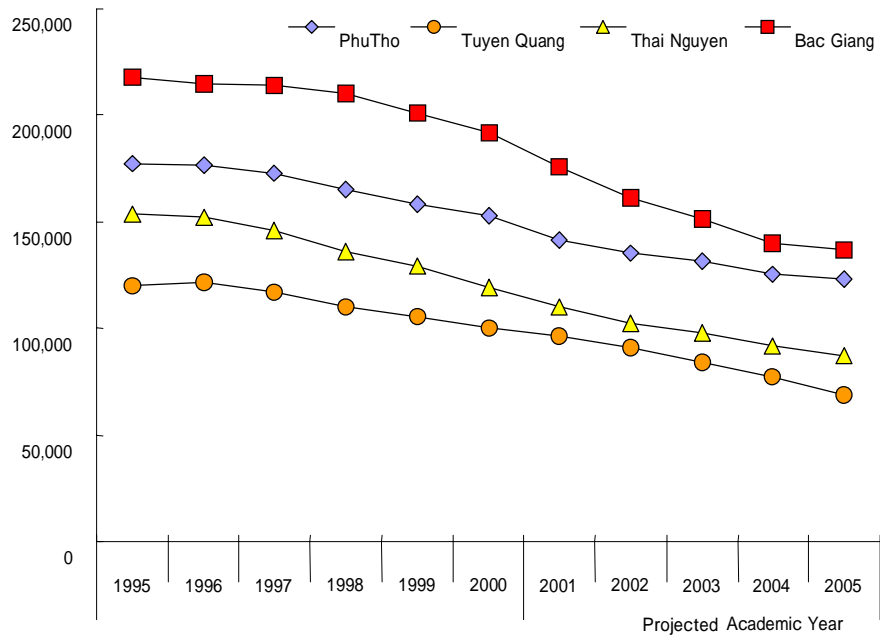


Fig. 2-1 Number of Primary School Students in Four Provinces, Project Area

Table 2-1 Projected Change of the Number of Students at Project Schools

No.	Name of School	97	98	99	00	01	Average growth rate	Number of Students 2001	Number of Students 2006
BG-1	An Chau	457	430	427	430	436	-1.1%	436	411
BG-1s	An Chau (Sub school)	50	58	59	55	45	-1.8%	45	40
BG-2	Phi Dien *1	596	568	578	597	421	-7.3%	421	289
BG-2s	Phi Dien (Sub school)	87	84	78	82	85	-0.5%	85	85
BG-3	Dong Hung 2	329	452	398	411	321	1.7%	321	350
BG-4	Cau Go	465	542	559	585	585	6.1%	585	787
BG-5	My Ha	398	450	345	490	438	5.3%	438	566
BG-6	Viet Lap	840	813	779	793	698	-4.4%	698	556
BG-7	Tri Yen	681	658	656	645	641	-1.5%	641	595
BG-8	Dong Lo 2	594	591	585	590	592	-0.1%	592	592
BG-8s	Dong Lo 2 (Sub school)	256	254	251	257	258	0.2%	258	263
BG-9	Hong Thai	950	879	845	787	731	-6.3%	731	527
BG-10	Nam Hong	743	708	700	658	589	-5.6%	589	442
BG-11	Ngoc Thien 1	1090	1084	1078	1060	949	-3.3%	949	803
BG-12	Hong Ky	524	493	467	468	429	-4.8%	429	334
BG-13	Yen Son *2	528	517	524	716	694	8.2%	694	1,030
BG-14	Dai Lam	691	642	626	548	545	-5.6%	546	409
BG-14s	Dai Lam (Sub school)	225	215	210	189	162	-7.8%	162	107
BG-15	Kien Lao	750	745	715	710	702	-1.6%	702	647
BG-16	Hop Thinh	925	880	902	866	763	-4.6%	763	604
BG-17	Thanh Lam	423	415	375	382	346	-4.8%	346	270
BG-18	Dong Viet	817	807	757	693	618	-6.7%	618	437
BG-19	Ninh Son	510	525	542	550	555	2.1%	555	617
BG-20	Yen Dinh	576	549	562	533	488	-4.0%	488	398
							Total	14,093	13,165
No.	Name of School	97	98	99	00	01	Average growth rate	Number of Students 2001	Number of Students 2006
TN-1	La Hien	629	581	573	544	500	-5.5%	500	376
TN-2	Trung Hoi *	587	531	523	487	461	-5.8%	461	274
TN-3	Nam Hoa 1	671	621	585	614	560	-4.3%	560	450
TN-4	Thi Tran Du	813	795	779	748	722	-2.9%	722	623
TN-5	Phu Lac	728	727	723	667	634	-3.3%	634	537
TN-5s	Phu Lac (Sub school)	178	157	162	159	123	-8.3%	123	80
TN-6	Tan Huong	928	834	783	705	619	-9.6%	619	373
TN-7	Thanh Ninh	882	805	711	632	566	-10.5%	566	325
TN-8	Ba Xuyen	713	645	506	437	394	-13.6%	394	189
TN-9	Doi Can	1498	1475	1432	1361	1213	-5.1%	1,213	935
TN-10	Bao Cuong	694	609	562	526	453	-10.1%	453	266
TN-11	Yen Trach 1	780	760	682	632	574	-7.3%	574	392
TN-12	Linh Son	1050	1016	840	756	750	-7.8%	750	499
TN-13	Van Yen	1157	1054	1056	989	931	-5.2%	931	712
TN-14	Tan Phu	578	546	576	578	476	-4.3%	476	381
TN-15	Luong Son	571	448	443	410	364	-10.3%	364	211
TN-16	Hong Tien	658	572	587	548	496	-6.6%	496	351
TN-16s	Hong Tien (Sub school)	389	361	357	335	306	-5.8%	306	226
TN-17	Binh Thanh	546	490	436	363	315	-12.8%	315	159
TN-17s	Binh Thanh (Sub school)	213	196	181	172	157	-7.3%	157	107
TN-18	Yen Ninh *	1011	928	834	779	690	-9.1%	690	368
TN-19	Ha Chau	717	662	597	528	464	-10.3%	464	270
TN-20	Lau Thuong *	730	697	665	574	507	-8.6%	507	274
							Total	12,011	8,378
No.	Name of School	97	98	99	00	01	Average growth rate	Number of Students 2001	Number of Students 2006
TQ-1	Thi Tran	624	476	433	404	373	-11.8%	373	199
TQ-2	Vinh Loc	821	830	776	697	619	-6.7%	619	438
TQ-3	Bac Muc	602	556	552	492	479	-5.5%	479	362
TQ-4	An Tuong	620	600	549	492	436	-8.4%	436	281
TQ-5	Thuong Am	565	459	415	367	342	-11.7%	342	184
TQ-5s	Thuong Am (Sub school)	232	277	206	165	149	-9.0%	149	94
TQ-6	Phan Thiet	888	894	896	899	950	1.7%	950	1,035
TQ-7	Thai Binh	266	252	240	230	197	-7.1%	197	137
TQ-8	Son Nam	711	701	691	621	625	-3.1%	625	534
TQ-9	Y La	669	636	588	543	514	-6.4%	514	369
TQ-10s	Xuan Quang (Sub school)	165	163	159	157	153	-1.9%	153	138
TQ-11	Yen Huong	-	-	-	214	221	3.3%	221	259
TQ-12	Nang Kha	380	370	390	340	360	-1.0%	360	340
TQ-13	Song Lo 1	485	457	453	443	371	-6.3%	371	269
TQ-14	Phuc Thinh	515	448	388	350	403	-5.3%	403	308
TQ-15	Tan Yen	409	372	344	326	254	-11.0%	254	142
TQ-16	Hung Thanh	588	542	531	513	508	-3.6%	508	424
TQ-17	Dang Chau	645	636	664	643	605	-1.5%	605	560
TQ-17s	Dang Chau (Sub school)	142	121	116	102	115	-4.6%	115	81
							Total	7,559	6,073
No.	Name of School	97	98	99	00	01	Average growth rate	Number of Students 2001	Number of Students 2006
PT-1	Hy Cuong	515	488	458	447	387	-6.8%	387	272
PT-2	T.T. Song Thao	582	568	557	554	506	-3.4%	506	426
PT-3	Phuong Trung	350	329	294	284	298	-3.8%	298	246
PT-4	Tieu Son	707	667	630	567	485	-8.9%	485	304
PT-5	Det	986	964	909	893	849	-3.7%	849	704
PT-6	Van Lung	789	732	812	811	792	0.3%	792	802
PT-7	T.T. Yen Lap *	910	868	821	770	717	-5.8%	717	586
PT-8	Co Tiet	738	631	602	560	543	-7.3%	543	372
PT-9	Am Thuong	818	806	815	800	752	-2.0%	752	679
PT-9s	Am Thuong (Sub school)	-	-	-	-	-	-	0	0
PT-10	Dong Xuan	521	446	465	432	405	-5.9%	405	299
PT-11	Trung Nghia	527	520	515	503	505	-1.1%	505	480
PT-12	Phu Loc	790	765	763	690	666	-4.1%	666	541
PT-13	Sai Nga	593	572	542	493	456	-6.3%	456	329
PT-14	Thanh Mieu	686	663	651	668	648	-1.4%	648	604
PT-15	Vo Mieu 2	816	793	731	720	724	-2.9%	724	625
PT-15s	Vo Mieu 2 (Sub school)	214	204	232	217	190	-2.5%	190	0
PT-16	Thanh Van	685	620	628	595	534	-5.9%	534	396
PT-17	Ngoc Quan	726	713	702	613	534	-7.2%	534	366
PT-18	Yen Luat	490	452	450	426	363	-7.1%	363	251
PT-19	Xuan Loc	759	766	741	728	710	-1.6%	710	654
PT-20	Ha Thach *	1260	1237	1197	1101	1056	-4.3%	1,056	848
PT-20s	Ha Thach (Sub school)	-	-	-	-	-	-	216	-
							Total	45,481	37,100
							Grand Total	118,818	94,848
							Total	14,093	13,165
							Grand Total	45,481	37,100

## 2) Plans for Integrating "Sub Schools" into "Main Schools"

Many of the "main" schools in the Project also have "sub" schools, and some of these Project schools have plans to integrate their "sub" schools with the "main" schools after Project completion. However, when this would happen and other detailed plans are not clear. Also, the Site Survey Team could not determine whether or not the students at those "sub" schools would even be able to actually attend the "main" schools after integration, because those "sub" schools were not included in the survey schedule.

So, for only those schools which have a firm plan to integrate their "sub" schools into the "main" school will the total number of both "main" and "sub" school students be used to calculate the number of classroom shortages for the Project. The one school that is expected to integrate with its main school is as follows: the new construction site for PT-20(main school) will be located much closer to PT-20s(sub school); and so the students presently attending the "sub" school PT-20s will be able to attend the "main" school PT-20. So the "sub" school PT-20s, will be eliminated from the Project.

## 3) The Number of Students Calculate the Necessary Number of Classrooms

It has been confirmed that the school enrollment rate in the Project Area is almost 100%. Thus, the present number of students will be the starting basis to calculate the projected number of students in the year 2006(described in 2-7).

## 4) Method for Calculating "Usable" Classrooms

### a) "Usable" Classrooms

Among all the existing classrooms, those that are in a good enough condition to be utilized are regarded as "usable" classrooms. Most of the existing school buildings are made of either brick or wood, and were built using low quality building materials and generally poor local construction methods; and even though some buildings are only several years old, many sections of some of these buildings are deteriorating or are badly damaged, the extent of the deterioration depending on how well and how often each building was maintained. In the midst of severe classroom shortages, each school does its own repair work to keep the classrooms "usable." Thus, some damage, the classrooms in the brick buildings will be counted as "usable" classrooms. On the other hand, most of the temporary wood buildings have walls made of mud and there are no windows or

doors and the interior conditions are very poor; and so are regarded as too difficult to repair. Thus, classrooms in the wooden buildings will be regarded as "unusable" classrooms.

b) "Satisfactory" and "Unsatisfactory" Classrooms

Some of the "usable" classrooms do not meet certain standards of MOET and will be treated as follows:

According to the "Regulations for Primary Education" of MOET and the "Design Standards" of the Ministry of Construction, one classroom cannot have more than the maximum number of 35 students, and must have a minimum space of not less than 1.2 m<sup>2</sup> per student. Under these guidelines, a "usable" classroom that has a minimum area of 42 square meters will be deemed "satisfactory" and can be counted as one classroom. A classroom that does not fall within these parameters will be deemed "unsatisfactory" and cannot be counted as one classroom. But, by applying the following equation index calculation, the number of classrooms can be adjusted to allow for more classroom construction:

$$\frac{\text{Floor area ( m}^2\text{ )} \div 1.2 \text{ ( m}^2\text{/student )}}{35 \text{ students}}$$

5) Method for Calculating the Number of Classroom Shortages

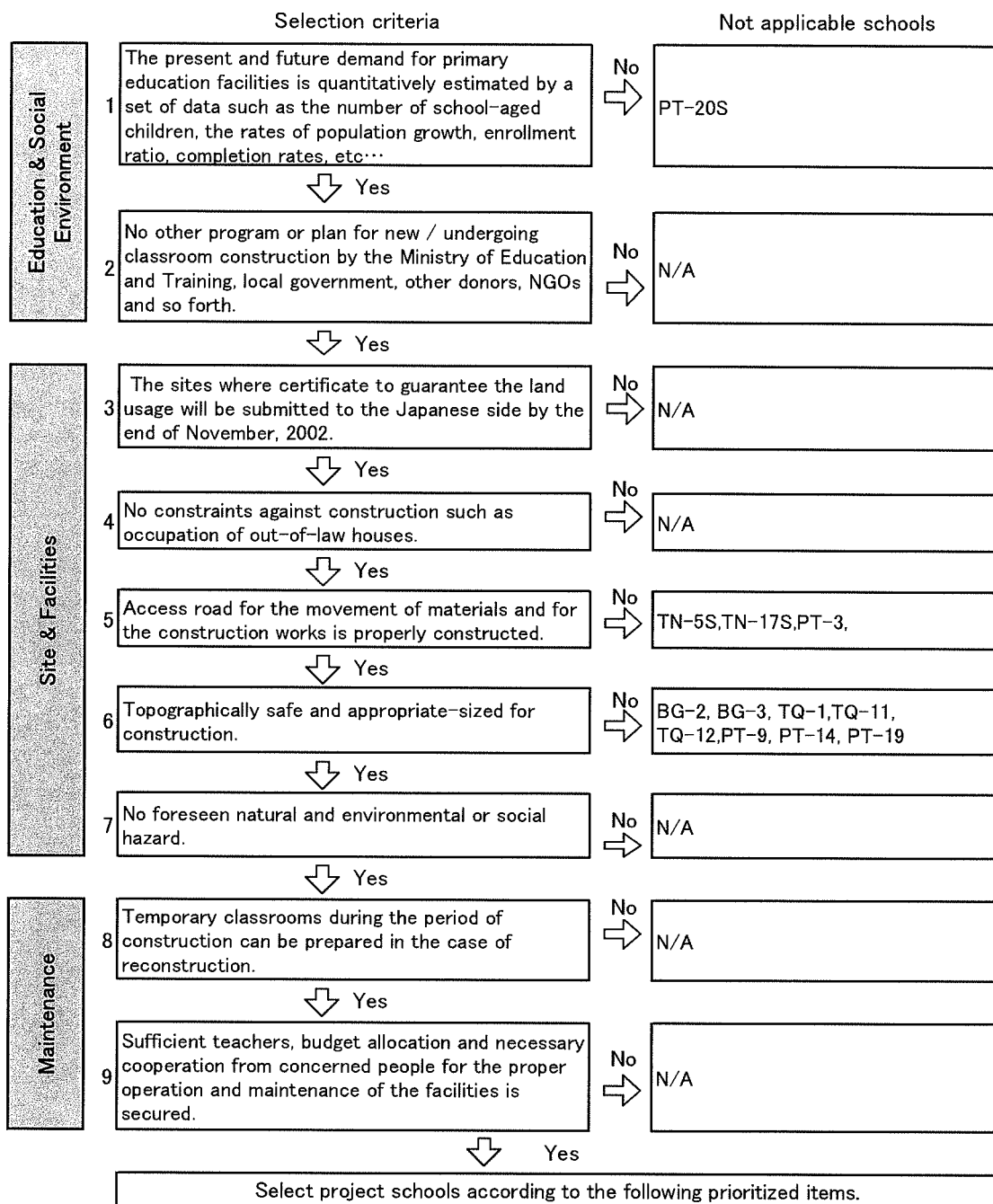
The average number of students in one classroom at the Project schools now is 29.4. This figure is less than the maximum number of 35 students per classroom as stipulated by the standards. The reason for this low average is that rather than trying to cram more than 35 students in one classroom to solve the classroom shortages, most of the Project schools choose to conduct classes in double shifts or rent additional rooms for class use. Also, there is an average of 1.2 teachers per classroom which means that there is no shortage of teachers. At present, Vietnam has a plan to introduce a full day schooling to almost all of the primary schools by 2010, therefore the calculation of the number of classroom shortages shall be based on 35 students in one classroom under the premise of the full day schooling. The formula for calculation is:

$$\begin{aligned} & \text{Number of students in 2006 (projected figure)} \div 35 \\ & \quad - \text{ number of usable classrooms} \end{aligned}$$

### **(3) Selection of Project Schools**

The selecting of the Project schools, conducted in accordance with the criteria that was agreed upon by both the Vietnamese and Japanese sides as recorded in the Minutes of Discussions, is shown in Fig. 2-2. Schools eliminated from the Project and the reasons for elimination are listed in Table 2-2.

Six of the schools that aid was requested for, located in the central and river basin areas of Tuyen Quang province and a part of Phu Tho province, are subject to serious flooding where the water levels often rise above the building ground floor level. It was evaluated that construction of school buildings in these areas would be possible as long as special safety measures against floods were provided. Thus, these schools were included in the Project



A Urgently needs the rehabilitation because of over aging and / or damage of the existing buildings (i.e. temporary classrooms).

B Urgently needs the construction of additional classrooms due to overcrowding.

Deciding criteria for over aging and not usable building.

1 Wooden temporary building not having windows and / or doors.

Figure 2-2 Selecting of the Project schools accordance with the criteria



Table 2-2 Schools Eliminated from the Project based on the Selection Criteria and Reasons for Elimination

School No.	School Name	Reason for Elimination from the Project
<b>Bac Giang Province</b>		
BG-2	Phi Dien	The site is located in a rice field and a large amount of land preparation work is required to construct a new building.
BG-3	Dong Hung 2	The site is located in a rice field and a large amount of land preparation work is required to construct a new building.
<b>Thai Nguyen Province</b>		
TN-5s	Phu Lac (Sub School)	The existing final access road is app reach approximately 5km long and only 2.5m wide unpaved road. Construction vehicle cannot reach the site.
TN-17s	Binh Thanh (Sub school)	The existing final access road is app reach approximately 1km long and only 2.5m wide unpaved road. Construction vehicle cannot reach the site.
<b>Tuyen Quang Province</b>		
TQ-1	Thi Tran	The school site is planned at a new location in a rice field. The land is 2.5m lower than the constructing road. An extensive amount of land reclamation costs would required to construct a building there. In addition, high voltage power lines pass over the land.
TQ-11	Yen Huong	Extensive slope cut work is planned at the school site and a high cliff may be created.
TQ-12	Nang Kha	Land behind the school site is a cliff and is dangerous. Access to the school site is by crossing a suspension bridge (allowable load limit is 2 tons). Material transportation by ferry may be possible , but it would be very expensive.
<b>Phu Tho Province</b>		
PT-3	Phuong Trung	Available access to the site is a newly constructed embankment. It is unpaved and approximately 11km long. Its 8km section is not usable during rainy season.
PT-9s	Am Thuong (Sub school)	The school site is a new location. At present, the site is a lotus pond. Extensive land reclamation costs would be required to construct a school building.
PT-14	Thanh Mieu	The school site is presently used as a rice field. A large amount of land reclamation costs would be needed to construct a school building.
PT-19	Xuan Loc	The school site is a new land that was a rice field. The land is approximately 1m lower than the front road. The ground is soft and is inundated every year by floods. The flood level becomes 1.2m higher than the front road.
PT-20s	Ha Thach	This school (PT-20s) is a sub school and will be integrated into the main school. Present students will go to the main school.

Except for the above schools, the actual number of classrooms to be built at the remaining 77 schools is the total number of classroom shortages that were calculated in accordance with the methods mentioned in paragraph 2-2-1 (2). However, out of the original schools that aid was requested for, those schools with only one or two classroom shortage were eliminated from the Project. These schools are expected to construct any necessary classrooms by their own effort to help themselves. The number of classroom shortages at each school and the schools that were eliminated from the Project are listed in Table 2-3. The schools that were selected for the Project are listed in Table 2-4.

Table 2-3 List of the Schools Eliminated from the Project  
(29schools / 89 candidate schools)

School ID	School Name	Number of existing class-rooms	Number of usable class-rooms	Adjustment	Number of usable classrooms after adjustment	Number of students (2006)	Number of necessary class-rooms	Number of class-rooms in shortage	
<b>Bac Giang Province</b>									
1	BG- 1s	An Chau (Sub School)	2	0		0.0	40	1.14	2
2	BG- 6	Viet Lap	16	16		16.0	556	15.89	-1
3	BG- 10	Nam Hong	12	12		12.0	442	12.63	1
4	BG- 12	Hong Ky	11	11	-1.1	9.9	334	9.54	-1
5	BG- 14	Dai Lam	10	10		10.0	409	11.69	2
6	BG- 14s	Dai Lam (Sub School)	4	4		4.0	107	3.06	-1
<b>Thai Nguyen Province</b>									
1	TN- 1	La Hien	12	12		12.0	376	10.74	-2
2	TN- 7	Thanh Ninh	13	13	-1.6	11.5	325	9.29	-3
3	TN- 13	Van Yen	23	23		23.0	712	20.34	-3
4	TN- 15	Luong Son	11	11		11.0	211	6.03	-5
5	TN- 16	Hong Tien	10	10	-0.2	9.8	351	10.03	1
6	TN- 18	Yen Ninh	13	13	-1.9	11.1	368	10.51	-1
7	TN- 20	Lau Thuong	10	10	-1.2	8.8	274	7.83	-2
<b>Tuyen Quang Province</b>									
1	TQ- 4	An Tuong	11	11		11.0	281	8.03	-3
2	TQ- 5	Thuong Am	8	6	-0.4	5.6	184	5.26	-1
3	TQ- 9	Y La	15	15	-0.3	14.8	369	10.54	-5
4	TQ- 13	Song Lo 1	12	12		12.0	269	7.69	-5
5	TQ- 15	Tan Yen	9	9		9.0	142	4.06	-5
6	TQ- 16	Hung Thanh	12	12		12.0	424	12.11	1
7	TQ- 17	Dang Chau	22	20		20.0	560	16.00	-4
<b>Phu Tho Province</b>									
1	PT- 1	Hy Cuong	12	12	-0.4	11.6	272	7.8	-4
2	PT- 2	T.T. Song Thao	13	13		13.0	426	12.17	-1
3	PT- 7	T.T. Yen Lap	11	11		11.0	286	8.17	-3
4	PT- 9	Am Thuong	10	10		10.0	271	7.74	-3
5	PT- 12	Phu Loc	18	18		18.0	541	15.46	-3
6	PT- 13	Sai Nga	11	11	-0.5	10.5	329	9.40	-2
7	PT- 15s	Vo Mieu 2 (SubSchool)	3	3		3.0	93	2.66	-1
8	PT- 17	Ngoc Quan	11	11	-0.9	10.1	366	10.46	1
9	PT- 18	Yen Luat	7	7		7.0	251	7.17	1

Table 2-4 List of Project Schools (48schools / 89 candidate schools)

School ID	School Name	Number of existing classrooms	Number of usable classrooms	Adjustment	Number of usable classrooms after adjustment	Number of students (2006)	Number of necessary classrooms	Number of classrooms in lack	Planned number of classrooms
<b>Bac Giang Province</b>									
1	BG- 13 Yen Son	11	11	-0.6	10.4	1,030	29.43	20	20
2	BG- 4 Cau Go	6	6		6.0	787	22.49	17	12*
3	BG- 19 Ninh Son	4	4	-1.4	2.6	617	17.63	16	16
4	BG- 16 Hop Thinh	4	4	-0.8	3.2	604	17.26	15	15
5	BG- 8 Dong Lo 2	3	3		3.0	592	16.91	14	14
6	BG- 1 An Chau	0	0		0.0	411	11.74	12	12
7	BG- 15 Kien Lao	8	8	-0.4	7.6	647	18.49	11	11
8	BG- 11 Ngoc Thien 1	13	13		13.0	803	22.94	10	10
9	BG- 5 My Ha	8	8	-0.4	7.6	566	16.17	9	9
10	BG- 8s Dong Lo 2 (Sub School) (New Site)	0	0		0.0	263	7.51	8	8
11	BG- 7 Tri Yen	10	10		10.0	595	17.00	7	7
12	BG- 17 Thanh Lam	3	3	-0.9	2.1	270	7.71	6	6
13	BG- 9 Hong Thai	10	10		10.0	527	15.06	6	6
14	BG- 18 Dong Viet	8	8		8.0	437	12.49	5	5
15	BG- 20 Yen Dinh	9	9	-1.2	7.8	398	11.37	4	4
16	BG- 2s Phi Dien (Sub School)	1	0		0.0	85	2.43	3	3
Province Total								163	158
<b>Thai Nguyen Province</b>									
1	TN- 12 Linh Son	0	0		0.0	499	14.26	15	15
2	TN- 9 Doi Can	13	13		13.0	935	26.71	14	14
3	TN- 11 Yen Trach 1	8	0		0.0	392	11.20	12	12
4	TN- 5 Phu Lac	6	6		6.0	537	15.34	10	10
5	TN- 2 Trung Hoi	11	0		0.0	274	7.83	8	8
6	TN- 19 Ha Chau	0	0		0.0	270	7.71	8	8
7	TN- 4 Thi Tran Du	10	10		10.0	623	17.80	8	8
8	TN- 6 Tan Huong	4	4		4.0	373	10.66	7	7
9	TN- 3 Nam Hoa 1	12	8		8.0	450	12.86	5	5
10	TN- 14 Tan Phu	8	8	-1.9	6.1	381	10.89	5	5
11	TN- 8 Ba Xuyen	2	2		2.0	189	5.40	4	4
12	TN- 10 Bao Cuong	12	4		4.0	266	7.60	4	4
13	TN- 17 Binh Thanh	6	2	-0.2	1.8	159	4.54	3	3
14	TN- 16s Hong Tien (Sub School)	4	4	-0.3	3.7	226	6.46	3	3
Province Total								106	106

School ID	School Name	Number of existing classrooms	Number of usable classrooms	Adjustment	Number of usable classrooms after adjustment	Number of students (2006)	Number of necessary classrooms	Number of classrooms in lack	Planned number of classrooms	
<b>Tuyen Quang Province</b>										
1	TQ- 6	Phan Thiet	18	18		18.0	1,035	29.57	12	12
2	TQ- 3	Bac Muc	0	0		0.0	362	10.34	11	11
3	TQ- 8	Son Nam	9	9		9.0	534	15.26	7	7
4	TQ- 14	Phuc Thinh	7	4		4.0	308	8.80	5	5
5	TQ- 2	Vinh Loc	14	8		8.0	438	12.51	5	5
6	TQ- 10s	Xuan Quang (Sub School)	5	0		0.0	138	3.94	4	4
7	TQ- 7	Thai Binh	0	0		0.0	137	3.91	4	4
8	TQ- 5s	Thuong Am (Sub School)	4	0		0.0	94	2.69	3	3
9	TQ- 17s	Dang Chau (Sub School)	1	0		0.0	91	2.60	3	3
Province Total								54	54	
<b>Phu Tho Province</b>										
1	PT- 20	Ha Thach	0	0		0.0	848	24.23	25	25
2	PT- 5	Det	8	8		8.0	704	20.11	13	13
3	PT- 8	Co Tiet	0	0		0.0	372	10.63	11	11
4	PT- 6	Van Lung	13	13		13.0	802	22.91	10	10
5	PT- 10	Dong Xuan(New Site)	0	0		0.0	299	8.54	9	9
6	PT- 4	Tieu Son	10	4	-0.8	3.2	304	8.69	6	6
7	PT- 11	Trung Nghia	9	9		9.0	480	13.71	5	5
8	PT- 15	Vo Mieu 2	14	14		14.0	625	17.86	4	4
9	PT- 16	Thanh Van	9	9		9.0	396	11.31	3	3
Province Total								86	86	
Grand Total								409	404	

\*Site of BG-4 is small therefore only 12 classrooms are planned.

#### **(4) Scale Setup for the Project**

##### **1) Policies Regarding the Scale of the Project**

The scale of the Project shall be decided on the basis of what best meets the construction schedules and the amount of available budgetary funding.

##### **2) Determination of Other Facilities and Equipment**

###### **1. Other Facilities**

Facilities other than classrooms, which were requested by the Vietnamese side, are principal's rooms, sanitary facilities, teaching aid rooms, teachers' rooms and waste treatment facilities. During the site survey, the Study Team confirmed that many Project schools already have rooms for the principals and teachers, although the room sizes and functions varied from school to school. For this reason, only those Project schools that do not have principal's rooms and teaching aid rooms shall be provided with them. However, there is one school which cannot build all the necessary classrooms and a teaching aid room because of the size and shape of the school site. In the case of this school, the maximum number of classrooms will be planned. In reference to teachers' rooms, the Study Team observed that some of these rooms were used for resting and teacher meetings. Because of this, it is deemed that teachers' rooms will not be exclusively used for teacher schoolwork (class prep, grading tests, etc), and so these rooms will not be constructed by the Project.

In reference to waste treatment facilities, most Project schools already have their own garbage incinerators on the school grounds. Also, as there didn't seem to be any other problem with the situation the way it is, the Project will not provide waste treatment facilities.

###### **a) Principal's Rooms**

According to the Design Standards of Vietnam, a principal's room should be 15 to 18 m<sup>2</sup>.

But, as the principal's room will also used as an administrative office, the size should be a little larger, i.e. one half of the size of a classroom or approximately 21 m<sup>2</sup>.

**b) Teaching Aid Rooms**

Teaching aid rooms shall be planned not only for storing teaching materials and text books, but also for holding teachers meetings. As a space of 9 to 12 m<sup>2</sup> is required for storing teaching aid materials and text books, one half the size of a classroom (approximately 21 m<sup>2</sup>), plus a meeting space for about 8 people (approximately 12 m<sup>2</sup>) will be provided for teaching aid rooms by the Project.

**c) Sanitary Facilities**

More than one half of the surveyed Project schools have toilets. But, most of them are simple outdoor-type toilets without treatment capabilities and are enclosed only with low fences. The average number of toilets is one or two per school. According to the Design Standards of Vietnam, one urinal and one toilet bowl should be installed per 40 students. There is a big gap between the standards and the reality. To improve this situation, toilets shall be installed at all the Project schools. But, as an enormous number of toilet booths and urinals would be required to meet the needs of all the students at the Project schools, only the toilets for those numbers of students who can be accommodated in the new Project classrooms will be provided by the Project. The number of toilet booths and urinals to be provided by the Project are listed in Table 2-5.

Table 2-5 Sanitary Facilities to be Provided by the Project

Number of Classrooms	3 ~ 4	5 ~ 6	7 ~ 9	10 ~ 11	12 ~ 13	14 ~ 16	17 ~ 18	19 ~ 20	25
Urinals for Males	2	3	4	5	6	7	8	9	11
Toilet Booths for Males	2	3	4	5	6	7	8	9	11
Urinals for Females	2	3	4	5	6	7	8	9	11
Toilet Booths for Females	2	3	4	5	6	7	8	9	11
Wash Basins for Males and Females	2	2	3	4	4	5	6	6	8

Both the urinals for males and the urinals for females shall be the ditch type, with the sizes to be decided by the layout of each sanitary facility. The number of wash basins was calculated on the "maximum number of students" in the new classrooms, and the type of building that the new classrooms will be constructed in.

## 2. Equipment Plan

Equipment requested by the Vietnamese side was furniture and teaching aids.

### a) Furniture

Furniture provided by the Project will be based on the facility components constructed by the Project, but basically they are desks and chairs for students and teachers, storage shelves and blackboards.

As a basic principle, wooden furniture should be selected by referring to the furniture specifications as provided in Phase I of the Project, with additional improvements in weight and durability. There is a custom in Vietnam for students in a full day schooling to take naps in their classrooms after lunch. Thus, the desks shall be the flat & level type for the students to nap. Blackboards should have the steel face in some part, where magnetic items can be quickly affixed to them.

Table 2-6 Educational Furniture for Each Room

Name of Room	Name of Item	Units per room
Classroom	Student's two-seater desk	18
	Student's chair	36
	Teacher's desk	1
	Teacher's chair	1
	Blackboard	1
Principal's room	Principal's desk	1
	Principal's chair	1
	Storage shelf	3
	Blackboard	1
Teaching aid room	Storage shelf	7
	Meeting table (for two persons)	4
	Teacher's chair	8
	Blackboard	1

### b) Teaching Aids

A new curriculum was introduced to first graders in the school year of 2002, and a new curricula for second graders will be introduced in the 2003 school

year. The introduction of new curricula to all grades will be completed by 2006. In accordance with the introduction of these new curricula, teaching aids are also being changed. Presently, a list of teaching aids for the new first and second grade curricula have been prepared. The teaching aid lists for the third through the fifth grades has not yet been prepared (A list for the second grade was completed in March 2003. It is not known when the lists for the third through the fifth grades will be completed, though. Also, the detailed contents of those lists are not yet known). Thus, the providing of teaching aids based on the new curricula is considered irrelevant.

Presently, the teaching aids used with the existing (old) curriculum are supplied by the Department of Education and Training (hereinafter DOET) through the Bureau of Education and Training (hereinafter BOET) after a request describing the types and quantities of equipment is submitted from each school. In fact, the Study Team learned that most of the schools conducting workshops possessed teaching aids based on the present curriculum. If the present teaching aids are adequately managed and shared by the teachers, it is considered that there won't be any shortages of teaching aids until 2006. Thus, provision of additional teaching aids for the present curricula is considered unnecessary. Further, since a system for the supplying of teaching aids has already been established, teaching aids will not be provided by the Project. This is based on the viewpoint that further improvements in the present system should be carried out through the country's own self-help efforts.

### 3) Facility Components

#### a) Electrical Facilities

For Project schools that are already equipped with electrical facilities, the Project will provide lighting fixtures for fluorescent tubes and ceiling fans for the classroom buildings and lighting fixtures for fluorescent tubes for the sanitary facilities. For the three Project schools that are not equipped with electrical facilities, only electrical wire conduits will be installed on the premise that electric power will be supplied to them in the future. In addition, lightning rods will be installed to all new classroom buildings constructed by the Project.

#### b) Water Supply Facilities

Most Project schools have water sources on or near the school grounds. They



are mainly shallow water wells that were constructed by each school. Among the facilities provided by the Project, only the sanitary facilities will use water. As it is possible for the Vietnamese side itself to connect water supply lines to the existing wells etc. to obtain water source, a water supply facility will not be provided by the Project.

#### c) Drainage Facilities

Most Project schools do not have any drainage facilities. Thus, rainwater should either be allowed to seep into the school grounds or be discharged into the nearby drainage ditches. Simple filtration-type septic tanks shall be installed to treat and drain the sewage from the toilets. Following figure shows water supply and sewerage system.

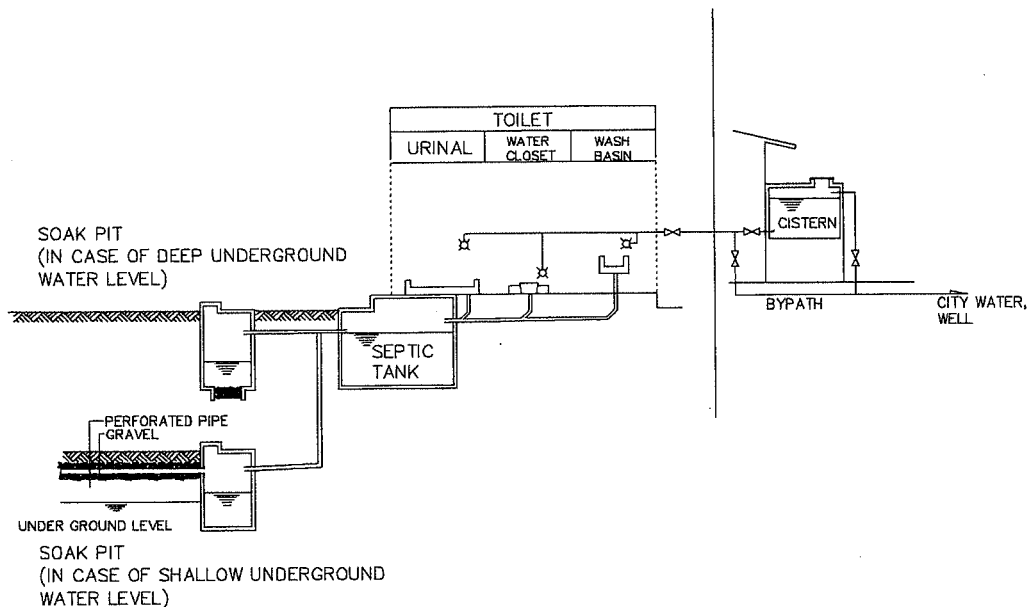


Figure 2-3 Water Supply and Sewerage System Diagram

#### 4) Project Facility Types and Components

Of the number of classrooms that will be provided to one school, three is the minimum, and 25 is the maximum. To efficiently construct a different number of classrooms at the various Project schools, various types of school buildings shall be planned, and then depending on the number of classroom shortages, site conditions and other restrictions at each Project school, the most suitable building type should be selected. The following building types are being considered:

**Classroom Buildings:**

<u>Building Type</u>	<u>Type Symbol</u>
1. One-storied Building of 2 Classrooms:	2C
2. One-storied Building of 3 Classrooms:	3C
3. One-storied Building of 4 Classrooms:	4C
4. One-storied Building of 5 Classrooms:	5C
5. One-storied Building of 6 Classrooms:	6C
6. Two-storied Building of 5 Classrooms:	2-5C
7. Two-storied Building of 6 Classrooms:	2-6C
8. Two-storied Building of 7 Classrooms:	2-7C
9. Two-storied Building of 8 Classrooms:	2-8C
10. Two-storied Building of 9 Classrooms:	2-9C
11. Two-storied Building of 10 Classrooms:	2-10C
12. Two-storied Building of 11 Classrooms:	2-11C
13. Two-storied Building of 12 Classrooms:	2-12C

A classroom building having a principal's room and/or a teaching aid room should be designated by adding +P or +T to the above symbol.

**Sanitary Facilities:**

<u>Building Type</u>	<u>Type Symbol</u>
1. Two Booths each for males and females:	S
2. Three Booths each for males and females:	M
3. Four Booths each for males and females:	L
4. Five Booths each for males and females:	XL
5. Six Booths each for males and females:	XXL

Facility components of each Project school are listed in the following table:

Table 2-7 Facility components of each Project School

School ID	School Name	Planned number of class-rooms	Principal's room	Teaching Aid room	Building Type	Toilet Type	School Area(m <sup>2</sup> )	Floor Area		
								Classroom Buildings(m <sup>2</sup> )	Toilet Buildings(m <sup>2</sup> )	
<b>First Stage</b>										
<b>Bac Giang Province</b>										
BG-	1	An Chau	12	1	1	2C+T+P, 2-10C	XXL	715.84	649.24	66.60
BG-	2s	Phi Dien (Sub School)	3			3C	S	160.84	127.68	33.16
BG-	4	Cau Go	12			2-12C	XXL	712.86	646.26	66.60
BG-	5	My Ha	9			3C, 2-6C	L	486.28	436.40	49.88
BG-	7	Tri Yen	7			3C, 4C	L	347.80	297.92	49.88
BG-	8	Dong Lo 2	14			2-6C, 2-8C	M, L	830.17	738.77	91.40
BG-	8s	Dong Lo 2 (Sub School)(New Site)	8			3C, 5C	L	390.36	340.48	49.88
BG-	9	Hong Thai	6			2-6C	M	350.24	308.72	41.52
BG-	11	Ngoc Thien 1	10			2-10C	XL	579.80	521.56	58.24
BG-	13	Yen Son	20			2-6C, 2-6C, 2-8C	L, XL	1,155.61	1,047.49	108.12
BG-	15	Kien Lao	11			3C, 2-8C	XL	615.97	557.73	58.24
BG-	16	Hop Trinh	15		1	5C+T, 2-10C	M, L	847.04	755.64	91.40
BG-	17	Thanh Lam	6	1	1	2-6C+T+P	M	393.94	352.42	41.52
BG-	18	Dong Viet	5			5C	M	254.32	212.80	41.52
BG-	19	Ninh Son	16	1	1	3C, 5C, 6C, 2C+T+P	M, L	814.92	723.52	91.40
BG-	20	Yen Dinh	4			4C	S	203.40	170.24	33.16
Total(Stage)		16Schools	158	3	4			8,804.89	7,832.37	972.52
<b>Secind Stage</b>										
<b>Thai Nguyen Province</b>										
TN-	2	Trung Hoi	8	1	1	2-8C+T+P	L	523.63	473.75	49.88
TN-	3	Nam Hoa 1	5		1	5C+T	M	275.60	234.08	41.52
TN-	4	Thi Tran Du	8			2-8C	L	479.93	430.05	49.88
TN-	5	Phu Lac	10	1	1	2-10C+T+P	XL	619.39	561.15	58.24
TN-	6	Tan Huong	7		1	3C, 4C+T	L	369.08	319.20	49.88
TN-	8	Ba Xuyen	4	1	1	4C+T+P	S	245.96	212.80	33.16
TN-	9	Doi Gan	14	1	1	5C, 6C, 3C+T+P	M, L	729.80	638.40	91.40
TN-	10	Bao Cuong	4		1	4C+T	S	224.68	191.52	33.16
TN-	11	Yen Trach 1	12	1	1	2C+T+P, 2-10C	XXL	715.84	649.24	66.60
TN-	12	Linh Son	15	1	1	2-5C+T+P, 2-10C	M, L	921.68	830.28	91.40
TN-	14	Tan Phu	5		1	5C+T	M	275.60	234.08	41.52
TN-	16s	Hong Tien (Sub School)	3			3C	S	160.84	127.68	33.16
TN-	17	Binh Thanh	3	1	1	3C+T+P	S	203.40	170.24	33.16
TN-	19	Ha Chau	8	1	1	2-8C+T+P	L	523.63	473.75	49.88
Total(Stage)		14Schools	106	8	12			6,269.06	5,546.22	722.84
<b>Third Stage</b>										
<b>Tuyen Quang Province</b>										
TQ-	2	Vinh Loc	5		1	5C+T	M	275.60	234.08	41.52
TQ-	3	Bac Muc	11	1	1	2-11C+T+P	XL	704.50	646.26	58.24
TQ-	5s	Thuong Am (Sub School)	3			3C	S	160.84	127.68	33.16
TQ-	6	Phan Thiet	12			2-6C, 2-6C	XXL	684.04	617.44	66.60
TQ-	7	Thai Binh	4	1	1	4C+T+P	S	245.96	212.80	33.16
TQ-	8	Son Nam	7			3C, 4C	L	347.80	297.92	49.88
TQ-	10s	Xuan Quang (Sub School)	4			4C	S	203.40	170.24	33.16
TQ-	14	Phuc Thinh	5			5C	M	254.32	212.80	41.52
TQ-	17s	Dang Chau (Sub School)	3			3C	S	160.84	127.68	33.16
Province Total		9Schools	54	2	3			3,037.30	2,646.90	390.40
<b>Phu Tho Province</b>										
PT-	4	Tieu Son	6			6C	M	296.88	255.36	41.52
PT-	5	Det	13	1	1	3C+T+P, 2-10C	XXL	758.40	691.80	66.60
PT-	6	Van Lung	10			2-10C	XL	579.80	521.56	58.24
PT-	8	Co Tiet	11	1	1	2-11C+T+P	XL	704.50	646.26	58.24
PT-	10	Dong Xuan(New Site)	9	1	1	2-9C+T+P	L	571.44	521.56	49.88
PT-	11	Trung Nghia	5			5C	M	254.32	212.80	41.52
PT-	15	Vo Mieu 2	4			4C	S	203.40	170.24	33.16
PT-	16	Thanh Van	3			3C	S	160.84	127.68	33.16
PT-	20	Ha Thach	25	1	1	2-6C, 2-7C+T+P, 2-12C	XL, XXL	1,509.87	1,385.03	124.84
Province Total		9Schools	86	4	4			5,039.45	4,532.29	507.16
Total(Stage)		18Schools	140	6	7			8,076.75	7,179.19	897.56
Grand Total		48Schools	404	17	23			23,150.70	20,557.78	2,592.92

### **2-2-2-2 School Sites and Facility Layout Plans**

As the conditions of each construction site vary from school to school, the most suitable facility layout plan should be prepared for each Project school, taking the natural conditions, site conditions, infrastructure installation conditions and the existing school facility arrangements into consideration. The main policies regarding the facility layout plans are as follows:

- 1) The layout of the new buildings shall be planned so that they will harmonize with the overall school site and the surrounding buildings;
- 2) The new school buildings shall be arranged on flat land as much as possible avoiding slopes and cliffs for ease of securing school site safety, and for minimizing the foundation work and lighten the burden of the land preparation work to be borne by the Vietnamese side;
- 3) The classroom buildings shall be laid out with sufficient clearance between them, and in such a way as to allow the wind to provide as much natural ventilation as possible by taking the predominant wind direction into account. Also, the sun direction shall be taken into account for the purposes of lessening the exposure to sunlight from the west;
- 4) For schools located in flood prone areas, the construction ground levels and building floor levels shall be carefully considered to avoid possible flooding;
- 5) Toilets shall be constructed in an independent building detached from the classroom buildings. The toilet buildings shall be located at a place where neither odor nor environmental problems will affect other facilities on the school grounds.

### **2-2-2-3 Architectural Plans and Designs**

#### **(1) Floor Plans**

To best take advantage of the wind for natural ventilation and the sun for natural light going into the rooms, a single-loaded corridor shall be incorporated in the floor plans of the buildings. According to the Design Standards of Vietnam, the corridor widths shall be 1.8m. These standards shall be applied to both single-storied buildings as well as two-storied buildings. The Project will also provide, depending upon the number of classrooms, one or two stairways in each two-storied building.

### 1) Classrooms

Based on the Design Standards of Vietnam and on consideration of the space necessary for the comfortable placement of furniture(desks), the basic size of all classrooms shall be set at

$$7.6\text{m} \times 5.6\text{m} = 42.56 \text{ m}^2.$$

### 2) Principal's Rooms

The construction of the principal's rooms shall use the same sized structural unit modules that are used for the classrooms, and shall be one half the size of a classroom:  $3.8\text{m} \times 5.6\text{m} = 21.28 \text{ m}^2$ .

### 3) Teaching Aid Rooms

The construction of the teaching aid rooms shall use the same sized structural unit modules that are used for the classrooms, and shall be one half the size of a classroom:  $3.8\text{m} \times 5.6\text{m} = 21.28 \text{ m}^2$ .

### 4) Sanitary Facilities

From the viewpoint of avoiding foul odors and keeping conditions clean, sanitary facilities shall be built separate from the classroom buildings. As for the number of toilet units and floor plans for the toilet facilities, there are several standard types available, and shall be selected to suit the needs of each Project school. A simple septic tank shall be constructed underneath the toilet building. Sewage treated by the septic tank shall be drained into the ground through a soak pit that is to be placed outside the toilet buildings.

## **(2) Section Plans**

To suit the strong sun and the hot, humid climate, the school building section plans shall be prepared by taking into account natural wind ventilation and insulation against the strong radiant heat from the roof. The floor to floor height of the buildings shall be 3.3m as stipulated in the Design Standards. The windows in the buildings shall be as large as possible. Also, to help prevent the rain from coming in during windy days and the strong sunlight from penetrating inside during the summer, eaves shall be provided over the windows. The buildings shall be provided with sloped metal roofs above concrete roof slabs to create attic spaces for the reason that good

ventilation of the attic spaces can prevent temperature rise in rooms caused by radiant heat from the roof. Further, metallic rain gutters shall be installed at the roof tips sticking out from the wall line, even though concrete rain gutters were installed in Phase I of the Project. To prepare for the possibility of flooding, the building floor level shall be set 50cm higher than the ground level. At the Project sites located in flood prone areas, the designed grade level shall be set higher than the flood level.

### (3) Structural Plans

#### 1) Structure Type

For both single and two-storied buildings, a reinforced concrete frame type structure, common in Vietnam, should be used. By making one unit of the frame structure 3.8m × 5.6m (one half the classroom size), it may be possible to have smaller beams, thus a lighter load per column. For the roof structure, steel sloped beams shall be installed on reinforced concrete posts sitting on horizontal beams of a frame type structure. Steel frame rafters will not be used (although they were used in Phase I of the Project). The exterior walls and interior partition walls shall be brick. The ground floor slab shall be of reinforced concrete. At those Project sites with good bearing ground, individual footing foundations shall be used. Thus, the overall building weight shall be as light as possible. Because roof slab above the corridor will not be used, the building weight will be lighter than that in Phase 1 of the Project.

The comparison of the differences of the structure types used in both Phases I and II of the Project is shown in the following table.

Table 2-8 Comparison of Structure Types

Item	Phase 1 Project	This Project (Phase 2)
1. Structure Module	5,700mm×3,800mm (Width × Length)	5,600mm×3,800mm (Width × Length)
2. Ceiling Height	3.30 m	3.30m
3. Main Structure	Reinforced Concrete Frame + Brick Walls	Reinforced Concrete Frame + Brick Walls
4. Roof Structure System	Steel Sloped Beams on Reinforced Concrete Beams and Posts	Steel Sloped Beams on Reinforced Concrete Beams and Posts
5. Ground Floor	Concrete Slab	Concrete Slab
6. Foundation Type	Reinforced Concrete Continuous and Independent Footing	Reinforced Concrete Independent Footing

## 2) Load and External Forces

The load condition for the structure design of Project facilities shall be in accordance with the Building Codes of Vietnam (BCV) and the Design Standards of Vietnam. Items that are not covered by these Codes and Standards shall be in accordance with the design standards of the Architectural Institute of Japan (AIJ) and the American Concrete Institute (ACI).

The design loads for Project facilities shall be as follows:

Live Load:	Roof:	150 kg/m <sup>2</sup>
	Classroom Floor:	200 kg/m <sup>2</sup>
	Corridor:	400 kg/m <sup>2</sup>
	Stairway:	500 kg/m <sup>2</sup>

Wind Load:  $P = C_e \times Q_s \times C_q$

where, P is wind load per 1 m<sup>2</sup>

C<sub>e</sub>: environmental coefficient

Q<sub>s</sub>: velocity pressure: 65 kg/m<sup>2</sup> in Zone Ia.

C<sub>q</sub>: wind force coefficient

The BCV stipulates the design load and velocity pressure in the Project Area as ( $w_0=65\text{kg/m}^2$  in Zone Ia). However, the BCV does not specify any wind force coefficients. Thus, the Japanese standards shall be used for the wind force coefficient.

Seismic Force:  $V = Z \times I \times C_0 \times W$

where, W: building weight

Z : area coefficient

I : building use coefficient

C<sub>0</sub>: standard shear stress coefficient

There are no design standards regarding seismic forces in Vietnam and the BCV( III 3.6) suggests using foreign standards. Therefore, the Japanese "seismic level 5" (an acceleration of a minimum 80gal), which is equivalent to the coefficient in "shake zone levels 6 to 8" (MSK) shown in the seismic zoning map of the BCV, should be used. Thus, C<sub>0</sub> = 0.08.

### **3) Building Materials**

All building materials shall be procured in Vietnam. Below are the specifications for the major materials and the allowable strengths.

Material Specifications: TCVN or JIS

Concrete:  $F_c=21\text{N/mm}^2$

Steel bar:  $f_y=295\text{N/mm}^2$  (SD2954A: D10 to D16, SD345: D19 to D25, SR295: R6 and R8)

Steel frame:  $f_y=240\text{N/mm}^2$  (SSC400 and SS400)

Brick:  $F_c=75\text{kg/cm}^2$

### **(4) Facility Plans**

#### **1) Electrical Facilities**

Lighting fixtures shall be installed in the classrooms, principal's rooms, teaching aid rooms and sanitary facilities for the reason that classes may be held in the evening when it's dark outside, as it generally gets dark earlier in the Northern Mountain Regions. In addition, outlets shall be installed to the classrooms, the principal's rooms and the teaching aid rooms. Also, to help alleviate the uncomfortable hot and humid room conditions during the summer, ceiling fans shall be provided in the classrooms, principal's rooms and teaching aid rooms.

As frequent thunderstorms occur in the Project Area, lightning rods shall be installed to all school buildings except for the toilet facilities, the same as was done in Phase I of the Project.

#### **2) Water Supply Facilities**

A cistern tank shall be installed at an elevation of approximately 2m above the ground in order to supply water to toilets. The Vietnamese side shall provide the water supply systems. For those Project schools that do not have a water supply system, access steps shall be built up to the top of the cistern tanks so that water can be hand-carried and poured into the tanks.

#### **3) Sewage Systems**

Sewage from the toilets should be treated by the use of a simple septic tank with a settling chamber and a decomposition chamber. The treated sewage shall be drained into the ground through a soak pit outside the toilet buildings. The capacity of the septic tank shall be based on the amount of water used and on the planned sewage storage period of each toilet type. Some Project sites have a clay soil ground with



poor absorbing qualities. In these sites and in areas with a high water table, trenches with perforated pipes should be installed instead of soak pits.

#### **(5) Building Materials Plan**

In order to make the operation and maintenance of the completed facilities simple and easy, building materials shall be selected with the natural weather conditions of the Project areas in mind and by taking the local construction methods into account.

##### **1) Roofing Materials**

So that buildings are well prepared for the local tornadoes and hailstorms during the winter, strong and durable roofing materials for sturdy roof structures shall be selected.

##### **2) Doors and Windows**

Aluminum units shall be mainly used. Use of wood materials shall be minimized because of the possibility of termite damage. When using wood materials, they shall be anti-termite treated with chemicals.

##### **3) Floor Materials**

Mortar, ceramic tiles and cement tiles are the most commonly used materials in the existing buildings at the Project schools. Floors of the Project school buildings shall be provided with cast-in-place terrazzo finish (as is commonly used in Vietnam), the same as was done in Phase I of the Project.

##### **4) Wall Materials**

Walls shall be constructed with bricks. The walls shall be provided with a paint finish on a mortar base. This finishing method is the most common in Vietnam and is simple to maintain.

The local school building specifications and the specifications for the Project are comprehensively compared in Table 2-9.

Table 2-9 Comparison of Specifications

		Local Specs	Phase 1 Project Specs	Phase 2 Project Specs	Reason for Adoption
<b>Structure and Building Type</b>		Brick and Reinforced Concrete	Reinforced Concrete, Single and Two-storied	Reinforced Concrete, Single and Two-storied	Strong and durable
<b>Exterior Finishing</b>	Roof	Roof tiles, asbestos sheets and corrugated steel sheets	Steel sheets above concrete slab	Steel sheets above concrete slab	Strong against impacts, better heat insulation, simple and easy maintenance.
	Wall	Paint finish on mortar base on brick wall	Paint finish on mortar base on brick wall	Paint finish on mortar base on brick wall	Local method is selected for simple and easy maintenance
	Corridor Floor	Mortar, cast-in-place terrazzo, cement tiles, ceramic tiles	Cast-in-place terrazzo	Cast-in-place terrazzo	Simple and easy maintenance
	Window	Wooden casement (glazed) windows	Wooden frame and aluminum jalousies	Aluminum jalousies with build-in frame	Better natural ventilation and lighting. Elimination of steel lattice and wooden material.
	Door	Wooden panel (glazed) doors	Wooden frame glazed doors	Wooden frame glazed doors	Simple and easy maintenance
<b>Interior Finishing</b>	Floor	Mortar, cast-in-place terrazzo, cement tiles, ceramic tiles	Cast-in-place terrazzo	Cast-in-place terrazzo	Simple and easy maintenance
	Wall	Paint finish on mortar base on brick wall	Paint finish on mortar base on brick wall	Paint finish on mortar base on brick wall	Simple and easy maintenance due to using of local method
	Ceiling	No finishing or paint finish	Paint finish on mortar base	Paint finish on mortar base	Simple and easy maintenance