

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR
CONSTRUCTION OF BASIC SCHOOLS
IN
BOSNIA AND HERZEGOVINA

MARCH 2000

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JAPAN INTERNATIONAL COOPERATION AGENCY
MORHI, ARCHITECT & ASSOCIATES, INC.

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PREFACE

In response to a request from the Government of Bosnia and Herzegovina the Government of Japan decided to conduct a basic design survey study on the Project for Construction of Basic Schools and entrusted the study to the Japan International Cooperation Agency (JICA).

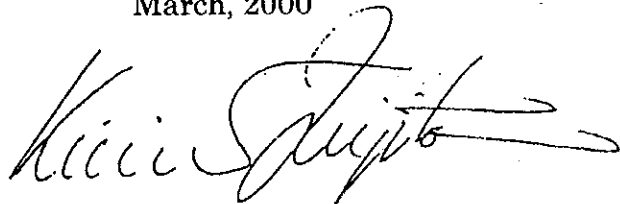
JICA sent to Bosnia and Herzegovina a study team from September 22 to October 30, 1999.

The team held discussions with the officials concerned of the Government of Bosnia and Herzegovina, and conducted a field study at the study area. After the team returned to Japan, further studies were made. Then, a mission was sent to Bosnia and Herzegovina in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope this report will contribute to the promotion of the project and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of Bosnia and Herzegovina for their close cooperation extended to the teams.

March, 2000



Kimio Fujita
President
Japan International Cooperation
Agency

March, 2000

Letter of Transmittal

We are pleased to submit to you the basic design study report on the Project for Construction of Basic Schools in Bosnia and Herzegovina.

This study was conducted by Mohri, Architect & Associates Inc., under a contract to JICA, during the period from March 16, 1999 to March 15, 2000. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Bosnia and Herzegovina and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

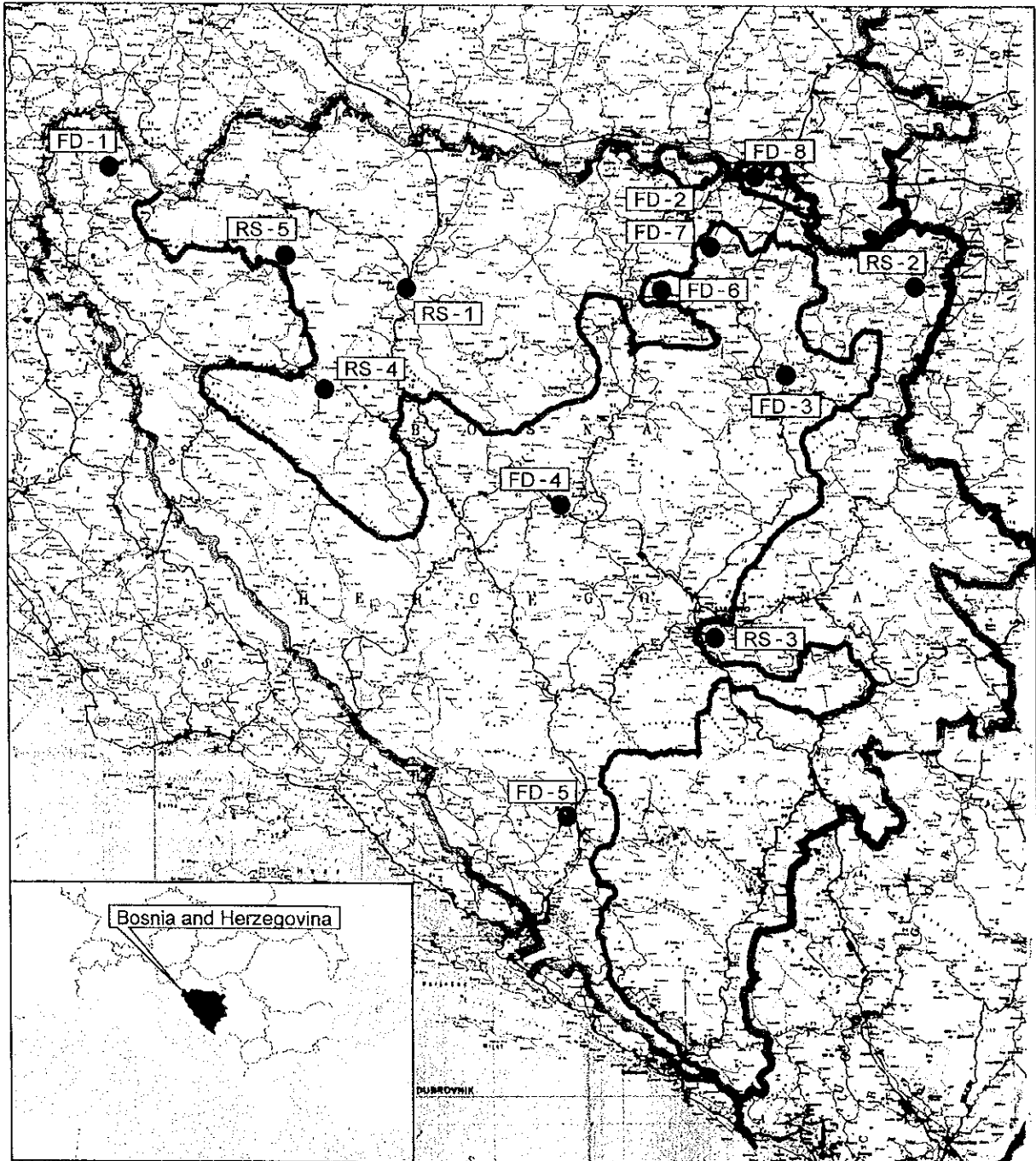
Finally, we hope that this report will contribute to further promotion of the project.

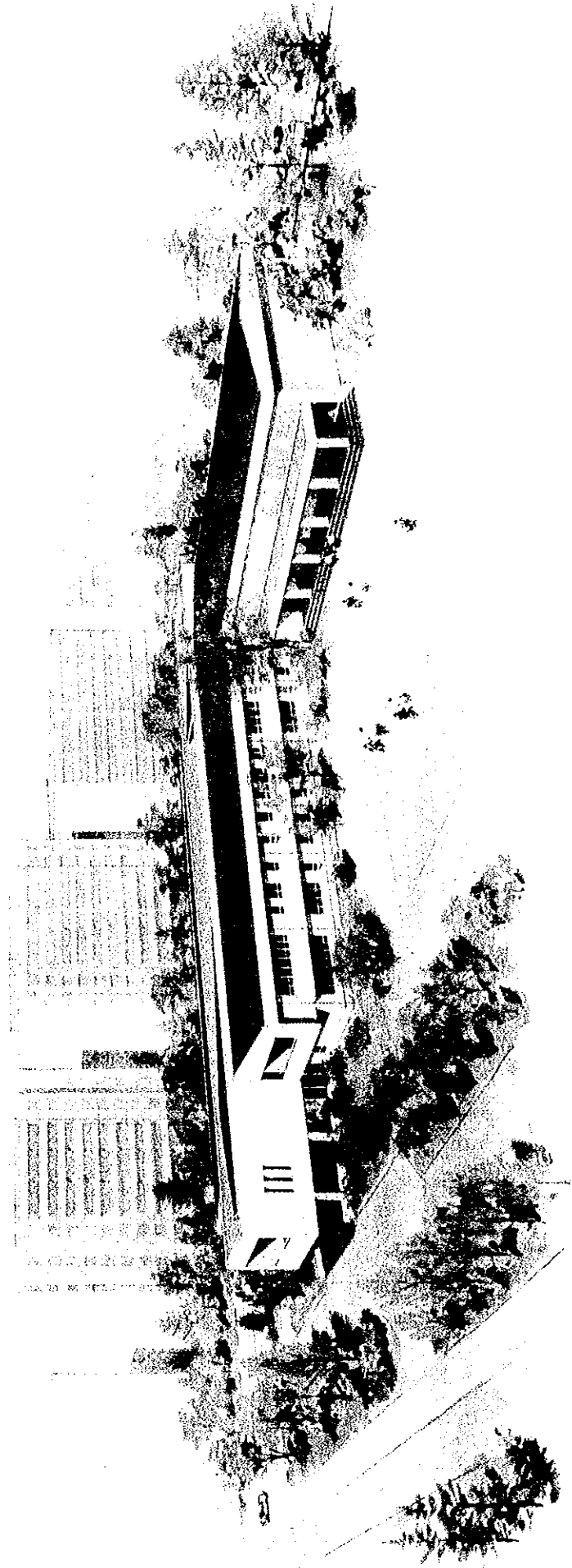
Very truly yours,

A handwritten signature in black ink, appearing to read 'T. Mohri', with a horizontal line extending to the right.

Takenobu Mohri
Project Manager
Basic design study team on
The Project for Construction of Basic Schools
Mohri, Architect & Associates Inc.

Site Location Map





FD-5 Dr. Ante Starcevic



RS-1 NO NAME

ABBREVIATIONS

B&H	Bosnia and Herzegovina
CS	Central School
DA	Deiton Agreement
DP	Displaced Persons
FD	Federation
IMG	International Management Group
MFTER	Ministry of Foreign Trade and Economic Relations
MOE	Ministry of Education
OHR	Office of the High Representative
PIU	Project Implementation Unit
RS	Republika Srpska
SS	Satellite School
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNHCR	United Nations High Commissioner for Refugees
UNICEF	United Nations Children's Fund
WB	World Bank

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CHAPTER 1 BACKGROUND OF THE REQUEST

CHAPTER 1 BACKGROUND OF THE REQUEST

1-1 Background of the Request and Project

Before the war in B&H, eight years of elementary school education and an attendance rate of 53% for secondary schools were qualified facts. However, 80% of school facilities were damaged during the war. As part of the social sector reconstruction project, elementary school facilities have been actively reconstructed through the cooperation of such international organizations as the World Bank, EU, UNHCR, UNESCO and aid organizations of countries centered in Europe. The Emergency Education Reconstruction Project, sponsored mainly by the World Bank since 1996, has reconstructed 71 elementary schools in addition to providing textbooks. More schools are planned to be reconstructed in Phase Two of this Project, thus ending this assistance for elementary school facilities.

The major aid activities which assist the return of refugees will also come to an end in 1999. It is assumed that aid to B&H will change from post-war reconstruction projects to economical development projects towards the year 2000. The education sector has many problems to deal with such as unifying the school curriculum, which is now separated according to race, and improving school texts. However, no action has been or is being planned to be taken to resolve these problems. Furthermore, schools in some areas are suffering from a lack of classrooms due to a great flow of refugees into that area. There are also access problems due to the division of the area into the FD and RS. As these schools do not fit into the category of damaged schools, they are exempt from aid projects.

Due to the above reasons, Japan received a request for Grant Aid from the Government of B&H for the construction of elementary school facilities. Thus, a Preparatory Study was conducted between November 25th and December 19th, 1998. The background of the request and contents were confirmed and as a result of the site survey of the requested 14 sites, the need to construct school facilities was also confirmed on all sites.

Based on the results of the study, the Government of Japan decided to conduct the Basic Design Study of the Project and JICA dispatched the Basic Design Study Team from September 1999.

1-2 Contents of the Request

1) The List of the Requested Schools

The list of the requested schools at the Preparatory Study is as shown below.

The Federation of Bosnia and Herzegovina

No.	Canton	Municipality	Name of School
FD 1	1	Buzim	Varoska Rijeka
FD2	3	Gradacac	Vida
FD 3	3	Tuzla	Pasci
FD 4	6	Vitez	Stari Vitez
FD 5	7	Mostar	II Dr. Ante Starcevic
FD 6	4	Doboj Jug	Mustafa Mulic
FD 7	3	Gradacac	Edhem Mulabdic
FD 8	2	Orasje	Bok
FD 9	2	Orasje	Prud

Republika Srpska

No.	Municipality	Name of School
RS 1	Banja Luka	No Name
RS2	Bijeljina	Sveti Sava
RS 3	Lukavica	Sveti Sava
RS 4	Ribnic	Prevljaja
RS 5	Srpsli Sanski Most	Ostra Luka

After the Preparatory Study of the Project, two requested schools, FD-8 and FD-9, were withdrawn and the school of Ivo Andric located in the same canton as those two schools was requested in place of them. Furthermore the school of Pasic, FD-3, was changed to another school (Sjenjak) located in the same municipality (Tuzla). Therefore 13 schools were requested in the end.

2) Contents of the Requested Project

The contents of the requested project at the Preparatory Study is as shown below.

① Constructing school Facilities

Primary School Building composed of the following:

- Normal Classroom, Special Classroom, Library, Staff Room, Storage Space, Multi Purpose Hall and etc.
- Toilet, Water Supply and Drainage, Electric and Heating Facilities,

② Providing Equipment

Basic Furniture

CHAPTER 2 CONTENTS OF THE PROJECT

THE HISTORY OF THE UNITED STATES

CHAPTER 2 CONTENTS OF THE PROJECT

2 - 1 Objective of the Project

Prior to the war in 1991, eight years of basic school instruction was usual throughout Bosnia and Herzegovina B&H and the standard of education was high. The war, however, was detrimental upon school facilities and on the school system in general. Following its conclusion, alterations to school administration and to the operating system were necessary to cope with changed administrative conditions and new factors such as race segregation and refugee influx.

Since the war is end, many international agencies have provided reconstruction aid and this has been most beneficial - school services, for example, have now resumed in regional areas. Problems remain, but, while aid is still necessary, its focus is shifting from reconstruction to improvement. The post-war reconstruction stage can be seen as complete and we are entering a new phase.

The objective of this Project is to reshape the basic education facilities at 13 sites in the regions of the FD and RS which were requested by the Government of B&H, through an improvement in physical infrastructure. This should rectify problems posed by the shortage of facilities (ex. limited school access), and in this way, better the B&H education system.

2 - 2 Basic Concept of the Project

2 - 2 - 1 Selection of Project Sites

(1) Criteria for Selection:

Site selection among 13 requested school sites will be according to the criteria attached to the Minutes of Discussions in the Basic Design Study, and shall satisfy the following requirements:

- ① Priority will be given to sites where there is a clear need for educational facilities, where there is a minimal number of students in the school district.
- ② Site Ownership: Legal rights should be clearly defined and understood by the school, the Ministry of Education or local government. Accordingly, there must be no illegal occupants on site.
- ③ Access: Sites should have access roads allowing the passage of construction vehicles.
- ④ Topography and Natural Conditions: Site topography should not pose problems for construction. Obstacles such as existing buildings or trees should be removed. Sites should not be at threat from flooding, ground subsidence or snow damage.
- ⑤ Safety Problems/ Social Problems: Dangerous items (for ex. mines) should be removed from sites and the areas surrounding should be safe from environmental and social hazards. Refugeeism must not be encouraged and racial separation must not be promoted through the implementation of the Project.
- ⑥ There should be no competing plans for project sites by the government or other donors.

(2) Screening

Screening shall be conducted based on the above Criteria for Selection (1). In cases where the land ownership certificate has not been submitted, the site shall be included as a candidate site until confirmation is received at a latter date.

Table 2-1 Screening of Candidate Sites

No.	School Name	Selection Criteria						Result	Remarks
		①	②	③	④	⑤	⑥		
FD1	Varoska Rijeka	○	○	○	△	○	○	△	Flooded in the past
FD2	Vida	○	○	○	△	○	○	△	Remove lumberyard
FD3	Sjenjak	○	○	○	○	○	○	○	
FD4	Stari Vitez	○	○	○	○	△	○	△	Possibility of race segregation
FD5	Dr. Ante Starcevic	○	○	○	△	○	○	△	Illegal occupants on site
FD6	Mustafa Mulic	○	○	○	○	○	○	○	
FD7	Edhem Mulabdic	○	○	○	○	○	○	○	
FD8	Ivo Andric	○	○	○	○	○	○	△	Mines were removed
RS1	Untitled	○	○	○	○	○	○	○	
RS2	Sveti Sava	○	○	○	○	○	○	○	
RS3	Sveti Sava	○	○	○	○	△	○	△	Possibility of encouraging refugees to stay
RS4	Nikola Mackic	○	○	○	○	○	○	○	
RS5	Ostra Luka	○	○	○	○	○	○	○	

Notes: ○: No Problem △: Some problems (can be solved) ×: Problems ? : Certificate not submitted

(3) Sites Having Problems

The sites evaluated in the above screening as having some problems requiring corrective measures are described below:

1) FD1: Varoska Rijeka

This school construction site fell prey to flooding in 1999 when a neighbouring river overflowed. In this case, as there is no alternative construction site, certain preventive measures must be taken. Large-scale land reclamation work should however be avoided. It is deemed that raising the floor heights of the buildings on site is the appropriate action in this instance.

2) FD2: Vida

When the site survey of the Basic Design Study Project was conducted, this school construction site was being used as a lumber storage yard. It is necessary that this yard, along with some existing facilities, be removed so that Project implementation can proceed. As the responsible, executing organization has agreed to this removal work, there should be no further obstacles to construction.

3) FD4: Stari Vitez

In Vitez City, where this school is located, there are both Croatian and Bosnian communities. Schools are divided by race and the Stari Vitez School, with only poor facilities on leased land, accommodates Bosnian children unable to attend nearby Croatian primary schools (Vitez) and is operating on a triple shift. As nearby Vitez does not have sufficient facilities, it is evident that school construction in the area is necessary. Other grant aid donors point out, however, that constructing a school exclusively for Bosnian children might cause further racial division. The following efforts will be made therefore to promote multiracial attendance at the Project school:

- (a) Waiving of the school attendance regulations for children of other races;
- (b) Establishment of a task force, consisting of municipalities and school related personnel to deal with any emerging issues.

Assuming the above measures are taken for this and other Project schools, implementation will proceed:

4) FD5: Dr. Ante Starcevic

As unauthorized facilities exist on this school site, it is necessary that they be relocated or removed to allow Project implementation. Concerned municipality personnel have promised to take the appropriate actions.

5) FD8: Ivo Andric

During the war, the existing school facilities were destroyed by bombing. When the field surveys for the Project were conducted, the site had not yet attained a landmine clearance certificate. However, this was issued by the Federal Ministry of Physical Planning and Environment of FD on December 22, 1999. It is considered that Project implementation can now proceed.

6) RS3: Sveti Sava

After the war, many serb refugees relocated to Srpsko Novo Sarajevo, where this candidate school is situated. Most of the students attending the school are the children of displaced persons. As has been pointed out by other aid donors, any assistance provided in this area may give rise to problems of DP settlement. There exist no primary schools with sufficient facilities and the candidate school is operated within a very poor environment on rented facilities. Approximately one half of the students are the children of the residents who were already in the area prior to the war (47% of area residents are in this category). Furthermore, many DP have now been living in the area for almost four years and it is unlikely that they will return to their own homeland in the near future. For these reasons, it is considered appropriate to include this school in the Project.

2 - 2 - 2 Criteria for Selecting the Number of Students

(1) Preconditions

- ① In general, candidate schools shall conduct a double shift system.
- ② The usual number of students to a class is between 20 and 30, however the standard for the facility shall be according to the accepted limit of 36 students stipulated by the Facility Standards established during the former Yugoslavia (hereafter referred to as "the Norm").
- ③ DP shall be included in the student estimates.
- ④ The target year, for considering the increase in the number of students shall be the year 2003 when the construction is assumed to be completed.
- ⑤ When considering the increase in student numbers, the increase or decrease in the school enrolment rate shall not be considered.
- ⑥ The estimated number of returning refugees is extremely small according to UNHCR material. Thus, this factor will not directly affect the student increase rate.
- ⑦ The rate of population increase in B&H is estimated as 0.05% per year which the United Nations, Population Division, Department of Economic and Social Affairs applied when estimating the population of B&H in 2050.

(2) An Estimate of the Number of Students to be Accommodated

Since the purpose of this project is to rectify the problems posed by limited facilities, the total number of students to be accommodated in each school shall be calculated according to the sum of the following: ① the number of existing students in the project schools, ② the number of excess students of other schools in the vicinity, ③ the number of students being transferred from surrounding schools.

① The number of existing students in the project school

The actual number of students at the time of the Basic Design Study shall be considered as the number of existing student in the project schools.

② The number of excess students of other school in the vicinity

In the case of excess students, from other schools in the vicinity, that can be

admitted to the project schools because of limited facilities, the number of excess students shall be considered as the number of new students to be accommodated. The total number of excess students shall be calculated according to the following equation (If there are several schools in the vicinity, the total number of excess students shall be added up):

Number of Excess Students =

(Present Number of Classes – Number of Existing Classrooms × Number of 2-shift classes) × the Average number of Students per Class

③The Number of Students being Transferred from Surrounding Schools

With Project implementation, the total estimated number of students transferred from surrounding schools in order to rectify access problems, shall be considered the number of new students being accommodated. In the case of Satellite Schools being upgraded to Central Schools, to improve access, higher grade students from the central schools in the vicinity who are transferred to the Project schools shall be considered as new students. Figures will be adjusted accordingly.

Working from the above calculation, the total number of students to be accommodated in each school at the time of the Basic Design Study (1999) and also in the target year (2003) is as shown below.

Table 2-2 The Number of Students in the Project Schools

No.	Canton	School Name	1999	2003
FD1	1	Varoska Rijeka	444	445
FD2	3	Vida	797	799
FD3	3	Sjenjak	601	602
FD4	6	Stari Vitez	229	229
FD5	7	Dr. Ante Starcevic	864	666
FD6	4	Mustafa Mulic	582	583
FD7	3	Edhem Mulabdic	279	280
FD8	2	Ivo Andric	124	124
RS1	-	Untitled	670	670
RS2	-	Sveti Sava	1,389	1,392
RS3	-	Sveti Sava	699	700
RS4	-	Nikola Mackic	266	267
RS5	-	Ostra Luka	211	211

2 - 2 - 3 Establishing Joint Components

(1) Evaluation of Facility Components

In the B&H school system, lower grades operate under a homeroom system, whereas higher grades under a subject course system necessitating the use of special purpose classrooms. Thus, it is not possible to calculate the number of classrooms simply using the student demand estimated and classroom capacity figures. In both entities of B&H in general, the school facilities are designed in accordance with the Norm. Thus, the contents and scale of the facilities for the Project schools shall be decided in accordance with the Norm. The facility size and contents of each classroom type under the Norm are shown below:

Table 2-3 Facility Contents and Size for each Norm Classroom Type

		24 CR Type		20 CR Type		16 CR Type		12 CR Type		8 CR Type		6 CR Type	
No. of Students	Single Shift	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area	No.	Area
	Double Shifts	864		720		576		432		288		216	
		1,728		1440		1,152		864		576		432	
Classrooms													
Classrooms for Low Grade		8	56	8	56	4	56	4	56	2	56	2	56
Classrooms for High Grade		10	56	8	56	8	56	5	56		56	3	56
Cabinet		6	16	5	16	5	16	4	16	4	16	3	16
Biological Laboratory		1	72	1	72	1	72	1	72	1	72	1	72
Cabinet		1	16	1	16	1	16	1	16	2	16	2	16
Science Laboratory		1	72	1	72	1	72	Share w/ Above		Share w/ Above		Share w/ Above	
Cabinet		1	16	2	16	2	16						
Physical Laboratory		1	72	Share w/ SL		Share w/ SL		Share w/ Above		Share w/ Above		Share w/ Above	
Cabinet		1	16										
Language Room		2	32+56	1	56	1	56	1	56	1	32	1	32
Cabinet		1	16	1	16	1	16	1	16	1	16	1	16
Workshop		2	32+56	2	24+56	2	24+56	2	24+32	2	24+32	1	32
Cabinet		1	16	1	16	1	16	1	16	1	16	1	15
Art Room		1	56	1	56	1	56	1	56	1	32	1	32
Cabinet		1	16	1	16	1	16	1	16		16	1	16
Music Room		1	56	Share w/ AR		Share w/ AR		Share w/ AR		Share w/ AR		Share w/ AR	
Cabinet		1	16										
Storage		2	16+24	2	16+24	2	12+24	1	12+16	1	16	1	16
Social Studies													
Library	Area for Reading	1	56	1	56	1	56	1	56	1	56	1	36
	Area for Bookshelves	1	16	1	16	1	16	Share w/ Above					
Social Activities Room		1	56	1	56	1	56	1	12				
Cubicles		1	16	1	16	1	16	(130)					
Multi purpose Space		1	(260)	1	(220)	1	(170)	1		1	(90)		
Management													
Principal's Room		1	16	1	16	1	16	1	16	1	12	1	12
Administration Room		1	16	1	16	1	16	1	12	1	12		
Teacher's Room		1	56	1	56	1	48	1	32	1	32	1	24
Counselling Room		1	16	1	16	1	16	1	12	1	12		
First Aid & Dental Room		1	16	1	16	1	16	1	12	1	12		
Gymnasium													
Arena	Large	1*	15x27	1	15x27	1	15x27	1	12 x24	1	12 x24		
	Small	1*	12x24										
Locker Room		4	16	2	16	2	16	2	16	2	16		
Storage		2	24+30	1	30	1	30	1	24	1	24		
Cabinet		2	12	1	12	1	12	1	12	1	12		
Service													
Kitchenette		1	24	1	24	1	24	1	24	1	24	1	16
Janitor's Room		1	12	1	12	1	12	1	8	1	8	1	8
Storage		1	24	1	24	1	16	1	16	1	12	1	12
Boiler Room		1	40	1	40	1	30	1	30	1	20		
Coal Storage		1	80	1	80	1	60	1	60	1	40	1	24
Working Space		1	6	1	6	1	6	1	6	1	6		
Total Area		4,262		3,666		3,226		2,394		1,921		1,121	

Note) * : Two arenas for 24 CR Type will be able to be replaced with one arena of 18m by 36m.

Abbreviations: CR = Classroom, SL = Science Laboratory, AR = Art Room

1) Normal Classrooms

Normal classrooms are, without doubt, necessary. However, as noted, the differing demands of lower and higher grades mean that their classroom types need to be considered separately.

① Normal Classrooms for Lower Grades (Grade One to Four):

One normal classroom is provided for each class and all subjects (except physical education) are taught there. The furniture and equipment should be appropriate for lower grade use.

② Normal Classrooms for Higher Grades (Grade Five to Eight):

In B&H, higher grade teaching is centred on subject courses. There are separate rooms for each subject and students have to change rooms accordingly. In small schools, however, such as in those found in farming areas, it is difficult to comply with this system. In such instances, therefore, classes are taught in one classroom as per the lower grades. As the teaching methods depend on the discretion of the school operating members, it may not be appropriate to consider all the classrooms in the Project as special rooms.

Except for those subjects which require the installation of special equipment and for those that, due to their nature, require a separate space, it shall be assumed that higher grade lessons are conducted in normal classrooms. The choice of teaching methods shall be entrusted to the school.

③ Cabinets:

The Norm states that the normal and special classrooms for the higher grades have an attached room (hereafter referred to as "the Cabinet"). The purpose of the Cabinet is multifold: to store equipment for various subjects, to allow preparation of educational material and as a staff room for subject teachers. Thus, higher grade teachers would not access the teacher' room, but would use the Cabinet between lessons.

When considering merely as a storage facility, the total number of Cabinets required may seem excessive. It must be remembered however, that it would be impractical for both Lower Grade and Higher Grade teachers to share the same small teacher's room.

2) Special Classrooms

The special classrooms are intended for specialist study by the higher grades. Under the Norm types include: Science Laboratories (Physics, Chemistry, Biology), Art & Music Rooms, Language Rooms and Workshops. Furthermore, schools in urban areas have separate rooms for some subjects including those categorised under humanities. No specifications, however, have been determined regarding special classrooms for The humanities and normal classrooms may well be adequate for these subjects. The use of and necessity for special classrooms under the Norm is evaluated below:

④ Science Laboratories (for Physics, Chemistry, and Biology):

The Norm states that either a common science laboratory (Physics, Chemistry

&Biology) or separate laboratories for each subject be set up. For 16 Classroom Type schools in this Project, the Norm is one laboratory for Physics and another for Chemistry and Biology. For smaller schools, it is stated that one laboratory be used as a combined Science facility.

Science lessons are based on teacher-centred experiments and experiments are rarely conducted by students. However, this may be as a result of insufficient equipment. As students conducted experiments may be possible in the future, the Project needs to make necessary allowances.

Science laboratories need to be supplied with water faucets and sinks for washing laboratory instruments and also sufficient space and tools for conducting experiments. In addition, as the number of necessary instruments is considerable, a special storage facility should be set up in all Project schools.

⑤ Art & Music Room:

The Norm states that a Art & Music room, with the inclusion of a piano, be set up for those Project schools operating with a maximum of 20 classrooms. Considering the special demands of the music curriculum, the room shall be separate from others. The music rooms in some existing schools are located next to the multipurpose hall, and these two areas are combined for school events. Due to this trend and in consideration of additional use by lower grade students, a music room shall be set up in all Project schools.

Although Art & Music may be considered to constitute the same category, it would nevertheless be inappropriate to have them share the same facility, due to their differing demands. However, if the Subject Course system is in use, there should be no problem in having a combined Art and Music room.

⑥ Workshop:

The Workshop is for technical instruction in the higher grades (five to eight) and is used average for one or two hours per week by each class. Wood work, Metal work, experiments requiring electricity and modelling all take place in this room. The Workshop is necessary as a place in which to use specific equipment and materials.

Previously in technical education in B&H, there was a limit to the number of students per teacher. The classroom was divided into two types, one for practical training and the other for lectures. The Norm stated, therefore, that there be one small and one large workshop for those schools with over 8 classrooms. As this system is not appropriate here however, the Ministry of Education (PIU) on the FD side has requested that there be only one workshop.

⑦ Language Room:

The total number of classrooms under the Norm is on the assumption that the maximum number of classes be conducted simultaneously. In the table below, the number of classrooms (including Language rooms) corresponds to the number of classes conducted in schools with over 8 classrooms. The Language room is thus necessary.

Table 2-4 Number of Classrooms of each Type

Type of room	24 room type	20 room type	16 room type	12 room type	8 room type	6 room type
Max. number of classes/shift	24	20	16	12	8	6
No. of normal classrooms	18	16	12	9	6	5
Science laboratories	3	2	2	1	1	1
Foreign language room	1.5	1	1	1	0.5*	0.5*
Art/music room	2	1	1	1	0.5*	0.5*
TOTAL	24.5	20	16	12	8	7

*0.5 refers to a classroom that can only accommodate half a class

Foreign language classes are taught from the fourth to the eighth grade in FD and from the fifth to the eighth grade in RS. Lessons are taught from two to four hours per week and so approximately eight to sixteen hours of foreign language teaching occurs for each grade during a one-week lesson period (approximately 16 to 27 lesson hours depending on school area and grade). Students may choose from English, German, and French (in FD), and English, German, French, and Russian (in RS). The teaching of each language is conducted in a separate classroom and subsequently, successful co-ordination depends on these rooms being made available. In schools sized over 8 classrooms, there is more than one class per grade. Where there exists one classroom for one subject, therefore, Language classes may be conducted simultaneously for each grade. Schools with less than 6 classrooms, however, have only one class per grade and so an adequate number of classrooms per subject may not be provided. Thus, there schools need to have separate classrooms for languages as stated in the Norm. Assuming that half the students in the class will attend the lessons, the size of the room shall be accordingly adequate. As language rooms do not require special facilities or equipment they shall be of the same type as normal classrooms.

⑧ Others:

The Cabinets mentioned in the above section shall also be considered special rooms. It is assumed that other subjects, excepting physical education be taught in normal classrooms. Special classrooms for other subjects are not therefore considered.

3) Rooms Related to Social Studies

⑨ Library:

As the purchase of books is problematic in B&H, libraries in basic schools are under great demand, with time limits being routinely placed on users. Where no library exists, schools commonly make use of a simple reading corner. Libraries are divided into open and closed-shelf types according to school. In order to equip libraries built under the Project, a great deal of money needs to be

spent (except in the case of some existing schools). However, libraries as resource centres are continually evolving. Current media and reference materials are now easily accumulated and accessed via the internet and resultantly, library resources are in even greater demand. In light of this trend, there will be one established in each Project school.

⑩ Social Activities Room/ Multi-Purpose Hall:

School facilities are frequently being accessed by local residents and the Norm states that special rooms are necessary for this purpose where schools have over 432 students. However, none of the schools inspected had such rooms and it is evident that entrance halls and normal classrooms can function in the same manner. A room specifically intended for social activities will therefore not be included.

4) Rooms Related to the Management of Schools

⑪ Teacher's Room:

As previously mentioned, the teacher's rooms in the primary schools of B&H are used by lower grade teachers. Most of the schools have double or triple shifts and teachers change accordingly. Teachers do not have their own desks but keep their belongings in a locker. In most cases, the teacher's room is also used for school meetings and meetings with guests, parents and local residents, with the furniture typically arranged around a big table. Teacher's rooms, combined with meeting rooms, shall be provided to Project schools.

⑫ Administration Office:

There are few office personnel in the basic schools in B&H. In most cases, the principal, vice-principal, secretary and treasurer are responsible for administration. Thus, a space adequate for a few staff members shall be provided. A principal's room shall be also provided independently.

⑬ First Aid Room and Other Room:

The Norm states that schools with over 8 classrooms have a First Aid / Dental room and a Psychology room. Although the existing schools do not have specialists permanently on staff, they are sometimes equipped (with dental treatment chairs, for ex.) for visiting doctors. Considering the inadequacies of the hospital system in B&H, it may be important to have such medical facilities on site. The equipment required for dental treatment is expensive, however, considering the frequency of use, and its maintenance is difficult. Provision will not be made for its inclusion in the Project although a simple first aid room shall be installed. Dental treatment shall be the future responsibility of B&H. Following the war there has been an increased demand for child psychiatric counselling. Although the necessity of counselling by teachers and other staff is understandable, a purpose built room may not be so frequently used. The first aid room is thought to serve the same purpose.

5) Gymnasium:

Due to the degree of snow in B&H, Physical Education lessons in winter are conducted in the gymnasium. Two to three hours are set aside for physical

education a week per grade, however this may differ according to the total weekly lesson hours (16-27 hours according to region and grade). Considering the above, the use of the gymnasium for double shift schools is estimated as follows:

Schools with 1 class/grade (total 8 classes): 30-37%

Schools with 2 classes/grade (total 16 classes): 59-74%

In the Norm, it is stated that CS with over 8 classrooms have a gymnasium. According to this standard, gymnasiums are divided into three sizes according to the number of classrooms. The smallest type is 12m×24m, which allows for at least one volleyball court. Locker rooms and cabinets adjacent to gymnasium are also provided. The site study on the Project Schools and CS in the vicinity showed that nearly 60% (19 of the 30 schools) possessed a gymnasium. In the urban areas especially, 90% of the primary schools (15 out of 17) had a gymnasium. This does not apply to satellite schools however. Considering the above, gymnasiums shall be provided to schools with over 8 classrooms, as stated in the Norm. And also dressing room and teacher's cabinet as additional facilities shall be provided.

6) Service Facilities

⑭ Kitchen:

In order to supply hot water to the staff and to supply school lunches in some schools, a simple kitchen shall be provided.

⑮ Janitor's Room:

In general, the cleaning of the basic schools in B&H is conducted by the cleaning staffs of the school. Repair and maintenance is conducted by the housekeeper. A number of school personnel are employed for this purpose and thus, a janitor's room shall be provided.

⑯ Storage:

As storage rooms are necessary for school archives and other materials, they shall be provided.

⑰ Corridors/Stairs/Hall:

To be installed where necessary. A reception shall be provided at the entrance hall.

⑱ Toilets:

Flush toilets as per the country's standards shall be installed.

⑲ Others:

Project Schools requiring the installation of boilers shall be provided with a boiler room, an area for fuel storage and a simple room for use by the maintenance person.

(2) Contents of the Plan for Each Project School

Based on the estimated number of students to be accommodated for each Project school (as calculated in the above section), the Norm for classroom types and facility contents shall be as in the table 2 - 5 :

Table 2-5 The Contents of Facilities of Each Project School

NO./Name of School	Category	No. of Requested CR	Norm Type	No. of Rooms Required by Norm						Existing School Facilities						No. of Rooms under the Project						No. of CR *									
				Normal CL		Special CR		LB	GYM	CR		LB	GYM	CR		Special CR		LB	GYM												
				LG	HG	Total	SL	AM	LR	WS	CR	SL	AM	LR	WS	CR	SL	AM	LR	WS											
The Federation of Bosnia and Herzegovina																				80											
FD-1	Varoska Rijeka	6	444	8	2	4	6	1	0.5	0.5	1	1	Small	3	0	0	0	0	0	0	0	3	3	1	0.5	0.5	1	1	Small	6	
FD-2	Vida	12	797	12	4	5	9	1	1	1	1	1	Small	-	-	-	-	-	-	-	-	4	5	9	1	1	1	1	Small	13	
FD-3	Sjenjak	12	602	12	4	5	9	1	1	1	1	1	Small	-	-	-	-	-	-	-	-	4	5	9	1	1	1	1	Small	13	
FD-4	Stari Vitez	6	229	6	2	3	5	1	0.5	0.5	0.5	1		-	-	-	-	-	-	-	-	2	3	5	1	0.5	0.5	0.5	1	-	7.5
FD-5	III Dr Ante Starcevic	16	864	16	4	8	12	2	1	1.5	1	1	Large	-	-	-	-	-	-	-	-	4	8	12	2	1	1	1.5	1	Large	17.5
FD-6	Mustafa Mulic	6	582	12	4	5	9	1	1	1	1	1	Small	5	0	0	0	0	0	0	0	2	2	4	1	1	1	1	Small	8	
FD-7	Edhem Mulabdic	6	279	6	2	3	5	1	0.5	0.5	0.5	1		No Utilization of the Exist. Facilities						2	3	5	1	0.5	0.5	0.5	1	-	-	-	7.5
FD-8	Ivo Andric	8	124	6	2	3	5	1	0.5	0.5	0.5	1		-	-	-	-	-	-	-	-	2	3	5	1	0.5	0.5	0.5	1	-	7.5
Republica Srpska																				45.5											
RS-1	Untitled	12	670	12	4	5	9	1	1	1	1	1	Small	-	-	-	-	-	-	-	-	4	5	9	1	1	1	1	Small	13	
RS-2	Sveti Sava	12	1389	20	8	8	16	2	1	1.5	1	1	Large	14	0	0	0	0	0	1	1	1	1	2	2	1	1	1.5	1	Exist.	7.5
RS-3	Sveti Sava	12	699	12	4	5	9	1	1	1	1	1	Small	-	-	-	-	-	-	-	-	4	5	9	1	1	1	1	Small	13	
RS-4	Nikola Mackic	8	266	6	2	3	5	1	0.5	0.5	0.5	1		3	0	0	0	0	0	0	0	1	1	2	1	0.5	0.5	0.5	1	-	4.5
RS-5	Ostra Luka	6	211	6	2	3	5	1	0.5	0.5	0.5	1		No Utilization of the Exist. Facilities						2	3	5	1	0.5	0.5	0.5	1	-	-	-	7.5

Note: * indicates the total number of classrooms, science laboratories, art & music rooms and language rooms.

Abbreviations: CR=Classroom, ST=Student, SL=Science Laboratory, AM=Art & Music Room, LR=Language Room, WS=Workshop, LB=Library
GYM=Gymnasium, LG=Low Grade, HG=High Grade, AC=Additional Construction, NC=New Construction, RC=Reconstruction

(3) Evaluation of Equipment Components

The materials to be provided in the Project are ① furniture and equipment and ② educational material.

1) Furniture and Equipment

Based on the facility component, the minimal required furniture and equipment for facility operation shall be provided. Classroom furniture will comprise students' desks and chairs, teacher's desks and chairs, blackboards, bulletin boards, coat hangers and storage amenities. Basic furniture (desks, chairs, storage amenities and bulletin boards) shall also be provided for other rooms.

2) Educational Material

a) Selection of Items

Those items necessary for teaching, in addition to present textbooks, shall be selected as no standard curriculum have been set. Audio-visual aids for the teacher shall also be included. Taking into account the request submitted by the Federal Ministry of Education, teaching materials shall be selected based on the following criteria:

- ① They shall be items of a non-racial nature.
- ② They shall be items for daily use.
- ③ They shall be items that can be easily managed and maintained.
- ④ They shall not be expendable.
- ⑤ They shall be durable for a long period.
- ⑥ They shall be for use in the classrooms built by the Project.
- ⑦ They shall not include textbooks and other related items, that might be possessed by individuals.
- ⑧ They shall not include computer related equipment, which tends to become obsolete within a short time.
- ⑨ They shall not include low cost items, that might be able to be procured easily by the government of B&H.

b) Examination of Quantities

The basis for deciding upon the quantity of educational material provided is described below. As Physics, Chemistry, Biology, and Science experiments are mainly demonstrated by teachers, equipment provided under the Project shall be intended for teacher use only and the provision of experimental equipment for students shall not be considered. The equipment mainly handled by students will be provided to each student or to each group (size: six students per group with six groups in total in a large school and three groups in total in a small school). No spare equipment units shall be taken into consideration.

- ① Equipment that might be for use by an entire school (audio-visual items, wall maps, etc.) shall be provided on the basis of one unit per kind, per school.
- ② Items that might be ordinary used in basic classrooms shall be provided on the basis of one per grade.
- ③ Science equipment shall be provided on the basis of one item per laboratory.
- ④ Equipment for students shall be provided to each student, or either three or six units (one unit per one group).

The result of the examinations is shown in the table below.

Table 2-6 List of Educational Equipment

No	Item	Requested Qty.	Reason for Omission	Qty. per School	Notes
1. Basic Teaching Aids					
1-1	Overhead Projector Standard	4	—	1	1 per school
1-2	Projection Screen (150x150)	4	—	1	1 per school
1-3	Cassette phone w/ CD W Deck	1	Provided at AM	0	—
1-4	Video Recorder	1	—	1	1 per school
1-5	Television 73cm	1	—	1	1 per school
1-6	Computer PC Pentium MX 300 MHz	1	⑧	0	—
1-7	Laser Printer Jet 6P	1	⑧	0	—
1-8	Public Address System	1	Included to Equip. Work	0	—
2. Bosnian, Serbian & Croatian Languages and Literature					
2-1	Elementary Reading Book, Cyrillic & Latin Alphabet Writing Letters and Printing Letters	1	⑦	0	—
2-2	Required Reading Books, Grade 1-8 (50 Different Titles)	15	⑦	0	—
3. Foreign Languages					
3-1	Wall Pictures on Various Topics Covering Relevant Programs for Each Class	1	—	1	1 per LR
3-2	Educational Films According to the Curriculum	1	—	1	1 set per LR
3-3	Printed Materials	English Dictionary	⑦	0	—
		German Dictionary	⑦	0	—
4. Mathematics (Grade 1~4)					
4-1	Wall Pictures and Illustrations (Group of Figures)	3	—	4	1 per Grade
5. Mathematics (Grade 5~8)					
5-1	Abacus w/ 10 Balls	1	—	1	1 per school
5-2	Positional Abacus (Sweden Type)	1	—	1	1 per school
5-3	Scales w/ Weights	1	—	1	1 per school
5-4	Level & Plumb Line	1	⑨	0	—
5-5	Wooden Ruler (Longitudinal)	5	⑨	0	—
5-6	Pair of Wooden Compasses for Blackboard	5	⑨	0	—
5-7	Wooden Triangle (Isosceles, right-angled)	5	⑨	0	—
5-8	Triangle (Scalene right-angled)	5	⑨	0	—
5-9	Models for Measuring Areas & Volumes	1	—	1	1 per school
5-10	Models of Liquid Measuring Devices	1	—	1	1 per school
5-11	Models of Geometric Bodies Made in Wire	1	—	1	1 per school
5-12	Models of Geometric Bodies Hollow, Made of Plastic	1	—	1	1 per school
5-13	Models of Roman Numbers	1	—	1	1 per school
5-14	Kit for Geometric Drawing	2	—	1	1 per school
5-15	Model of Circle divided into Parts	1	—	1	1 per school
5-16	Model of Circumference & Area of Circle	1	—	1	1 per school

Table 2-6 List of Educational Equipment (Continued)

No	Item	Requested Qty.	Reason for Omission	Qty. per School	Notes
5-17	Model of Pythagorean Theorem	1	—	1	1 per school
5-18	Model of Binomial Squaring	1	—	1	1 per school
5-19	Model of Line by Line Section	1	—	1	1 per school
5-20	Model of Angle Division	1	—	1	1 per school
5-21	Scale Ruler	1	—	1	1 per school
5-22	Model of Central & Peripheral Angles	1	—	1	1 per school
5-23	Model of Areas of Geometric Figures	1	—	1	1 per school
5-24	Blank Transparent Sheets & Erasable Pens (For Overhead Projector)	1	④	0	—
6. Computer Science (Grade 7, 8)					
6-1	Net Card	1	⑧	0	—
6-2	Server	1	⑧	0	—
6-3	Workstation	5	⑧	0	—
6-4	HP 1100 Laser Jet	1	⑧	0	—
6-5	HP Desk Jet 610 C	1	⑧	0	—
6-5	UPS 500 VA	1	⑧	0	—
6-7	UPS 650 VA	1	⑧	0	—
6-8	HUB 16 Ports	1	⑧	0	—
7. Geography (Grade 5~8)					
7-1	Thermometer (Common Minimum, Maximum)	4	—	4	1 per Grade
7-2	Barometer (Aneroid)	1	—	1	1 per school
7-3	Turtle Aquarium	1	②	0	—
7-4	Binoculars	1	②	0	—
7-5	Map of the World - Physical	1	—	1	1 per school
7-6	Map of Europe	Physical	—	1	1 per school
		Political	—	1	—
		Economical	—	1	1 per school
7-7	Map of Asia - Physical	1	—	1	1 per school
7-8	Map of Africa - Physical	1	—	1	1 per school
7-9	Map of North America - Physical	1	—	1	1 per school
7-10	Map of South America - Physical	1	—	1	1 per school
7-11	Map of Australia & Oceania - Physical	1	—	1	1 per school
7-12	Map of South Europe - Physical	1	—	1	1 per school
7-13	Map of B&H - Physical	1	—	1	1 per school
8. Physical Education					
8-1	Box Horse	1	—	1	1 per GYM
8-2	Balance Beam	1	—	1	1 per GYM
8-3	Spring Board	1	—	1	1 per GYM
8-4	Basketball Nets	1	Included in Cms Work	0	—
8-5	Ping-Pong Table	1	—	1	1 per GYM
8-6	Rings (Hand Rings)	1	—	1	1 per GYM
8-7	Sticks	15	⑤	0	—
8-8	Medicine Balls (2, 3, 5kg)	6	⑤	0	—
8-9	Volleyball	5	⑤	0	—
8-10	Basketball	5	⑤	0	—
8-11	Handball	5	⑤	0	—
8-12	Football (Soccer Ball)	3	⑤	0	—
8-13	Short Rope	15	⑤	0	—
8-14	Long Rope	1	⑤	0	—
8-15	Pulling Rope	1	—	1	1 per GYM
8-16	Hoops	5	⑤	0	—
8-17	Rubber Balls (For Rhythmic Exercises)	5	⑤	0	—
8-18	Hurdles	2	⑥	0	—
8-19	Hammer Throwing (3 & 4kg)	2	⑥	0	—

Table 2-6 List of Educational Equipment (Continued)

No	Item	Requested Qty.	Reason for Omission	Qty. per School	Notes
9. Physics					
9-1	Mechanics (Experiments in Kinematics and Dynamics)	1	--	1	1 per SL
9-2	Equipment w/ Magnetic Holders for Experiments in Static	1	--	1	1 per SL
9-3	Precise Scales w/ Weights	1	--	1	1 per SL
9-4	Science Dealing w/ Heat	1	--	1	1 per SL
9-5	Electrostatics	1	--	1	1 per SL
9-6	Rectifiers (4, 6, 12, 24V)	1	--	1	1 per SL
9-7	Low Voltage Transformers (4, 6, 12, 24V)	1	--	1	1 per SL
9-8	Equipment for Providing the 2nd Newton's Law	1	--	1	1 per SL
9-9	Equipment for Demonstration of Action & Reaction	1	--	1	1 per SL
9-10	Equipment for Friction Testing	1	--	1	1 per SL
9-11	Equipment for Demonstration of a Falling Body	1	--	1	1 per SL
9-12	Oscillator (Mechanical)	1	--	1	1 per SL
9-13	Pendulum	1	--	1	1 per SL
9-14	Steep Board That Can Change Angle	1	--	1	1 per SL
9-15	Equipment for Proving the Pascal's Law	1	--	1	1 per SL
9-16	Hydrostatic Scale	1	--	1	1 per SL
9-17	Hydraulic Press Model	1	--	1	1 per SL
9-18	Equipment for Proving the Archimedes' Law	1	--	1	1 per SL
9-19	Calorimeter w/ Thermometer	1	--	1	1 per SL
9-20	Faraday's Cage	1	--		
9-21	Model Condenser w/ Ability to Change Capacity	1	--	1	1 per SL
9-22	Condenser (Sheet, Electrolyte, Ceramic w/ Ability to Change Capacity)	1	--	1	1 per SL
9-23	Leclanche's Element	1	--	1	1 per SL
9-24	Equipment for Ersted's Experiment	1	--	1	1 per SL
9-25	Permanent Magnet (Bar, Horse Shoe, Magnetic Pin)	1	--	1	1 per SL
9-26	Decline/Incline Measuring Device	1	--	1	1 per SL
9-27	Compass	1	⑨	0	--
9-28	Galvanometer	1	--	1	1 per SL
9-29	Micrometer	1	--	1	1 per SL
9-30	Chronometer	1	--	1	1 per SL
9-31	Dynamometer (1N, 2N, 5N, 10N, 20N)	1	--	1	1 per SL
9-32	Thermometer (R, C, F, K)	1	⑨	0	--
9-33	Laboratory Thermometer (0-100)	1	--	1	1 per SL
9-34	Mercurial Thermometer	1	⑨	0	--
9-35	Metallic Thermometer	1	⑨	0	--
9-36	Mercurial Barometer	1	--	1	1 per SL
9-37	Barometer - Aneroid	1	--	1	1 per SL
9-38	Metallic Manometer	1	--	1	1 per SL
9-39	Voltmeter (10A)	1	--	1	1 per SL
9-40	Galvanometer	1	--	1	1 per SL
9-41	Ampere-meter	1	--	1	1 per SL
9-42	Universal Measuring Device	1	--	1	1 per SL
9-43	Beaker	1	⑨	0	--
9-44	Deep Glass Tab	1	--	1	1 per SL
9-45	Shallow Glass Tab	1	--	1	1 per SL
9-46	Connected Tubes (Various Radius)	1	--	1	1 per SL
9-47	Capillary Tubes	1	⑨	0	--
9-48	Glass Tube T Shape	1	⑨	0	--
9-49	Graphical Demonstration of SI System	1	--	1	1 per SL
9-50	Pictures of Famous Physicists	1	⑨	0	--
9-51	Bimetal Tape	1	⑨	0	--
History					
9-52	Map of Roman Empire	1	①	0	--

Table 2-6 List of Educational Equipment (Continued)

No	Item	Requested Qty.	Reason for Omission	Qty. per School	Notes
9-53	Medieval Bosnian Country	1	①	0	--
9-54	Great Geographical Discovery Period	1	①	0	--
9-55	Europe in 18th Century	1	①	0	--
9-56	Europe 1815-1848	1	①	0	--
9-57	Europe 19th Century	1	①	0	--
9-58	World War I in Europe 1914-1930	1	①	0	--
10. Chemistry					
10-1	Precise Scale w/ Weights	1	--	1	1 per SL
10-2	Thermometers (-10-360°C)	1	⑨	0	--
10-3	Molecule Models	1	--	1	1 per SL
10-4	Metals & Alloys Collection	1	--	1	1 per SL
10-5	Table of Periodic System of Elements	1	--	1	1 per SL
10-6	Measurement & Unit Prescribed by Law	1	--	1	1 per SL
10-7	Molecular Model of Diamond Crystal	1	--	1	1 per SL
10-8	Molecular Model of Graphite Crystal	1	--	1	1 per SL
10-9	Molecular Model of Ice Crystal	1	--	1	1 per SL
10-10	Structural Model of Organic Molecule	1	--	1	1 per SL
10-11	Universal Holder, Set w/ Parts	1	--	1	1 per SL
10-12	Clamps	1	⑨	0	--
10-13	Tripod	1	⑨	0	--
10-14	Asbestos Net	1	⑨	0	--
10-15	Laboratory Tweezers	1	⑨	0	--
10-16	Tongs	1	⑨	0	--
10-17	Metal Spoon for Burning	1	⑨	0	--
10-18	Alcohol Lamp	1	⑨	0	--
10-19	Magnet	1	⑨	0	--
10-20	Plastic Syringe Bottle	1	⑨	0	--
10-21	Metal & Plastic Spoons for Chemicals	5	⑨	0	--
10-22	Rubber Lids Various Sizes	0.3	⑨	0	--
10-23	Cork Lids Various Sizes	0.3	⑨	0	--
10-24	Drill for Lids, Set	1	⑨	0	--
10-25	Wooden Pincers for Test Tubes	5	⑨	0	--
10-26	Test Tube Holder	2	⑨	0	--
10-27	Trays (Plastic or Wood)	2	⑨	0	--
10-28	Brush for Washing Test Tubes	5	④	0	--
10-29	Rubber Hose(5, 7mm)	5	④	0	--
10-30	Filter Paper	5	④	0	--
10-31	Candle	5	④	0	--
10-32	Dust Bottles w/ Lid	3	⑨	0	--
10-33	Reagent Bottle (100cm)	5	To be provided w/ Contents	--	--
10-34	Reagent Bottle (250cm)	3		--	--
10-35	Brown Reagent Bottle (100m)	2		--	--
10-36	Porcelain Cup (70mm)	1	⑨	0	--
10-37	Porcelain Mortar w/ the Pestle (100mm)	1	⑨	0	--
10-38	Glass Bell w/ Tubes & without Tubes	1	⑨	1	1 per SL
10-39	Libig's Cooler	1	⑨	0	--
10-40	Balloon w/ a Flat Bottom (100cm)	1	⑨	0	--
10-41	Burette (25cm)	1	⑨	0	--
10-42	Potbellied Pipette w/ Measuring Scale	2	⑨	0	--
10-43	Measuring Bottle Various Sizes	2	⑨	0	--
10-44	Regular Dish (100cm)	1	⑨	0	--
10-45	Regular Dish (1 dm)	1	⑨	0	--
10-46	Conical Flask (100, 250cm)	3	⑨	0	--
10-47	Glass Funnel (70mm)	2	⑨	0	--
10-48	Funnel for Pouring	1	⑨	0	--
10-49	Watch Glass (60, 80mm)	3	⑨	0	--

Table 2-6 List of Educational Equipment (Continued)

No	Item	Requested Qty.	Reason for Omission	Qty. per School	Notes
10-50	Ordinary Test Tube	50	⑨	0	--
10-51	Test Tube w/ Lateral Drain	3	⑨	0	--
10-52	Test Tubes Made of Heat Resistant Glass	2	⑨	0	--
10-53	Dropper	1	⑨	0	--
10-54	Glass Hose (3, 5, 7mm)	0.5	⑨	0	--
10-55	Glass Wands	0.5	⑨	0	--
10-56	Distributing Hoses	3	⑨	0	--
10-57	Laboratory Glasses: Short 100, 250	5	⑨	0	--
10-58	Laboratory Glasses: 1 dm	1	⑨	0	--
10-59	Laboratory Glasses: 1 dm	2	⑨	0	--
10-60	Round Bottom Flask	2	⑨	0	--
1 1. Music, Culture					
11-1	CD & Tape Player	1	--	1	1 for AM
11-2	Piano	1	--	1	1 for AM
11-3	Classical Guitar	1	②	0	--
11-4	Block - Soprano Flute	5	②	0	--
11-5	Block - Alto Flute	2	②	0	--
11-6	Block - Tenor Flute	1	②	0	--
11-7	Block - Bass Flute	1	②	0	--
11-8	Harmonica	2	②	0	--
11-9	Children's Instrumentals (Jingles, Bells, Tambourine)	1	②	0	--
11-10	Metronome	1	②	0	--
11-11	Mono-cord	1	②	0	--
11-12	Tuning Fork	1	②	0	--
1 2. Biology					
12-1	Microscope & Projector or w/ Accessories				
	a School Microscope	2	--	1	1 per SL
	b Microscope Lamp	1	--	1	1 per SL
	c Equipment for Microscope				
	Slide Glass (100 per St)	1	To be included in	0	--
	Cover Glass (100 per Set)	1	Microscope	0	--
	Microscope Pin/Needle	5		0	--
	Test Tube w/ Medicine Dropper	4		0	--
	d Magnifying Glass (5, 10 times)	4	--	1	1 per SL
12-2	Equipment for Dissection & Vivisection (Pah Scales, Tweezers, Scissors, Lancet, Pin)	2	--	1	1 per SL
12-3	Life Community - Biosynthesis				
	Food Chain (Forest, Field, Swamp)				
	Botany	1	⑨	0	--
	Picture: Cell	1	⑨	0	--
	Picture: Bacteria & Algae	1	⑨	0	--
	Picture: Fungi & Lichens	1	⑨	0	--
	Picture: Moss & Fern	1	⑨	0	--
	Picture: Gymnosperm	1	⑨	0	--
	Picture: Family of Ranunculaceae & Fagaceae	1	⑨	0	--
	Picture: Family of Fabaceae	1	⑨	0	--
	Picture: Family of Liliaceae & Poaceae	1	⑨	0	--
	Picture of Animal Anatomy	1	⑨	0	--
	Invertebrates:	1	⑨	0	--
	• Poriphera & Coelenterate	1	--	1	1 per SL
	• Annelids (Earthworm)				
	• Crustacean (River Crab)				
	• Arachnid (Spider)				
	• Insects (Honeybee)				
	• Mollusk (River Clam)				
	• Gastropod (Snails)				
	• Echinoidea (Sea Urchin)				

Table 2-6 List of Educational Equipment (Continued)

No	Item	Requested Qty.	Reason for Omission	Qty. per School	Notes
12-3	Vertebrates	1	--	1	1 per SL
	• Fish (Fish w/ Bone Skeleton)				
	• Batrachian (Frog, Internal Organs of Female Frog)				
	• Reptiles (Lizard)				
	• Birds (Pigeon)				
	• Mammals (Rabbit)				
12-4	Plastic Model - Botany's	1	--	1	1 per SL
	• Apple Flower (Blossom)		--	1	1 per SL
	Human Model - Plastic	1	--	1	1 per SL
	Human Skeleton	1	--	1	1 per SL
	Throat	1	--	1	1 per SL
	Eye	1	--	1	1 per SL
13. Technical Education					
13-1	Bilateral Drill (Borer)	1	⑨	0	--
13-2	Transformer 0-25V (Connections for Directed & Alternating Current)	1	⑨	0	--
13-3	Steel Ruler w/ Millimetre Graduation	5	⑨	0	--
13-4	Steel Meter	5	⑨	0	--
13-5	Marking Needle	5	⑨	0	--
13-6	Wooden Triangle	5	⑨	0	--
13-7	Triangle w/ Meter (Locksmith's)	5	⑨	0	--
13-8	Hammer (Locksmith's)	5	⑨	0	--
13-9	Awl	5	⑨	0	--
13-10	Knife for Modelling	5	⑨	0	--
13-11	Scissors for Paper	5	⑨	0	--
13-12	Knife for Paper	5	⑨	0	--
13-13	Brush for Painting	5	⑨	0	--
13-14	Needle for Leather	5	⑨	0	--
13-15	Awl 0.3	5	⑨	0	--
13-16	Awl 0.5	5	⑨	0	--
13-17	Awl 0.6	5	⑨	0	--
13-18	Carpentry Chisel (5mm)	2	⑨	0	--
13-19	Carpentry Chisel (Different Size)	2	⑨	0	--
13-20	Carving Arc	5	⑨	0	--
13-21	Carving Clamp (Vise)	5	⑨	0	--
13-22	Carving Board	5	⑨	0	--
13-23	Round Rasp for Rough Wood	5	⑨	0	--
13-24	Flat Rasp for Wood (Finish)	5	⑨	0	--
13-25	Shovel for Putty	2	⑨	0	--
13-26	Device for Parallel Drawing	1	⑨	0	--
13-27	Hand Saw	2	⑨	0	--
13-28	Screwdrivers (5mm)	5	⑨	0	--
13-29	Steel Pointer	2	⑨	0	--
13-30	Locksmith's Compasses	2	⑨	0	--
13-31	Plastic Hammer	2	⑨	0	--
13-32	Flat Rasp (Rough)	2	⑨	0	--
13-33	Flat Rasp (Finish)	2	⑨	0	--
13-34	Round Rasp (Rough)	2	⑨	0	--
13-35	Round Rasp Rough Various Sizes	2	⑨	0	--
13-36	Round Rasp Finish	2	⑨	0	--
13-37	Combination Pliers w/ Insulated Handles	2	⑨	0	--
13-38	Flat Pliers w/ Insulated Handles	2	⑨	0	--
13-39	Round Pliers w/ Insulated Handles	5	⑨	0	--
13-40	Awl	2	⑨	0	--
13-41	Tweezers	2	⑨	0	--
13-42	Hacksaw (Frame)	5	⑨	0	--

Table 2-6 List of Educational Equipment (Continued)

No	Item	Requested Qty.	Reason for Omission	Qty. per School	Notes
13-43	Screwdrivers (3mm)	5	(9)	0	--
13-44	Cutter w/ Insulated Handles	5	(9)	0	--
13-45	Test Lamp	2	(9)	0	--
13-46	Wire Stripper	5	(9)	0	--
13-47	Set of Awls for Leather	1	(9)	0	--
13-48	Carpentry Pliers	2	(9)	0	--
13-49	Finishing Plane	1	(9)	0	--
13-50	Rough Plane	1	(9)	0	--
13-51	Brush for Painting or Lacquer, Polish	2	(4)	0	--
13-52	Wooden Hammer	2	(9)	0	--
13-53	Carpentry Clamp (Metal 300-500)	1	(9)	0	--
13-54	Drill for Wood 3-25 mm	10	(9)	0	--
13-55	Stone for Sharpening Cutlery (Grind Stone)	1	(9)	0	--
13-56	Spare of Saw	1	(9)	0	--
13-57	Level	1	(9)	0	--
13-58	Milling Machine	2	(9)	0	--
13-59	Cutter for Glass	1	(9)	0	--
13-60	Angle Iron	1	(9)	0	--
13-61	Clamp for Adapting Processing Wood	2	(9)	0	--
13-62	Hacksaw (Crude)	1	(9)	0	--
13-63	Hacksaw (Finish)	1	(9)	0	--
13-60	Angle Iron	1	(9)	0	--
13-61	Clamp for Adapting Processing Wood	2	(9)	0	--
13-62	Hacksaw (Crude)	1	(9)	0	--
13-63	Hacksaw (Finish)	1	(9)	0	--
13-64	Cutting Hatchet	1	(9)	0	--
13-65	Triangle for Metal (Large)	1	(9)	0	--
13-66	Manual Clamp for Metal	1	(9)	0	--
13-67	Hand Drill	1	(9)	0	--
13-68	Twist Drill for Metal 1-10mm	10	(9)	0	--
13-69	Steel Brush for Cleaning the Rasps	1	(9)	0	--
13-70	Electrical Soldering Gun 120-200W	2	(9)	0	--
13-71	Micrometer	1	(9)	0	--
13-72	Scissors for Tin (Large)	1	(9)	0	--
13-73	Scissors w/ Insulated Handles (Small)	1	(9)	0	--
13-74	Micrometer	1	(9)	0	--
13-75	Set of Wrenches (Spanners)	1	(9)	0	--
13-76	Set of Steel Numbers	1	(9)	0	--
13-77	Set of Steel Letters	1	(9)	0	--
13-78	Anvil	1	(9)	0	--
13-79	Compasses for Metal	1	(9)	0	--
13-80	Set of Scalpels	1	(9)	0	--
13-81	Welding Brace	2	(9)	0	--
13-82	Welding Plate	2	(9)	0	--
13-83	Set of Screwdrivers (Large)	1	(9)	0	--
13-84	Set of Screwdrivers	1	(9)	0	--
13-85	Parallel Locksmith's Clamp	6	(9)	0	--
13-86	Soldering Gun 18-20V	2	(9)	0	--
13-87	Universal Measuring Instrument	1	(9)	0	--
13-88	Wire Stripper	2	(9)	0	--

Abbreviations: Qty = Quantity, AM = Art & Music Room, LR = Language Room, SL = Science Laboratory,

WS = Workshop, GYM = Gymnasium,

2-3 Basic Design

2-3-1 Design Concept

The objective of this Project is to better the quality of education in elementary schools through an improvement in facilities and equipment. After closely evaluating the requests of the government of B&H and considering the contents of the meetings held during field survey, this Basic Design for the facilities and equipment was determined. It shall adhere to the following:

(1) Policy for Natural Conditions

The middle and northern part of B&H share a continental climate with temperatures ranging from high in summer to low, with snowfalls, in winter. The southern part is Mediterranean in climate with mild temperatures all year round. Thus, the facilities should be designed in consideration of proper thermal insulation and be able to cope with natural hazards caused by heavy snowfalls. It is intended that the buildings be warmed by means of a central heating system in winter and that they take advantage of natural ventilation for cooling in summer. In addition as there was an earthquake at Banja Luka in 1969, the buildings should be designed in accordance with anti-seismic principles.

(2) Policy for Social Conditions

Construction material will be procured locally where possible, and the buildings will be designed so as to harmonize with the natural surroundings. The facilities shall also be designed so that all ethnic groups are encouraged to share in their use, thus strengthening cross-cultural relations in the long run. Facilities shall further be designed so that physically disabled persons are able to join in their use.

(3) Policy for Local Construction Conditions

1) Rules and Regulations for Building

In B&H regulations stipulate that building permission be attained prior to the commencement of construction. In the first instance the general drawings are submitted for the approval of the relevant municipal authority. Following this detailed drawings are submitted for review by the Government. The Project facilities shall be designed in accordance with the Norm which stipulates the standards for educational facilities in B&H after the examination of the contents of the Project facilities.

2) Local Consultants and Contractors

The technical standards of local consultants and contractors are of a high level and it is quite possible that they be employed under the supervision of Japanese firms. However, considering the sensitivity surrounding ethnic issues, separate local consultants and contractors should be selected from the Federation of B&H and Republika Srpska respectively.

3) Building Materials

Factories for the production, assembling and processing of structural materials,

as well as finishing materials, exist near the project sites and it is therefore possible to attain all construction materials locally. To this end, the design of the Project facilities will make provision for materials to be 100% locally procurable. Sourcing materials locally will also ensure that operation and maintenance of facilities be easier after completion and turn over.

4) Labor

There exist a number of local construction workers who have been largely unemployed since the war and because these workers are able to function at a high level of proficiency, they can achieve much under proper guidance. These workers therefore comprise a labor force that the Project may utilize. During winter however, some workers in the employ of local construction firms, seek work abroad to avoid laboring in harsh conditions. Those that remain and who have employment, often choose to take paid vacation, guaranteed by social security, at this time. The tendency is thus towards fewer construction workers being available during the winter months and the construction plan shall take this into account.

(4) Policy for Project Implementing Agency's Operation and Maintenance Capabilities

Project schools will have the same functions as existing schools and so may be operated by shifting the students and teachers currently in employment. It should be possible, therefore, to attain school personnel relatively easily. With regard to costs there will not be a large increase in the financial burden of the Project's implementing organization. However, some hiring of teachers and school staff may be necessary to cater for the increased number of classrooms and schools and, as a result, a slight increase in personnel and utility costs may be unavoidable. Taking into account the limited budgetary funds of the Government of B&H, the design of the Project facilities shall consider accordingly minimal operation and maintenance costs.

(5) Policies for Setting the Scope of Facilities and Equipment and their Grades

In keeping with the Japanese Government's Grand Aid scheme and the Project's overall concept, the facility design and equipment plan for the requested school facilities will take into account strategies to meet the various conditions described in the previous section. As for the grades, Project school facilities are to be designed under specifications similar to those which are commonly used for school construction in B&H. The teaching materials for science & mathematics, music, arts, geography, workshop and also, audio-visual equipment for teachers, shall be readily available in the local market and similarly school furniture shall be locally procurable.

(6) Policy for Construction Period

It is difficult to construct all 13 schools within a period of 12 months, a single fiscal year of Japanese government, because the 13 sites are widely dispersed on a mountainous area measuring 300km by 300km. The construction schedule shall therefore be divided into 2 phases. A rational and effective construction strategy shall be prepared by dividing the whole project area into several smaller

construction zones and establishing construction bases at each. This will allow simultaneous construction to take place within the entire area.

2-3-2 Basic Plan

(1) Facility Arrangement Plan

As conditions differ from site to site an appropriate arrangement plan must be drawn up by assessing shape, condition of infrastructure and the position of existing facilities. The points to be noted in the arrangement plan are as mentioned below.

- 1) If a site comes into contact with two or more roads, the school main entrance shall face the road bearing the least traffic.
- 2) The layout plan of the Project facilities shall be arranged in harmony with the natural configuration so that less site preparation is required.
- 3) In order to avoid direct sunlight, classroom buildings will be on an east to west axis if possible.
- 4) A rational arrangement plan will be made by taking into account the functional considerations between existing buildings, students and work vehicles during the project facilities construction period.
- 5) The space between buildings should be considered to maximize natural ventilation and light.
- 6) The maximum schoolyard space, in which to conduct outdoor activities, sports, etc., shall be secured. Allowance shall also be made, where possible, for additional construction in the future.
- 7) The gymnasium shall be adjacent to the school yard so that outdoor physical education can be conducted smoothly.

(2) Architectural Plan

1) Floor Plan

As the Project involves the building of thirteen different sized schools under different site conditions, floor plans shall be prepared to suit each school's individual requirements. The Project schools, however, are public schools and their curriculum and management methods will therefore be uniform. Rooms will correspond to a common function, size, and shape wherever possible. Hence, a standard design for each room type shall first be prepared. This design will then be modified and incorporated into the floor plan of each school as required.

a) Standard Design of Rooms

The standard design of rooms shall be based on the following principles:

- ① The function, size, and shape of each room shall follow the facility standards of MOE as closely as possible and the size of each room shall be decided after careful examination of arrangement of furniture.
- ② The size of ordinary classrooms shall be 7.5m by 7.5m adopted as a standard grid for designing other rooms. The sizes of main rooms for the Project facilities are shown below together with the sizes specified by the Norm.

Table 2-7 The Sizes of Main Rooms for the Project Facilities

Name of Room		Adopted Span	Adopted Size	Size Specified by the Norm
Classroom		7.5m × 7.5m	56.25m ²	56m ²
Science Laboratory		10.0m × 7.5m	75.00m ²	72m ²
Language Room	Small	5.0m × 7.5m	37.50m ²	32m ²
	Large	7.5m × 7.5m	56.25m ²	56m ²
Art & Music Room	Small	5.0m × 7.5m	37.50m ²	32m ²
	Large	7.5m × 7.5m	56.25m ²	56m ²
Workshop	Small	5.0m × 7.5m	37.50m ²	32m ²
	Medium	7.5m × 7.5m	56.25m ²	56m ²
	Large	10.0m × 7.5m	75.00m ²	80m ²
Library	Small	5.0m × 7.5m	37.50m ²	36m ²
	Medium	7.5m × 7.5m	56.25m ²	56m ²
	Large	7.5m × 7.5m + 4 × 2.5m	66.25m ²	72m ²
Gymnasium	Small	12.5m × 24.50	300.0m ²	12m × 24m = 288.0m ²
	Large	15.0m × 27.0m	405.0m ²	15m × 27m = 405.0m ²

b) Building Floor Plan at each School Site

The following principles shall be followed during the preparation of each school site's building floor plan:

- ① A courtyard type floor plan, having the advantage of enabling natural light and air circulation, shall be adopted where the site has sufficient space. A center corridor type floor plan, a practical alternative shall be adopted where the school site is of limited space.
- ② To maximize effective land use, a basic school building will comprise two stories and allow for easy movement between levels. However, different sites require different approaches and a three tiered structure may also be employed
- ③ Two stairways shall be provided for all Project school buildings, securing two escape routes in case of an emergency.

Following the basic plan, prepared in accordance with the above-mentioned, the facility size of each school site shall be as shown:

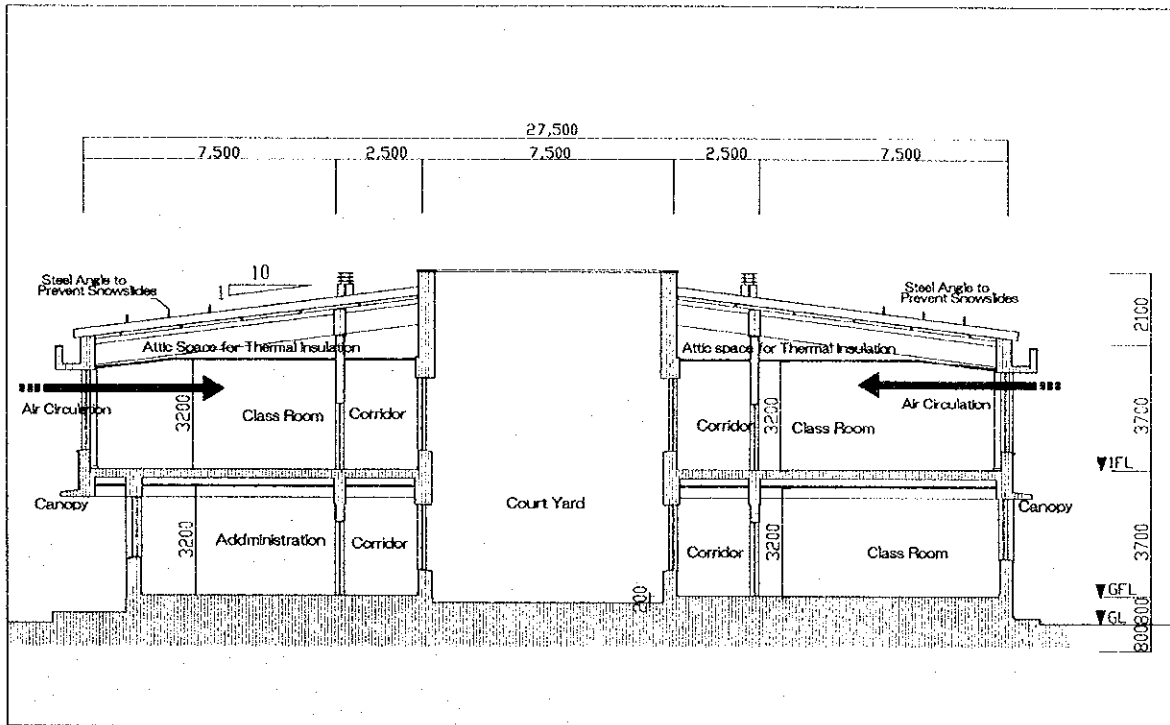
Table 2-8 Facilities Size of Each School Site (Area)

No	Project Site	Type of Construction	Type of Building	No. of Floors	Floor Area(m ²)	Remarks
FD-1	Varoska Rijeka	Additional	Central Corridor	2F+1BF	1,726.65	
FD-2	Vida	New	Central Corridor	3F+1BF	2,441.30	
FD-3	Sjenjak	New	Courtyard	2F	2,460.00	
FD-4	Stari Vitez	New	Courtyard	2F	1,415.65	No Gym.
FD-5	Dr. Ante Starcevic	New	Courtyard	2F	3,225.95	
FD-6	Mustafa Mulic	Additional	Central Corridor	3F	1,904.00	
FD-7	Edhem Mulabdic	Reconstruction	Courtyard	2F	1,429.40	No Gym.
FD-8	Ivo Andric	New	Courtyard	2F	1,415.65	No Gym.
Subtotal					16,018.60	
RS-1	Untitled	New	Courtyard	2F	2,467.20	
RS-2	Sveti Sava	Additional	Central Corridor	2F	1,312.65	Exist. Gym.
RS-3	Sveti Sava	New	Courtyard	2F	2,467.20	
RS-4	Nikola Mackic	Additional	Courtyard	2F	1,152.60	No Gym.
RS-5	Ostra Luka	Reconstruction	Central Corridor	3F	1,499.88	No Gym.
Subtotal					8,899.45	
Total					24,918.05	

2) Section Plan

So that foundations remain unaffected by the expansion of frozen soil, it is necessary that they be at least 80cm below ground level (the top 60cm of soil being susceptible to freezing.) In an average in B&H winter snow accumulates to a height of 80cm at the mountainous area and so the floor level should be above this meterage to avoid the potential hazard of melting snow. The space below the ground floor shall be utilized as a piping space for a water supply and drainage facility. The floor height of the Project building shall be 3.7m, average for B&H, to secure a sufficient volume of air in classrooms. The attic space shall be planned at the top floor of the building and thermal insulating sheets shall be laid above the suspended ceiling space for heat insulation for the building. In consideration of student safety, the roof angle will not be steep and steel frames will be installed to prevent snow-slides to the ground. Canopies at the top of windows of each room are also planned to prevent direct sunlight and rain entering rooms. A typical section of a Project facility is shown below.

Figure 2-1 A Typical Section of a Project Facility



3) Structure Plan

a) Subsoil Condition

A defining feature of B&H's geology is the mixture of sand and silt common to most of its soil. It was confirmed, through soil bearing capacity tests conducted during the field survey for the Basic Design, that almost all of the Project sites have a bearing capacity of 20 t/m². However, it is necessary to submit a report detailing the results of boring tests to the public services during the process period for the building permits. Thus, boring tests at all the Project sites shall be conducted during the field survey for the detailed design.

b) Structure Type of School Buildings

As the weight of a classroom building is relatively heavy (the wall being double-bricked) mat foundations shall be adopted for any three story classroom buildings and strip foundations for two story classroom buildings, boiler buildings and gymnasiums. A part of the space between the mat foundation and the floor slab shall be utilized for water supply and drainage facility piping. The upper structure shall be of reinforced concrete - the prevalent construction type in B&H. The basic grid of 7.5m by 7.5m for posts and beams shall be adopted for classrooms. Gymnasium building shall have either 4.5m by 15m or 4m by 12.5m grids for posts and beams, in addition to steel trusses with folded-sheet roofing on beams.

c) Materials

All the materials used will be procured locally.

Concrete:	Ready mixed concrete
Cement:	Portland cement
Aggregate:	Local crushed stone and river sand
Reinforcing Bars:	Deformed reinforcing bar

- Bricks: Over D16 : SD345 or equal
Available locally
- d) Design Load
- ① Dead Load ;
- | | |
|-------|--|
| Roof | 150 Kg/m ² |
| Floor | 690 Kg/m ² for 1st floor
490 Kg/m ² for 2nd floor |
| Wall | 470 Kg/m ² |
- ② Live Load ;
- | | |
|-------|---|
| Roof | 200 Kg/m ² |
| Floor | 300 Kg/m ² for classrooms
400 Kg/m ² for corridors |
- ③ Seismic Forces; Horizontal seismic forces shall be calculated by the equation
- $$Q = C_i \times W \text{ (Kg)}$$
- $$C_i = 0.15 \times A_i$$
- ④ Wind Load; As there is no record of typhoons or powerful winds, the design wind load will be 35m/sec.

4) Facility Plan

a) Electrical Facility Plan

It is possible to connect electrical supply lines at all Project school sites. The Project's electrical facility plan shall be established on the following principles:

① Receiving Facility

200V 50Hz electricity supply lines shall be provided to the receiving pole in each Project site, by the B&H side, then connected to the distribution board (to be installed in the school buildings).

② Lighting and Outlets

In B&H, double shift classes are generally conducted. Also, it is necessary to provide lighting for the winter season's short and rainy days. The lighting system should be of a direct ceiling mounted fluorescent type most common in B&H. Two outlet units shall be provided for each normal classroom, six to eight units or more if necessary for each special purpose room. In addition, emergency and guide lighting shall be installed in accordance with B&H laws and standards.

③ Telephone Line

The B&H side shall connect lines for telephones at each site. The line shall then be connected the buildings, through underground conduits, then conduits and outlets in the principal's office, administration office, teacher's room and first aid room shall be installed. The installation of wiring and telephones shall be shouldered by the B&H side.

④ Announcing Facility

An announcing system shall be installed in each Project school. The amplifier and other associated equipment shall be located in the staff office. The system will be used for general school announcements and to signify the start and finish of each class. No outdoor speaker units will be provided.

⑤ TV Antenna Connection

Special classrooms and teacher's rooms shall be provided with TV antenna connection outlets. Antenna cable conduits shall be made available, but no antennas and actual cables will be installed. Costs for the installation of antennas, antenna cables and TV units shall be borne by the B&H side.

⑥ Fire Alarm System

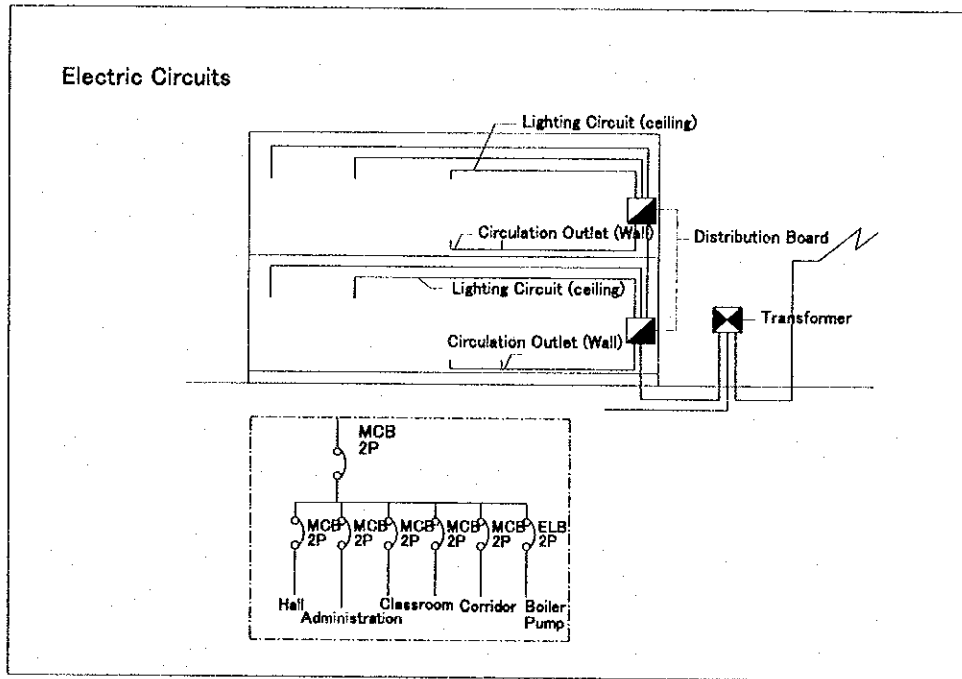
⑥ Fire Alarm System

In accordance with the B&H laws for fire fighting, fire alarm systems shall be installed at all Project schools.

⑦ Lightning Conductor

As lightning is very common in B&H, all of the school buildings, boiler oil tanks and fuel oil supply fittings shall be provided with lightning conductors to secure student safety.

Figure 2-2 Lighting and Outlet Wiring Diagram



b) Water Supply, Sewerage and Other Facilities

① Water Supply Facility

The water sources for Project schools can be classified into two categories: Well Water and City Water. The volume and pressure of City Water is sufficient at all Project school sites. As the pressure is approximately 3.0kg/cm^2 , water is obtainable through direct connection with the supply line. Regarding Well Water, the pressure is sufficient at FD-8 school site so that well water will be connected directly. Well Water at the other Project sites dries up during the summer season. Therefore Well Water at those school sites should be collected in reservoir tanks, then distributed by means of pressure pumps. The type of water supply at each Project school is listed in the following table:

Water Source	Supply Method	Project School No
City Water	Direct connection	FD-1, FD-2, FD-3, FD-4, FD-5, FD-6, RS-1, RS-2, RS-3, RS-4
Well Water	Collecting tank and pressure pump	FD-7, RS-5
	Direct connection	FD-8

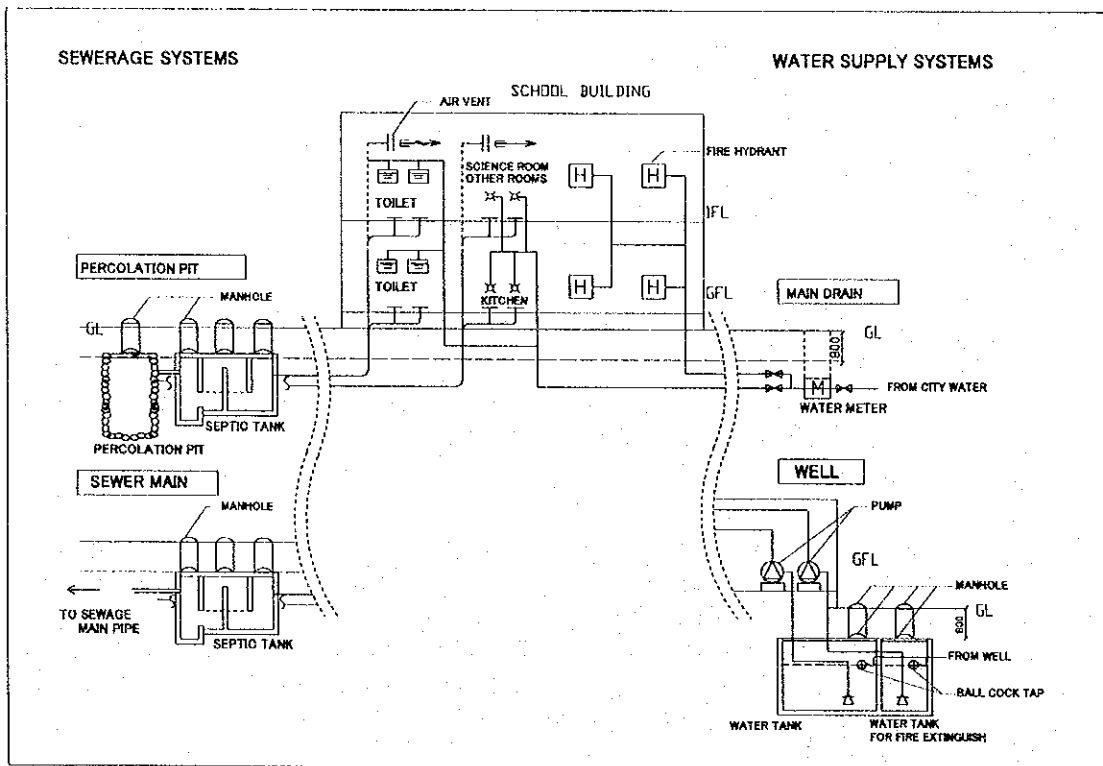
② Sewerage Facility Plan

In areas where a public sewerage system is installed, sewerage from Project facilities shall be treated by septic tanks. The treated sewerage shall then be discharged directly into the public sewerage system. In areas where no public sewerage system is available, waste from Project facilities shall be treated by septic tanks then absorbed into the ground through infiltration tanks. Rainwater shall be directly discharged into surface drainage systems. Toilets shall be of the flush type. Staff toilets shall be western type toilet bowls. Student toilets shall be Turkish type toilet bowls, with the addition of urinals for male students.

③ Indoor Fire Extinguishing Facility

In accordance with B&H laws for fire fighting, all Project facilities shall be provided with indoor fire fighting hydrants. In areas where City Water with sufficient pressure is available, the firefighting pipe shall be connected directly to the water supply line. In areas where Well Water is used, water-holding tanks shall be installed. The water shall then be distributed to each fire hydrant through means of a dedicated pump.

Figure 2-3 Water Supply and Sewerage System Diagram

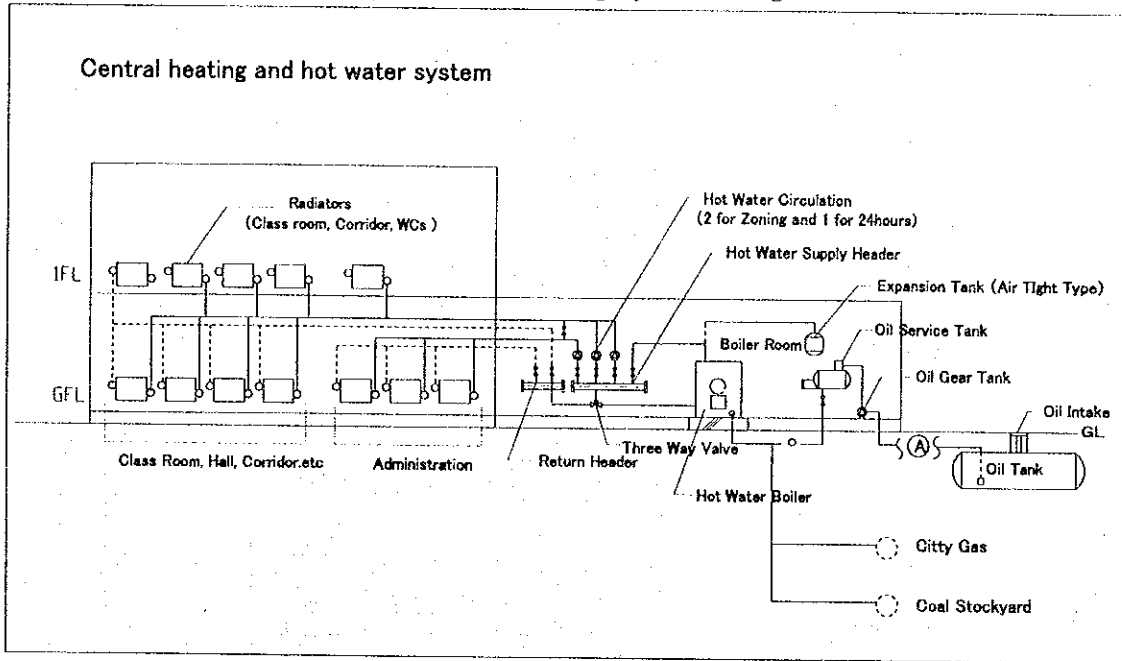


④ Heating Facility

Heating facilities are necessary during the severe winter season. All Project schools shall accordingly be provided with heating facilities. The heating medium shall be hot water. Indoor hot water pipes will not be insulated. Radiators shall be used as heaters. Boiler fuel should be oil, coal or City Gas. The boiler fuel for each Project school is listed in the following table:

Fuel Type	Project School No.
Oil	FD-1, FD-2, FD-3, FD-4, FD-5, FD-6, FD-7, FD-8, RS-1, RS-2
Coal	RS-4, RS-5
City Gas	RS-3

Figure 2-4 Heating System Diagram



(3) Construction Material Plan

The following table shows the finishing and construction methods adopted for the buildings in the Project, the reasons for their choice and a comparison with local methods.

Table 2 -9 Construction Methods to be Used in the Project and Reasons for Selection

Building Portion		Local Method	Project Method	Reason for Selection
Foundation		Reinforced Concrete	Same	Corresponds to local method
Column/ Beams		Reinforced Concrete	Same	
Floor	Base	Reinforced Concrete	Same	
	Finish	Classroom: Vinyl Sheets Toilet: Ceramic tiles	Terrazzo Block Tiles Same as local	Strong durability Corresponds to local method
Wall	Base	Bricks	Same as local	Corresponds to local method
	Finish	Mortar coating	Same as local	
Roof	Base	Wooden/steel trusses	Concrete Slab	Strong durability
	Finish	Tiles	Colored zinc coated steel folded sheet roof	Strong durability
Ceiling		Mortar coating	Cement boards w/ holes	Sound absorption
Fixtures	Window	Alum. sash/ double-glazing	Same as local	Corresponds to local method
	Door	Wood	Same as local	Similar to local method

(4) Equipment Plan

1) Educational Furniture and Appliances

The basic furniture and appliances will be based on the standard specifications of the MOE and will be procured locally. The contents for each Project room are shown in the following table:

Table 2 -10 Furniture and Appliances for Each Project Room

Room	Item	Specification	Quantity		
			Large Room	Medium Room	Small Room
Classroom - Low Grade	Student's Desk	For 1 student, 65×50×70(H)	36		
	Student's Chair	For 1 student, H=42	36		
	Teacher's Desk	130×60×76(H), w/ drawers & keys	1		
	Teacher's Chair	32×32×46	1		
	Blackboard	390×120	1		
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1		
	Bulletin Board	Made of Cork, 120×80	2		
Classroom - High Grade	Student's Desk	For 2 students, 130×50×76(H)	18		
	Student's Chair	For 1 student, H=46	36		
	Teacher's Desk	130×60×76(H), w/ drawers & keys	1		
	Teacher's Chair	32×32×46	1		
	Blackboard	390×120-180	1		
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1		
	Bulletin Board	Made of Cork, 120×80	2		
Cabinet for Classroom - High Grade	Teacher's Desk	130×60×76(H), w/ drawers & keys	1		
	Teacher's Chair	32×32×46	1		
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1		
Science Laboratory	Stool	W/ Steel pipe legs, H=50	36		
	Experimental Table	180×80×80(H) w/ granite table top	6		
	Demonstration Table	239×84×90(H) w/ drawers, keys & sink	1		
	Teacher's Chair	w/ casters	1		
	Blackboard	390×120-180	1		
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1		
	Bulletin Board	Made of Cork, 120×80	1		
Cabinet for Science Laboratory	Teacher's Desk	130×60×76(H), w/ drawers & keys	1		
	Teacher's Chair	32×32×46	1		
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1		
Workshop	Stool	W/ Steel pipe legs, H=50	36	36	18
	Working Table	210×80×82(H) w/ wooden table top	6	6	3
	Teacher's Desk	140×60×82(H)	1	1	1
	Teacher's Chair	w/ casters	1	1	1
	Blackboard	390×120-180	1	1	1
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1	1	1
	Bulletin Board	Made of Cork, 120×80	1	1	1
Cabinet for Workshop	Teacher's Desk	130×60×76(H), w/ drawers & keys	1	1	1
	Teacher's Chair	32×32×46	1	1	1
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1	1	1
Language Room	Student's Table	For 2 students, 130×50×76(H)	18	18	9
	Student's Chair	For 1 high grade student, H=46	36	36	18
	Teacher's Desk	130×60×76(H), w/ drawers & keys	1	1	1
	Teacher's Chair	32×32×46	1	1	1
	Blackboard	390×120-180	1	1	1
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1	1	1
	Bulletin Board	Made of Cork, 120×80	1	1	1
Cabinet for Language Room	Teacher's Desk	130×60×76(H), w/ drawers & keys	1	1	1
	Teacher's Chair	32×32×46	1	1	1
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1	1	1

Table 2-10 Furniture and Appliances for Each Project Room (Continued)

Room	Item	Specification	Quantity		
			Large Room	Medium Room	Small Room
Art & Music Room	Student's Table	65×50×76(H) w/tilted table top	36	36	18
	Student's Chair	For 1 high grade student, H=46	36	36	18
	Teacher's Desk	130×60×76(H), w/ drawers & keys	1	1	1
	Teacher's Chair	32×32×46	1	1	1
	Blackboard	390×120-180	1	1	1
	Bulletin Board	Made of Cork, 120×80	1	1	1
Cabinet for Art & Music Room	Teacher's Desk	130×60×76(H) w/ drawers & keys	1	1	1
	Teacher's Chair	32×32×46	1	1	1
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	1	1	1
Library	Student's Chair	40×40×46	24	18	12
	Reading Table	180×80×76(H) w/ melamine table top	4	3	2
	ReceptionDesk with Chair	160×70×76(H)	1	1	1
	Bulletin Board	Made of Cork, 120×80	1	1	1
	Free-standing Bookshelf	double-sided, made of steel pipes, 90×49×210(H)	11	11	8
	Bookshelf	one-sided, made of steel pipes, 90×27×210(H)	18	18	14
	Reception	Student's Chair	W/ Steel pipe legs	2	2
Principal's Room	Principal's Desk	160×80×76, w/ wooden table top	1		
	Principal's Chair	Fabric finish w/ casters	1		
	Closet	W/ 2 doors & keys, 90×35×210(H)	4		
	Meeting Table	180×90×76(H), w/wooden table top	1		
	Meeting Chair	40×40×46	4		
Teacher's Room	Meeting Desk	180×80×76(H) w/ melamine table top	6	4	4
	Meeting Chair	40×40×46	12	8	8
	Teacher's Locker (A)	For documents, made of steel, 90×35×210	3	2	1
	Teacher's Locker (B)	For storage w/ shelves, made of steel, 90×35×210	3	2	1
Administration Room	Administrator's Desk	130×60×76(H) w/ drawers & keys	2	2	1
	Administrator's Chair	32×32×46	2	2	2
	Closet	W/ 2 doors & keys, 90×35×210(H)	2	2	2
	Shelf for Public Address System	Made of melamine, 70×45×80(H)	1	1	1
Kitchenette	Cupboard	90×42×200(H)	2	2	1
	Table	150×75×76(H)	2	2	1
	Chair	46×42×46(H)	4	4	2
First Aid Room	Bed	180×60×60(H) for examination	1		
	Desk	130×70×78(H) w/ drawers & keys	1		
	Chair	W/ casters	1		
	Closet	W/ 2 doors & keys, 90×55×180(H)	1		
Locker Room	Bench	Made of wood, 130×35×45(H)	2		
Cabinet for Gymnasium	Teacher's Desk	130×60×76(H) w/ drawers & keys	1		
	Teacher's Chair	32×32×46	1		
	Teacher's Closet	W/ 2 doors & keys, 90×55×180(H)	2		
Janitor's Room	Table	150×75×76(H)	1		
	Chair	46×42×46(H)	2		
	Closet	W/ 2 doors & keys, 90×55×200(H)	2		

2) Educational Equipment

The contents of the educational equipment for the Project schools shall be as shown in the table 2-6.