

**BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES
IN
MONGOLIA**

BASIC DESIGN STUDY REPORT
ON THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES IN MONGOLIA

OCTOBER 1999

OCTOBER 1999

JICA LIBRARY



J 1153787(5)

**JAPAN INTERNATIONAL COOPERATION AGENCY
YOKOGAWA ARCHITECTS & ENGINEERS, INC.
MOHRI, ARCHITECT & ASSOCIATES, INC.**

JICA
115
46
IRT
BRARY

G R T
CR (3)
99-153

BASIC DESIGN STUDY REPORT
ON
THE PROJECT
FOR
THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES
IN
MONGOLIA

OCTOBER 1999

JAPAN INTERNATIONAL COOPERATION AGENCY
YOKOGAWA ARCHITECTS & ENGINEERS, INC.
MOHRI, ARCHITECT & ASSOCIATES, INC.



1153787 (5)

PREFACE

In response to a request from the Government of Mongolia the Government of Japan decided to conduct a basic design study on the Project for the Improvement of Primary Education Facilities in Mongolia and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Mongolia a study team from May 17 to June 25, 1999.

The team held discussions with the officials concerned of the Government of Mongolia, 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 Mongolia in order to discuss a draft basic design, and as this result, the present report was finalized.

I hope that 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 Mongolia for their close cooperation extended to the teams.

October 1999



Kimio Fujita
President

Japan International Cooperation Agency

October, 1999

LETTER OF TRANSMITTAL

We are pleased to submit to you the basic design study report on the Project for the Improvement of Primary Education Facilities in Mongolia.

This study was conducted by the Consortium of Yokogawa Architects & Engineers, Inc. and Mohri, Architect & Associates, Inc., under a contract to JICA, during the period from April 30, 1999 to October 29, 1999. In conducting the study, we have examined the feasibility and rationale of the project with due consideration to the present situation of Mongolia and formulated the most appropriate basic design for the project under Japan's grant aid scheme.

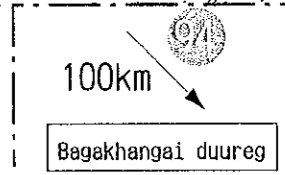
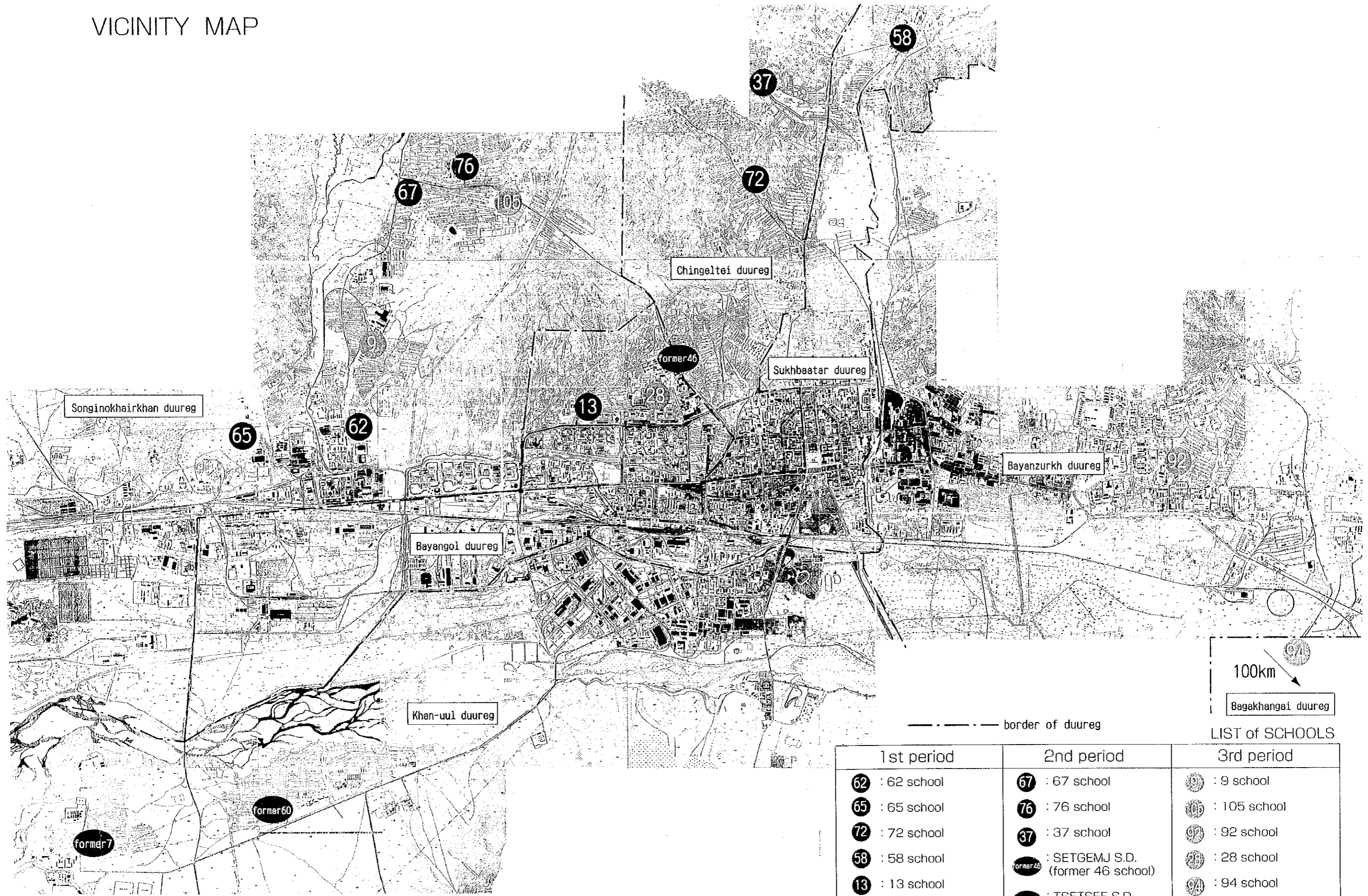
Finally, we hope that this report will contribute to further promotion of the project.

Very truly yours,



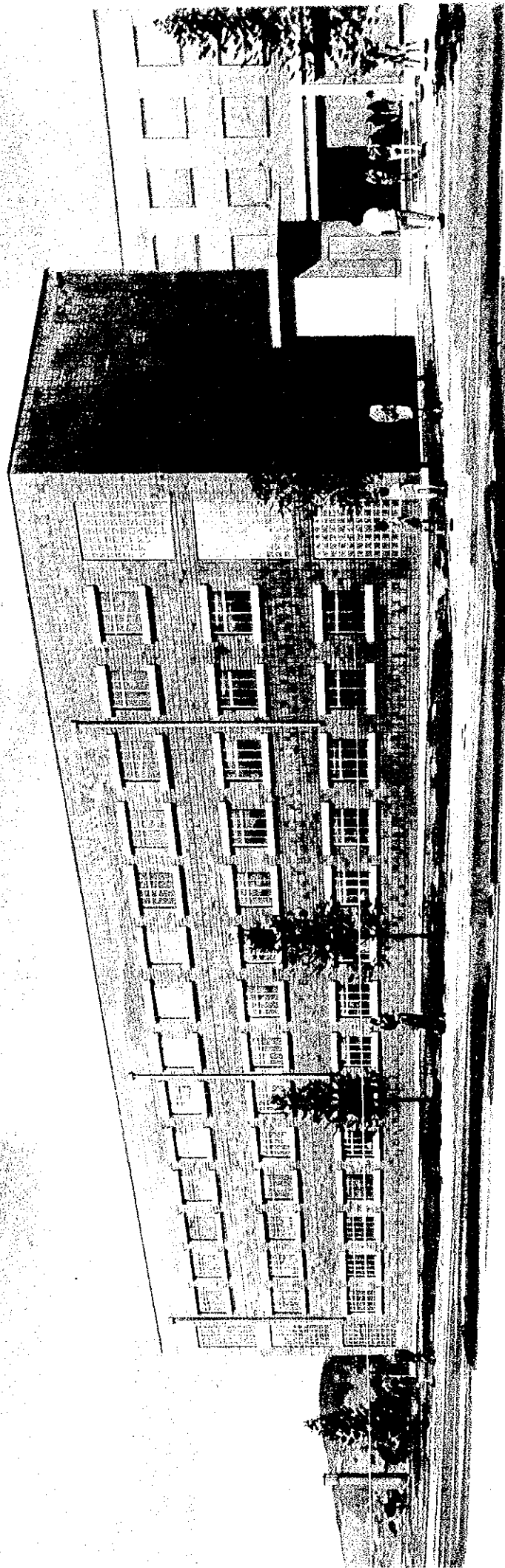
Takeo Eto
Project Manager,
Basic design study team on
the Project for the Improvement of Primary
Education Facilities in Mongolia
The Consortium of
Yokogawa Architects & Engineers, Inc. and
Mohri, Architect & Associates, Inc.

VICINITY MAP



LIST of SCHOOLS

1st period	2nd period	3rd period
62 : 62 school	67 : 67 school	9 : 9 school
65 : 65 school	76 : 76 school	105 : 105 school
72 : 72 school	37 : 37 school	92 : 92 school
58 : 58 school	former 46 : SETGEMJ S.D. (former 46 school)	28 : 28 school
13 : 13 school	former 60 : TSETSEE S.D. (former 60 school)	94 : 94 school
former 7 : BUYANT UKHAA S.D. (former 7 school)		




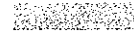
Exterior Perspective


The Project for The Improvement of Primary Education Facilities in MONGOLIA

The Photographs of Requested Sites-1

Regend

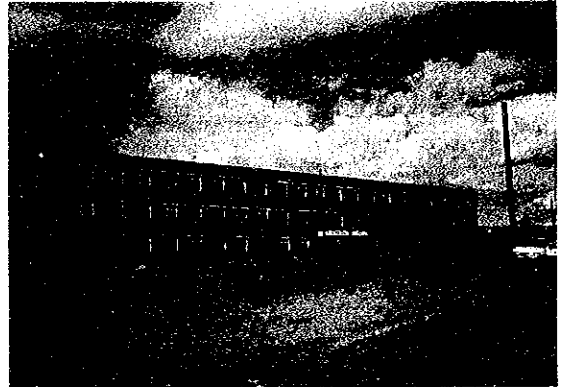
 Target Site (Phase-1)

 Target Site (Phase-2)

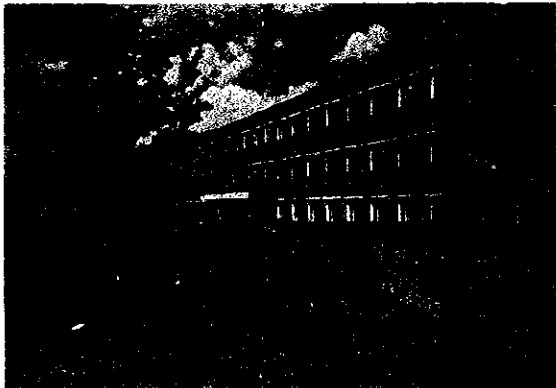
 Target Site (Phase-3)



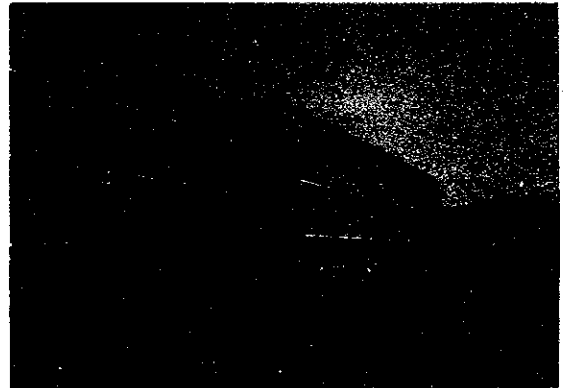




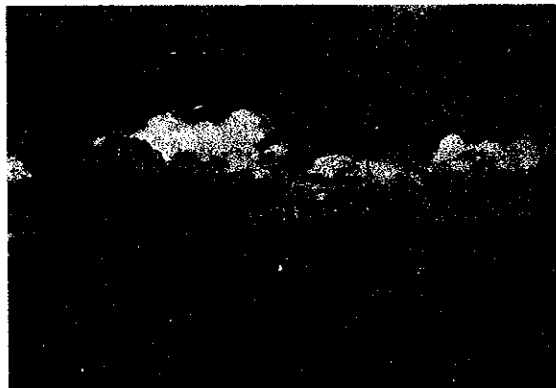
5. The 67th School, Songinokhairkhan



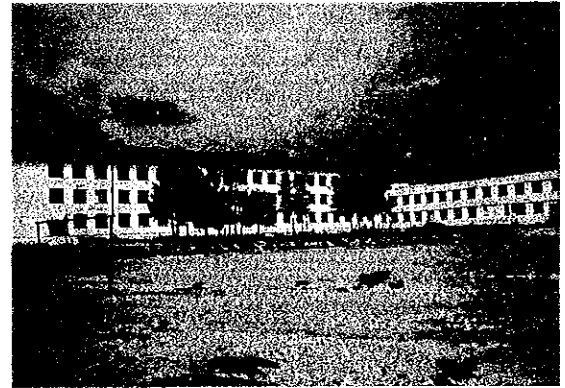
2. The 37th School, Chingseltai



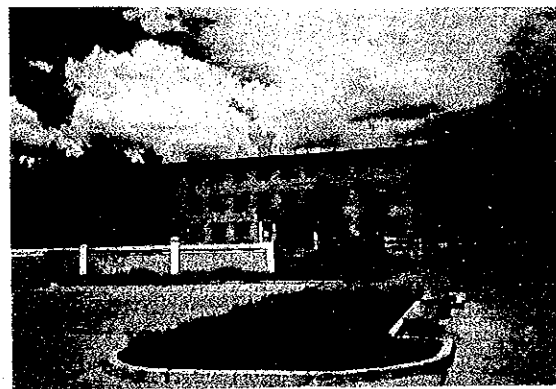
6. The 76th School, Songinokhairkhan



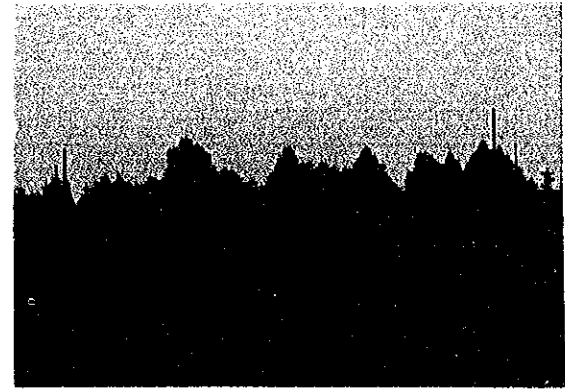
3. The 42nd School, Songinokhairkhan



7. The 28th School, Bayangol




4. The 2nd School, Sukhbaatar





8. The 94th School, Bagakhangai

The Photographs of Requested Sites-2

Regend

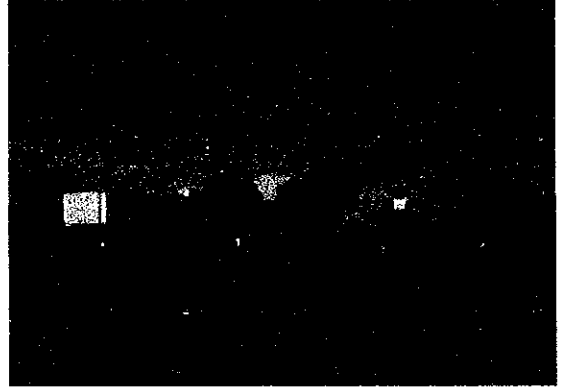
 Target Site (Phase-1)

 Target Site (Phase-2)

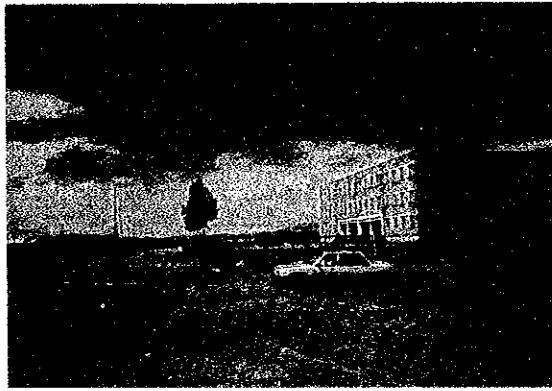
 Target Site (Phase-3)



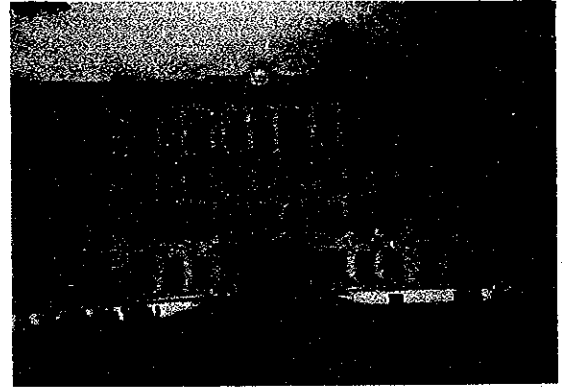
9. The 84th School, Bayanzurkh



13. TSETSEE S. D., Khan-uul



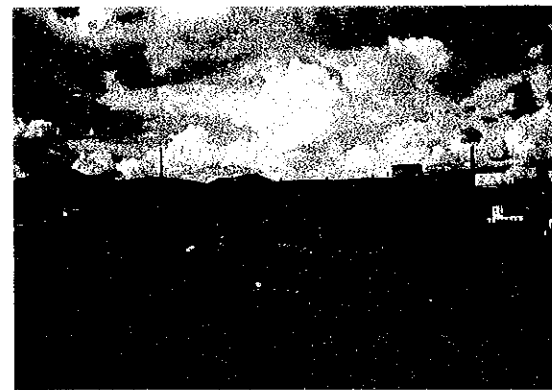
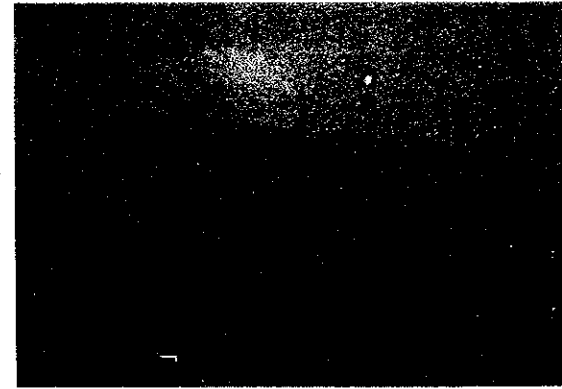
10. The 65th School, Songinokhairkhan



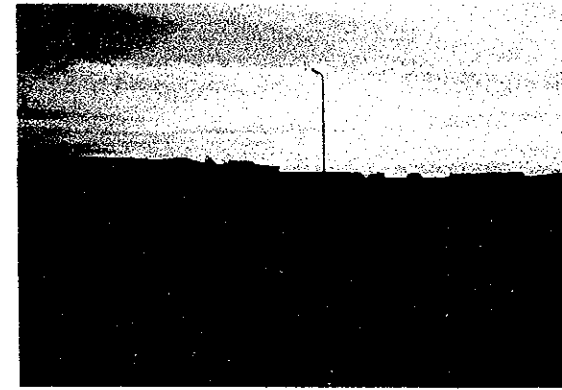
14. The 5th School, Chingeltei



11. The 20th School, Bayangol





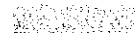
12. The 72nd School, Chingeltei



16. The 97th School, Bayanzurkh

The Photographs of Requested Sites-3

Regend

-  Target Site (Phase-1)
-  Target Site (Phase-2)
-  Target Site (Phase-3)



17. The 21st School, Bayanzurkh



21. The 32nd School, Khan-uul



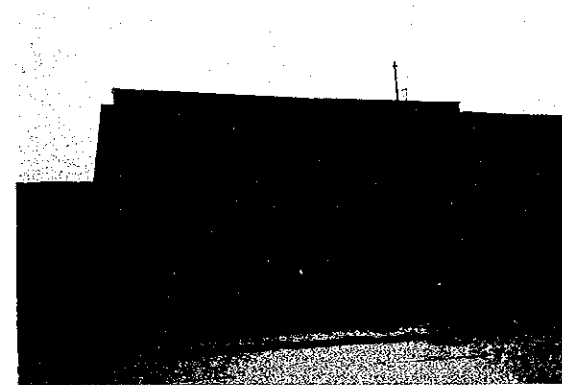
19. The 40th School, Bayangol



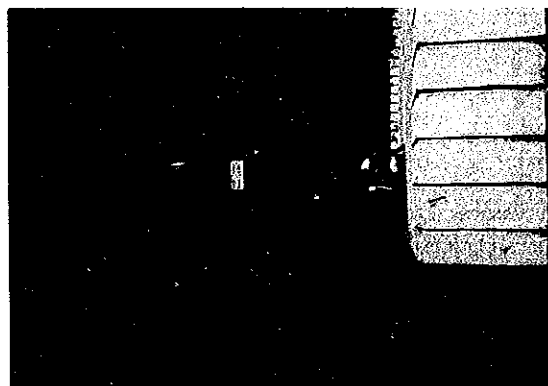
22. The 18th School, Khan-uul



19. The 40th School, Bayangol



23. The 52nd School, Khan-uul




20. The 73rd School, Bayangol




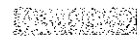
24. BUYANT-UKHIAA SUKH-KHISHIGUI

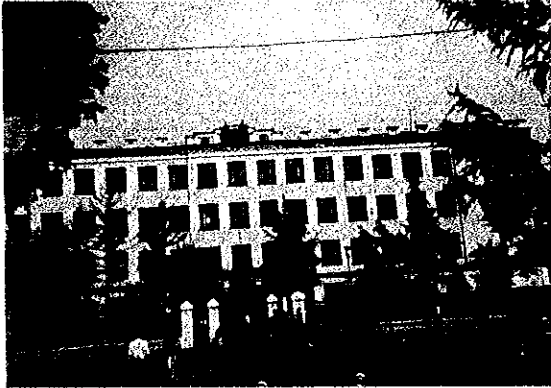
The Photographs of Requested Sites-4

Regend

 Target Site (Phase-1)

 Target Site (Phase-2)

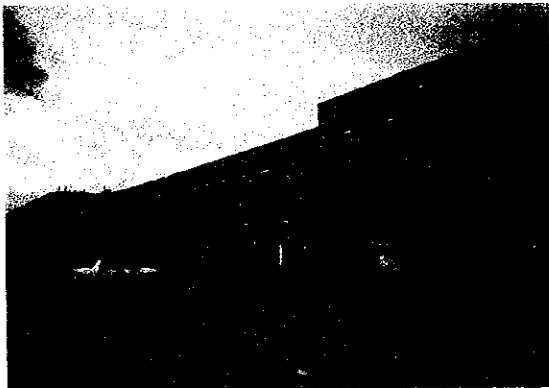
 Target Site (Phase-3)



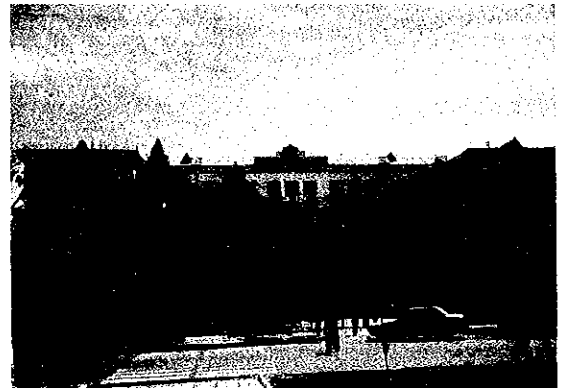
25. The 1st School, Sukhbaatar



29. The 33rd School, Bayanzurkh



26. The 9th School, Songinokhairkhan



30. The 14th School, Bayanzurkh



27. The 75th School, Khan-uul



31. SETGEW S. D., Bayangol




28. The 105th School, Songinokhairkhan




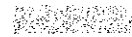
32. The 92nd School, Bayanzurkh

The Photographs of Requested Sites-3

Regend

 Target Site (Phase-1)

 Target Site (Phase-2)

 Target Site (Phase-3)



17. The 21st School, Bayanzurkh



21. The 32nd School, Khan-uul



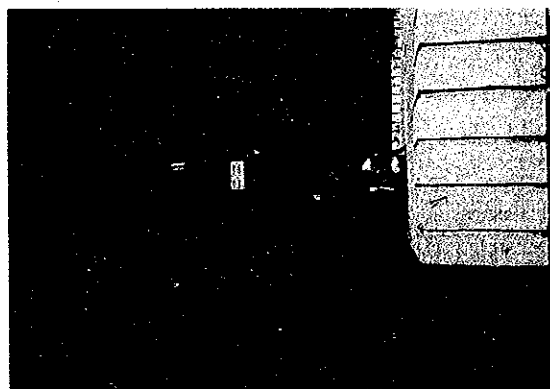
22. The 18th School, Khan-uul



19. The 40th School, Bayangol



23. The 52nd School, Khan-uul



20. The 73rd School, Bayangol



24. BUYANT UKHAA S.D. KHAN-UUL

CONTENTS

PREFACE

LETTER OF TRANSMITTAL

VICINITY MAP

EXTERIOR PERSPECTIVE

PHOTOS OF REQUESTED SITES

ABBREVIATIONS

CHAPTER 1 BACKGROUND OF THE PROJECT

1-1	Background of the Request.....	1
1-2	Contents of the Request.....	2

CHAPTER 2 CONTENTS OF THE PROJECT

2-1	Objectives of the Project.....	4
2-2	Basic Concept of the Project.....	4
2-2-1	Propriety of the Project.....	4
2-2-2	Decision of the Site and Scale for the Cooperation.....	5
2-2-3	Establishment of the Components of Cooperation.....	18
2-3	Basic Design	23
2-3-1	Design Concept.....	23
2-3-2	Principles for Design Standards	29
2-3-3	Basic Design	30
2-4	The System for the Realization of the Project	45
2-4-1	Organization.....	45
2-4-2	Budget.....	47
2-4-3	Staff and Skills	49

CHAPTER 3 IMPLEMENTATION PLAN

3-1	Implementation Plan.....	51
3-1-1	Implementation Concept.....	51
3-1-2	Observations for Construction	52
3-1-3	Scope of Work.....	53
3-1-4	Construction Supervisory Plan.....	58
3-1-5	Procurement Plan for Materials and Equipment	59
3-1-6	Implementation Schedule	61
3-2	Project Cost Estimation	62
3-2-1	Project Cost.....	62
3-2-2	Operation and Maintenance Costs.....	63

CHAPTER 4 EVALUATION AND RECOMMENDATIONS

4-1	Evaluation and Corroboration for the Feasibility and Effects of the Project.....	65
4-2	Recommendations	67

CONTENTS OF ANNEX

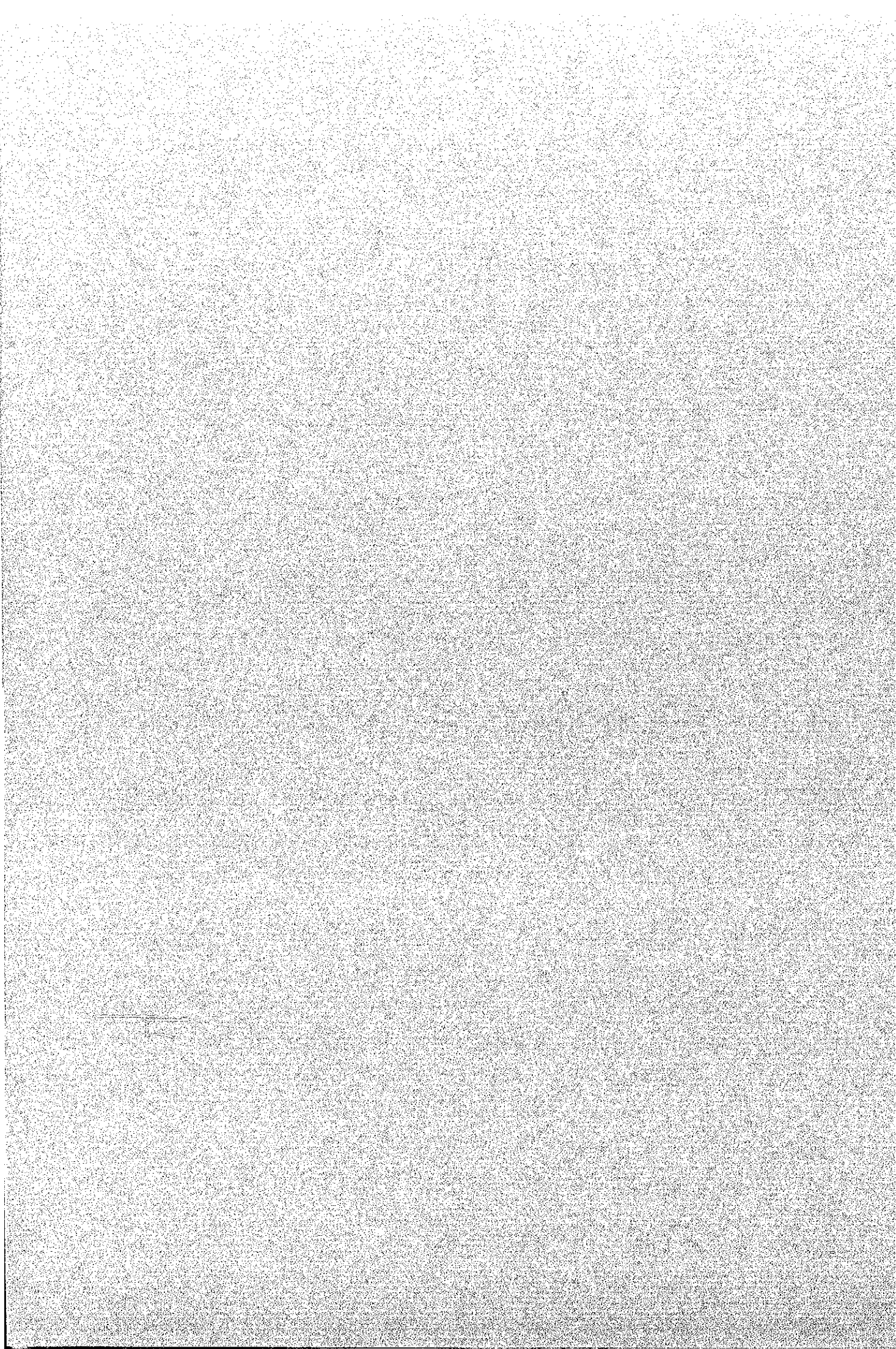
1. MEMBERS OF THE STUDY TEAM	
(1) Basic Design Study.....	1
(2) Explanatory Study of the Basic Design Summary Report	1
2. STUDY SCHEDULE	
(1) Basic Design Study.....	2
(2) Explanatory Study of the Basic Design Summary Report	4
3. LIST OF PARTY CONCERNED IN MONGOLIA.....	5
4. MINUTES OF DISCUSSIONS.....	8
5. ESTIMATION OF COSTS TO BE BORNE BY MONGOLIA.....	23
6. OTHER RELEVANT DATA	
(1) Plot Plan of Each Site	24
(2) Typical Drawings.....	40
(3) Conditions of Surveyed Schools in Software Aspects.....	44
(4) Infrastructural Conditions of School Facilities Surveyed	45

ABBREVIATIONS

ADB	Asian Development Bank
BHN	Basic Human Needs Council for Mutual Economic Assistance; Communist Economic
COMECON	Conference
DANIDA	Danish International Development Agency
JICA	Japan International Cooperation Agency
JOCV	Japan Overseas Cooperation Volunteers
MOSTEC	Ministry of Science, Technology, Education & Culture
ODA	Official Development Assistance
UBC	Ulaanbaatar City
UNESCO	United Nations Educational, Scientific and Cultural Organization
Unicef	United Nations Children's Fund

CHAPTER 1

BACKGROUND OF THE PROJECT



CHAPTER 1 BACKGROUND OF THE REQUEST

1-1 Background of the Request

Mongolia spreads about 1.566 million square kilometers in the east of central Asia neighboring Russia and China. Since its independence from China in 1921 with support from the former Soviet Union to become the second oldest socialist country, Mongolia maintained a close relationship with the former Soviet Union both politically and economically for as long as 70 years and used to be called "the 16th republic of USSR."

Since around 1990 a democratic movement has been growing in Mongolia under the influence of perestroika in the former Soviet Union, and in January 1992 the great change into democracy and capitalism was decided in accordance with the new constitution adopted at the People's Assembly. Along with the introduction of the new political and economic systems, great disturbances occurred in the country including suspension of support from the former Soviet Union, severe economic and industrial blows induced by the dissolution of COMECON, confusion in operation of new systems, concentration of people into urban areas, etc. Economic stability has been regained after 1991 as a result of cooperation from western countries, loans from IMF and World Bank as well as structural adjustment policies.

Development of human resources had been considered the most important policy until the end of the 1980s and a considerable portion was invested in the education sector, which produced a very high standard of education such as 98% of the primary school attendant rate and 96% of the adults literacy rate. However, because of the social confusion and insufficiency of finances, investment to build the infrastructure has not been expanded as much as expected. As a result, superannuation of educational facilities is very serious, no mention of construction of new facilities.

The Mongolian government stated, "For the purpose of making Mongolian young people active in the society of market economy, we have to fulfill the needs for national education, in particular by giving them good welfare, education and social training" in "The Action Plans for Mongolia toward the 21st Century", manifested in 1998. This means that education is regarded as an important policy of the Mongolian government. Laws and regulations relevant to education have been modified frequently since 1992 and the current one is the Educational Law enforced in 1998. The Basic Conception of Reform in Education Sector, which was also issued in 1998 directed reforms namely reconstruction of the education system, qualitative improvement of education, enhancement of efficiency, decentralization of jurisdiction and improvement of management ability.

Today international organizations such as the Asia Development Bank (ADB), Unicef, UNESCO, Danish International Development Agency (DANIDA), TACIS/TEMPUS, SOROS Foundation provide cooperation in Mongolia in the Educational sector. They are mainly in the aspect of software for education. ADB and Unicef extend supports to small scale restoration or rehabilitation of school facilities.

Rapid concentration of people into UBC began around 1990, but investment to build the infrastructure was not expanded as much as expected. As a result, shortage of classrooms and superannuation of educational facilities in the city has become very serious. In spite of the emergent needs for preparation, a prospect for budget allocation has not been achieved.

In these circumstances, UBC has requested Grant Aid from Japan through MOSTEC for construction of school facilities and supply of educational equipment for primary and junior secondary levels that are compulsory in Mongolia.

1-2 Contents of the Request

Major contents of the request from the Government of Mongolia are as follows:

(1) Target Areas of the Project

Forty schools in the entire Ulaanbaatar City areas.

- | | | |
|---------------------|------------------------|----------------------|
| 1. The 61st School | 15. The 5th School | 28. 7.8 Town |
| 2. The 62nd School | 16. The 58th School | 29. The 1st School |
| 3. The 37th School | 17. The 97th School | 30. The 9th School |
| 4. The 42nd School | 18. The 21st School | 31. The 75th School |
| 5. The 2nd School | 19. The Airport School | 32. The 105th School |
| 6. The 67th School | 20. The 13en School | 33. The 33rd School |
| 7. The 76th School | 21. The 40th School | 34. The 14th School |
| 8. The 28th School | 22. The 73rd School | 35. Tsugaantawaa |
| 9. The 94th School | 23. The Working | 36. The 46th School |
| 10. The 84th School | Juveniles School | 37. The 8th & 7th |
| 11. The 65th School | 24. The 32nd School | Unified School |
| 12. The 20th School | 25. The 18th School | 38. The 10th School |
| 13. The 72nd School | 26. The 52nd School | 39. The 87th School |
| 14. The 60th School | 27. Hayanghoshoo West | 40. The 48th School |

(2) Requested Facilities and Equipment

1) Facilities

- Ordinary classrooms for primary and junior secondary schools
- Teachers room
- Toilets

2) Equipment

- Students' desks and chairs
- Teachers' desks and chairs
- Meeting tables and chairs for teachers room
- Teaching materials cabinet
- Basic teaching materials (for teacher's use in class)
- Maintenance equipment and tool

CHAPTER 2

CONTENTS OF THE PROJECT

CHAPTER 2 CONTENTS OF THE PROJECT

2-1 Objectives of the Project

Rapid concentration of people in cities where the infrastructure has not been improved began around 1990 in accordance with the transfer to market economy system, but because of the social confusion and insufficiency of finances, investment to build the infrastructure has not been increased as much as expected. As a result, shortage of classrooms and superannuation of educational facilities in Ulaanbaatar city are very serious. In spite of the emergent needs for preparation, a prospect for a budget allocation has not been achieved.

The purpose of this project is to improve the learning condition and to support the development of human resources in Mongolia by building annex classrooms and by supplying furniture for classrooms and basic teaching materials for public primary schools (from Grade 1 to 4) and junior secondary schools (from Grade 5 to 8) which are in a very bad condition.

2-2 Basic Concept of the Project

2-2-1 Propriety of the Project

“The Action Plans of Mongolia toward the 21st Century” declared to provide educational service to all of the nation free of charge. On this declaration, the “Educational Law” manifested that all citizens could get basic education under the control of the government, that is, primary and secondary education for free. Each of the organizations which cooperate mainly in the aspect of software in Mongolian educational activities focus on the democratization and establishment of the market economy. As a cooperation in the aspect of hardware, ADB plans to restore the buildings of 25 schools in the whole country and Unicef plans to repair primary school facilities in rural areas, but there is no such rehabilitation plan for schools in Ulaanbaatar which faces a severe overcrowding of school facilities because of a rapid increase in population.

This project is for public primary and secondary schools with many underprivileged students in urban areas where other organizations' aid has not been implemented. It follows the national development plan of Mongolia that the whole nation should be educated and the policy of the Japanese government that advocates good practice of educational service as the basic human needs (BHN) and does not overlap with other donors' aid programs. This project also goes with Japanese principles of Grant Aid because its objective is to aid the self-reliance policy of the Mongolian government to pursue educational development in spite of its limited budget.

As mentioned above, this project is generally appropriate for Grant Aid and will contribute directly to the development of human resources in Mongolia, which is one of the purposes of the Mongolian National Development Plan, so it can be judged that implementation of this project is very significant and meaningful.

2-2-2 Decision of the Site and Scale for the Cooperation

A request proposal of sites for aid brought by the Mongolian government were selected for the reasons that classrooms are insufficient in each school and they are overcrowded because the number of students per class exceeds the standard of the government. However, it is not thought to be well-grounded in such respects as the order of priority, necessity for improvement, degree of emergency and appropriateness. Therefore, it is necessary to screen the sites which are more appropriate as an object of this project by two-stages of examination; selection of appropriate sites through domestic analysis, and decision of the sites and scale of the cooperation.

(1) Site Selection through Domestic Analysis

Site selection through domestic analysis was done for 35 schools surveyed during the study based on the criteria of five points which were taken from the nine points mentioned in Annex-3 in the Minutes of Discussions on the Basic Design Study.

Criteria for the Site Selection through Domestic Analysis

Points	Contents	Sites to be eliminated
① Legal right for land use	Confirmed by UBC in a written form that UBC has a legal right to use the land for project site.	0
② No other facility construction plan on the same site	Confirmed by Education Dept. of UBC and headmasters of each school that there are no other facility construction plans by MOSTEC, UBC, other countries or international organizations.	0
③ Access to the site	The study team confirmed all the sites are accessible by vehicles.	0
④ Topography inappropriate for construction	The study team confirmed topographic and geological features of all the sites by eyes or sometimes by simple measurement.	0
⑤ Workers' safety during construction	The study team confirmed during the field surveys that there were no natural and environmental hazards which endanger the workers' safety.	0

As a result, as is shown above, no site was eliminated. Concerning point ②, there was one school which had a plan to resume a suspended construction of annex institutions

of a gym, but this school was not excluded because it was not the construction of ordinary classrooms and the construction would be finished in 1999.

However, field survey was refused at No. 75 School by people concerned for the reason that there was no need for classroom extension when the study team visited there in accompany with a Mongolian counterpart, so this school was eliminated from the study. Therefore, the candidate schools for the domestic study are 34.

(2) Site Selection and Setting up the Scale

After the selection of the candidate sites for cooperation, appropriate scale of cooperation and sites as objectives of cooperation were decided. Conditions as a premise are as follows.

Preconditions

- | | |
|---|---|
| a. School district | Today in UBC each school district is decided considering distance of attending, students' safety in attending and capacity of each school. This district often does not overlap with that of administration, but the population in school district is grasped by headmasters and chiefs of Horoors in the district. |
| b. Number of school-aged children in each Duureg | The data of population of every five ages 1995 ~ 1998 and that of every age 1998 obtained at the Static Information and Research Dept. of UBC are used. The last national census in Mongolia was taken in 1989. The data after that were taken from population research held at the end of every year. |
| c. Number of school-aged children in each school district | Data on the number of children from 3 to 15 years old in each school district reported from headmasters and chiefs of Horoors in the district are used. |
| d. Rate of population increase | The rate of population increase per year was about 2.6% in 1989. After 1990, when economy and society were much confused, it began to decrease rapidly down to around 1.4% in 1998. The population data necessary for this project is the number of children from ages 3 to 10 in 1999, which can be obtained from the data on condition b., so it is not necessary to research natural rate of population increase. However, a rate of increase and decrease of population in every Duureg should be worked out by the data in condition b. because many people often move from one place to another in UBC. |

- e. School enrolment rate in the year the project completed
- According to population statistics obtained from the Statistics Information and Research Dept. in UBC and the population of school attendants of every age obtained from the Information, Monitoring and Assessment Dept. in MOSTEC, the school enrolment rate of UBC 1998 is about 103%. The expected school enrolment rate is set up to be 100% in 2004 when this project is supposed to be completed.
- f. Number of existing classrooms
- Existing primary and secondary schools, except for those which were built originally for another purpose and now used as schools, were built according to the standards of the former Soviet Union, and they are equipped with many specified classrooms and annex facilities. But most of the classrooms specified for science are used as ordinary classrooms to ease a serious shortage of classrooms. Therefore, as the number of classrooms of the surveyed schools, those confirmed by three persons, a study team member, a UBC counterpart and either a headmaster or head teacher, are used. The number of classrooms of other schools is taken from the data submitted by the counterpart.
- g. Classrooms for 9th and 10th graders
- The objective of this project is to construct classrooms for Grades 1 to 8, but all the schools except one researched this time are schools of ten grades systems. According to statistics, 9th and 10th graders share on the average 10% of all the students in a school. From this rate, 10% of all the classrooms are to be kept for these grades.

1) First screening

The criteria for the first screening are set up as follows under the preconditions mentioned above.

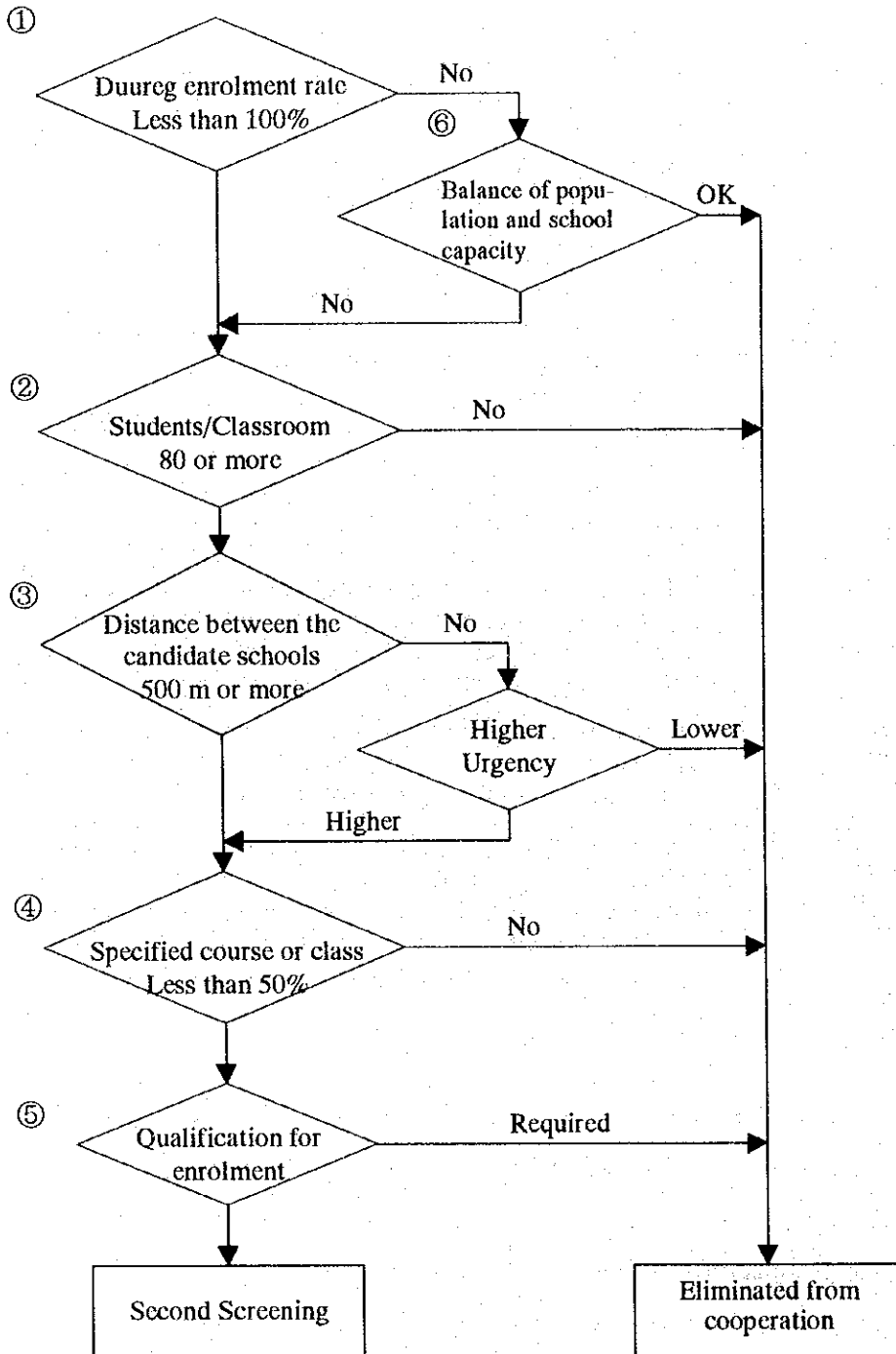
In applying the criteria to each site, it should be avoided to decide the propriety by only one criterion, that is, selection should be made by multiple examination based on plural criteria, in consideration that each site has different problems under different circumstances. This examination was done on the Screening Table (p. 16) following the procedures as described in the flow chart of the first screening on the next page.

Criteria for Selection of the Candidate Sites for Cooperation

Points	Contents	Sites to be eliminated
① School enrolment rate in each Duureg	Priority is given to such Duuregs whose enrolment rates are assumed to be under 100% in the year 2004.	0
② Number of students in 2004 per classroom in each school	If the figure is small, it means there is a possibility to increase the enrolment rate by efficient use of existing classrooms. Therefore, priority is given to the schools that have over 80 students per classroom. (80 students = 40 students x 2 shifts)	7
③ Distance between neighboring schools	Considering school mapping, it is desirable that schools are scattered equally according to population density. Therefore, except for Duuregs having urgent necessity, if two request schools are located within 500 meters to each other, either one is selected.	(1)
④ Specified courses or classes	Many schools have specified classes where advanced lessons on some subjects are taught. Such schools appeal to students and their parents and make them enter these schools even if they are not in their own school district. Moreover, some schools collect tuition for the specified classes. These factors are inappropriate for the objective of this project that aims to enable anybody to study free of charge in nearby schools. Priority is given to the schools which have fewer classes or courses like this.	(2)
⑤ Entrance of ordinary students	Considering the aim of this project to support BHN (Basic Human Needs), the schools where only those students who have special social background can enter are eliminated.	1
⑥ Emergency (many classrooms are needed)	A school in a Duureg of high enrolment rate can be an object of cooperation on condition that the school needs many classrooms, it is in the area of low school density and there are other special social circumstances.	0
⑦ Utilization	Schools that have more than 3 shifts a day are given priority.	0

Sites in the Duureg whose school enrolment rate exceeds 100% in point ① mentioned above are also left in the short list of the selection unless they are not eliminated in points ②~⑤, because the population and school are not evenly distributed and some schools urgently need additional classrooms due to insufficient school capacity when they are viewed on the school district basis. Though these schools get lower priority than those satisfy these points, propriety of the selection is to be decided with consideration of other criteria such as density of schools and life environment which are not included in the points mentioned above.

Screening Flow Chart of First Screening



By the points of ② and ⑤, 8 sites were excluded. The numbers in parenthesis of the points ③ and ④ show that they overlap the sites eliminated in ② and ⑤. In this stage of the selection, the number of the candidate sites has become 26.

2) Second screening

The second screening is undertaken according to the following criteria.

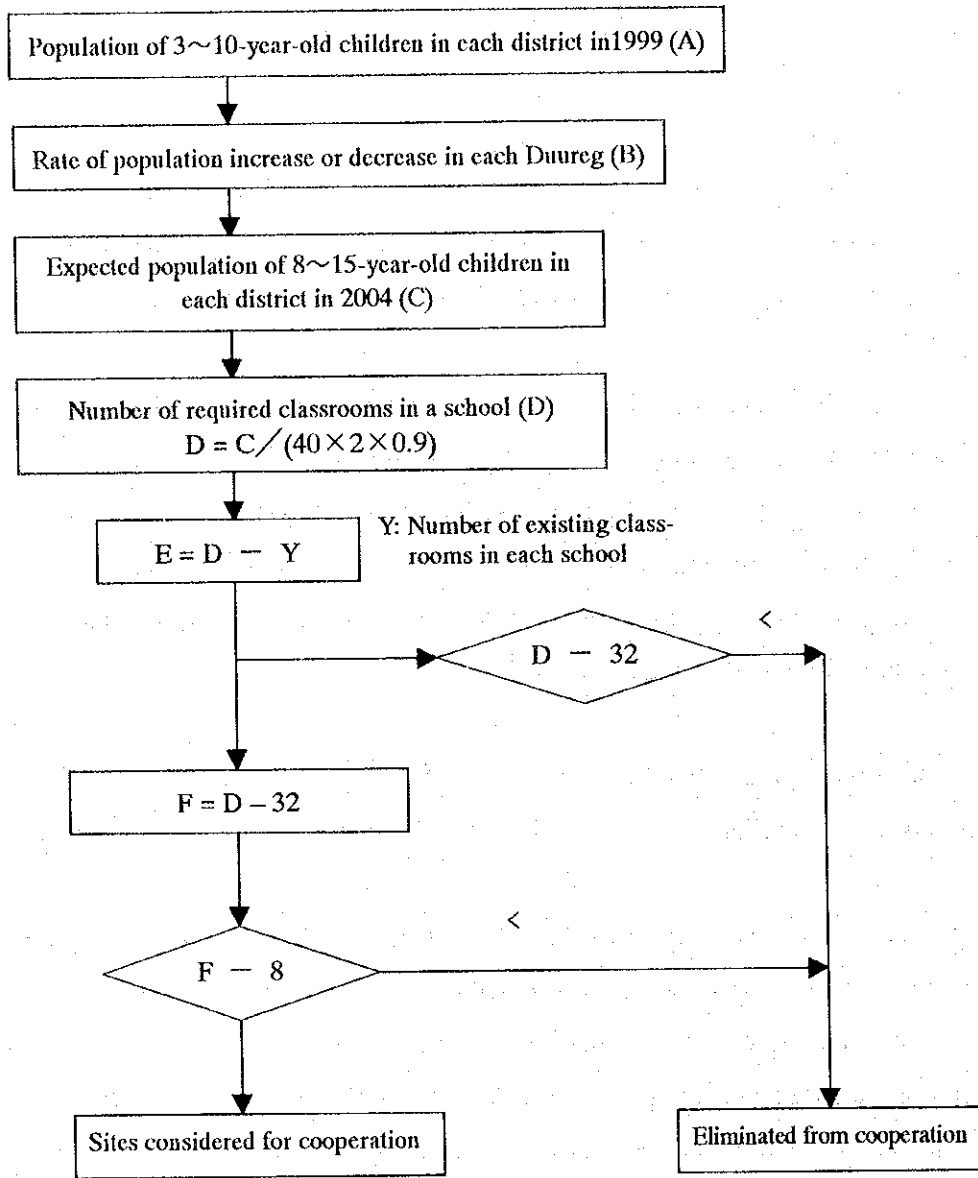
- ① Schools that do not consist of at least Grade 1 to 8 are eliminated to avoid low economical efficiency of the project when the number of schools to be constructed is too small.
- ② The schools in Duureg whose school enrolment rate exceeds 100% but satisfies point ① mentioned above are, though given with the lower priority than those where the school enrolment rate is less than 100%, filtrated based on the criteria of life environment in the school district. Continuous population increase is expected in Gel areas, but not so much in apartment house areas. Thus, schools in the latter areas are eliminated from cooperation.

Based on the preconditions mentioned in the foregoing pages, the second screening is undertaken in accordance with the following procedures as described in the next flow chart.

- (a) To calculate the population of 3 ~ 10-year-old children in each school district in 1999 (A) according to the data presented by the headmasters and Horoor leaders.
- (b) To calculate the rate of population increase or decrease during 3 years in each Duureg according to the population data from 1995 to 1998 obtained at the UBC Statistics Information and Research Department, and to multiply 5/3 to calculate the increase or decrease rate during the next 5 years (B).
- (c) To multiply (A) and (B) to calculate the population of 8 ~ 15-year-old children in each school district in 2004 (C).
- (d) As mentioned in the precondition g, students in Grades 9 and 10 are estimated to be 10% of the total students in a school, which means the total students are calculated by $C/0.9$.

According to the project conditions that one classroom accommodates 40 students and will be operated in the double shift schooling, the number of required classrooms in a school in 2004 (D) can be calculated by $D = C/(0.9 \times 40 \times 2)$.

Flow Chart of Second Screening



- (e) The number of required additional classrooms in each school (E) is calculated by $E = D - Y$, where (Y) represents the number of existing classrooms.
- (f) (F) is calculated by $32 - \text{the number of existing classrooms}$, where 32 means the maximum number of classrooms in a school specified in the following paragraph. The sites where (F) is less than 8 are eliminated.
- (g) From among the schools in Duureg whose enrolment rate is expected to exceed 100% in the year 2004 but satisfies the above-mentioned screening criteria, the schools where students in the school district are apartment house dwellers are eliminated.

As the result of the second screening, 16 sites are considered for cooperation, 10 sites being eliminated.

The following terms are also examined during the screening.

- Urgency : Schools with a larger number of required classrooms are regarded as in higher urgency. When the priority of schools is evaluated in each Duureg, the schools with smaller number are eliminated first.
- School Density : Schools where there are no or few neighboring schools nearby are considered first, because children can be allocated to neighboring schools if these exist.
- Social Conditions of the Community :
Schools in the districts where the inhabitants' income level is rather low, or in the Gel areas where population may increase continuously are considered first.
- Converted Buildings and Obsolete Facilities :
In general, schools using the buildings originally used for other purposes are in worse condition than those constructed for school use from the first. These schools as well as those with obsolete facilities are considered for cooperation.

3) Setting up the scale (Calculation of the number of classrooms to be constructed)

The scale of cooperation was not mentioned in the request from the Mongolian government. So the number of the classrooms is decided on the Japanese side in each remaining candidate school for cooperation after screening. In consideration that the Japanese cooperation is limited to a certain extent and that the cooperation should be

dispersed among as many schools as possible, the following two limitations are defined in setting up the scale.

- a. Due to the following reasons, the maximum number of ordinary classrooms per school is set at 32.

Recent international tendency is to reduce the number of students per class and to confine the scale of a school. It is the result of examination on how to provide better education service.

- A small school can offer student-oriented education and thus contributes to better learning than a large school.
- A small school means that its school district is also small, which reduces dangers on the way to and from school, and imposes fewer burdens on the students for attending.
- A small school enables close management of the school, including student guidance, proper use of school equipment and facilities, etc.
- In a large school, more than one class often have to use the gymnasium or library or other common facilities at the same time, which is far from optimum environment for students. In fact, three or more classes use the gymnasium simultaneously in No. 20 School.
- Teachers have to move a rather long distance at recess in a large school.

On the other hand, a large school is advantageous in terms of teaching efficiency. A teacher who does not have classes but teaches special subjects tends to spend more hours waiting than teaching and specified classrooms are left unused for longer hours if the school is too small.

The largest number of classes in individual primary and secondary schools in UBC are 63 in No. 62 School according to the UBC statistical data, and 65 in No. 20 School from the field surveys. There are five schools including these two which have 60 ~ 65 classes, and this seems the maximum allowable size of school for proper management. The largest number of classrooms observed in the field surveys was 33 in No. 20 School.

When the optimum number of classrooms is calculated according to 65 classes at the maximum, 32 classrooms are regarded best.

In the future when Grades 9 and 10 are separated to form an independent school and the progress rate of the 1st ~ 8th graders reaches 100%, 64 classes (= 8 grades × 8

classes) will be the closest to 65, the maximum allowable classes. To provide 64 classes, 32 classrooms will be required if the double shift schooling is adopted in the entire school.

It seems reasonable to adopt 32 classroom system in terms of the current annual student enrolment in each grade. During a tentative period when the 9th and 10th graders remain in the same school with the lower graders and the progress rate of the 1st ~ 8th graders reaches 100%, 32 is a good number for efficient use of classrooms. (8 grades \times 7 classes + 2 grades \times 4 classes = 64 classes)

b. Due to the following reasons, the maximum number of classrooms to be additionally constructed is set at 14 per school.

- The number of requested additional classrooms is over 20 in some schools. This scale is so large that it should be coped with not by extension but by constructing a new school.
- If more than 14 classrooms are added, there will be more than 32 classrooms mentioned above in many schools.
- It is necessary to limit the number of classrooms per school improved in this project due to severe natural conditions of Mongolia and the limit to the capabilities of local contractors.

According to the result of the second screening and the criteria established above, the number of classrooms to be constructed is calculated in the following procedure.

- ① “The number of required additional classrooms in each school (E)” and “32 – existing classrooms (F)” is compared. When either smaller one is 14 or less, it is regarded as a tentative number of classrooms to be constructed (X1). If both are 15 or larger, 14 is taken as (X1).
- ② In order them to match the “type of facilities to be constructed,” (X1) = (X2) if (X1) is an even number, and (X1) – 1 = (X2) if it is an odd number. This figure is established as the final number of classrooms to be constructed.

The above-mentioned evaluation refers to data in Table of Classrooms to be Constructed shown in page 17.

(3) Result of Site Selection

The result of examination in Section (2) above, based on the viewpoint to provide equal educational opportunities as BHN, are summarized in the following table. Schools in Songinokhairkhan, Chingeltei and Bagakhangai were selected because of the insufficiency of classrooms in Duuregs. In other Duuregs schools that are located distant from neighboring schools and thus the number of classrooms are insufficient to accommodate children of school ages were selected.

Duureg	Number of Sites for Cooperation	Number of Classrooms to be Constructed
Songinokhairkhan	6	72
Chingeltei	3	40
Sukhbaatar	1	12
Bayanzurkh	1	14
Bayangol	2	18
Bagakhangai	1	4
Khan-Uul	2	22
Total	16	182

Screening Table

DUUREG	DUUREG	Land ownership	(C) 8~15 year old child. in 2004	Existing classrooms for G 1~10 (G 1~8)	First Screening								Second Screening					Remarks							
					(Y) Existing ordinary classrooms	① School enrolment rate	② Students per classroom	Expected required classrooms	Utili-zation	③ School density	Eco-nomy	Convert Bldg.	④ Speci-fied class	⑤ Free admis-sion	Space	Obstacles	Expected enrolment rate in 2004*		Required class-rooms	(Z) Required additional class-rooms	(D) Required classrooms in each school	Existing class-rooms	(E) Required additional class-rooms	32 - existing class-rooms	Environ-ment
Songinokhairkhan	DUUREG		24460	261(235)	76.86%										76.9%	340	79								
	No. 62 School	○	2390	23	104	A	A	B		A	A	○	Sewage pipe							33	23	10	9	C	
	No. 42 School	○	1982	20	99	A	A	A		A	A	○	Wood, stones							24	20	4	12	A	
	No. 67 School	○	1948	15	130	B	A	B		A	A	○								27	15	12	17	A	
	No. 76 School	○	4157	20	208	A	B	B		A	A	○	Grading							58	20	38	12	A	
	No. 65 School	○	2784	19	147	B	A	A		A	A	○								39	19	20	13	A	
	No. 9 School	○	7814	18	434	B	A	B		A	A	○	Cut & fill							109	18	91	14	A	
No. 105 School	○	6515	8	814	B	B	A		A	A	○	Cut & fill				90	8	82	24	A	Construction of special classrooms will re-started soon.				
Chingeltei	DUUREG		22293	195(175)	62.80%									62.8%	310	115									
	No. 37 School	○	2110	15	141	A	A	A		A	A	○								29	15	14	17	A	
	No. 72 School	○	2357	19	124	B	A	B		A	A	○								33	19	14	13	A	
	No. 5 School SETGEMJ.S.D. (Ex No. 46)	○	1581	25	63	B	B	A		B	A	○	Grading							24	10	14	22	A	Temporary classroom 11 rooms.
Sukhbaatar	DUUREG		13433	202(182)	108.39%									108.4%	187	-15									
	No. 2 School	○	2479	25	99	B	B	C		A	A	○								34	25	9	7	C	
	No. 58 School	○	1633	10	163	B	A	A		A	A	○								23	10	13	22	A	
	No. 1 School	○	457	19	24	B	C	B		A	B	△													Entrance exam.
Bayanzurkh	DUUREG		19790	281(253)	102.27%									102.3%	275	-6									
	No. 84 School	○	2496	27	92	A	B	B		A	A	○								35	27	8	5	C	
	No. 97 School	○	2275	24	95	B	B	B		A	A	○	Heating pipe							30	24	0	8	C	
	No. 21 School	○	1978	16	124	A	A	A		B	A	○								27	16	11	16	C	
	No. 33 School	○	1044	20	52	A	B	B		A	A	○								20	15	3	17	B	
	No. 14 School	○	1425	15	95	B	B	A		A	A	○								53	12	41	20	A	Used to be military facilities. Various floor areas but small in general.
	No. 92 School	○	3794	12	316	A	B	A	●	A	A	○	Cut & fill, sewage pipe							32	25	7	7	C	Used to be military facilities. Various floor areas but small in general.
Bayangol	DUUREG		21346	273(246)	92.20%									92.2%	296	23									
	No. 28 School	○	6101	24	254	B	C	B		A	A	○								85	24	61	8	B	
	No. 20 School	○	3917	33	119	B	C	C		A	A	○								54	33	21	1	C	Old Russian school; far better equipped than other schools.
	No. 13 School	○	3506	22	159	B	B	B		A	A	○								49	22	27	10	B	
	No. 40 School	○	1484	20	74	A	C	C		A	A	○													School for children of railroad company employees; equipped with a dormitory.
Bagakhangai	DUUREG		1275	12(11)	69.02%									69.0%	18	6									
	No. 94 School	○	441	2	221	A	A	A	●	A	A	○								6	2	4	30	A	Originally a kindergarten. 4 shifts for Grade 1~8 students.
Khan-uul	DUUREG		10408	187(168)	129.13%									129.1%	145	-42									
	TSETSEE GUN S.D.	○	3377	12	281	B	A	A		A	A	○								47	12	35	20	A	
	No. 32 School	○	397	13	31	B	A	B	●	C	A	○	Cut & fill												Used to be a kennel house in the college campus. Few houses nearby.
	No. 18 School	○	726	24	30	B	B	A		C	A	△	Grading							27	20	7	12	C	
	No. 52 School	○	1930	20	97	B	B	B		B	A	○								20	11	9	21	A	Various floor areas
Buyant Ukhaa S.D. (Ex No. 7)	○	1425	11	130	B	A	C		A	A	○						12	10	2	22	A				
	○	868	10	87	B	A	A		A	A	○														

Criteria

- 1) Utilization A: Double or more shifts B: Double shift C: Single shift
- 2) School Density A: 5 or less B: 6~15 C: 16 or more (Total of points giving 5 for a school in 500m, 3 for the one in 1000m and 1 for the one in 1500m.)
- 3) Economy A: Annual income 300,000 Tg or less B: 300,000~50,000 Tg C: 500,000 Tg or more
- 4) Specified courses, classes A: Less than 20% B: 20~49% C: 50% or more
- 5) Free admission A: No qualification B: Qualification required

Shaded cells

○ Sites eliminated from the cooperation targets

■ Main reason for elimination

□ Reason that the site is recovered from elimination

* In the title bars, figures in circle correspond to the points in "Criteria for Selection of the Candidate Sites for Cooperation" and block letters in parenthesis correspond to those in "Second screening" and "Setting up the scale" in the text.

Classrooms to be Constructed

		1999.8.29									
DUUREG	Schools surveyed	(D)	(Y)	(E)	(F)	(X1)	(X2)	(X)	No. of classrooms after the project	Enrolment rate after the project	Increase rate of enrolment
		Required classrooms in each school	Existing classrooms	Required additional classrooms	32 - existing classrooms	Step 1 adjust-ment	Classrooms to be constructed	Duureg Total			
Songinokhairkhan	No. 62 School	33	23	10	9	9	8				
	No. 67 School	27	15	12	17	12	12				
	No. 76 School	58	20	38	12	12	12	72	333	98.0%	21.2%
	No. 65 School	39	19	20	13	13	12				
	No. 9 School	109	18	91	14	14	14				
	No. 105 School	90	8	82	24	14	14				
	No. 37 School	29	15	14	17	14	14				
Chingeltei	No. 72 School	33	19	14	13	13	12	40	235	75.9%	13.1%
	SETGEMI S.D. (Ex No. 46)	24	10	14	22	14	14				
Sukhbaatar	No. 58 School	23	10	13	22	13	12	12	214	114.7%	6.3%
Bayanzurkh	No. 92 School	53	12	41	20	14	14	14	295	107.3%	5.1%
	No. 28 School	85	24	61	8	8	8	18	291	98.2%	6.0%
Bayangol	No. 13 School	49	22	27	10	10	10				
	No. 94 School	6	2	4	30	4	4	4	16	90.4%	21.3%
Khan-uul	TSETSEE GUN S.D. (Ex No. 60)	47	12	35	20	14	14	22	209	144.6%	15.5%
	Buyant Ukhaa S.D. (Ex No. 7)	20	9	11	23	9	8				
								Total	182		

2-2-3 Establishment of the Components of Cooperation

(1) Examination of the Components

This project intends to assist the objectives of the Educational Law of Mongolia, which is to provide the entire nation with opportunities to receive education, through improvement of the educational environment including alleviation of overcrowded classes in basic education facilities. In order to maximize the effect of the project within the limited budget, the project is focused on the increase of capacity of school facilities. The major components of cooperation are ordinary classrooms, teachers room and toilets. In consideration of its severe winter conditions, a separate entrance, students' coat cloak and wide corridors are indispensable. The administrative and maintenance staff room is not included in this project, but the one in the existing building will be shared.

The equipment to be supplied in this project will consist of minimum required desks and chairs for the classrooms and teachers room, basic teaching materials for general use and maintenance equipment including cleaning tools.

1) Classroom

All the existing schools were constructed based on the standards of the former Soviet Union. The school facilities are composed of ordinary classrooms, specified classrooms for various purposes, a gymnasium, auditorium, library and other annex facilities. Except for such schools that utilize buildings originally constructed for other purposes, a classroom is designed as a 6 m×9 m module and accommodates 32 ~ 50 students.

In the "Construction Codes and Standards of Mongolia" enforced in 1998, the "Design Standards of School Facilities" specifies design criteria for school facilities of different levels of education. The maximum capacity of a classroom is required to be 30 students for Grade 1 (2.0 m²/student) and 35 for the upper grades (1.5 m²/student). The reality is, however, one classroom holds on the average 40 students and the double or triple shift schooling is conducted commonly. In these circumstances, it seems more important to accommodate all the school-age children by the double-shift schooling than to strictly observe the design standards.

When 40 students are accommodated in a 6 m×9 m large classroom, each student occupies 1.35 m² space. This figure has been proved acceptable by the past Grant Aid project schools in other countries. In conclusion, this project will be planned on condition that one classroom will be designed in 6 m×9 m to hold 40 students.

2) Teachers room

The teachers room will be designed for meetings among teachers who will teach classes in the new classrooms, for teaching preparation and for storage of basic teaching materials and equipment.

The number of teachers who will use this room is assumed as the "number of classrooms + 6," including those who are not in charge of classes but teach each subject in Grades 5 and above.

3) Toilet

Most of the sanitary wares in the existing school toilets are broken and out of use. Poorly maintained toilets and insufficient ventilation cause bad odors spreading into the corridors. The Japanese side offered to install flushing type urinals and wash basins, but the flushing type urinals were turned down for fear of bad odors in case of water shortage. In the toilet for students, one stall for men and women teachers' common use will be designed, because about 80% of the teachers are women.

There are two criteria applicable to sanitary wares, one by the Design Standards of School Facilities and the other by the UBC Public Health Department. With reference to these criteria, appropriate number of sanitary wares will be planned in consideration of current circumstances and economic feasibility.

In principle, water closet toilet systems will be planned in this project to maintain a sanitary environment and to accord with the standard specifications applied to the existing schools. For the site where the city sewage main is not available, a sewage tank will be designed from which sewage will be retrieved by vacuum cars.

4) Corridor

In Mongolia, school corridors serve not only for passage space but also for students' play areas during the winter season. Some schools enlarge part of the corridor width to 6 meters to make it a lounge space. The Design Standards of School Facilities require the minimum effective width of corridor to be 2.2 m. In this project, the structural members will be designed to be 3 m wide to match the width of ready-made PC floor slabs, which will ensure about 2.5 m effective corridor width.

5) Entrance and cloak room

The additional school buildings to be constructed in this project will not be designed to have a passage corridor connected to the existing school buildings. An

entrance and a coat cloak space will be designed for the students who will study in the project school buildings. An anteroom will be provided to prevent outside cold air from flowing in during the winter. The coat cloak will be designed to avoid bringing coats into the classrooms, which may cause missing of things and materials or covering classroom walls which otherwise can be utilized for study.

6) Equipment

The equipment to be provided in this project are, in general, divided into three types.

- ① Classroom equipment
- ② Basic teaching materials and equipment
- ③ Maintenance equipment

Classroom equipment will consist of desks and chairs for students, those for teachers, meeting tables and cabinets for storing teaching materials.

Basic teaching materials and equipment will be selected based on the equipment list requested by MOSTEC with reference to educational experts of Pedagogical University who work on development of curriculums, textbooks and teaching aids. The selection criteria are that they correspond to the current school curriculums. They can be used daily, they are easily handled and maintained by the teachers, they do not require any special technique or provisions and they are usable in the ordinary classrooms, etc.

Among the basic teaching materials and equipment, packages of set squares, T squares and compasses will be supplied in correspondence to the number of classrooms to be constructed. Abacus, blocks and those for domestic science will be supplied in correspondence to the number of classrooms for primary level (Grades 1 ~ 4), and other equipment and materials to the number of rooms for junior secondary level (Grades 5 ~ 8).

Maintenance equipment will be selected on the criteria that they are suitable to the materials and parts used for the school facilities. Manual tools will be provided to facilitate operation by the teachers and parents, who usually repair schools facilities, as well as cleaning tools for daily maintenance of facilities. One set of maintenance equipment will be supplied to each project school.

The school headmasters will be responsible for the management of basic teaching materials and maintenance equipment. A list of equipment to be provided in this project is shown in the following pages.

(2) Special Concerns

1) Convenience of maintenance

The UBC Government is responsible for maintenance of school facilities in principle. In the classrooms, however, class teachers take leadership of maintenance work with financial and physical support from the students' parents.

Most schools in UBC are 10 to 40 years old and require urgent repairs to some extent, and each year more than 50 out of 90 schools in UBC apply for repairs to the city government. Most of them are repairs of roof waterproofing layers damaged by strong ultraviolet light and extreme temperature difference in summer and winter, and of obsolete piping systems. Due to strict cost containment policies, only 10 and some of these applicant schools (approx. 20%) are funded for repairs. Thus, in an assumption that prompt repairs are hardly possible, the project school facilities will be designed to require least maintenance and to be repaired easily in low cost. For this purpose, the following concerns will be incorporated in planning.

- Rigid and durable construction materials will be selected.
- Locally available and low cost materials and equipment will be selected as much as possible.
- Locally prevailing construction methods will be respected.
- Simple systems will be designed as much as possible.

2) Heat insulation of the buildings

It is impossible to continue classes in winter without heating. Present school buildings were constructed of thick brick walls for heat insulation. Brick masonry has a large heating capacity, but does not have good insulation efficiency. The schools have to keep heating for 24 hours a day in winter because it takes hours to rewarm the rooms once the heating is turned off at night. This leads to considerable heating costs. In fact, the heating expenses of school facilities is 20% of the budget allocated to educational sectors of the city government budgets. At present, heating costs are charged to the users on the basis of the building volume. The UBC Heating Line and Net Department plans to shift this to a calorie-consumption-base charging system soon by installing a meter at each user.

These circumstances taken into consideration, good heat insulation will be designed in the roofs and walls to reduce heating costs, which will contribute to ease the burden of the city government from heating expenses and may enable the surplus to be allocated to the maintenance of school facilities.

(3) Components of Facilities and Equipment to be Provided

The following tables provide a summary of facilities and equipment examined for cooperation in accordance with the above-mentioned principles.

Size of Facilities

Planned Facilities		Remarks
Type	Component of School Facilities	
4C-1	① 4 classrooms/1 floor + teachers room + toilets	- One of the building types listed in the left will be adopted based on the required number of classrooms and topographic conditions of each site. - All the classrooms to be constructed have identical shape and size. Each room will accommodate 40 students. - A cabinet for storage of teaching materials will be provided in the teachers room.
8C-2	② 8 classrooms/2 floors + teachers room + toilets	
10C-2	③ 10 classrooms/2 floors + teachers room + toilets	
12C-3	④ 12 classrooms/3 floors + teachers room + toilets	
14C-3	⑤ 14 classrooms/3 floors + teachers room + toilets	
	Toilets	- Number of toilet stalls 1 per 40 girl students, 1 per 60 boy students - 1 urinal per 40 boy students - Wash basins will be installed for hand washing. - Teacher's toilet 1 stall in every toilet, to be commonly used by men and women.

Range of Equipment

Requested Equipment	Items Considered	Results
Classroom Equipment	Furniture for classrooms and teachers room ① Students' desks and chairs ② Teacher's desk and chair ③ Meeting tables and chairs ④ Teaching materials cabinets	Equipment for additionally constructed classrooms - 20 desks and 40 chairs in each classroom - one desk and chair for teacher in each classroom - 3 meeting tables (2 for type 4C-1) and (the number of classrooms + 6) chairs - one cabinet per two classrooms
Basic Teaching Materials	① Teaching aids in accordance with school curriculums ② Teaching aids for blackboards	- one set for each class of applied grades. - one set in each classroom
Maintenance Equipment	① Maintenance and repair tools ② Cleaning tools	- one set in each site - one set in each site