No.

Ministry of Education, Culture and Science
Mongolia

BASIC DESIGN STUDY REPORT
ON
THE PROJECT FOR IMPROVEMENT OF
PRIMARY EDUCATION FACILITIES
(PHASE IV)
IN
MONGOLIA

January 2009

JAPAN INTERNATIONAL COOPERATION AGENCY

MATSUDA CONSULTANTS INTERNATIONAL CO., LTD.

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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 Improvement of Primary Education Facilities (Phase IV) and entrusted the study to the Japan International Cooperation Agency (JICA).

JICA sent to Mongolia a study team from June 2 to June 28, 2008.

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.

January, 2009

Eiji Hashimoto
Vice-President
Japan International Cooperation Agency

January, 2009

Letter of Transmittal

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

This study was conducted by Matsuda Consultants International Co., Ltd., under a contract to JICA, during the period from May, 2008 to January, 2009. 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 outline 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,

Tomohiro Osawa

Project manager,
Basic design study team on the Project for
Improvement of Primary Education Facilities
in Mongolia
Matsuda Consultants International Co., Ltd.

Summary

1. Overview of the Country

Mongolia is a landlocked country at the center of East Asia, sandwiched by Russia in the north and China in the south. According to the Mongolian National Statistics Office (NSO), the nation's territory extends for 1.5641 million km2, four times larger than that of Japan, and the total population is about 2.635 million as of 2007. In the western part of the land are the Altay and Khangai Mountains of 4,000 m class. The land gradually lowers eastward so that the central and eastern parts of the country are covered by upland plains at heights between 1,000 and 1,500 m. In the south lies the Gobi Desert, and 70 percent of the country consists of steppes. The weather conditions are very severe: it is dry throughout the year under a typical continental climate, with the maximum monthly average temperature being 30 to 35 degrees Celsius in the summer and the minimum below -30 degrees Celsius in the winter. The temperature difference in the day can also be as profound as 30 degrees Celsius on average.

Mongolia shifted to a democratic, market-oriented economy in 1990 following the collapse of the former Soviet Union, but soon it was struck by a serious economic crisis with an annual inflation rate of 300 percent or above in the first half of 1990s. The country, however, pushed forward with a structure reform combining drastic economic liberalization measures, privatization of state assets, and various others under the auspices of international society. Later in 2002 and onward, weather conditions turned favorable for agriculture and stock-raising and international market prices of mineral resources went up leading to active investment in the Mongolian mining industry. Consequently, the country's economy has been on a healthy track with an annual GDP growth rate of 7 to 10 percent (2003 to 2007). Industry-wise, the primary, secondary, and tertiary industries account for 20, 36, and 44 percent of the GDP, respectively (NSO 2007). The key industries are the agriculture and stock-raising sector, which is equivalent to 38 percent of the total workforce, and the mining sector, which contributes to 27 percent of the GDP and 79 percent of the total exports. China is the major trade partner responsible for 74 percent of exports and 32 percent of imports, while the connection with Russia still remains significant.

2. Background and Outline of the Requested Project

The Government of Mongolia (GoM) attaches great importance to education as one of its focal areas in its National Development Strategy and other priority plans; it has set out mid-term objectives as constructing a general education system in compliance with international standards and disseminating primary education across the country. Accordingly, the Ministry of Education, Culture and Science (MECS) hammered out a "Master Plan to Develop Education of Mongolia in 2006-2015" in 2006, which focuses on "improvement of access to education with attention paid to eliminating disparities" and “provision of quality education adapted to the renewed educational

values". Based on these objectives, the MECS is carrying forward detailed measures with an emphasis on the reinforcement of basic education and the expansion of educational opportunities, centering on the shift of the general education system from 10 years to 12 years.

The net school enrollment ratio in Mongolia reached 92.7 percent for primary education and 89.9 percent for the entire basic education, including lower secondary grades, in 2007. On the other hand, the development of education facilities is not keeping pace with the drastic increase in the number of students, caused by the rapid influx of population into urban areas along with the shift to a market-based economy and by the extension of school years; as a result, the educational environment in the country has been seriously deteriorating. In particular, in the capital city of Ulaanbaatar (UBC), which is home to nearly 40 percent of the entire population, the population increased approximately 1.3-fold between 2000 and 2007 due to an inflow of people from rural areas, and accordingly the number of students subject to general education jumped by 22 thousand. Furthermore, the urban area is expanding in accordance with the government's aggressive land endowment measure in the peripheral areas. As a result, children in many districts may not find schools in their commuting sphere and thus are forced to travel a far distance or board to go to school. Some schools in those areas with rapidly-increasing populations are suffering from overcrowded classrooms with 50 or more students each and/or giving lessons on three shifts. Even if not, most of schools in the city need to use special classrooms, corridors, halls, etc. as classrooms to make up for the lack of classrooms. Furthermore, the starting age of primary education was lowered to six years in 2008. Subsequently, the number of new students increased nine percent from the previous year (tentative number by the Education Department of UBC). Thus, it is a pressing need for the city to expand and improve education facilities to respond to the situation.

The GoM addresses such a situation by putting an emphasis on the quantitative development of education facilities to cope with an increase in the number of students due to the educational system reform with consideration given to rectifying disparities among areas in its Master Plan. More precisely, it aims to provide additional classrooms for 69 thousand seats across the country by 2015. To do so, it has largely increased the investment budget for the educational sector and prepared annual implementation plans, including projects funded by foreign donors, in order to develop education facilities in a full-fledged manner. The Government of Japan (GoJ) has played an undisputed role in this respect: it has rendered the first and third phases of the Project for Improvement of Primary Education Facilities in UBC since 1999. However, the continued population growth and the school system reform in Mongolia have drastically augmented the number of students even more and the GoM is unable to put sufficient facilities in place with its own financial sources alone. That being the case, the GoM requested to the GoJ for another grant-aid project concerning construction of education facilities and procurement of associated equipment in UBC, following the third phase project.

3. Summary of Study Results and Contents of the Project

In response to the request from the GoM, the GoJ decided to implement a Basic Design Study (B/D) and the Japan International Cooperation Agency (JICA) dispatched a Basic Design Study (B/D) team to Mongolia between June 2nd and July 2nd, 2008. The study team discussed with parties concerned on the Mongolia side, including the personnel from the MECS and the Education Department of UBC, and carried out site surveys based on the contents of the request. After returning to Japan, the study team conducted analyses on the results from the field survey, and drafted a basic design focusing on twelve schools, consisting of seven existing schools and five new schools, screened from the 26 schools finally confirmed by the Mongolian side in the discussion. The team re-visited the country between October 13th and 22nd, 2008 to explain the contents of the draft basic design, and compiled this finalized version of Basic Design Study (B/D) report in Japan.

The following describes the basic concept of the Project formulated in consultation with the counterpart.

1) Target Schools and Scale of the Japanese Assistance

The 26 schools requested by the Mongolian side were further evaluated based on the criteria agreed upon by both sides in the consultation. Three were excluded as there were problems with respect to land use rights and geography of the sites, which would hamper the implementation of the Project. The study team carried out site surveys as to the remaining 23 sites and scrutinized the collected data. As a result, the team selected 12 sites to be included in the Project, for which school demand at a sufficient level is anticipated into the future and six or more additional classrooms are needed, in case of existing schools, and at least 16 classrooms, in case of schools to be newly constructed. The numbers were determined in consideration of the scale of school that allows efficient and effective building construction and school management. The shortage of classrooms was assessed based on the school demand (estimated number of students) per school zone in 2013, which is the scheduled completion year of the Project, by calculating the necessary number of classrooms assuming that 36 students per class times two shifts, as a standard, and subtracting the current number of serviceable classrooms therefrom as for the existing schools.

In deciding the scope of assistance at each site, a standard building type with four stories above the ground was set as the basis in the light of the cost efficiency and the effective utilization of space. For the existing schools, building types that best provide sufficient classrooms as calculated above were selected, while on the other hand, a 16-classroom type was selected as the most appropriate scale for all schools to be newly constructed. In total, the scope of assistance covers a total of 155 classrooms (for 11,160 students) at the 12 sites.

2) Basic Design of Facilities and Equipment

Inside the school buildings, classrooms, teachers' rooms, cloakrooms, and toilets with hand washing spaces are planned as essential facilities in the country subject to severe cold winter; as for new schools, gyms, computer rooms, special classrooms, and kitchens are added as incidental facilities regarded as necessary based on the standard curricula and the status of use at existing schools. A special classroom is provided per school for accommodating technical and vocational training and science experiments as included in the curricula, and is further planned as a multi-purpose room. Kitchens are planned as to function as a storeroom where light meals for primary-year students can be kept temporarily.

The planar layout, configuration and floor area of each room, and specifications of each building are designed in compliance with Mongolia's building standards for educational facilities, while at the same time referring to and comparing with the details of school facilities constructed by the Mongolian government and preceding Japanese grant-aid projects in terms of durability, livability, workability and cost reduction. The buildings will have a rectangular, four-story structure with minimized external wall area whereby enhancing the heat insulation of the building as a whole and cutting construction costs down. The bottom of the foundation is set at minimum three meters below the ground level, where it is below the freezing depth, so as to avoid any impact of frozen soil; the underground space created accordingly is effectively utilized for a machine room or cloakroom that does not require natural lighting.

As for equipment to be provided under the Project, basic educational furniture necessary for the facilities is defined in accordance with the contents of the previous phase III project as requested by the Mongolian side. Similarly, basic educational equipment in conformity to the current curricula and tools necessary for daily maintenance of the facilities are included in the scope of the Project.

The following tables show the schools to be included in the Project along with the contents and scales of facilities and furniture to be provided under the Project.

Target Schools and Contents of Facilities

Site	District	Building type	No. of class-rooms	Facilities		Building services			Floor Area (㎡)
				Class-room building	Gym	Water tank	Sewage tank	Boiler	
Existing schools (7)									
1 No.35 School	Sukhbaatar	8CR-S	8	○	-	-	○	-	1,558.38
2 No.19 School	Bayangol	8CR	8	○	-	-	-	-	1,558.38
3 Shavi CS	Bayanzurkh	19CR	19	○	-	-	-	-	2,852.35
4 Amgalan CS	Bayanzurkh	12CR-S	12	○	-	-	○	-	1,974.50
5 No.79 School	Bayanzurkh	12CR-BS	12	○	-	-	○	○	2,012.94
6 No.52 School	Khan-Uul	8CR	8	○	-	-	-	-	1,558.38
7 No.12 School	Songinokhairkhan	8CR	8	○	-	-	-	-	1,558.38
New schools (5)									
1 Khujir Bulan	Bayanzurkh	16CR-BW	16	○	○	○	○	○	3,353.15
2 361st Garam	Songinokhairkhan	16CR-BW	16	○	○	○	○	○	3,353.15
3 Near Tahilt	Songinokhairkhan	16CR-BW	16	○	○	○	○	○	3,353.15
4 Near Bayangol	Songinokhairkhan	16CR-B	16	○	○	-	-	○	3,353.15
5 Yarmag	Khan-Uul	16CR-B	16	○	○	-	-	○	3,353.15
Total			155	12	5	3	6	6	29,839.06

Contents of Furniture

Room	Contents of Furniture
Classroom	Double student desks & chairs, Teacher’s desk & chair, Blackboard, Bulletin board
Teachers’ Room	Meeting tables (for 6 persons) & chairs, Headmaster’s desks & chairs, Cabinets
Computer Room	PC desks, Stools, Teacher’s desk & chair, Bulletin board
Special Classroom (Multi-purpose Room)	Double student desks & chairs, Laboratory table, Teacher’s chair, Blackboard, Bulletin board, Cabinets
Kitchenette	Open racks

The following table summarizes the contents of equipment to be provided under the project.

Contents of Equipment

Items		Remarks
Educational Equipment	Maps (Geographic map/ Administrative map/ Mineral resource map/ Botanical map/ Zoological map of Mongolia, World geographic map, World political map)	Materials on social studies for primary and lower secondary grades
	Wall charts (Chemical elements chart, Chart of physical measuring units, Human body dissection chart)	Materials on sciences for primary and lower secondary grades
	Mongolian Cyrillic alphabet chart	Materials on Mongolian for primary grades
	Multiplication table, Geometric block models, Abacus	Materials on mathematics for primary grades
	Wall thermometer, Azimuth compass, measuring tape	Materials on life sciences for primary grades
	T-square, Ruler set	Materials on mathematics for primary and lower secondary grades
	Projector set	All purposes, all grades
Maintenance Tools	Tools set	For maintenance of buildings and building services

4. Term of Work and Estimated Project Cost

The entire implementation term for the Project is set as 46.5 months, consisting of 5.5 months for detailed designing, 2.5 months for tendering, and 38.5 months for construction and procurement works, in consideration of the scale of construction works, weather constraints, and the status quo of the construction sector in the country. The cost to be borne by the recipient side is estimated as 32.85 million Japanese yen.

5. Verification of the Appropriateness of the Project

The implementation of the Project is expected to bring about the following direct benefits.

- UBC will have an addition of five primary and secondary education facilities with a total of 80 classrooms for 5,760 students. This will improve access to primary and secondary education of those children who are forced to travel far or have to rely on a relative or use a boarding house to commute to school.
- 75 classrooms that have a standard space and an adequate environment will be additionally provided by the Project at the seven existing schools to accommodate additional 5,400 students. This will immensely improve the learning environment of approximately 13,200 students who are currently put in a poor learning environment. Specifically, 21 three-shift classes at four schools and 21 classrooms that do not satisfy the government’s standards will be cleared up, and the number of students per classroom will be mitigated from 85 to 70 so that the MECS's standard of 35 students per class will be realized.

The Project is also expected to bring about the following indirect benefits.

- The overcrowding at the existing schools around the new school sites will be alleviated as some of their students will be transferred to new schools.
- Children in the new school’s zones will be able to commute on foot and their parents will be relieved from extra costs for long-distance travel or boarding. This will encourage those children who cannot go to school due to financial reasons to enroll in a school.
- The new facilities with basic teaching equipment and an adequate learning environment will make it possible to manage effective lessons and provide high-quality education.
- The sanitary and health conditions for students will be better maintained by sanitary toilets provided separately for men and women and heating and ventilating equipment suited to the severe local climate conditions.

In addition to the above-mentioned benefits, the Project will expectedly provide direct support to the GoM in achieving its goals to "strengthen basic education" and "expand educational

opportunities" as a priority in the education sector through expanding the capacity of education facilities. At the same time, an improved educational environment in primary and secondary schools will lead to an elevated standard of basic living in the local communities. Thus, the Project is deemed as appropriate to be carried out under Japan's grant-aid scheme.

In terms of maintenance of the facilities after the completion of the Project, there is no need for special techniques and the current human resources and technology in Mongolia are adequate enough. Additional costs to be incurred in consequence of the Project are estimated at around 1,123 million Tg. (equivalent to app. 8.2 million Japanese yen) per annum, including the cost for teachers and school staff to be newly hired. This amount of money corresponds to roughly 2.8 percent of UBC's budget for general education schools and hence is at a manageable level to be continuously secured.

In the meantime, in order to make the Project more effective, it is vital to deploy qualified and competent teachers in right positions in accordance with the education levels and subjects. In particular, as new schools need to be ready for running immediately after the completion of construction, the MECS and the Education Department of UBC should collaborate with each other to secure necessary budgets and establish management structures in a coordinated and planned manner. In addition, the effects of the Project will be greater and more sustainable if UBC sets up a system which i) supplements the school management structure, in terms of organization and budget, concerning the maintenance and planning of school facilities, ii) provides sufficient support in routine maintenance and improvement activities for the facilities, and iii) carry out mid- and long-term periodic large-scale repair and renovation of the facilities in a planned manner.

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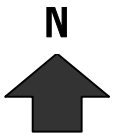
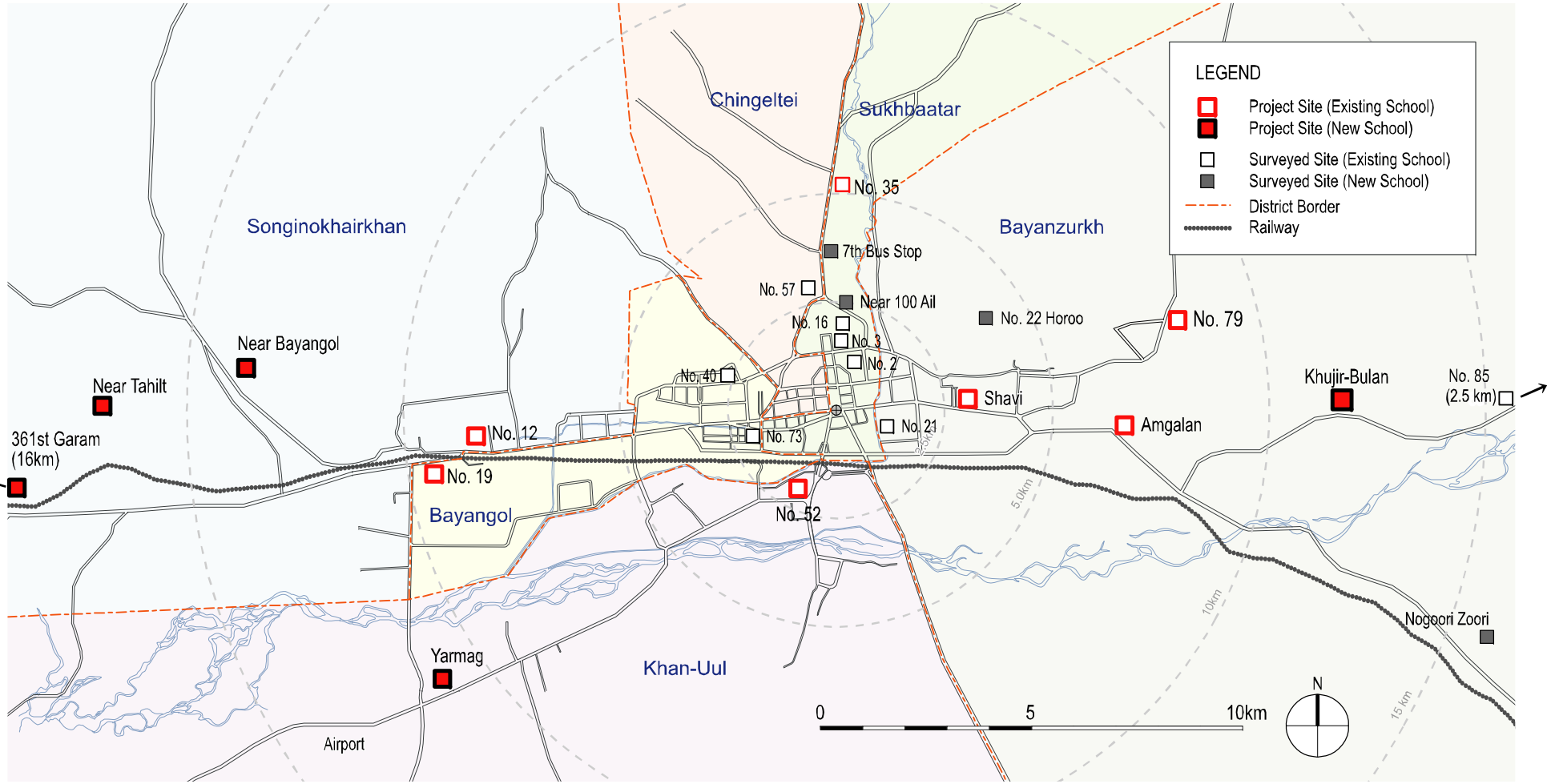
Appendices

Location Map




LEGEND
Project Site (Existing School)
Project Site (New School)
Surveyed Site (Existing School)
Surveyed Site (New School)
District Border
Railway
Chingeltei
Sukhbaatar
Songinokhairkhan
Bayanzurkh
Bayangol
Khan-Uul
No. 35
7th Bus Stop
No. 57
Near 100 Ail
No. 16
No. 3
No. 2
No. 40
No. 22 Horoo
No. 79
Shavi
No. 21
No. 73
No. 12
No. 19
No. 52
Near Bayangol
Near Tahilt
361st Garam
(16km)
Amgalan
Khujir-Bulan
No. 85
(2.5 km)
Yarmag
Airport
Nogoori Zoori
5.0km
10km
15 km
0
5
10km
N

Perspective

New School Site (Tahilt, 16CR-TYPE)

Existing School Site (No. 35 School, 8CR-TYPE)

List of Figures & Tables

Abbreviations

ADB	Asian Development Bank
AIJ	Architectural Institute of Japan
ALC	Autoclaved Lightweight Concrete
A/P	Authorization to Pay
B/D	Basic Design Study
BHN	Basic Human Needs
CB	Concrete Block
CS	Complex School
E/N	Exchange of Notes
G/A	Grant Agreement
GDP	Gross Domestic Product
GoJ	Government of Japan
GoM	Government of Mongolia
EPS	Expanded Polystyrene
FY	Fiscal Year
ICT	Information and Communication Technology
JICA	Japan International Cooperation Agency
JIS	Japanese Industrial Standard
JMA	Japan Meteorological Agency
MECS	Ministry of Education, Culture and Science
M/D	Minutes of Discussions
MSK	Medvedev Sponheuer Karnik
NGO	Non Governmental Organization
NSO	National Statistical Office of Mongolia
PC	Personal Computer
PC	Pre-cast Concrete
PVC	Polyvinyl Chloride
RC	Reinforced Concrete
TCP	Technical Cooperation Project
UBC	Ulaanbaatar City
U.S.S.R.	The Union of Soviet Socialist Republics

Chapter 1. Background of the Project

Chapter 1 Background of the Project

1-1 Background and Outline of the Request

The Government of Mongolia (hereafter the “GoM”) positions the education sector as one of top priorities in its overall plans, including the National Development Strategy, and has set its mid-term objectives as constructing a general education system commensurate with the international standard and disseminating primary education across the country. Accordingly, the Ministry of Education, Culture and Science (hereafter the “MECS”) hammered out a "Master Plan to Develop Education of Mongolia in 2006-2015" in 2006, which focuses on "improvement of access to education with attention paid to eliminating disparities" and provision of quality education adapted to the renewed educational values." Based on these objectives, the MECS is carrying forward measures with an emphasis on the reinforcement of basic education and the expansion of educational opportunities, centering on the shift of the general education system from ten to twelve years.

The net enrollment rate in primary education in Mongolia reached 92.7 percent in 2007, however, the development of education facilities is not keeping pace with the drastic increase in the number of students, caused by the rapid influx of population into urban areas along with the shift to a market-based economy and by the extension of school years; as a result, the educational environment in the country has been seriously deteriorating. In particular, in the capital city of Ulaanbaatar (UBC), which is home to nearly 40 percent of the entire population, the population increased approximately 1.3-fold between 2000 and 2007 due to an inflow of people from rural areas, and accordingly the number of students subject to general education jumped by 22 thousand. One third of all public schools have more students than 36 per class, which is the target set by the MECS. Some schools in those areas with rapidly-increasing populations are suffering from overcrowded classs with 50 or more students each and/or giving lessons on three shifts. Nine percent of public schools still run on three shifts, though partially. Most of schools in the city need to use special classrooms or partition corridors, halls, etc. to create temporary classrooms to make up for the classroom shortage. Furthermore, the starting age of primary education was lowered to six years in 2008. Subsequently, the number of new students increased nine percent from the previous year (tentative number by the Education Department of UBC). Thus, it is a pressing need for the city to expand and improve the education facilities to respond to the situation.

The GoM addresses such a situation by putting an emphasis on the quantitative development of education facilities to cope with an increase in the number of students due to the educational system reform with consideration given to rectifying disparities among areas in its Master Plan. More precisely, it aims to provide additional classrooms for 69 thousand seats across the country by 2015. To do so, it has largely increased the investment budget for the educational sector and prepared annual implementation plans, including projects funded by foreign donors, in order to develop education facilities in a full-fledged manner. The Government of Japan (hereafter the “GoJ”) has played an undisputed role in this respect by providing a total of 396 classrooms (including 28

classrooms under construction) in UBC under three phases of grant-aid projects—the Project for Improvement of Primary Education Facilities—aimed to improve the basic education environment in major urban areas in Mongolia since 1999: the first phase carried out from FY1999 to 2001, the second from FY2002 to 2005, and the third from FY2004 and 2007. However, the continued population growth and the school system reform in Mongolia have drastically augmented the number of students even more and the GoM is unable to put sufficient facilities in place with its own financial sources alone. That being the case, the GoM has requested to the GoJ for another grant-aid concerning construction of education facilities and procurement of associated equipment in UBC, following the third phase project.

In response to the request from the GoM, the GoJ decided on a Basic Design Study (B/D), and dispatched a Basic Design Study (B/D) team to Mongolia from June 2nd to July 2nd, 2008. Although Mongolia's original request included 18 existing schools and 12 new schools, three of these were excluded from the request as a result of consultation between the Mongolian side and the study team at the time of the field survey, because these sites are situated in suburban districts with small populations. The following table lists the details of the request finally submitted to the GoJ.

Table 1-1 Outline of the Request

District	School/Site	Requested Components
Existing schools (17)		
Sukhbaatar	No.2 School, No.3 School, No.16 School, No.35 School	Classrooms, Teachers' room, Cloakroom, Toilet & hand washing places, Basic educational furniture, Basic teaching material (20 items) and Maintenance tools
Bayangol	No.19 School, No.20 School, No.40 School, No.73 School	
Bayanzurkh	Shavi Complex School, Amgalan Complex School, No.21 School, No.79 School, No.85 School	
Khan-Uul	No.52 School	
Chingeltei	No.5 School, No.57 School	
Songino-khairkhan	No.12 School	
New schools (10)		
Bayanzurkh	Khujir Bulan、Nogoori Zoori	Classrooms, Teachers' room, Cloakroom, Toilet & hand washing places, Gym, Kitchen, Computer room, Chemistry room, Physics room, Vocational training room, Basic educational furniture, Basic teaching material (20 items) and Maintenance tools
Songino-khairkhan	361st Garam、Near Tahilt、Near Bayangol、Bayankhoshuu Western	
Khan-Uul	Yarmag	
Sukhbaatar	7th Bus Stop、Near 100 Ail、AZE school (relocation)	

1-2 Natural Conditions

(1) Climate Conditions

UBC has a typical continental climate with dry weather throughout the year. There are four seasons and the temperature greatly varies in the day and in the year. While the highest temperature in summer exceeds an average of 30 degrees Celsius, the lowest temperature in winter

goes below -30 degrees Celsius. The temperature difference between daytime and nighttime is as large as 25 to 30 degrees Celsius on average. The annual average temperature is around 0 degrees Celsius, and the capital is known as one of the "coldest capital cities in the world." The rainfall is quite low at 200 to 300 mm per year, roughly 70 percent of which is concentrated in July and August. Another noticeable point is its long sunshine hours of 2,600 to 3,300 hours, resulting from approximately 250 cloudless days in the year.

Winter lasts long for about six months between late October and early April, while there are quite a few days under clear sky conditions and winds are relatively mild due to the Siberian High. There is not much snowfall in UBC with the maximum snow coverage being 38 cm (April 1978) and a common snow coverage in January, in the midst of winter, being less than 10 cm. Spring starts in early April and continues for about 50 to 60 days until the end of June. However, during this season, the weather is very unstable with the highest temperature exceeding 30 degrees Celsius on some days and the lowest temperature dropping below -10 degrees Celsius on other days. The wind speed in this season is the fastest in the year. Strong wind with a speed of 15 m or more, snow storm, and sandblast are frequently recorded. Summer refers to approximately 60 days between late June to the end of August with torrential downpours sometimes accompanied by lightning strokes and hail. Autumn covers September and October for 50 to 60 days. The temperature suddenly drops from about 15 degrees Celsius down to below zero. Turbulent wind, which is unique to the continental climate, is recorded throughout the year, most frequently in spring and autumn. Such strong winds are often accompanied by tornado and sand storm.

(2) Natural Disasters

The natural disasters potential in UBC may include flood, strong wind, sandstorm, blizzard, lightning strokes, etc., though there is no record of damaged buildings in natural disasters at the project sites in actuality. Especially, momentary torrential local downpours, causing flood, flash flooding, and blast, combined with the dwelling area sprawl into riverbeds and steep slopes and the vulnerable infrastructure, inflict more or less of damage to the city every year. Major records include: 100 deaths or more on July 12th and 13th, 1966; 130 deaths due to a rainfall of 44 mm in 19 minutes on August 3rd, 1983; 10 deaths, 93 buildings collapsed, and 300 buildings flooded due to a rainfall of 56 mm with hail in 40 minutes in July 2003; and so forth. In addition to these, traffic hazards due to flooded roads and blockages of trunk roads caused by soil avalanche are frequently observed.

There is no record of seismic damages in UBC; however, Mongolia lies on a seismogenic area and there have been four inland earthquakes with a magnitude of 8—Bulnain Mountains in 1905 (M8.4), Mongolia Altay Mountains in 1931 (M8.0), Govi-Altai Aimag in 1957 (M8.1), and Bulgan Aimag in 1967 (M7.8)—and six earthquakes at the M7 level in the 20 century in Mongolia. Large-scale earthquakes and many lateral faults are concentrated in the west half of the country. As UBC is a few hundred kilometers east from such large faults, the greatest earthquake observed in the city so far is of a Japanese seismic intensity scale of 4 to 4.5. At the same time, relatively minor

earthquakes, with a magnitude of 5 or 6, are observed 40 to 200 km away from UBC and there are active faults in the vicinity. Under such circumstances, UBC has divided the city into zones depending on the soil conditions and requires anti-seismic design for buildings to be constructed.

(3) Geological and Soil Conditions

The soil around UBC is composed of: a metamorphic rock stratum from the Palaeozoic Era; a layer mainly containing sand and mud stones that are terrigenous sediments from the Devonian to Carbon ages; and granites and other rocks intruding these. There are also young sediments composed of argillites and gravels distributed around the bases of mountains and along rivers. In the field survey, the study team carried out geotechnical investigations—boring and sampling—by means of local sub-contracting with respect to five sites at different locations with different geographic conditions, chosen from the candidate project sites, so as to obtain basic information necessary for basic designing of the buildings. The tests were conducted in the following procedure.

- Sampling by boring and standard penetration test at two points at each site (up to 12 m, in principle.)
- Laboratory test on the sampled soil (distribution of particle sizes, consistency limits, water content, unit mass, etc.)

The test results, given in the following table, indicate that the planned supporting layer, at approximately 3.5 m below the ground surface, is in good condition with sufficient solidity and tightness, with a bearing capacity of, expectedly, 300 to 500 kPa. No groundwater was observed down to the boring depths, except two sites relatively close to the rivers. The results from past boring tests conducted in the city also show that typical soil in UBC generally comprises clayey sand or sandy clay strata mixed with gravel, which have an N value of 30 to 40 or above, at a depth of 3 m, except the basin of the Tuul river and its tributaries and that the layers at 8 to 15 m or more have an N value of as high as 50 and hence are a very stable, self-standing, solid ground. The following describes the specific nature of soil at each site.

- Northern hilly area (No. 79 School, Near Tahilt): The soil is composed of a layer of sandstones formed during the Carbon age, at depths of 3.3 to 6.3 m, on top of which are sediment layers of clayey sand with gravel or gravel with sand and clay. The layer beneath the surface soil, deeper at a depth of 0.4 to 2.3 m, form a very solid ground.
- Near rivers (No. 52 and 12 Schools): Beneath the surface layer at a depth of 1.0 to 2.1 m is an alluvial gravel layer mixed with sand and clay. It is rather solid with an N value of 40 at a depth of 3 m and below.
- Southern hilly area (Yarmag): A solid gravel layer mixed with sand and clay has sedimented onto a clayey sand sediment layer from the Neogene. The lower strata have a lower N value, yet a sufficient bearing capacity can be expected.

Table 1-2 Results of the Geotechnical Investigations

Site		No. 79 School	No. 52 School	No. 12 School	Near Tahilt	Yarmag
Geographical conditions		Northeastern part of the city, hilly terrain. Urban area (gel districts)	Southern part of the city, near dry riverbed. Urban area	Western part of the city, along the railways. Urban area	West suburban of the city, hilly terrain. New development area	Southwestern part of the city, hilly terrain. New development area
Test results	Soil property of the planned supporting layer	Clayey sand with gravel	Poorly graded gravel with sand	Poorly graded gravel with sand and clay	Clayey sand with gravel	Poorly graded gravel with sand
	N value at the planned foundation level	27, 34	37	37, 39	52, 54	51,52
	Bearing capacity of the above stratum	400kPa	500kPa	450kPa	450kPa	300kPa
	Reference depth of frozen soil (*1)	GL-3.3m	GL-3.8m	GL-3.8m	GL-3.3m	GL-3.8m
	Groundwater level	None	GL-3.7m	GL-7.1 to 7.2m	None	None

(*1) The calculated depth of frozen soil, to act as an indicator of the depth of the foundation, is a value reduced from the reference depth of frozen soil depending on given conditions. In case that there is a basement, the value will be multiplied by a coefficient of from 0.4 to 0.8 depending on the temperature in the room.

1-3 Environmental and Social Considerations

In the Project, new facilities will be constructed in the premises of existing schools or the sites appropriated for new schools. All the construction sites are either flat or slightly inclined where there are no large trees; thus, there is no need for modifying land or vegetation on a large scale to carry out the Project. In the meantime, the environmental standards and other environment-related norms in Mongolia will be respected in the facility planning and also the following points are taken into account in order to avoid any negative impact on the natural environment as much as possible.

- At inclined sites, facilities will be laid out in such a way that makes most use of the current geographical conditions and the excavation and land preparation will be kept to the minimum.
- At the sites without sewerage systems, wastewater and sewage will be stored in sewage tanks inside the premises and then transported by septic trucks so as not to contaminate the surrounding soil.
- At those sites where independent boiler houses will be set up, low-pollution type boilers that conform to the Mongolian environmental standards will be employed.

In terms of social environments, the implementation of the Project will not necessitate a relocation of existing dwellings or cause any change in the living environment of nearby residents, since all the construction sites are either existing school premises or unused lands; thus no adverse impact on the local communities is presumed. However, sufficient space will be secured between the new structures and neighboring buildings in planning facility layouts, in order to minimize impact of sun shadow, wind damage, etc. on the surrounding houses, as all the existing schools are situated in

developed urban areas. It is also important to plan appropriate pathways and temporary installations at the construction stage in order to prevent possible deterioration of the living environment of the local residents due to noise and safety concerns during the construction works.

In conclusion, the Project is deemed as a project that "has minimum or little adverse impacts on the environment and society."

Chapter 2. Contents of the Project

Chapter 2 Contents of the Project

2-1 Basic Concept of the Project

(1) Overall Goals and Project Objectives

The government of Mongolia positions in its overall plan "promotion of dynamic economic growth driven by the private sector" and "development of human resources to lead the sustainable growth", indispensable for achieving the former, as two pillars of its national development, and places top priority on the education sector. Following these strategies, MECS prepared the "Master Plan to Develop Education of Mongolia in 2006-2015" in 2006, based on which it has been carrying out detailed measures with an emphasis on the reinforcement of basic education, centering on the shift of the general education system to a 12-year schooling structure, and the expansion of educational opportunities.

The Master Plan posts as one of its primary objectives the quantitative development of educational facilities to cope with an increase in the number of students to be brought about by the introduction of the 12-year schooling system and rectify the disparity. Based on this objective, it plans to develop classrooms for 69,000 seats and dormitories for 5,200 beds by 2015. Another key objective points to the "development of an educational environment necessary for providing quality services of primary and secondary education. In line with this objective, the MECS has been taking various actions, such as the "development of a schooling and learning environment friendly to children," "preparation for accommodating the renewed educational standards," and "establishment of an educational environment based on the utilization of information and communication technology (ICT)."

The Project aims to support a part of these initiatives of the Mongolian government by quantitatively enriching basic education facilities in UBC in order to deal with an increase in the number of students in accordance with the educational reform and the inflow of population from rural areas into the city.

Against the backdrop of the rapid expansion of urban areas and concentration of population in accordance with the recent economic development, the shortage of educational facilities has become a serious concern in UBC, the target area of the Project. In many districts of UBC, children are forced to travel a far distance to school or to enroll in a far school by boarding due to a lack of schools in the catchment area. Also some schools inevitably run with overcrowded classrooms with 50 students each or on three shifts due to the rapid increase of students. Furthermore, schools at large are using special classrooms or even halls in corridors to supplement the shortage of classrooms. As a result, some schools are faced with difficulties in providing lessons in compliance with the prescribed curricula.

The Project is aimed at upgrading the educational environment in the target area by dissolving the

shortage of classrooms, and improving access to education in the districts and schools where the abovementioned situation is noticeable.

(2) Basic Concept of the Project

In order to accomplish the objectives described in the preceding section, the Project is designed to build additional classroom blocks in seven existing schools in UBC suffering from severe deficiencies in classrooms and construct new schools in five districts where no school exists in the catchment areas, out of those requested by the recipient country. The Project will expectedly lead to an expansion of acceptance of students by primary and secondary educational facilities in the target area, thereby refurbishing the educational environment. In addition, it is expected to improve access to primary and secondary education in the areas planned for construction of new schools; specifically, the requested Japanese assistance will cover the construction of facilities required for minimal school management (classrooms, teachers' rooms, toilets, cloakrooms, gyms, and special classrooms) and the procurement of basic furniture, teaching equipment and maintenance tools.

2-2 Basic Design of the Requested Japanese Assistance

2-2-1 Design Policy

(1) Basic Policy

Of the 26 sites confirmed by the Mongolian side as their final request, the Project covers those sites that satisfy the criteria agreed upon by both sides during the field surveys and that are verified as necessary to be included in the Project as compared with the intents of alleviating the lack of primary and secondary education facilities and improving educational environments based on objective data. Moreover, in selecting specific components to be covered by the assistance, the construction of general classrooms is given top priority, but also other components are included as for new schools to the extent minimally required for avoiding a disparity in contents and quality of education to be provided by the existing schools and other new schools developed by the Mongolian government.

(2) Selection of Sites to be Included in the Assistance and Setting of Scales of Assistance

1) Sites to be Studied in the Basic Design Study

The sites to be studied were finalized based on the following steps in consultation with MECS and the Education Department of UBC during the field survey.

- Of the 18 existing schools initially requested, Aze School, for which the relocation to a new site was requested, was withdrawn because of no prospect for finding and securing a new site.

- Of the 12 new school sites initially requested, Baganuur, Bagakhangai, and Nalaikh were excluded as a result of discussion, because the populations in the school zones were deemed as not critical enough for constructing new schools.
- Bayankhosuu Western in the initial request for new schools is also included in the Mongolian government's school construction plan; thus it was replaced by a new school in No. 22 Horoo, Bayanzurkh District.

The final request from the Mongolian side includes the following 26 sites (17 existing schools and 9 new schools) to be studied.

Table 2-1 List of Schools to be Studied

Existing schools	Sukhbaatar District	No.2 School, No.3 School, No.16 School, No.35 School
	Bayangol District	No.19 School, No.20 School, No.40 School, No.73 School
	Bayanzurkh District	Shavi Complex School, Amgalan Complex School, No.21 School, No.79 School, No.85 School
	Khan-Uul District	No.52 School
	Chingeltei District	No.5 School, No.57 School
	Songinokhairkhan District	No.12 School
New schools	Bayanzurkh District	Kkujir Bulan, Nogoori Zoori, No. 22 Horoo, 361st Garam
	Songinokhairkhan District	Near Tahilt, Near Bayangol, Yarmag
	Sukhbaatar District	7th Bus Stop, Near 100 Ail

2) Evaluation and Selection of Sites to be Covered by the Assistance

Sites to be included in the Project were screened out of the sites to be studied, according to the following criteria agreed upon between both sides as a result of discussion.

Table 2-2 Criteria for Selection and Prioritization of Sites to be Covered by the Project

Criteria for site selection

1. Land ownership or proper land use right necessary for school construction is legally secured with written evidence.
2. No dwelling or obstacle, such as underground service line, which needs extensive relocation exists within the site.
3. No other classroom construction program at the site is planned by MECS, UBC, other donors, NGOs, etc.
4. Topographically safe and appropriately sized land is secured for construction.
5. Access road for construction works and transportation of materials is properly provided.
6. The school is open to the general public with no special qualification being required for admission.
7. Sufficient teachers, staff and budget for proper operation and maintenance of the facilities are secured by the relevant authorities.
8. Present and future facility demand can be quantitatively estimated by a set of data, such as the number of school-aged children in the catchment area, planned population of ongoing housing development projects, etc.

Criteria for site prioritization

1. Priority will be given to the sites where recent population increase is remarkable or no school is established within the target school district.
2. Priority will be given to the sites where the school is forced to operate on three shifts.
3. Priority will be given to the sites where extension of classrooms is urgently needed because of overcrowding of existing facilities even after the introduction of the double-shift system.
4. Priority will be given to the sites where shortage of classrooms calculated based on the demand analysis is beyond the size suitable for efficient operation and construction.

The field survey found that the following sites do not fully meet the above selection criteria. These sites therefore are excluded from the scope of the assistance.

- No. 22 Horoo (new construction): A dried river runs through the premises limiting the constructable area. The site is surrounded by bristling private residences. Thus, it is difficult to build planned facilities in this site.
- 7th Bus Stop (new construction) and Near 100 Ail (new construction): The sites were not yet appropriated at the time of the field survey and there were privately-owned buildings at the sites. Although the Mongolian side plans to expropriate the lands for school construction, they have not taken procedures yet and the study team was not allowed to enter the sites for on-site survey.

As for land use rights, the Mongolian side has submitted the land use contracts between the Land Management Department and individual schools in respect of existing school sites, and copies of Mayor's order on such contracts with regard to new school sites and the sites to be extended.

3) Verification of Facility Demands and Scale of Assistance

The scale of facility demands for the 23 sites—consisting of 17 existing schools and 6 new schools, after subtracting the three sites deemed as inappropriate as above—was verified by predicting school demand in 2013, which is assumed as the completion year of the Project, based on the gathered data, and calculating the size of facilities (number of classrooms) to be developed.

Verification of School Demand and Facility Demand

The prediction of school demand and the estimation of the necessary number of classrooms to be newly established were performed according to the following flow and conditions.

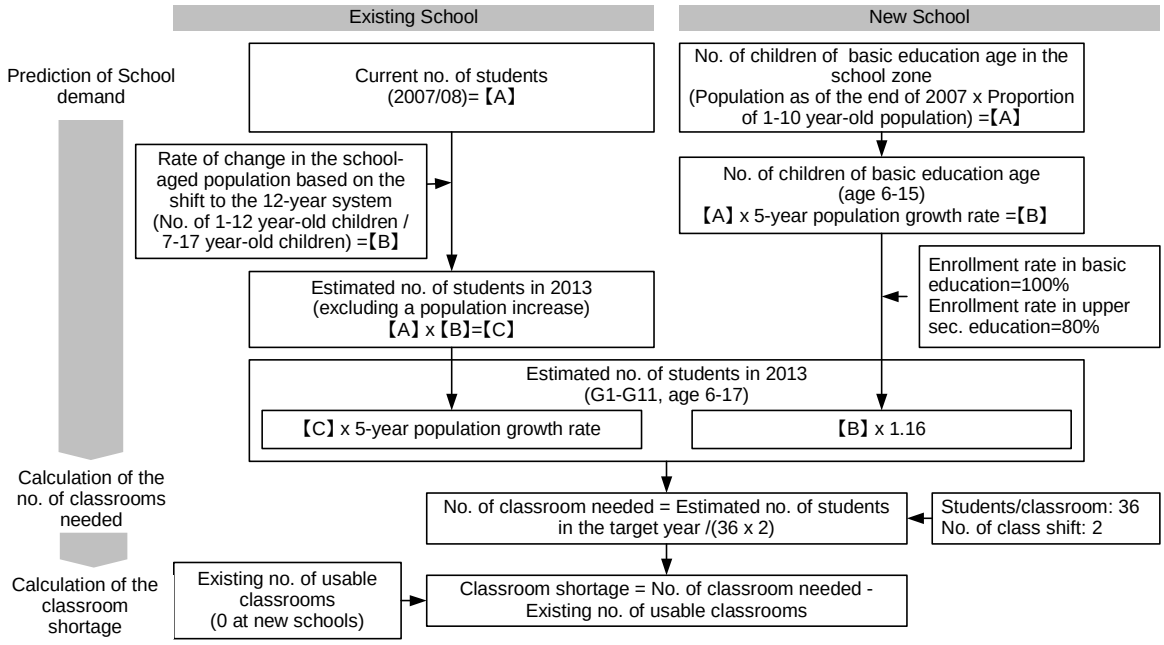


Figure 2-1 Flow of Predicting School Demand and Determining the Classroom Shortage

[1] Prediction of School Demand

- <Existing schools> : Based on the number of students for the 2007/2008 school year, the number of students in the target year 2013 was calculated with consideration given to population growths in the school zones due to the expansion of coverage of school-aged children in association with the educational reform, i.e. introduction of the 12-year system, and the influx of population.
- <New schools> : First, the size of populations reaching the basic education school ages in the target school zones in the target year 2013 was calculated by multiplying the total population in the school zones based on the population statistics per Horoo as of the end of 2007 by the ratio of children aged from one to ten to the total population based on the statistics per district. Then, the number of basic education students in the target year was determined by taking into account population growths in the zones caused by the population influx and applying 80% as the rate of advance to the next upper secondary grade as set forth by the Education Department of UBC.
- <Estimation of population growth> : In order to reflect the latest demographic movement on the district basis, the population growth was estimated by applying an annual average growth rate, which is derived from the population statistics by Horoo for the three years between the end of 2005 and the end of 2007. Additionally, as the school zone of each school does not necessarily correspond to its administrative zone (Horoo), the population was redistributed in accordance with the ratios ascertained through interviews and the population growth rate in each school zone was calculated and applied. Besides, a population expansion is planned at some sites in

association with urban development projects. However, there are still much uncertainties in the progress of these projects and hence in an actual increase of residential population to be induced by the projects. Also the growth potential may change with a number of socio-economic conditions. Therefore, the population increase due to the urban development projects, except for those that have already been implemented, is not reflected in the prediction of school demand hereof.

- <Scope of education levels to be included in the Project> : Of the schools to be studied, Shavi, Amgalan, and No. 79 are complex schools. As for Shavi School, which separately manages the primary and secondary schools and will continue the same form of management in future, the primary school branch alone is subjected to the Project.

[2] Calculation of the Number of Classrooms Needed

The number of classrooms needed to accommodate the number of students predicted in [1] above was derived based on the following parameters.

- Number of shifts : Currently all existing schools run on either two or three shifts. In the view of the government's overall plan, which stipulates two shifts as the limit, the double-shift system is assumed in the Project.
- Maximum number of students per classroom : 36 is determined as the maximum number of students per classroom in accordance with the standard numbers of students as stipulated by the Mongolian Architectural Standard for Educational Facilities—30 for the first grade and 35 for the other grades—and the current actual conditions in UBC, i.e., 34.7 on average for public schools and 37.1 on average for the existing schools studied hereof.

[3] Calculation of the Classroom Shortage

The number of classrooms to be newly provided was derived by subtracting the number of existing classrooms that are deemed sufficient to be continually used from the total number of classrooms needed, which was calculated in [2] above. The number of existing classrooms was determined as follows.

- Of the rooms that are currently used as classrooms, i) those that deviate from the relevant standards, in such a way, for example, that the floor area or width is narrower than standard classrooms, direct entry from corridors into rooms is disturbed, or otherwise, and ii) those that have been identified by the authorities as unfeasible to be used any more due to aging are regarded as disqualified, and the other rooms are qualified for continuous use.
- Some special classrooms of a size equivalent to standard classrooms can be used also as classrooms, except for those provided as a standard in the existing schools, namely, a technical room, a homemaking room, and computer rooms. For the purpose of evaluating all schools on equal footing, these special classrooms are considered to be used also as classrooms and are

counted in the number of existing classrooms.

Table 2-3 summarizes the calculation results.

Setting of the Scale of the Assistance

[1] Scope of the Assistance (target sites)

The deficiencies of classrooms ascertained above were prioritized in accordance with the fourth criterion for site prioritization agreed between the both sides, and the scope of sites to be covered by the Project was determined in line with the following.

- As for new schools, an appropriate size per school was set at 1,200 to 1,500 students, or 16 to 20 classrooms, in view of the average size of public schools in UBC, i.e., 1,583 students per school and 1,255 students per school building, and the number of students accepted by a standard school facility constructed by the Mongolian government, 1280 (640 students x two shifts) at the maximum. Those sites where the classroom shortage exceeds 16 rooms are included in the assistance.
- As for existing schools, in consideration of effects against the costs expended, the facilities are assumed as to have at least three floors, and those sites where the classroom shortage exceeds six rooms are included in the assistance.

With these criteria the final sites to be included in the Project were narrowed down to 12 sites, consisting of seven existing schools and five new schools, as shown in shades in Table 2-3.

[2] Setting of the Planned Number of Classrooms

While the requested numbers of classrooms are 24 for new schools and 18 for existing schools, four out of the five new school sites and one out of the seven existing school sites were assessed as a result of the above calculation that the lack of classrooms is beyond the size of the request. With this in mind, the numbers of classrooms to be provided under the Project were determined by setting and applying several facility types based on the identified scale of classroom shortage, and planned according to existing and new schools as follows.

- In view of cost efficiency, the buildings to be constructed will basically have a four-story structure. As for existing schools, three types are set: 8 classrooms, 12 classrooms, and 19 classrooms. As for new schools, a 16-classroom type will be applied to all the sites, in the light of the appropriate school size and the coverage of Japan's budget over the five sites.
- For existing schools, appropriate building types will be determined so as to best complement the deficiencies of classrooms, and the final sizes will be adjusted individually.

The following tables show the processes of selecting the sites to be covered by the Project and the results of calculating the number of classrooms to be provided at the selected sites.

Table 2-3 Calculation of the classroom shortage and the number of classrooms to be provided

Calculation results for existing schools

	Site	District (*1)	Horoo	Current no. of students: G1-G11 [2007/08]	Growth rate of school-aged children (*2) [2013/present]	Population growth rate in the school zone (*) [%/year]	Estimated no. of students in the project completion year [2013]	No. of classroom needed [students/classroom=36, double-shift]	Existing no. of classrooms			No. of usable classrooms	No. of classroom shortage	Planned no. of classrooms
									Existing no. of general classrooms	No. of disqualified classrooms	No. of rooms that can be used as general classrooms			
1	No. 2 School	SU	6	1,992	0.924	3.95	2,234	32	38	1	1	38	-6	
2	No. 3 School	SU	8	1,663		0.52	1,577	22	33	5	0	28	-6	
3	No. 16 School	SU	10	1,486		4.52	1,712	24	25	2	4	27	-3	
4	No. 35 School	SU	14	1,797		2.04	1,837	26	31	12	0	19	7	8
5	No. 19 School	BY	20	1,135	0.911	10.21	1,682	24	17	1	0	16	8	8
6	No. 20 School	BY	1	2,321		5.29	2,737	39	32	0	2	34	5	
7	No. 40 School	BY	14	1,582		-0.76	1,388	20	27	0	2	29	-9	
8	No. 73 School	BY	3	1,105		-0.53	981	14	15	2	0	13	1	
9	Shavi CS	BZ	4	3,824	0.880	8.45	5,050	71	45	1	0	44	27	
	Primary			2,052		8.45	2,710	38	20	1	0	19	19	19
	Secondary			1,772		8.45	2,340	33	25	0	0	25		
10	Amgalan CS	BZ	8	2,301		5.52	2,650	37	28	2	0	26	11	12
	I			1,975		5.52	2,274		25	2	0	23	9	
	II			326		5.52	375		3	0	0	3	3	
11	No. 21 School	BZ	6	1,884		3.86	2,004	28	25	0	0	25	3	
12	No. 79 School	BZ		2,511		6.71	3,059	43	31	0	0	31	12	12
	Primary		9	1,579		6.71	1,924		17	0	0	17	10	
	Secondary		17	932		6.71	1,136		14	0	0	14	2	
13	No. 85 School	BZ	20	932		3.95	996	14	14	0	0	14	0	
14	No. 52 School	KU	1	1,608	0.922	5.60	1,948	28	25	4	0	21	7	8
15	No. 5 School	CH	4	2,066	0.964	2.47	2,250	32	27	0	0	27	5	
16	No. 57 School	CH	11	1,997		1.24	2,047	29	29	3	1	27	2	
17	No. 12 School	SO	18	1,802	0.961	4.99	2,209	31	25	1	0	24	7	8
	Total			**32,006**			**36,361**	**514**	**467**	**34**	**10**	**443**	**71**	**75**

*1 BZ=Bayanzurkh, SO=Songinokhairkhan, BY=Bayangol, SU=Sukhbaartar, KU=Khan-Uul, CH=Chingeltei

*2 Calculated as the ration of the population reaching the age of G1-G12 (age 7-17) in 2013 to the current number of children of G1-11 age. An increase in school-aged children due to the introduction of the 12-year system is included but a general population growth.

*3 Derived by dividing the population by Horoo as of the end of 2005 to the end of 2007 proportionality among the relevant school zones and totalizing it.

Calculation results for new schools

	Site	District (*1)	Horoo	School zone (No. of Horoo)	Population in the school zone [end of 2007]			Population growth rate in the school zone (*4) [%/year]	Estimated no. of students in the project completion year [2013]		No. of classroom needed [students/classroom=36, double-shift]	Planned no. of classrooms
						Ratio of 1-10 year-old children [%]	Estimated no. of 1-10 year-old children		No. of G1-10 students	No. of G1-12 students		
1	Khujir Bulan	BZ	23	Whole 23	9,885	14.42	1,425	21.59	3,787	4,393	62	16
2	Nogooni Zoori	BZ	11	Whole 11	3,872	14.42	558	0.99	586	680	10	
3	361st Garam (*2)	SO	21	Southern part of 21	6,195	16.73	1,036	4.60	1,240	1,438	20	16
4	Near Tahilt (*3)	SO	22	Half of 22	4,508	16.73	754	19.86	1,865	2,163	31	16
5	Near Bayangol	SO	22	Half of 22	4,508	16.73	754	19.86	1,865	2,163	31	16
6	Yarmag	KU	8	Whole 8	8,853	16.08	1,424	2.99	1,650	1,914	27	16
	Total								**10,993**	**12,751**	**181**	**80**

*1 BZ=Bayanzurkh, SO=Songinokhairkhan, BY=Bayangol, SU=Sukhbaartar, KU=Khan-Uul, CH=Chingeltei

*2 There is already a school approximately 11 km north in the same Horoo; the base population is set as the sum of the current dwelling population in and a planned number of households moving into the area (1,408) obtained through interviews.

*3 As both Nos. 4 and 5 are in the same Horoo, each is assumed to have a half of the total population in the Horoo.

*4 As for the new Horoos established in 2007 (S. Khairkhan-22, Bayanzurkh-22 and 23), the growth rates of the former Horoos, before the split, are adopted.

(3) Policies on Project Components

1) Facility Components

The following components are included in the request from the Mongolian side.

- Existing Schools: Classrooms, teachers' room, cloakroom, and toilets with hand washing places
- New Schools: The above plus a gym, computer room, chemistry room, physics room, vocational training room, and kitchen

The above-requested components for existing schools are compliant with the contents of the previous phase (Phase III) of the Project, and are all essential and indispensable for education facilities in consideration of the meteorological conditions in the country. The components provided by Japan's Projects in the past have been used and maintained properly without a problem. Hence, it is deemed as appropriate to provide these in accordance with the planned size of each site.

On the other hand, those requested solely for new schools were excluded from the scope of Phase III for the sake of maximizing benefits of the assistance by constructing as many classrooms as possible at that time. After Phase III, the government of Mongolia formulated the Master Plan for the education sector and built schools with its official funds. The government has clearly taken up initiatives to establish an environment necessary for providing quality education, in addition to quantitative improvement of educational facilities. Based on this background and the priorities put by the Mongolian side, the components of the Project were examined from the following points of view.

- The rooms to be provided must be those that are typical and fully utilized in the existing schools and the schools constructed by the government, and that are difficult to use for other purposes and hence require dedicated space.
- The rooms to be provided must be those that are clearly specified in the government's overall plan or in the curricula currently under use or preparation and that are promising to be definitely needed and frequently used in the future.
- The rooms to be provided must be those for which the Mongolian side can easily secure necessary equipment and personnel and that can be sufficiently maintained by the schools themselves.

The results of examination on necessary components and the policies of provision are as follows.

Gym

In Mongolia, where children cannot do any physical exercise outside during the long-lasting wintertime due to the severe climatic conditions, indoor space for exercise is of considerable importance. A gym is normally provided at each existing school and frequently used by, for example, two to three classes together. Effective utilization for other purposes, such as assembly and extra-curricular activities, including cultural activities, can also be expected. Thus, a gym of a

standard scale will be provided in the Project.

Computer Room

Computer rooms and PC equipment have been procured in schools in the country at large, since the government has announced the strengthening of ICT-based education in its education policies and incorporated the informatics into the mandatory curricula for lower grades of secondary education and higher. All the existing schools are equipped with dedicated computer rooms and equipment—most typically 20 PCs per room—and the rooms and equipment are constantly in use even after the class hours. As the installation of computers requires dedicated rooms and power supply systems, computer rooms will be provided under the Project.

Physics Room, Chemistry Room

Regarding the provision of science laboratory, while there are some schools furnished with dedicated rooms with experiment tables for students, the majority of schools only provide lessons in general classrooms based on demonstrations by teachers, mainly because of the lack of dedicated spaces. In the meantime, as the government has announced its policy to strengthen the development of scientific human resources, schools are now working toward an improvement of teaching methods. Under such circumstances, it is highly expected to provide such facility that can accommodate future improvement in experimental lessons. Accordingly, the Project will provide special classrooms, which can be commonly used for other functions, and bare minimum equipment, in preparation for the introduction of experimental lessons in accordance with the status and school policies in the future.

Vocational Training Room

Technical education (technical arts and homemaking) is a part of the curricula for the fourth and higher grades. Practical lessons at dedicated rooms are generally held from the secondary grades. Specifically, male students learn woodwork, metalwork, electric repair, etc., while female students engage in handcraft, needlecraft, cooking, etc. However, the contents of practical lessons vary according to schools. The Project will respond to the situation by providing power source systems in the afore-mentioned special classrooms so that schools can set up equipment and perform vocational training lessons, though at the minimum level, as necessary according to the school policies.

Kitchen

The supply of light meals to primary students started in 2006 in all primary schools. It is instructed by the authority that schools secure a section of space to temporarily keep the food and containers delivered. The Project will therefore provide a small room as a kitchenette with equipment for hot water service where people can serve tea and cook soup or other simple dishes.

2) Equipment Components

The following components are included in the request from the Mongolian side.

- Furniture, basic teaching material, maintenance tools

The Mongolian side agreed that it is Mongolia's responsibility to provide necessary equipment (PCs, laboratory equipment, vocational training equipment, etc.) that are need for rooms other than general classrooms at new schools. The results of examination on necessary components and the policies of provision are as follows.

Furniture

The following pieces will be provided under the Project as furniture minimally required for the management of the facilities to be constructed under the Project.

- Classroom : Desks and chairs for students and teachers, blackboard/bulletin board
- Teachers' room : Tables and chairs for meetings, desks and chairs for the headmaster and other management staff, cabinets
- Computer room : PC desks and stools for students, desk and chair for teachers, bulletin board
- Special classroom : Desks and chairs for students, laboratory table and chair for teachers, blackboard/bulletin boards, cabinets
- Kitchenette : Open shelves (for temporary storage of school-provided meals)

Teaching Equipment

The requested components are identical with the contents of Phase III project. They are all essential equipment commensurate with the contents of education at respective stages, and have been confirmed not necessary to change under the current curricula. The equipment provided in the past has been fully utilized in general lessons at classrooms and also maintained properly without a problem. Thus, the Project will provide the equipment, as requested, in accordance with the planned number of classrooms.

Maintenance Tools

The requested components (maintenance tools) are identical with the contents of Phase III project, and are essential for routine maintenance of the facilities and equipment to be provided under the Project. Each school will be staffed with servicing personnel for the facilities and equipment installed at the school, posing no concern over maintenance capabilities. Thus, the Project will provide the maintenance tools as requested.

(4) Policies on Natural Conditions

1) Consideration for Meteorological Conditions

UBC is situated on highlands at an elevation of approximately 1,300 m in the midlands of the Eurasia continent. It has a typical continental climate; while the lowest temperature can go below -30 degrees Celsius in winter, the highest temperature exceeds 30 degrees Celsius in summer. The difference in temperature in the day is as large as 15 to 20 degrees Celsius on average. An annual precipitation is limited to 270 mm, which mostly concentrates in summer with frequent torrential downpours. Moreover, windblasts that are unique to the continental climate are recorded throughout the year, with an occurrence of tornados and sandstorms. Taking these climatological conditions into account, the following policies were put together for facility planning in the Project.

- The buildings to be constructed under the Project will be equipped with heating systems sufficient to manage with the weather conditions during the rigorous winter. At the same time, the heat insulation of the whole building will be maximized by applying thorough external heat insulation and improving the heat insulation capability of windows of the building that are usually fragile in terms of heat insulation.
- The surface of the building in contact with ambient air will be reduced by simplifying the shape of the building to the extent possible, and no space where snowdrifts are likely formed will be created.
- The windows of the building will be designed as sufficiently air-tight and wind-resistant to stand windblasts and sandblasts.
- The building will be designed in such a way that classrooms will face the south, in principle, whereby solar heat in winter and natural lighting can be well secured. On the other hand, the windows along the corridors, on the northern side, will be limited to a bare minimum size for natural lighting in order to minimize heat loss.

2) Consideration for Natural Disasters

Natural disasters potential in UBC include floods due to torrential rainfalls, gales, lightning strokes, etc. There is no site that has a history of flood or other disasters among the sites covered by the Project, but the floor height will be planned in consideration of possible inundation at a time of flood. At the same time, the specifications and fixing methods of accessories on the external walls will be determined in the light of possible damage by windblasts and also lightning protection will be provided on the roof of the main building.

Mongolia has experienced an M8 inland earthquake in the past, but major seismic zones concentrate on the Central Western region. There is no record of damage to buildings inflicted by earthquakes in UBC. However, frequent earthquakes at the level of M5 to 7 have been observed approximately 300 km west of UBC, and an earthquake with an intensity of 4 on the JMA (Japan Meteorological Agency) seismic scale has been recorded in the city. Considering that the Mongolian building

standards require seismic-resistant designs according to the area of construction, the Project will adopt a seismic-resistant design in compliance with the standards.

3) Consideration for Geographical and Soil Conditions

All project sites are either flat or gently inclined at a gradient of 5% at the maximum. The layers at a depth of 3.0 m or lower, assumed to be the supporting layers, are very hard sandy/clayish soil mixed with gravels. The buildings will be designed based on the following policies in consideration of these geographical and soil conditions.

- At those sites for new schools where there is an inclination, the layout and the floor level of the buildings to be constructed will be planned by standing on the orientation of the buildings and their relations with surrounding buildings and taking advantage of the geographical conditions.
- The level of the foundation is set at a freezing depth of approximately 3.0 m to prevent frost heaving damage to be caused by soil freezing, and the resulting underground space will be made most use of as a machine room, cloakroom, etc.

(5) Policies on Socio-economic Conditions

1) Consideration for Urban Planning

UBC is carrying out urban development projects in some districts based on its city master plan. At the sites included in the area of the district level development plan, the layout of the buildings should be considered with due attention paid to the plan of town blocks and the positions of infrastructure to be developed by the city. In actual layout planning for the Project, the rough building layout plans agreed by the relevant authorities during the field survey will be followed in addition to UBC's development plan drawings per district.

2) Consideration for Economic Situations

Mongolia has been enjoying a rapid economic growth for the past few years, but a soaring inflation has ensued and is pushing up construction materials prices. Moreover, the insatiable demand for construction works has triggered a shortfall in supply of construction materials, labor and machinery in UBC, especially in summer when all works concentrate. Therefore, the materials, specifications and methods to be employed in the Project will be selected in view of the proactive use of materials from Japan or third countries where prices and supply are relatively stable, thereby minimizing impacts of the inflation in Mongolia, which is foreseen to continue for a while.

(6) Policies on Local Conditions Related to Construction

1) Permissions, Building Standards, etc.

The construction in the Project will be allowed to commence when the details of the designs are reviewed and approved by the relevant authorities in accordance with the Mongolian building

permit system. There also will be several interim inspections during the construction and a final inspection at the completion of construction before being put to use. The review will be conducted in comparison with detailed standards for educational facilities, general standards for public facilities, structural and building safety-related norms, regulations concerning water supply, heating, and other infrastructure connections, and various other relevant rules. Since some of these are under revision and some reviews and guidance are based on the norms of the former U.S.S.R., it is critical to closely communicate with competent authorities at each phase of design and construction in order to specifically confirm the details of design in depth. For this purpose, a local consultant, who has deep knowledge on the building standards and review systems in the country, will be hired. The consultant will play a pivotal role in close coordination with the parties concerned during design stage. The implementation schedule will also be determined with due consideration given to the time required for processing necessary permission procedures. The following table describes the steps and procedures related to building permits needed prior to the commencement of construction. The review at the detailed design stage requires a period of approximately four months.

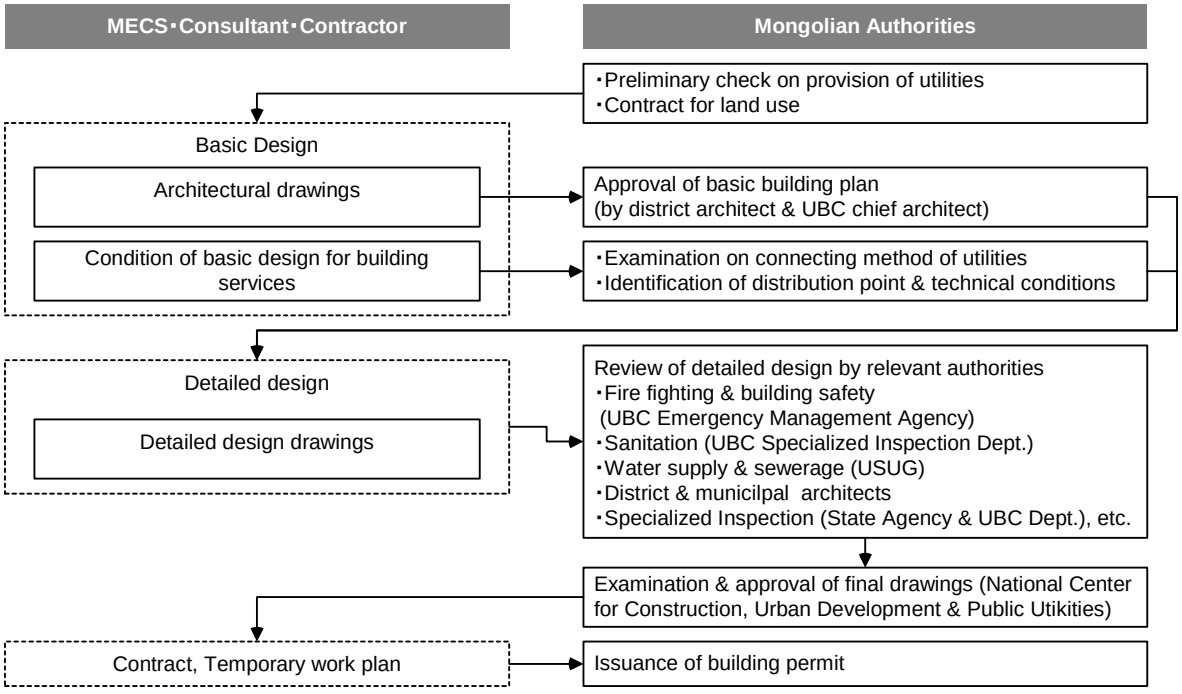


Figure 2-2 Procedures for Permission Needed Prior to the Commencement of Construction

2) Construction and Procurement Conditions

The statuses of construction and procurement have been drastically changing in Mongolia these recent years, in accordance with the rapid economic growth. There are many construction materials and methods that used to be unavailable in the country but have become popular in the meantime, and some industrial products have become domestically produced in full swing. In view of these recent situations in the construction sector, the optimal specifications and methods are

determined based on the following basic policies, by comprehensively comparing the performance, workability, stability in procurement, cost, cost fluctuation, etc.

- For the building structures, construction methods using ready-mixed concrete will be considered in the light of the supply and construction system being almost fully established in the country, instead of pre-cast concrete products that are constrained volume-wise.
- Keeping to the minimum the use of domestic products that are subject to striking price increase due to pressing demand, the materials and specifications to be adopted in the Project will be determined with focus on direct procurement of imported industrial products that excel in quality and have relatively stable price and supply systems.
- As for the materials and specifications for the exterior works, such as roofing and walls, the adoption of dry methods, which are labor- and time-saving, will be studied in consideration of the necessity for completing the works within the limited summer time.

As far as procurement of materials is concerned, locally-procured products will basically be delivered by trucks from around UBC and those to be procured outside the country will mainly be transported by railway via Zamyn-Uud at the border with China. Most of the trunk roads around UBC are paved and hence pose no concern over the transportation of materials, but, in case of railroad transport, the cargo needs to be transloaded whereas the existing facilities are not sufficient to respond to an increase in freight. Consequently, the cargo may be held or delayed quite often. That being the case, a well-planned procurement will be organized in the Project by employing as much container transport as possible, considering its ease to transload, and sparing ample time for transportation in the procurement plan.

(7) Policies on Utilization of Local Contractors

1) Construction Companies

There are approximately 1,100 construction companies in UBC, which are registered to the National Center for Construction, Urban Development and Public Utilities. Of these, a mere half or less have actual offices and are operating business activities. Major public works and large-scale construction projects in the private sector are carried out by large and medium-sized construction companies including those with foreign funds. No problem is observed in their quality, construction management, and ability to procure materials, equipment and labor. That being the case, large and medium-sized companies which have a certain level of construction capabilities will be evaluated from a comprehensive standpoint with a focus on experience in construction of educational facilities or other similar projects and know-how and network in conjunction with construction and procurement in the country. Suitable companies will be selected and made use of for the smooth implementation of construction.

2) Local Consultant

There are roughly 240 architectural design offices registered to and based in UBC, some of which are specialized houses in structures or building services. Many of them have been amassing experiences on the occasion of the recent construction boom. In coordination with competent authorities in terms of building permits and procedural inspections as well as creating application drawings in conformity to the building standards and prescribed formats in the country, the Project inevitably needs to collaborate with a local consultant. Those consultants with experience in similar tasks will be assessed and screened in view of their technical prowess and ability to accomplish tasks. The selected consultant will be fully utilized particularly in structural and building service designs, which are the key in technical evaluation by the authorities.

(8) Policies on Operation and Maintenance

General schools in Mongolia are responsible for their own operation and maintenance under supervision and guidance of the respective local education departments. However, approximately 70% of the budget allotted for operation is spent on personnel and social security expenses, leaving only a limited amount of fund for the maintenance of facilities. That being the case, methods and materials for constructing strong and durable facilities will be selected so as to alleviate the burden of maintenance on the schools as much as possible and require no special techniques in maintenance activities.

(9) Policies on Setting of Grades of Facilities and Equipment

The grades of facilities shall comply with relevant standards concerning educational facilities in Mongolia. Concurrently, the contents and specifications of designs of common school buildings that have been constructed in preceding grant-aid projects provided by the government of Japan or built with the Mongolian government's funds will be compared and evaluated from various standpoints of functionality, economic efficiency, ease of maintenance, etc. Appropriate grades at such a level that functions and durability needed as school facilities are assured will be selected. However, the specifications for heat insulation, which is directly related to the basic performance of the building, will be assessed comprehensively and determined with respect to the external walls, roofs and windows so as to strike a balance in the heat insulation performance as the whole building.

Moreover, all furniture and equipment to be provided will be those essential components commonly provided to the existing schools and have specifications and grades commensurate with the Phase III grant-aid project, which was planned in accordance with the standard grades of furniture and equipment procured by the Education Department of UBC.

(10) Policies on Construction and Procurement Methods and Implementation Schedule

Construction works in Mongolia are largely constrained by the severe weather conditions in winter.

Generally the construction starts with excavation in early or mid April where the frozen ground starts to melt, and all the works necessary to accommodate heating systems, i.e., works in association with building structures, exteriors, and heating systems themselves, have to be completed by mid October when heating operation begins. For this reason, the six months in the summer time becomes the peak season for primary construction works; the labor and materials become scarce in this time frame and an around-the-clock work plan, including work on day-offs, needs to be developed. In the Project, the construction terms at major sites will be planned over multiple years in order to carry out critical works, such as structural and exterior works, in a smooth manner, and the works will be carried out based on the following policies.

- The 12 sites dispersed across UBC with a combined floor area of approximately 30,000 m^2 will be grouped into three with an appropriate construction scale each, and every group will be carried out with a different time schedule.
- At the sites where the construction commences in the second or later year, the structural work below the ground will be completed in the initial year and all works above the ground will be carried out in the following year, so that a sufficient period of six months can be allocated to the structural and exterior works above the ground.
- Grouping of sites and the contents of works for each year will be planned with consideration given to leveling of workload throughout the entire construction period.
- In planning construction schedule, due attention will be diverted to the acquisition of permits needed at the time of commencement of the works and at each stage during construction and the time required to procure materials and equipment. Furthermore, the work schedule must assure that the start and the end of exterior works, which are particularly critical path, will adhere to the planned deadlines.

2-2-2 Basic Plan

The basic plans for facility and equipment are firstly developed based on the contents and specifications of designs of general schools having been constructed in the previous phase of Japan's grant aid project and with the Mongolian government's funds and then improved to incorporate the actual conditions of use and maintenance of the facilities ascertained during the field surveys. The basic plans should be compliant with the governing standards and norms for educational facilities in Mongolia, and will take into account the consultation with and guidance by the relevant authorities of Mongolia during the field surveys.

(1) Layout Plan

The layouts of the buildings are planned in accordance with the following rules, based on the basic layout plans confirmed during the field surveys with the attendance of the parties concerned, namely the Land Management Department and Town Planning Department of UBC and school

stakeholders, with consideration given to the status of existing facilities and underground infrastructure elements at each site.

- In order to maximally take sunshine into classrooms, the longitudinal side of the building will be laid in the direction from east to west so that the classrooms face the south.
- In order to minimize impacts of the shades of existing school buildings, the buildings to be newly constructed will be laid out with sufficient spacing (at least 6 m) from the existing buildings. The layout will be determined also in consideration of the shades of neighboring buildings such as high-rise apartments.
- The buildings to be constructed under the Project will be laid out in parallel with the neighboring buildings or town blocks to achieve harmony with the surrounding environment.
- In order to establish easy access between existing school buildings and new buildings, the positions of entrances/exits of the existing school buildings are taken into consideration in deciding the orientation and position of the new buildings.
- At the sites in developed urban areas where regional central heating systems, water and sewer lines, or other underground service lines are in place, the buildings will be laid out to avoid such existing infrastructure.
- The building layout will be planned to maximize effective vacant spaces for playgrounds, etc. In cases where part of current playgrounds needs to be subjected to the construction, the occupation by the new buildings will be kept to the minimum.
- At those sites where underground sewage tanks and boilers are to be installed, pathways will be planned for vehicles to access for pumping sewage up and supplying coal to boilers on a regular basis.
- The layouts will be in agreement with the details of urban planning of the city, such as the width of the road in front of the school, drawing of town blocks, etc., at respective sites.

The following points will also be taken into account with regard to new schools.

- Land preparation will be kept to the minimum and the building will be laid out in parallel with the direction of the geographical inclination, in principle, in order to avoid soil erosion and blown sand burial after the completion of construction.
- In order to prevent the width of the building cluster from getting unnecessarily large, the gym will be laid out perpendicular to the classroom block, and positioned south of the building to avoid the shade of the building.

(2) Architectural Plan

1) Standard Building Types

In accordance with the design policies described above, four standard building types were set: 8, 12, and 19 classrooms for existing schools and 16 classrooms (with a gym building) for new schools. The four are subcategorized into seven with respect to the details of building services to be provided, depending on the conditions of the premises and infrastructure at the sites. Furthermore, the 16-classroom type for new schools includes a horizontally reverse type and a special type which has the gym close to the front side of the classroom building. The most appropriate building type will be selected depending on the local conditions at the respective sites. The following table explains the contents of buildings to be constructed by site.

Table 2-4 Contents of Buildings by Site

Site	District	Building type	No. of classrooms	Facilities		Building services		
				Classroom building	Gym	Water tank	Sewage tank	Boiler
Existing schools (7)								
1 No.35 School	Sukhbaatar	8CR-S	8	○	-	-	○	-
2 No.19 School	Bayangol	8CR	8	○	-	-	-	-
3 Shavi CS	Bayanzurkh	19CR	19	○	-	-	-	-
4 Amgalan CS	Bayanzurkh	12CR-S	12	○	-	-	○	-
5 No.79 School	Bayanzurkh	12CR-BS	12	○	-	-	○	○
6 No.52 School	Khan-Uul	8CR	8	○	-	-	-	-
7 No.12 School	Songinokhairkhan	8CR	8	○	-	-	-	-
New schools (5)								
1 Khujir Bulan	Bayanzurkh	16CR-BW-r	16	○	○	○	○	○
2 361st Garam	Songinokhairkhan	16CR-BW	16	○	○	○	○	○
3 Near Tahilt	Songinokhairkhan	16CR-BW-r	16	○	○	○	○	○
4 Near Bayangol	Songinokhairkhan	16CR-B-s	16	○	○	-	-	○
5 Yarmag	Khan-Uul	16CR-B	16	○	○	-	-	○
Total			155	12	5	3	6	6

Acronyms for sub-building types

S: With sewage tank W: With water /sewage tanks B: With boiler (r: reverse type s: special type)

2) Floor Plan

Classroom Building

The floor plan of classroom buildings will be prepared in accordance with the following rules, based on the plans used in Phase III project.

- The underground space created due to the necessity to have the foundation at a freezing depth or lower will be effectively utilized as a machine room, storage room, cloakroom, hall, etc. that do not require natural lighting.

- Classrooms will be placed with one-sided-corridor to secure light intake directly from the external side and indirectly from the corridor side, for taking mitigation measure to uneven light distribution inside of them.
- The plan will be a pure rectangle with straight lines so as to minimize the surface of the building by volume, thereby enhancing the heat insulation on the whole. This type of plan is concurrently effective for increasing workability and cost efficiency.
- Staircases are provided at the two ends of the building or near the ends in order to secure daily convenience and two-way evacuation routes in case of emergency.
- The basic span length in the longitudinal direction will be set at 3.6 m, which is a half of the span of classrooms. The number of spans in the longitudinal direction will be increased in accordance with the number of classrooms for a selected building type. In case of the 8- and 12-classroom type, however, the span for toilet space will be set at 6 m as an optimal size in consistency with the number of classrooms. The teachers' room and the entrance hall will be planned above and beneath the toilet space, respectively. Incidentally, the largest length of the building will be set as 50 m more or less, which does not require structural joints, and the 16- and 19-classroom types will be considered as to have the maximum size.

The floor size and size of each room is planned as follows.

- Classroom

As opposed to the standard classrooms size in Mongolia (6 × 9 m), the classrooms constructed in Phase III project have a shorter span in order to shorten the distance between the last row of the class and the blackboard, and a narrower width of external walls for improved heat insulation and reduced construction cost. Following this example, the classroom will be planned to have a size of 7.6 m × 7.2 m (on the column center basis), suitable for 36 students at the maximum.

- Special Classroom (Multi-purpose room: for new schools only)

To allow diverse uses depending on educational plans of individual schools, special classrooms will be designed without an anteroom but as a spacious room equivalent to 1.5 times a common classroom. Doors will be provided at two locations to allow a split of the room into two sections as necessary. The room will be furnished with a laboratory sink and power supply for motive energy necessary for the use of power tools in technical practical lessons, etc.

- Computer Room (for new schools only)

In view of the actual status of typical use at existing schools, the computer room will be designed for 36 students per lesson to use 20 PCs. The size will be set as same as a common classroom. The room will be planned on the second or higher floor, avoiding the first (ground) floor where unspecified people can access, in consideration of the risk of theft of equipment. Plug outlets will also be provided to fit the most-likely layout of the furniture.

- Teachers' Room

The necessary floor area set forth by the Mongolian Standards for Educational Facilities (at least 2.5 m^2 per teacher) and office space for managerial staff other than general teachers, meaning the managers of primary and secondary educations will be secured. The actual size of the room will then be adjusted optimally depending on the size of the building itself; it will be set at 6 m × 7.6 m above the toilet space for the 8- and 12-classroom types and at 10.8 m × 7.6 m, equivalent to three spans, for the 16- and 19-classroom types. In case of the 19-classroom type, the space underneath the staircase will also be leveraged, and as for the 16-classroom type designed for new schools, the room for the headmaster will independently be provided next to the teachers' room.

- Kitchenette (for new schools only)

A small room for storing school-provided food (snacks and beverages), serving hot water, and cooking easy meals, such as soup, will be provided adjacent with the teachers' room, and it will be furnished with a sink.

- Toilets

Toilets will be provided above the entrance hall on the second and third floors where water can be supplied directly with the pressure of municipal water supply system. The pipes will be concealed in the false ceilings above the hall. Toilet room on each floor will be composed of toilets for male students, female students and teachers. There are three room types in accordance with the building types (8-, 12-, and 16/19-classroom types). The number of fixtures will be designed according to the Mongolian Standards for Educational Facilities: one toilet bowl per 30 females, one bowl per 40 males, and one hand-washing faucet per 30 students, plus a slop sink. Furthermore, an independent hand-washing station will be provided in front of the toilets where students can wash hands without entering into the rooms.

- Corridors

In Phase III project, the width of the corridor (between column centers) was set at 2.8 m in consistency with the Mongolian Standards for Educational Facilities, which stipulates the effective width to be at least 2.2 m. The same width will be adopted in the Project; considering that the corridors will be used for physical exercise of students during breaks in winter, while the width of the columns on the external wall side of the corridor will be minimized to allow as large effective space as possible. Furthermore, an escape exit and a ladder down to the ground level will be provided on the fourth floor in accordance with guidance by the Fire Department.

- Cloakroom

Similarly to Phase III project, the cloakroom will be provided on the basement floor for effective utilization of underground space. The floor area will be set in compliance with the Mongolian Standards for Educational Facilities, i.e., 0.15 m^2 per student or more, and be determined to allow sufficient space for providing coat hooks for all students in accordance with the building type. An

escape staircase directly leading from the cloakroom to the outside of the building, with a width of 1.5 m, will also be provided conforming to the guidance by the Fire Department.

- Entrance Hall

As all the students will drop by in the cloakroom on the basement floor in the beginning and after class during the wintertime, a staircase with a width of 1.8 m, which is wider than that of the other staircases in the building, will be provided in the high hallway facing the entrance hall, for the sake of openness in the space. Moreover, a hall with sufficient space will be provided in front of the cloakroom to allow students to hang out when coming to or leaving school. Natural light will be taken in through the high hallway.

Gym (for new schools only)

The gym will be provided as an independent building from the classroom building, in consideration of the difference in the span and floor height and the disturbance of lessons in classrooms by the noise of games. Similarly to the classroom building, however, the gym building will have the semi-buried structure for effective utilization of underground space. The minimal incidental rooms including a couple of changing rooms for males and females will be designed on the upstairs. An escape staircase leading directly to outside, with a width of 1.5 m, will also be provided in accordance with the Mongolian building standards. The size of the arena is also determined as 12 m × 24 m in compliance with the Mongolian Standards for Educational Facilities. The span in the longitudinal direction will be set as 3.6 m, the same as that of the classroom building, with a view to standardization of materials and architectural details. The overall size of the building, including the incidental rooms, will be set at 12 m × 28.8 m (3.6 m x 8 spans). The arena will be directly connected to the basement hall of the classroom building through a connecting pathway.

Boiler House

At those sites where independent boilers will be installed, a boiler house will be constructed as an independent building. The size will be determined at the minimum level required for accommodating the equipment to be procured. An anteroom for boiler operators is needed for the operations around the clock and hence will be provided under the Project.

Floor Area by Room

Based on the above plans, the following table summarizes the contents of facilities and floor areas of rooms by building type.

Table 2-5 Contents and Floor Area by Building Type

Building type				Existing schools				New schools
				8CR 8CR-S	12CR-S	12CR-BS	19CR	16CR-B 16CR-BW
Classroom building	Classroom	Classroom	No. of rooms	8	12	12	19	16
			Floor area (m^2)	59.54/room	59.54/room	59.54/room	59.54/room	59.54/room
		Special classroom	Floor area (m2)	-	-	-	-	89.32
		Computer room	Floor area (m2)	-	-	-	-	59.54
	Teachers' room (per head)		Floor area (m2)	49.62 (3.82)	49.62 (2.61)	49.62 (2.61)	104.20 (3.72)	89.32 (3.57)
	Headmaster's room		Floor area (m2)	-	-	-	-	12.60
	Kitchenette		Floor area (m^2)	-	-	-	-	9.72
	Toilet		No. of rooms	2	2	2	2	2
			Floor area (m^2) *1	49.62/room	49.62/room	49.62/room	59.54/room	59.54/room
	Cloakroom (per head)		Floor area (m^2)	62.43 (0.22)	77.19 (0.18)	77.19 (0.18)	119.75 (0.18)	109.66 (0.19)
	Total floor area of the classroom building			1,558.38	1,974.50	1,974.50	2,852.35	2,839.45
Gym			Floor area (m^2)	-	-	-	-	475.26
Boiler house			Floor area (m^2)	-	-	38.44	-	38.44

Total floor area (m^2)	1,558.38	1,974.50	2,012.94	2,852.35	3,353.15
No. of applicable sites	4	1	1	1	5
Total floor area (m^2)					29,839.06

*1 The area includes the alcove.

3) Sectional Plan

Classroom Building

Taking advantage of the underground space created as a result of frost heave countermeasures and reducing the construction cost per classroom by applying a multistory structure to the building within the scope of feasible construction schedule, the classroom building is planned to have four stories and a basement. The sectional plan of each element is designed as follows:

- The floor height is set at 3.3 m in accordance with the Mongolian Standards for Educational Facilities, and the first (ground) floor is elevated by +0.75m from the reference ground level in preparation for floods at times of torrential rain or frost damage due to snowdrift at times of snowfall. The floor height of the basement is set at 3.45 m between the level of the foundation bed as required by frost heave countermeasures and the lowest possible ceiling to allow a water tank to be installed. The foundation bed is planned to be at 3 m or deeper below the ground level, which is a general freezing depth of soil in UBC.
- In order to take in natural light into the back of classrooms as much as possible, the windows in the longitudinal direction will be designed as high as possible underneath the beams. The height will be common for classrooms and corridors, but the width of windows in classrooms

that face the south will be maximized for the purposes of daylight and heat collection, whereas that in corridors will be limited to the least necessary for daylight to minimize heat emission.

- The windows on the corridor side of classrooms will be set over the height of eye line, so that glances of people passing by will not disturb the class and also that daylight will be let in from the corridor side for a balanced illumination across the room.
- The beams around the building will be designed to minimize its projection inside the rooms, which creates oppressive feeling, with narrow and tall cross sections. The height of the beams on the longitudinal direction will be standardized for the sake of efficient construction. On the other hand, as for the beams in the span direction, the width will be set as same as that of columns and the height will be minimized so as to allow a sufficient dimension beneath the beams (2.7 m.)

Gym

The height of the ceiling of the gym will be set as same as the standard ceiling height of similar buildings, 7 m, and the floor height is set at 7.2 m. The gym will be designed as a semi-buried structure for effective utilization of the underground space. Daylight will be let in from the windows provided above the ground. The floor level of the arena is set at -2.7m from the ground level, like the classroom building, but the reference ground level will be adjusted in order to minimize the excavation depth in accordance with the conditions of the ground at each site. In case of the difference of the floor levels between the gym and classroom building, it will be adjusted by setting up a staircase at the underground connecting pathway.

Designing of Heat Insulation for Roofs and External Walls

In order to be supplied with central heating in UBC, the sections of buildings in contact with ambient atmosphere must have a heat transmission coefficient of 0.4 or lower as the heat insulation performance. The Project will follow the same requirement with respect to the specifications of roofs, external walls, floors, and windows. Heat insulation will basically be external heat insulation, which will be achieved by linking thermal barriers where possible to maximally avoid creation of heat bridges.

- The roofs will be designed as deck roofs, and an insulator will be laid over the cast-in-place concrete slab. For the waterproofing, metal sheets with standing seam joints, which are applicable to low gradients, will be adopted in the Project, as opposed to asphalt built-up waterproofing with a protective layer of concrete employed in Phase III in accordance with the standard specifications in the country. The metal sheets allow dry works irrespective of ambient air temperature and save labor.
- The main parts of external walls will be designed as ALC (autoclaved lightweight concrete) panel walling of a dry type, in place of brick walls whose price is increasing. The other side of

the thermal insulation, that is, the indoor walls, will be made of concrete blocks that have high resistance to impact and excellent durability.

- For windows, heat-insulated sashes made of PVC will be adopted as they are becoming increasingly popular in recent years, while low-emission double-glazing will be used to assure high heat insulation. For the purposes of natural ventilation in summer and supplementary ventilation during the heating season, windows will be accompanied by small ventilation openings, which will be covered by steel grilles on the first floor in order to prevent theft.

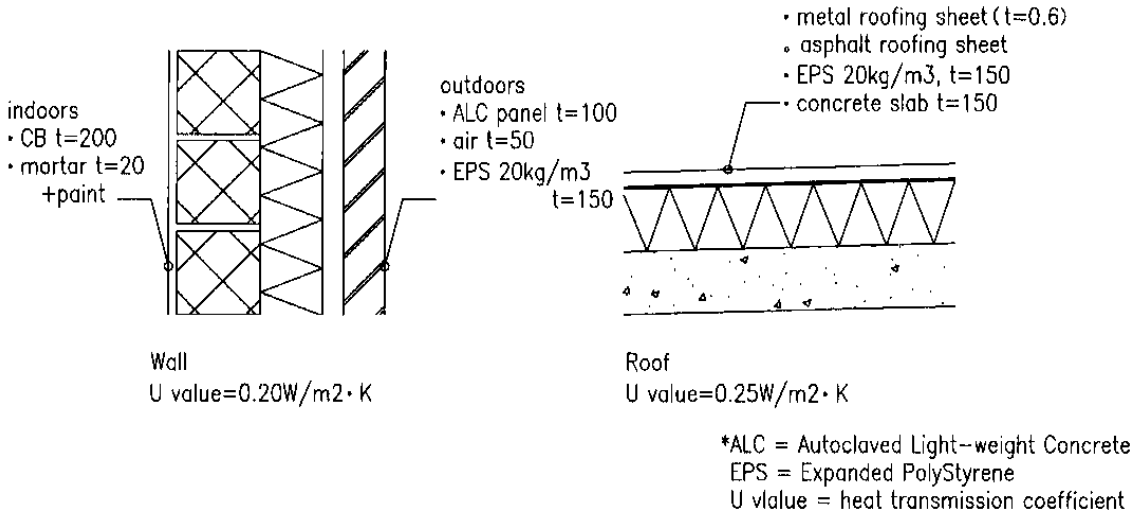


Figure 2-3 Heat Insulation Specifications for Roofs and External Walls

4) Structural Plan

Structure Types

- Main structure : The frame structure with cast-in-place RC columns and beams will be adopted, as it is the most common in the country. In designing the structural profile, due consideration is given to standardization of the cross section of basic members in order to simplify the construction works to the extent possible, for completing the structural works within the limited time of summer.
- Foundation type : The investigation on the soil conditions at the project sites has found that the soil at 2.0 m below the ground surface or lower is generally an extremely rigid stratum—gravel layer mixed with sand or sand/clay layer with gravels—with an expected bearing capacity of 200kN/m^2 or more. As for the foundation, independent RC footings with foundation beams, which allow a most efficient design, will be adopted assuming the long-term bearing capacity of soil as 200kN/m^2. The level of the foundation bed is set at 3.46 m below the ground level as a countermeasure against frost heave.
- Floor structure : Cast-in-place RC slabs, which are taking over PC floor, will be used. The

slabs of the basement floor will be designed as slabs on grade while the others, including roofs, will be designed as structural slabs.

- Basement walls : PC blocks of 400 mm width, which are most popular method in the country to support the earth pressure with their own weight, will be used in the Project.

Structural Standards

The construction-related standards in Mongolia will be observed basically, partly referring to the Japanese standards (AIJ) as necessary.

- Live load : Roof $0.6kN/m^2$
  : Classrooms, teachers' room, toilet $1.96\ kN/m^2$
  : Corridors, halls, staircase $2.95kN/m^2$
- Wind load : Although the requirement is $35kgf/m^2$ (Regional Category II), the seismic force will be based on in the design considering that the seismic force is greater in terms of horizontal force.
- Snow load : Although the requirement is $50kgf/m^2$ (Regional Category II), the permanent load will be based on in the design considering that the permanent load (fixed load + live load) is greater in terms of vertical load.
- Seismic force: The project sites fall under the zone with 6 to 8 on the MSK seismic scale, which are equivalent to 4 to 5 on the Japan Meteorological Agency's seismic scale. While UBC's regional zoning by seismic scale is quite complicated due to the soil conditions at different places, most of the project sites belong to scale 7 zone as defined on the zoning map. Thus, the design in the Project will be based on the base shear coefficient of 0.08 that corresponds to scale 7.

Structure Materials

Structure materials are planned as follows in compliance with the norms in the country:

- Concrete: ready-mixed concrete (Mongolian standard product)
  - Main structure (foundation, columns and beams, etc.)
    : M350 (Fc=25N/mm2 equivalent)
  - Other parts : M350 (Fc=25N/mm2 equivalent)
- Rebars, section steels: round and deformed bars to be imported from Japan or produced in Mongolia (JIS product)
  - Rebars of D16 or lower : SD295A Yield strength of 295MPa
  - Rebars above D16 : SD345 Yield strength of 345MPa
  - Section steels : SS400 Yield strength of 235Mpa

5) Building Services Plan

All building services installed under the Project should be accordant with the technical standards in Mongolia and guidance provided by relevant authorities. Furthermore, an indoor environment suitable for the severe weather conditions in the country must be secured. With these basic policies in mind, the building services are planned as follows.

Electrical Installations

- Power receiving and main feeder system : Low-voltage power (3-phase/4-wire, 380/220V 50Hz) is drawn into the lead-in switch box set up inside the premises and supplied to the main distribution panel in the underground machine room via buried cables. The Japanese side will bear the responsibility for power connection after the lead-in pole in case of aerial lines or the lead-in switcher in case of buried lines. Inside the buildings, a distribution panel will be installed on each floor for supplying power to various loads. For the distribution circuit for heating, water and hot water supply, and other pumps indispensable for operating the building properly, an automatic voltage regulator will be installed to assure stable power supply.
- Lighting system : Fluorescent lights, in most cases, or otherwise will be provided in accordance with the function of each room. The illuminance by room will be designed as the minimum level, based on the Mongolian standards, as follows.
  - Classrooms :300 Lx
  - Teachers' room, gym : 200 Lx
  - Corridors, halls, toilets, machine rooms, etc. : 75 Lx
- Plug outlets : Two outlets will be provided per classroom and the necessary number according to the respective loads expected for other rooms. A special classroom will be provided with the necessary number of outlets based on an assumption that experiments will be performed in groups, and a special power panel so that experimental equipment or tooling machines can be used in the room depending on educational programs.
- Fire alarms : In compliance with the building safety standards, an automatic fire alarm system consisting of smoke detectors and alarm bells will be provided. The detectors will be set up all over the building, except the toilets and the boiler house, and the control panel will be set up near the entrance on the first floor where guards will be stationed all the day.
- Bell system : An electromagnetic bell will be set up on each floor. They will be remotely controlled from the teachers' room.
- Communication systems : A terminal board will be set up in the underground machine room. Conduits and a telephone outlet to each of the teachers' room and computer rooms will be covered in Japan's scope of work. The Mongolian side will be responsible for installing devices, drawing line, and connecting the line.

- Lightening protection : Roof-conductor type lightning protection system will be set up on the top of the main building, in accordance with the guidance by the UBC Fire Department.

Water Supply, Drainage and Sanitary Equipment

- Water supply system : The data from the UBC Water Department shows that the water pressure at the project sites is 3kg/cm^2 or more. At those sites where city water is available, it is feasible to directly connect to the city water. In case of existing schools, water pipes will be branched from the existing water main in the premises, in principle, while, in case of new schools, an inspection pit will be set up at the lead-in point in the premises, and the Japanese side will bear the responsibility from the inspection pit inwards. At those sites where the city water is not available, water will be supplied by water tank trucks, by setting a water tank in the machine room on the basement floor. The tank will have a capacity equivalent to an assumed one-day consumption. Water is then pumped up to the supply points on the above floors using pressure pumps. The supply points include the toilets (for flushing and washing hands), hand washing station, machine room, boiler house (for cleaning and washing hands), special classrooms (for a laboratory sink), changing rooms in the gym, and kitchenette.
- Hot water supply system : Hot water will be supplied to all supply points of water, excluding flushing at toilets, from an electric water heater of the storage type in the underground machine room. Hot water, mixed with cold water to an appropriate temperature, will be transferred directly from the machine room. The hand washing station in front of toilets and the kitchenette will be equipped with mixed tap water to also supply cold water.
- Sanitary equipment : The numbers of toilet bowls and washing basins are planned in accordance with the Mongolian Architectural Standard for Educational Facilities. The table below shows the plan of providing sanitary equipment according to the building types (number of classrooms). In addition, a laboratory sink in the special classroom and another sink in the kitchenette will be provided at new schools, and a washing basin in the boiler operator's room at the sites where the boiler house will be built. As for toilet bowls, the squat type (for closet bowls) and the stool type (for urinary pots) will be provided for students, considering their age starting with six, and the Western type for teachers.

Table 2-6 Number of Sanitary Units to be Provided

Room/equipment		8CR type Capacity: 288	12CR type Capacity: 432	16CR/19CR type Capacity: 576 / 684
Toilets for students (2 rooms)	Closet bowls	6 for female, 4 for male	8 for female, 4 for male	12 for female, 6 for male
	Urinary pots	6 for male	6 for male	10 for male
	Washing faucets	12	16	24
	Slop sinks	2	2	2
Toilets for teachers (2 rooms)		2 Western-type bowls, 2 washing basins	Same as left	Same as left
Hand washing stations (2)		2	2	6

- Drainage system : Sewage and miscellaneous wastewaters will be together collected and carried to the existing sewer main at the sites where the public sewerage system is accessible. At existing schools, sewer pipes will be connected to the existing sewage pit inside the premises, in principle, and at new schools, the piping up to the final pit in the premises will be laid by the Japanese side whereas the connection therefrom to the sewer main will be undertaken by the Mongolian side. At those sites where the public service is not accessible, a sewage tank will be provided in the sites where a septic truck will regularly call on for drainage. Incidentally, the sewer pipes outside the buildings and the sewage tank will be set up at the freezing depth or lower, in order to prevent freezing during the wintertime.
- Fire-fighting equipment : In accordance with the building safety standards, indoor hydrants will be provided at the sites where water is supplied by the city water system, and at those where the city water is not available, extinguishers will be provided on the corridor of each floor. Fire escape signs will be set up at the staircases, entrances and exits to outside, as required by the same standards.

Heating System

- The hot-water radiator system will be adopted as it is the most popular in the country. Heating system will be provided to all parts of buildings except the boiler house. At the sites where central heating is provided, hot water, being the source of heat, will be taken out by branching from the existing hot water pipe in the site, transferred to the underground machine room, and pumped up to the above floors using circulating pumps. The Mongolian side will be responsible for branching from the main pipe, as it must be done by the heat provider. The Japanese side will undertake the works needed after the branching point. At those sites where central heating is not available, an independent boiler will be provided as an annex to the building and it will provide the source of heat. A coal-fired boiler that satisfies the Mongolian environmental standards will be adopted for this purpose and set up above the ground in accordance with the guidance by the competent department.

Ventilation System

- Ventilation method : In accordance with the Mongolian Standards for Educational Facilities, a mechanical ventilation system will be installed for obtaining ventilation once an hour at the minimum. In winter, when heating is needed, all windows will be tightly shut with running the ventilation system. During the other seasons, natural ventilation will be obtained by letting ventilation openings open to reduce operation costs.
- Mechanical ventilation system : Fresh air is let in through the supply air inlet and heated in the underground machine room. The warm air is again heated in the blower unit with the hot water heating coil incorporated and distributed to the classrooms via supply air duct. Exposed ducts will be hung from the ceilings of the corridors, for the sake of allowing effective space in

classrooms and easy maintenance, and will lead to the supply air outlets in the classrooms. Exhaust air will be pushed out from classrooms to corridors, and then to toilets, and discharged from the exhaust fans installed in the toilets. In addition, forced exhaust system (using local exhaust fans) is planned for the kitchenette and special classrooms at new schools, and forced air supply system (using local supply air fans) for the boiler house.

- Air circulation system : An air circulation system to be provided collects ascending warm air at the top of the building and returns it to the lowest floor, in order to narrow the difference in temperature among floors during the heating season. More specifically, the ventilation fan set up on the fourth floor corridor will suction air and return it through ducts down to the first floor corridor.

6) Building Materials Plan

The specifications for the respective sections are planned as shown in the following table, in the light of basic grades as school facilities, robustness, durability, workability, and etc., as a result of a comparative study on the specifications and construction methods generally accepted in the country as well as actually used in similar facilities, such as standard school buildings by the government and the school buildings provided under the Phase I and III of Japan's grant aid projects.

Table 2-7 Construction Methods and Specifications by Building Element

Elements	Selected methods and specifications	Similar facilities/ local standards	Rationale
Main structure			
Footings/ foundation beams	RC	Same as left	Compliant with local standard
Columns/ beams	RC	RC, brick masonry, PC	High seismic resistance and excellent workability
Roof/ floors	RC	PC floor slabs, RC	Stable supply and freedom in design
Exteriors			
Roof	Insulation (150mm) + asphalt roofing sheet + Zincalum steel sheet roofing w/standing seam joints	Insulation (100mm) + protective concrete layer + asphalt water-proofing (a PC block protective layer was used in Phase III)	Dry construction is feasible at any ambient temperature. Fewer construction processes. Cost competitive. Heat insulation will be enhanced with roofs and walls providing thermal barriers in a row.
Walls	Insulation (150 mm) + ALC panels (100 mm) + painting, partly brick veneer walls	Insulation (100 mm) + bonded bricks, bricks + mortar +painting	By keeping bricks, which are increasingly becoming expensive, to a minimum, and employing highly-workable panel materials, an overall cost is reduced.
Window (General)	PVC sash + low-emissivity double-glazing	PVC sash+ double-glazing, double wooden sash, steel insulation doors	Excellent air-tightness, heat insulation and durability and easy maintenance. Heat insulation is enhanced by improving the specifications for glass.
Window (Gym)	PVC sash + low-emissivity double-glazing (with security grilles)	Glass block window	Natural ventilation is obtainable in summer, with easy natural lighting and high heat insulation.

Interiors				
Floor	General	PVC floor sheet (t=2.5mm)	Same as left: wooden strip flooring, terrazzo floor (PVC sheet was used in Phase III)	Commodity products locally available are of the 2 mm thickness yet they easily get worn. High durability is pursued.
	Entrance hall	Ceramic tiles	Same as left (PVC sheet was used in Phase III)	Hard-wearing and easy to clean
	Toilets	Ceramic tiles	Same as left	Compliant with local standard
	Gym	Natural linoleum sheet (t=3.2mm)	Wooden strip flooring, PVC floor sheet	Hard-wearing with excellent workability
Walls	General	CB wall + mortar base + painting	Bricks + mortar + painting (calcium silicate board was used in Phase III)	Stable price and high workability and the finishing generally accepted in Mongolia.
	Toilet	Ceramic tiles (below door height)	Same as left	Compliant with local standard
Ceil-ing	General	Cast-in-place concrete + painting	Mortar, ceiling board + painting (PC floor slabs + thin plastering in Phase III)	Bare cast-in-place concrete with minimum plastering backing
	Entrance hall	Steel suspension system + gypsum ceiling board		Easy inspection of piping on the back of the ceiling.
Window		PVC window + PVC door	Wooden window/door, PVC window/door	PVC is uniformly employed because of the absence of deformation.

CB: Concrete blocks PVC: Polyvinyl Chloride PC: Precast concrete
Phase III: The Project for Improvement of Primary Education Facilities (Phase III)

(3) Furniture & Equipment Plan

Basic educational furniture, basic teaching equipment and maintenance tools will be provided under the Project, all of which are minimally required for the operation of schools, following the examples of the furniture and equipment provided in Phase III project.

1) Furniture

The specifications for the furniture will basically follow those of Phase III project; the specific contents and quantities are as given below.

- Classrooms : With the maximum number of students per classroom being 36, a desk and chair for teacher, a blackboard, a bulletin board, 18 double student desks, which can seat two students, and 36 chairs for students will be provided in each classroom. There are three types of desks and chairs for students: for the 1st-3rd grades, 4th-7th grades, and 8th-12th grades. The numbers of classes per grade are calculated as to each site and the number of classrooms are determined accordingly. As for the buildings to be added at existing schools, primary and lower secondary grades will be a focus of provision in view of the conditions of use of the classrooms provided in the preceding project.
- Teachers' room : Sets of a six-seating meeting table plus six chairs will be provided in the quantity commensurate with the number of teachers likely to concurrently use the room (the number of classrooms x 1.45). Cabinets for keeping equipment will be provided in accordance

with the number of classrooms. Furthermore, a desk, a chair and two cabinets for keeping administrative documents will be provided for each managerial staff member: three sets for the headmaster, primary school manager, and secondary school manager at new schools, and one set at existing schools.

- Computer room : Assuming that a class of children will use 20 PCs in a lesson, 20 PC desks and 36 stools for students, a desk and a chair for the teacher, and a bulletin board will be provided.
- Special classroom : Assuming a multi-purpose use of the room in accordance with policies of individual schools, the furniture to be provided will include the same as that for classrooms, namely 18 double student desks + 36 chairs for students, a blackboard and a bulletin board. For the teacher, a laboratory table with a sink, in case that the room will be used for experiments, will be provided together with a chair and six cabinets.
- Kitchenette : Two open racks will be provided for temporary storage of food delivered.

Table 2-8 shows the contents to be provided by site.

2) Teaching Equipment

The specifications for teaching equipment will basically follow those provided in Phase III project. The necessary equipment and its quantities will be determined in accordance with the number of classrooms, which is planned based on the number of classes per grade at each site. As for OHP, though optical ones were provided in Phase III project, a PC-connection type projector will be provided to each school as they are becoming more and more popular in the country.

Table 2-9 shows the contents and quantities of teaching equipment as well as details and specific quantities per site.

3) Maintenance Tools

The contents and specifications for maintenance tools will basically follow Phase III project; the following tools will be provided to each of the sites.

- Pliers, hammer, a set of drivers, electrical tester, saw, grinding files, measuring tape, and shovel

Table 2-8 List of Furniture

Room	Items		Existing schools							New schools					Total
			No.35 School	No.19 School	Shavi CS	Amgalan CS	No.79 School	No.52 School	No.12 School	Khujir Bulan	361st Garam	Near Tahilt	Near Bayangol	Yarmag	
Number of classrooms			8	8	19	12	12	8	8	16	16	16	16	16	155
Classroom	Teacher's desk & chair		8	8	19	12	12	8	8	16	16	16	16	16	155
	Double student desk	Large	0	0	0	36	36	0	0	90	90	90	90	90	522
		Medium	72	72	180	90	90	72	72	108	108	108	108	108	1188
		Small	72	72	162	90	90	72	72	90	90	90	90	90	1080
	Student chair	Large	0	0	0	72	72	0	0	180	180	180	180	180	1044
		Medium	144	144	360	180	180	144	144	216	216	216	216	216	2376
		Small	144	144	324	180	180	144	144	180	180	180	180	180	2160
	Blackboard/bulletin board		8	8	19	12	12	8	8	16	16	16	16	16	155
Teachers' room	Meeting table		2	2	4	3	3	2	2	4	4	4	4	4	38
	Meeting chair		12	12	24	18	18	12	12	24	24	24	24	24	228
	Headmaster's desk & chair		1	1	1	1	1	1	1	3	3	3	3	3	22
	Cabinet		6	6	12	8	8	6	6	14	14	14	14	14	122
Computer room	PC desk									20	20	20	20	20	100
	Stool									36	36	36	36	36	180
	Teacher's desk & chair									1	1	1	1	1	5
	Bulletin board									1	1	1	1	1	5
Special classroom	Laboratory table									1	1	1	1	1	5
	Teacher's chair									1	1	1	1	1	5
	Double student desk (Large)									18	18	18	18	18	90
	Student chair (Large)									36	36	36	36	36	180
	Blackboard/bulletin board									1	1	1	1	1	5
	Cabinet									6	6	6	6	6	30
Kitchenette	Open rack									2	2	2	2	2	10

Table 2-9 List of Educational Equipment

Items	Target grade	Quantity CR: Classroom	Existing schools							New schools					Total
			No.35 School	No.19 School	Shavi CS	Amgalan CS	No.79 School	No.52 School	No.12 School	Khujir Bulan	361st Garam	Near Tahilt	Near Bayangol	Yarmag	
Number of classrooms			8	8	19	12	12	8	8	16	16	16	16	16	155
1 Geographic map of Mongolia	1-9	1 sheet/1 CR	8	8	19	12	12	8	8	16	16	16	16	16	155
2 Political & administrative map of Mongolia	6-9	1 sheet/2 CRs	4	4		6	6	4	4	8	8	8	8	8	68
3 Mineral resources map of Mongolia	6-9	Ditto	4	4		6	6	4	4	8	8	8	8	8	68
4 Botanical map of Mongolia	1-5	Ditto	4	4	19	6	6	4	4	8	8	8	8	8	87
5 Zoological map of Mongolia	1-5	Ditto	4	4	19	6	6	4	4	8	8	8	8	8	87
6 World geographic map	6-9	Ditto	4	4		6	6	4	4	8	8	8	8	8	68
7 World political map	6-9	Ditto	4	4		6	6	4	4	8	8	8	8	8	68
8 Periodic table of the elements	8-9	1 sheet/4 CRs	2	2		3	3	2	2	4	4	4	4	4	34
9 Chart of physical measuring units	8-9	Ditto	2	2		3	3	2	2	4	4	4	4	4	34
10 Human body chart	6-9	1 sheet/2 CRs	4	4		6	6	4	4	8	8	8	8	8	68
11 Mongolian alphabet cards	1-5	Ditto	4	4	19	6	6	4	4	8	8	8	8	8	87
12 Multiplication table	1-5	Ditto	4	4	19	6	6	4	4	8	8	8	8	8	87
13 Wall thermometer	1-5	1 pc/2 CRs	4	4	19	6	6	4	4	8	8	8	8	8	87
14 Azimuth compass	1-5	Ditto	4	4	19	6	6	4	4	8	8	8	8	8	87
15 Measuring tape	1-5	Ditto	4	4	19	6	6	4	4	8	8	8	8	8	87
16 Geometric block models	1-5	1 set/2 CRs	4	4	19	6	6	4	4	8	8	8	8	8	87
17 Abacus	1-5	1 pc/2 CRs	4	4	19	6	6	4	4	8	8	8	8	8	87
18 T-square	1-9	1 pc/1 CR	8	8	19	12	12	8	8	16	16	16	16	16	155
19 Scales	1-9	1 set/1 CR	8	8	19	12	12	8	8	16	16	16	16	16	155
20 Projector	-	1 set/school	1	1	1	1	1	1	1	1	1	1	1	1	12

2-2-3 Basic Design Drawings

(1) Layout Plans

- A-01 No.35 School (Sukhbaatar District)
- A-02 No.19 School (Bayangol District)
- A-03 Shavi Complex School (Bayanzurkh District)
- A-04 Amgalan Complex School (Bayanzurkh District)
- A-05 No.79 School (Bayanzurkh District)
- A-06 No.52 School (Khan-Uul District)
- A-07 No.12 School (Soginokhairkhan District)
- A-08 Khujir Bulan (Bayanzurkh District)
- A-09 361st Garam (Soginokhairkhan District)
- A-10 Near Tahilt (Soginokhairkhan District)
- A-11 Near Bayangol (Soginokhairkhan District)
- A-12 Yarmag (Khan-Uul District)

(2) Plans, Elevations and Sections

1) Type-8CR (8-classroom block for existing schools)

- A-13/14 Plans
- A-15/16 Elevations and Sections

2) Type-12CR (12-classroom block for existing schools)

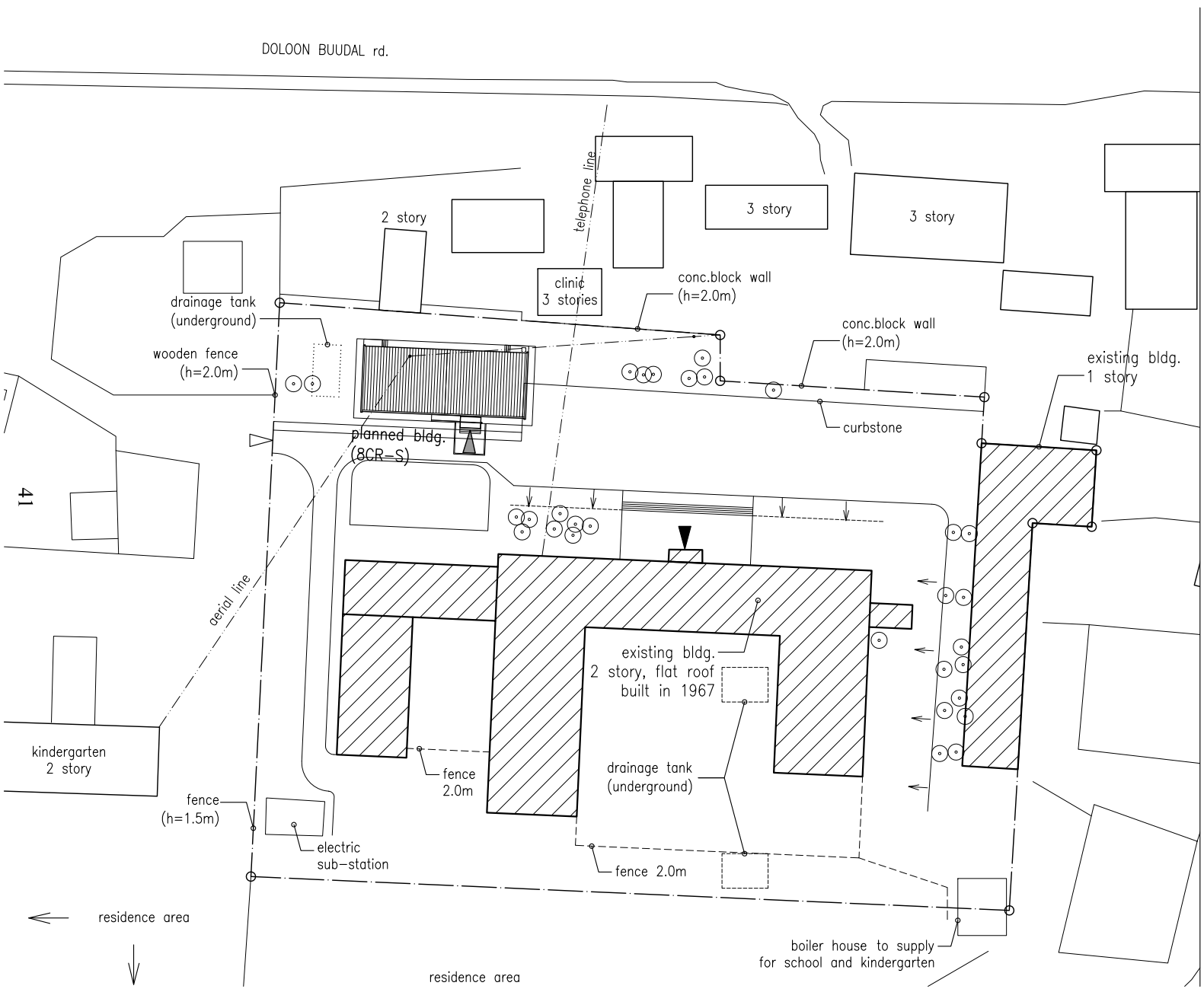
- A-17/18 Plans
- A-19/20 Elevations and Sections

3) Type-19CR (19-classroom block for existing schools)

- A-21/22 Plans
- A-23/24 Elevations and Sections

4) Type-16CR (16-classroom and gym blocks for new schools)

- A-25~28 Plans
- A-29~32 Elevations and Sections



SITE NAME : NO.35

CLASSIFICATION	: EXISTING SCHOOL
LOCATION	: SUKHBAATAR, 14th HORO
NEIGHBORHOOD	: GER RESIDENCE
SITE AREA	: 12,800 sqm.
BLDG. TYPE	: 8CR-S
UTILITY	: CITY WATER
	: HEATING WATER SUPPLY

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

W S N E

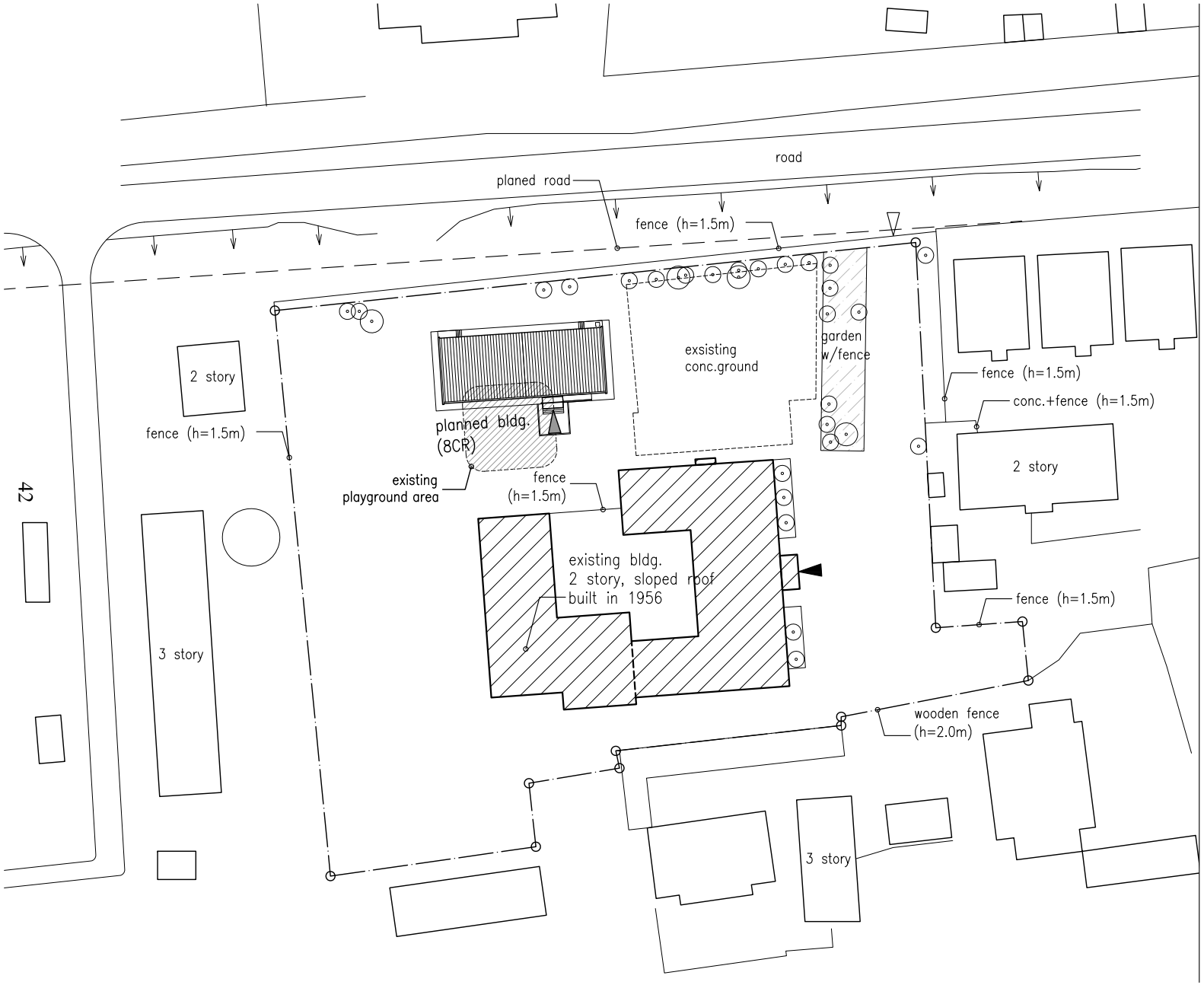
0 10 20 40m

建物配置図 S=1/1,000

BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A01



SITE NAME : NO.19

CLASSIFICATION	: EXISTING SCHOOL
LOCATION	: BAYANGOL, 20th HORO
NEIGHBORHOOD	: INDUSTRIAL ZONE
SITE AREA	: 9,500 sqm.
BLDG. TYPE	: 8CR
UTILITY	: CITY WATER & DRAINAGE
	: HEATING WATER SUPPLY

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

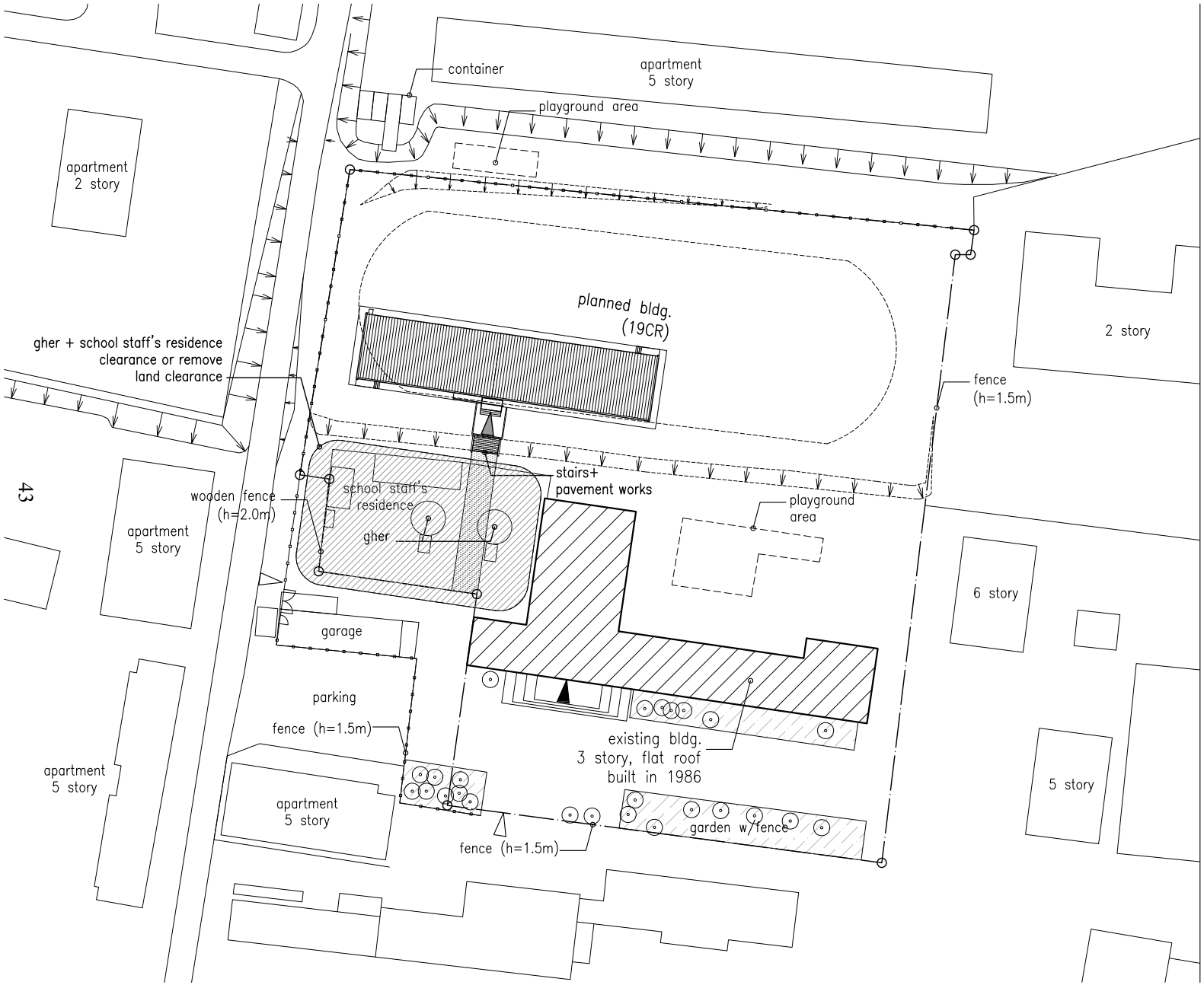
N W E S

0 10 20 40m

建物配置図 S=1/1,000
BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A02



SITE NAME : SHAVI (No.30)

CLASSIFICATION	: EXISTING SCHOOL
LOCATION	: BAYANZURKH, 5th HORO
NEIGHBORHOOD	: APARTMENT
SITE AREA	: 15,824 sqm.
BLDG. TYPE	: 19CR
UTILITY	: CITY WATER & DRAINAGE
	: HEATING WATER SUPPLY

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

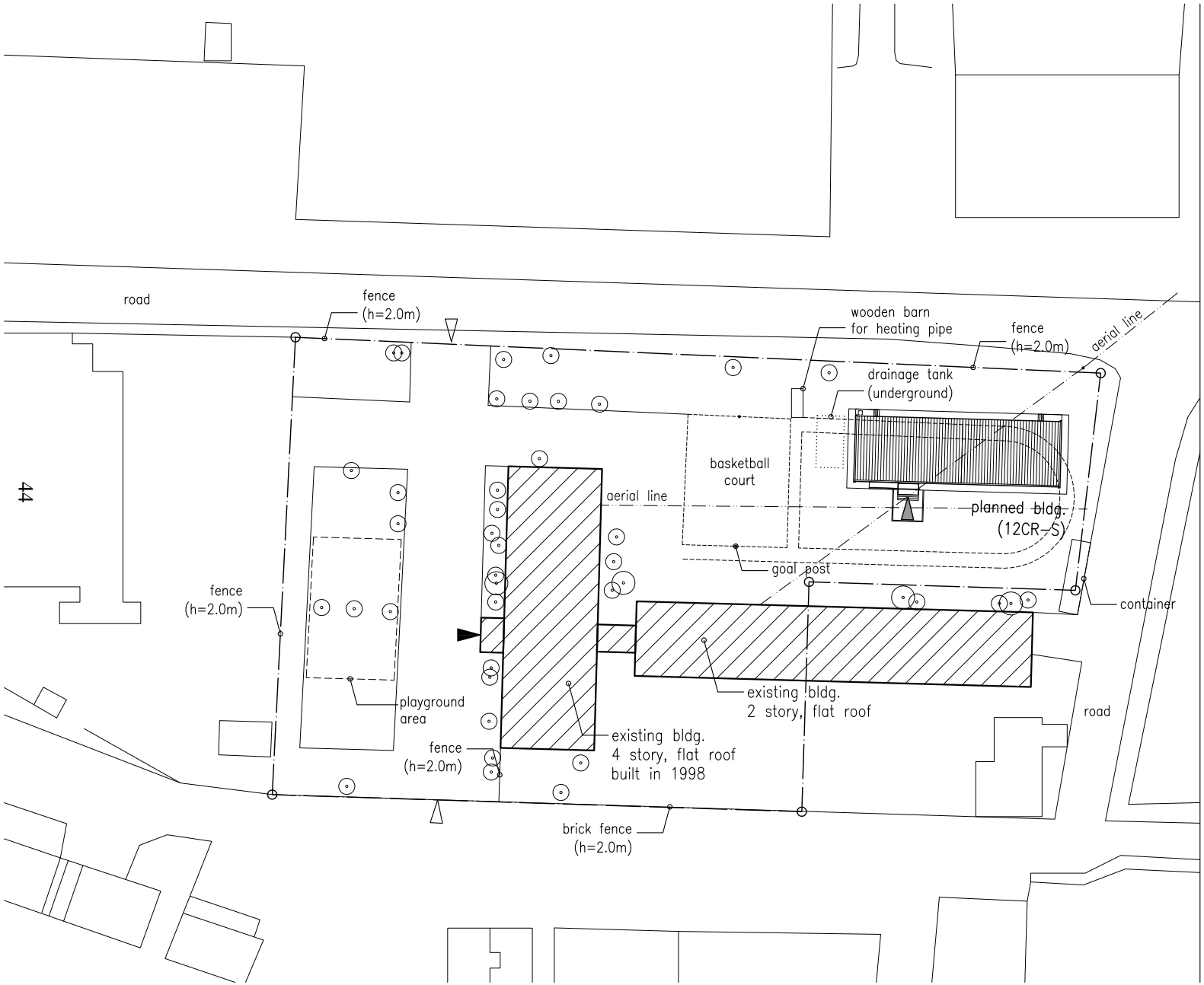
N
W E
S

0 10 20 40m

建物配置図 S=1/1,000
BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A03



SITE NAME : AMGALAN (No.27)

CLASSIFICATION	: EXISTING SCHOOL
LOCATION	: BAYANZURKH, 8th HORO
NEIGHBORHOOD	: GER RESIDENCE
SITE AREA	: 9,200 sqm.
BLDG. TYPE	: 12CR-S
UTILITY	: CITY WATER
	: HEATING WATER SUPPLY

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

N / W / E / S

0 10 20 40m

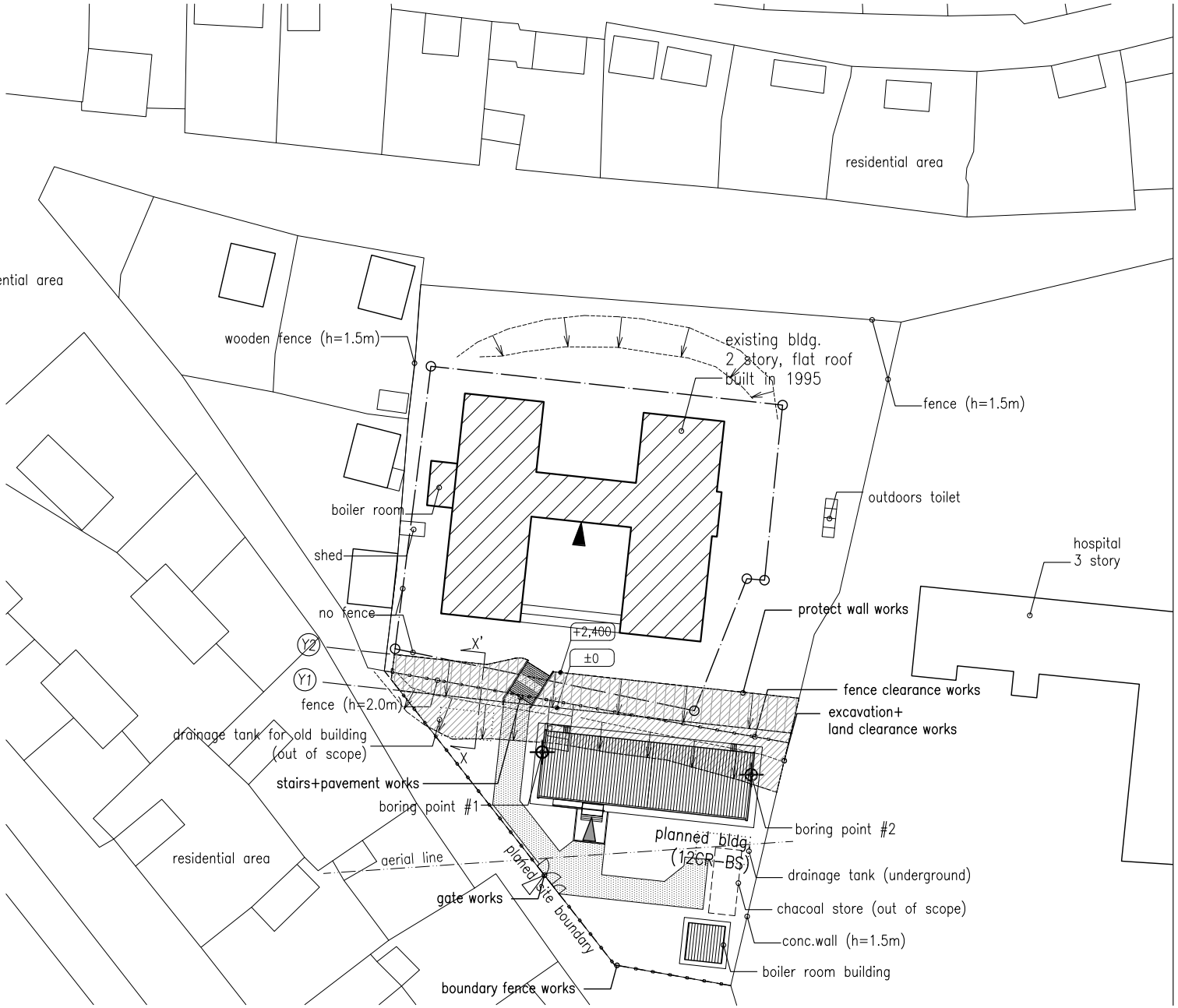
建物配置図 S=1/1,000

BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画

THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A04



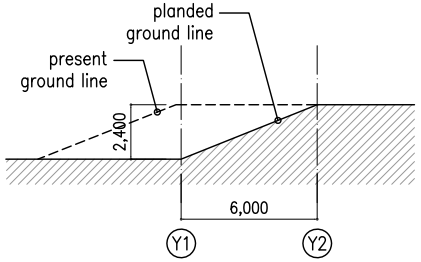
45

SITE NAME : NO.79

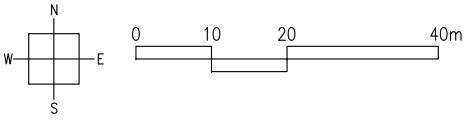
CLASSIFICATION	: EXISTING SCHOOL
LOCATION	: BAYANZURKH, 17th HORO
NEIGHBORHOOD	: GER RESIDENCE
SITE AREA	: 3,000 sqm.
BLDG. TYPE	: 12CR-BS
UTILITY	: CITY WATER (PROPOSED)
	:

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)



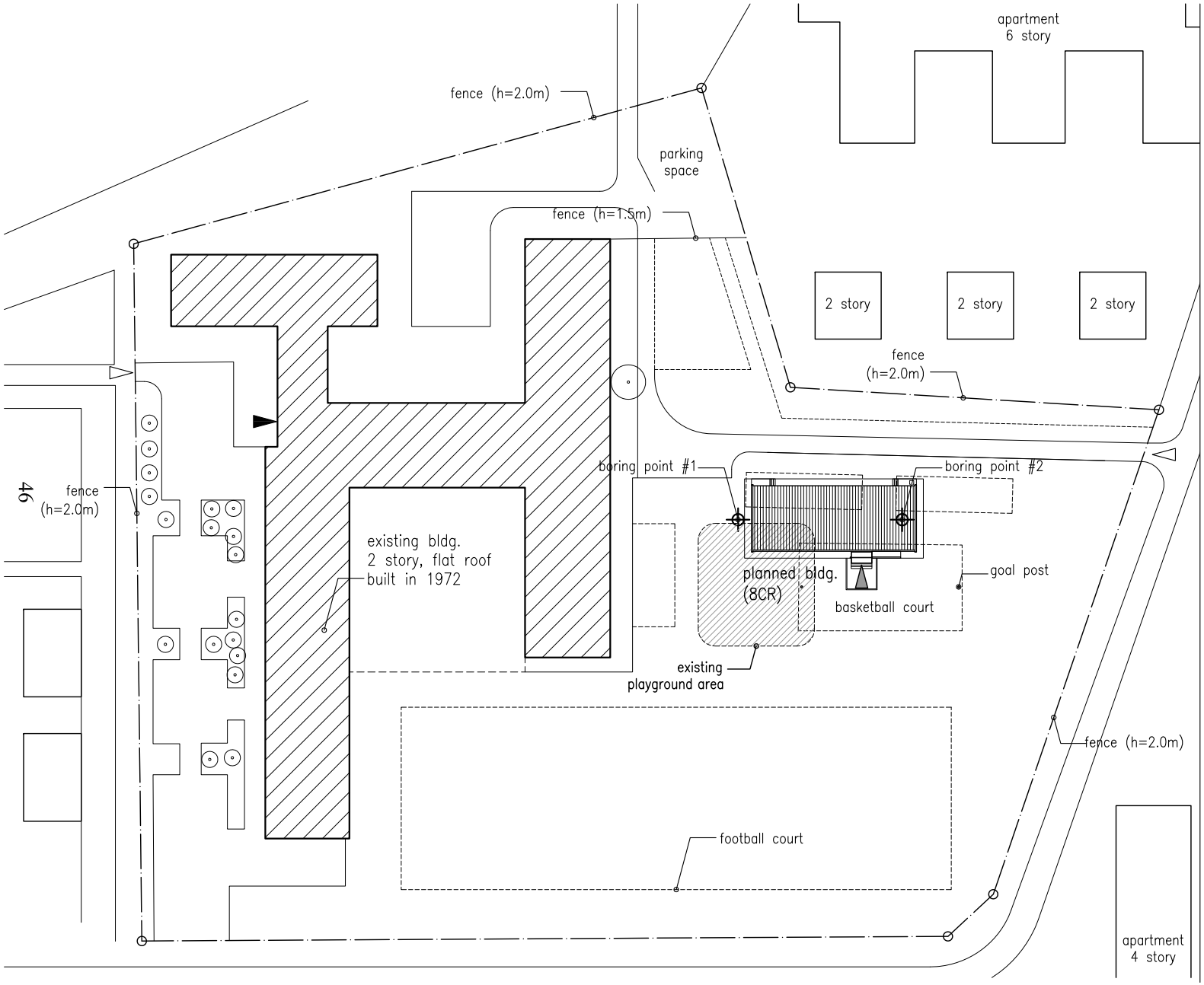
X-X' Section



建物配置図 S=1/1,000
BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A05



SITE NAME : NO.52

CLASSIFICATION	: EXISTING SCHOOL
LOCATION	: KHAN UUL, 1st HORO
NEIGHBORHOOD	: GER RESIDENCE
SITE AREA	: 16,038 sqm.
BLDG. TYPE	: 8CR
UTILITY	: CITY WATER & DRAINAGE
	: HEATING WATER SUPPLY

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

N / W / E / S

0 10 20 40m

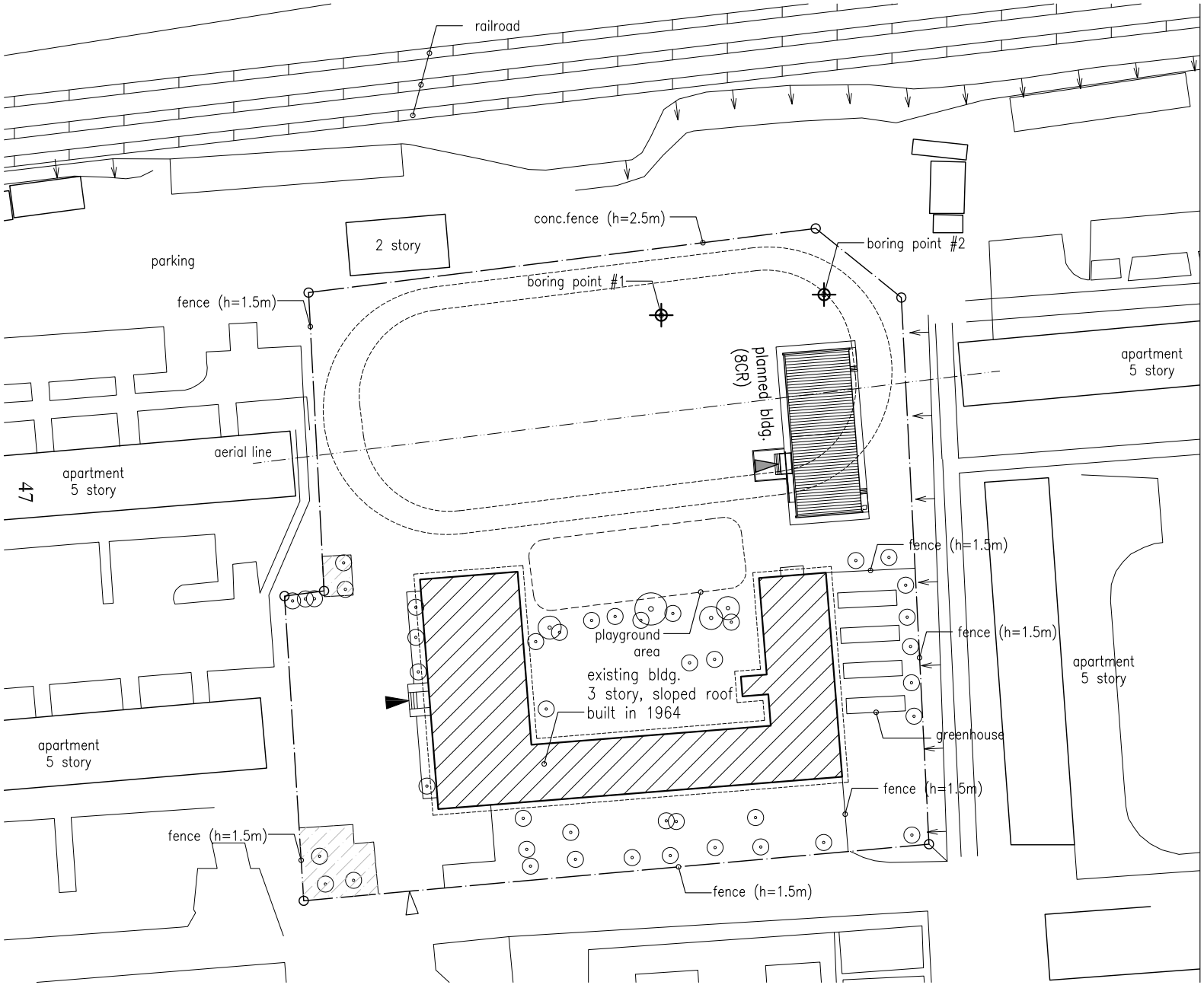
建物配置図 S=1/1,000

BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画

THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A06



SITE NAME : NO.12

CLASSIFICATION	: EXISTING SCHOOL
LOCATION	: SONGINOKHAIRKHAN 18th HORO
NEIGHBORHOOD	: APARTMENT, RAILWAY
SITE AREA	: 9,502 sqm.
BLDG. TYPE	: 8CR
UTILITY	: CITY WATER & DRAINAGE : HEATING WATER SUPPLY

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

N / W / E / S

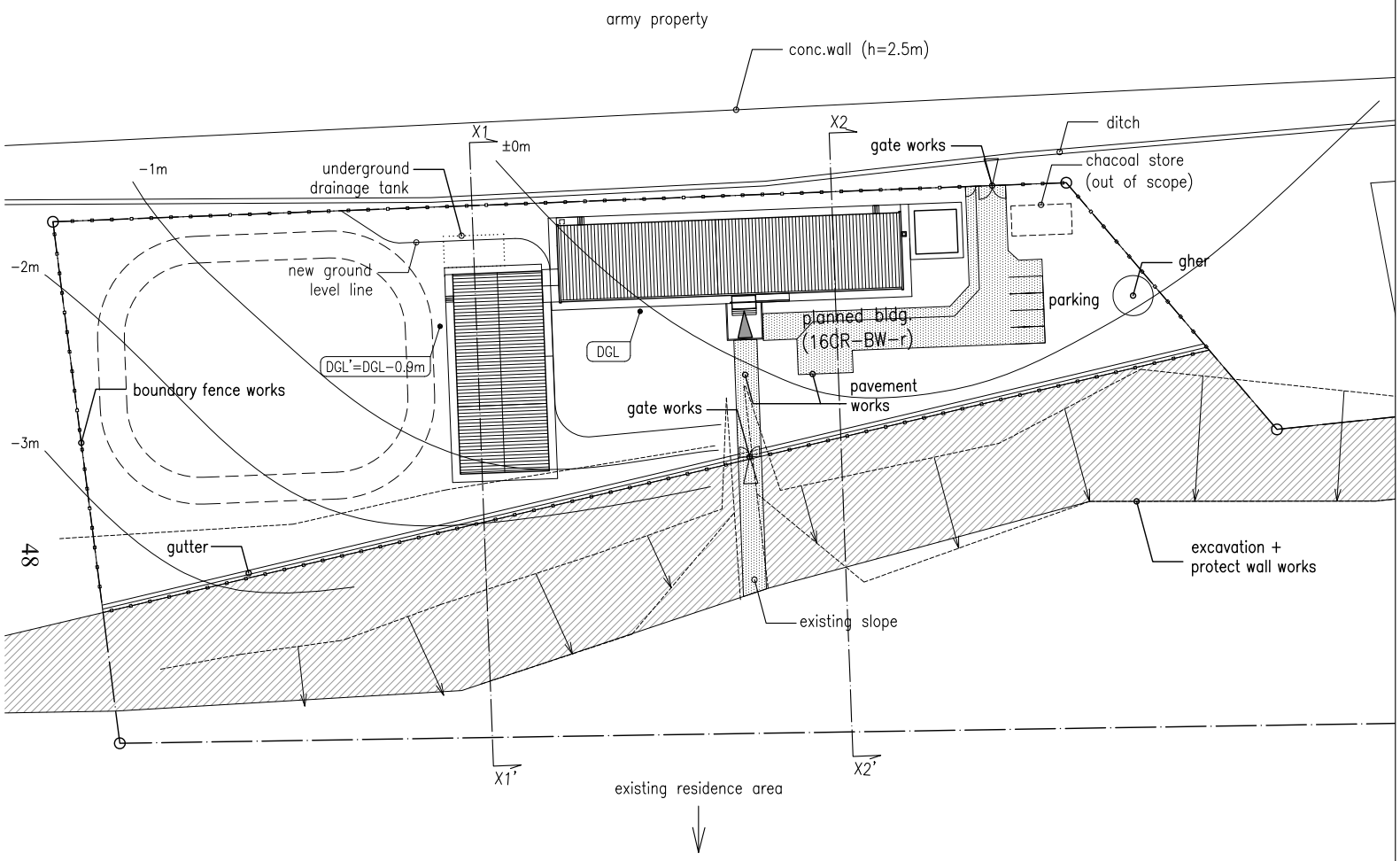
0 10 20 40m

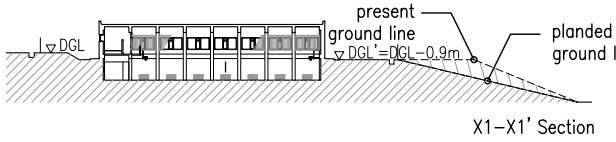
建物配置図 S=1/1,000

BUILDING LAYOUT PLAN

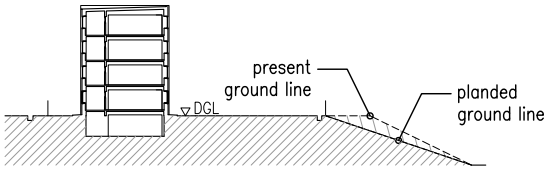
モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A07





X1-X1' Section



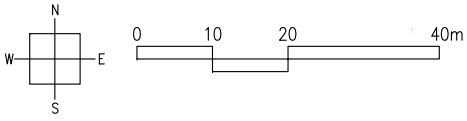
X2-X2' Section

SITE NAME : KHUJIR-BULAN

CLASSIFICATION	: NEW SCHOOL
LOCATION	: BAYANZURKH, 23th HORO
NEIGHBORHOOD	: GER RESIDENCE
SITE AREA	: 19,888 sqm.
BLDG. TYPE	: 16CR-BW-r
UTILITY	:
	:

LEGEND

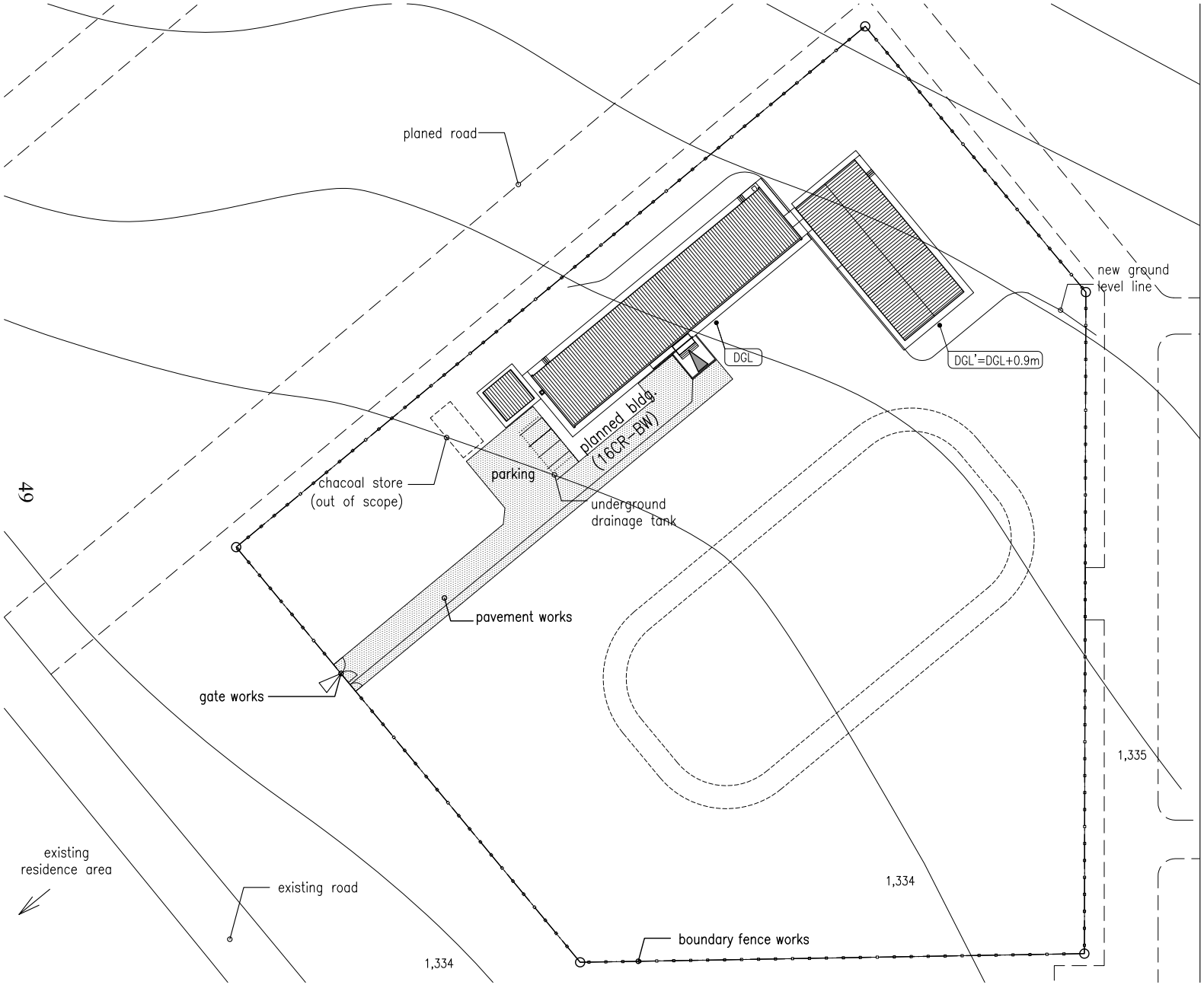
- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)



建物配置図 S=1/1,000
BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A08



SITE NAME : 361st GARAM

CLASSIFICATION	: NEW SCHOOL
LOCATION	: SONGINOKHAIRKHAN, 21st HORO
NEIGHBORHOOD	: GER RESIDENCE
SITE AREA	: 15,777 sqm.
BLDG. TYPE	: 16CR-BW
UTILITY	:
	:
	:

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

N E W S

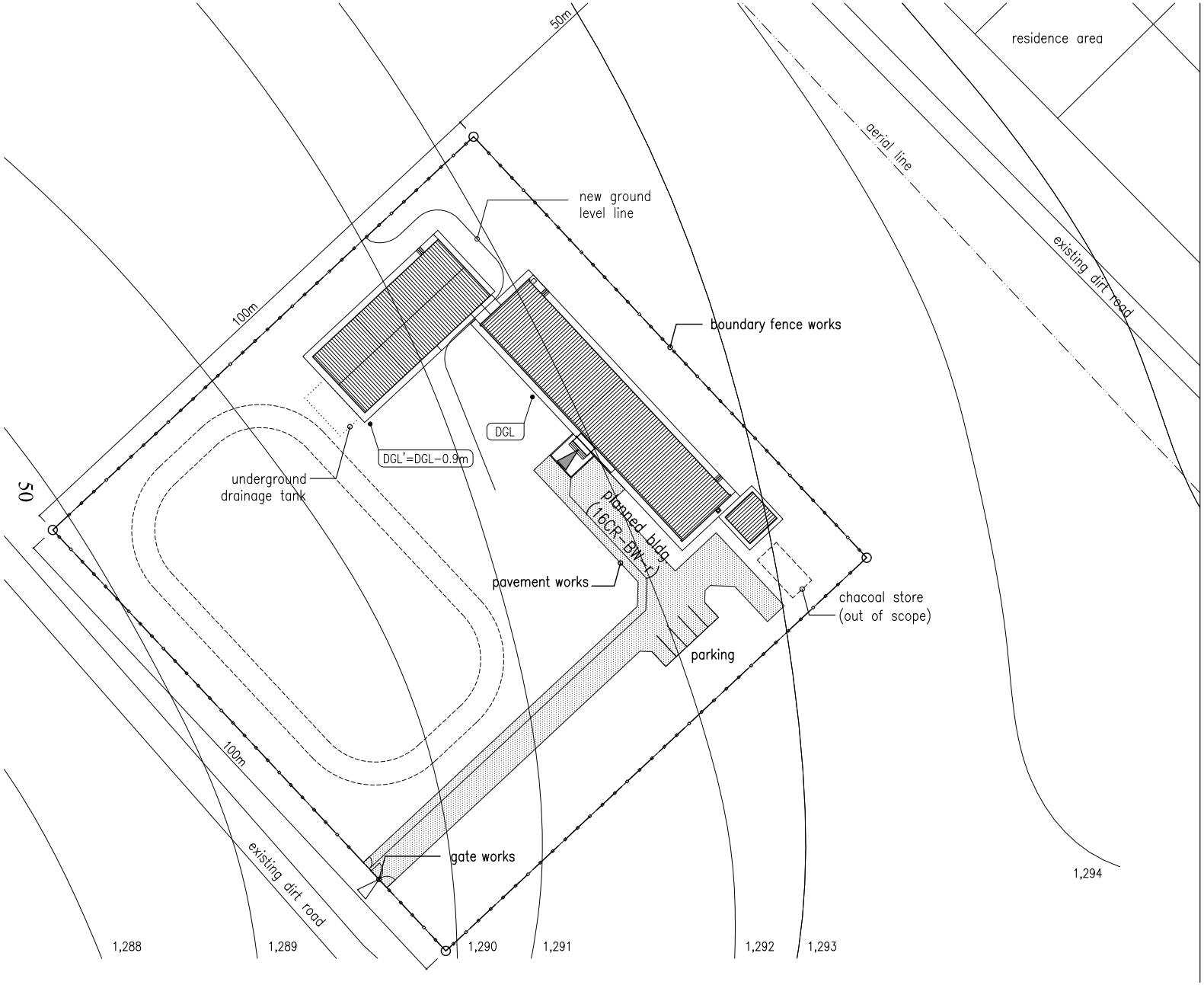
0 10 20 40m

建物配置図 S=1/1,000

BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A09



SITE NAME : NEAR TAHILT

CLASSIFICATION	: NEW SCHOOL
LOCATION	: SONGINOKHAIRKHAN, 22th HORO
NEIGHBORHOOD	: GER RESIDENCE
SITE AREA	: 10,000 sqm.
BLDG. TYPE	: 16CR−BW−r
UTILITY	:
	:

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

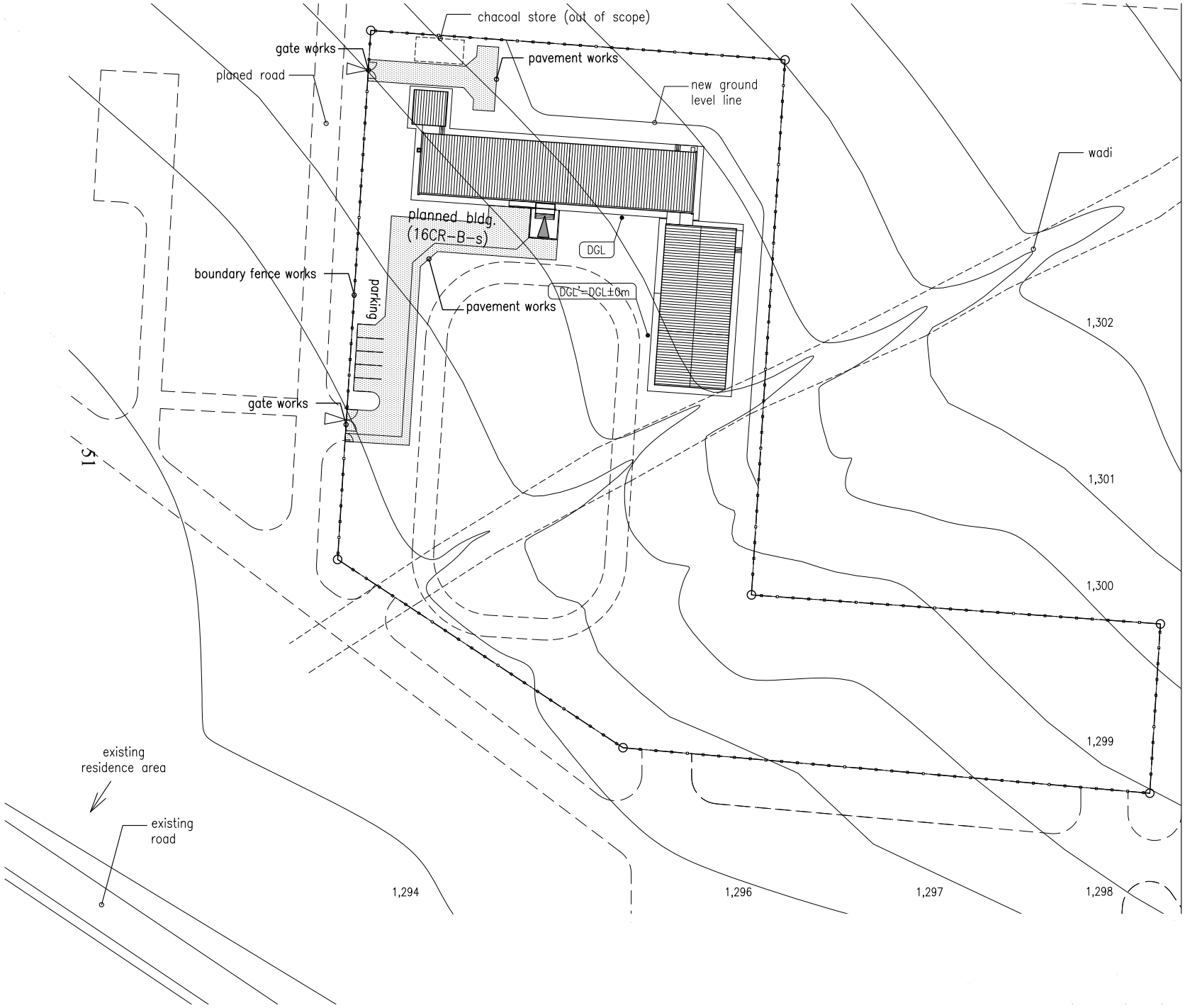
N
W E
S

0 10 20 40m

建物配置図 S=1/1,000
BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A10



SITE NAME : NEAR BAYANGOL

CLASSIFICATION	: NEW SCHOOL
LOCATION	: SONGINOKHAIRKHAN, 22th HORO
NEIGHBORHOOD	: GER RESIDENCE
SITE AREA	: 11,600 sqm.
BLDG. TYPE	: 16CR-B-s
UTILITY	: CITY WATER & DRAINAGE
	:

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

N / W / E / S

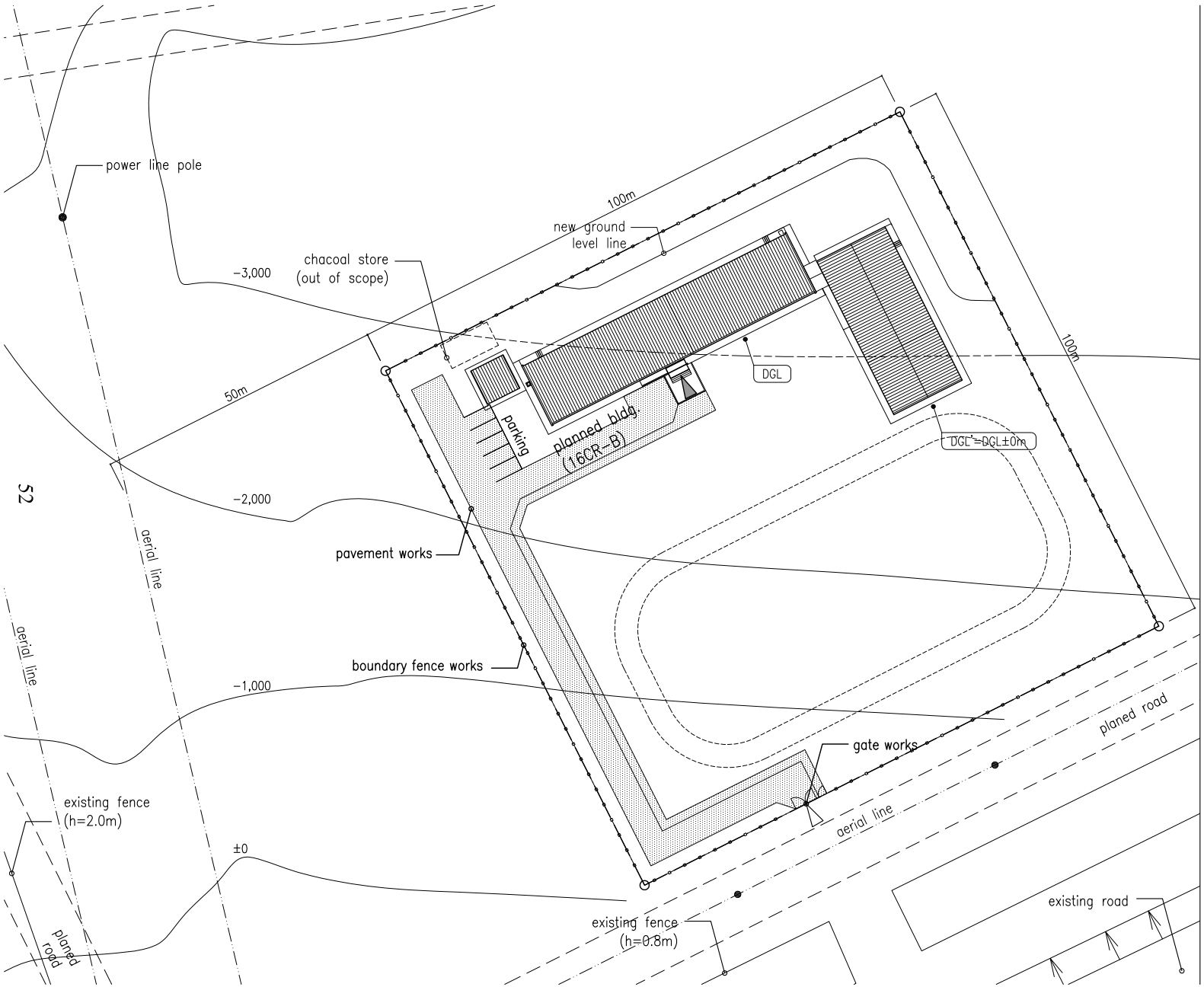
0 10 20 40m

建物配置図 S=1/1,000

BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A11



SITE NAME : YARMAG

CLASSIFICATION	: NEW SCHOOL
LOCATION	: KHAN-UUL, 8th HORO
NEIGHBORHOOD	: GER RESIDENCE
SITE AREA	: 10,000 sqm.
BLDG. TYPE	: 16CR-B
UTILITY	: CITY WATER & DRAINAGE
	:

LEGEND

- slope (directional down)
- site boundary line
- entrance of planned building
- entrance of existing building
- approach to building on site
- before construction (works by Mongolian Govt.)
- after construction (works by Mongolian Govt.)

N / W / E / S

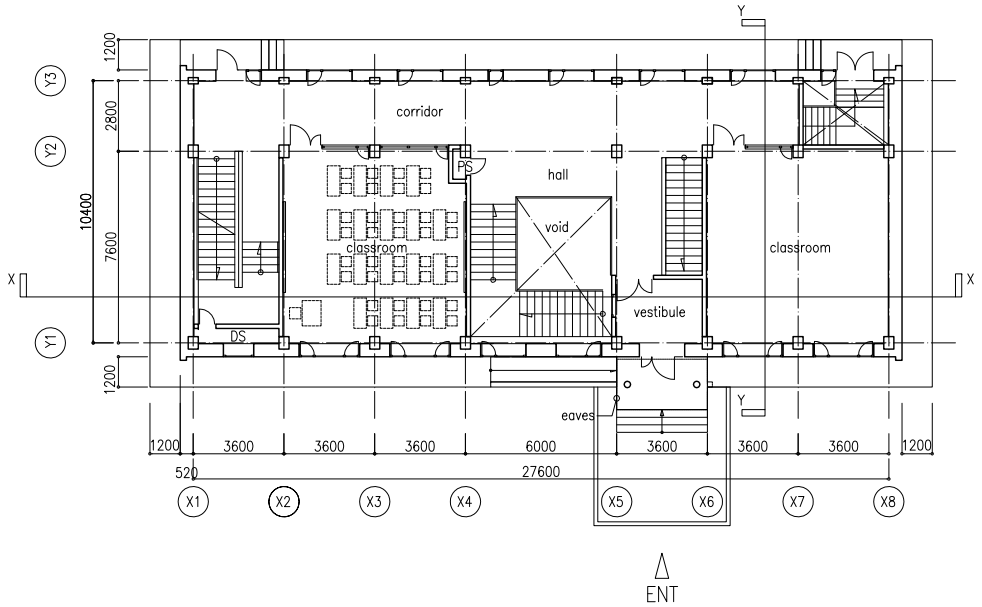
0 10 20 40m

建物配置図 S=1/1,000

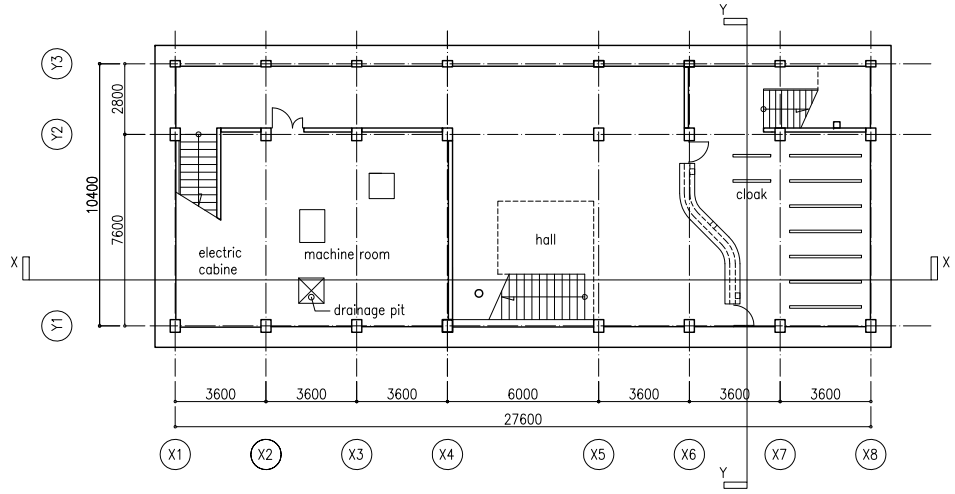
BUILDING LAYOUT PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

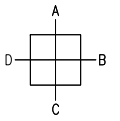
A12

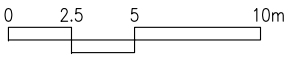


1st FLOOR PLAN



BASEMENT FLOOR PLAN

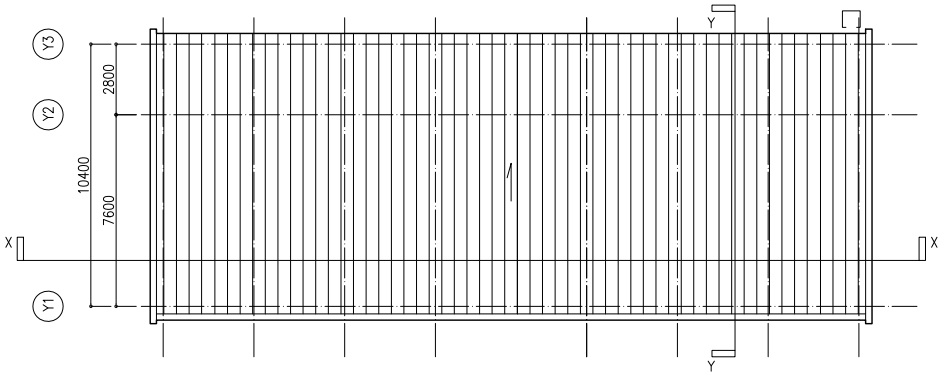




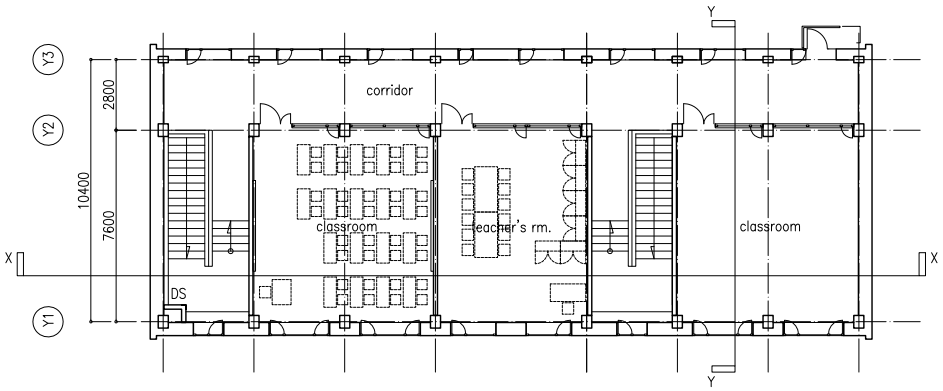
地下１階平面図　１階平面図（8CR/8CR-S）　S=1/300
BASEMENT FLOOR PLAN, 1st FLOOR PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

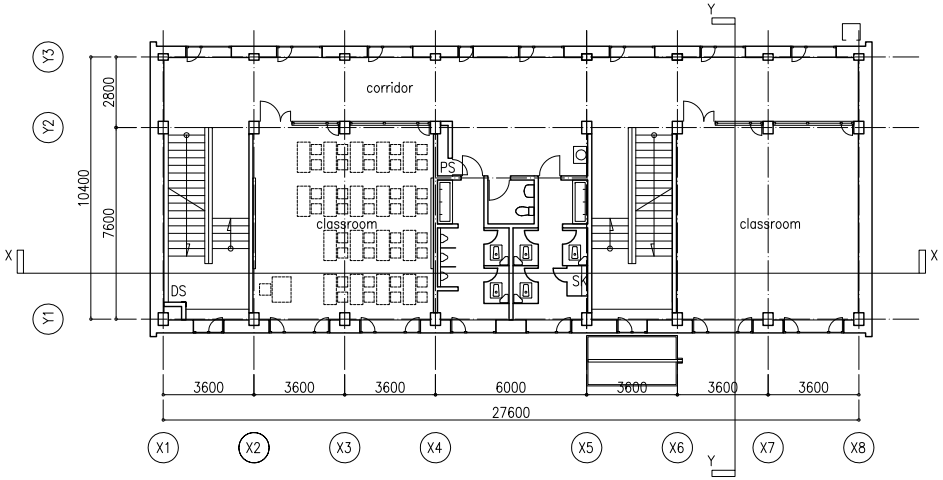
A13



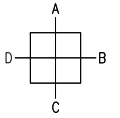
ROOF PLAN

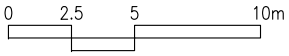


4th FLOOR PLAN



2,3rd FLOOR PLAN

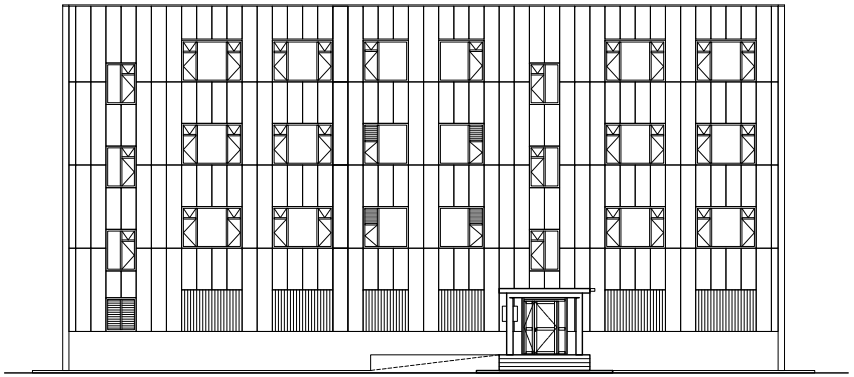




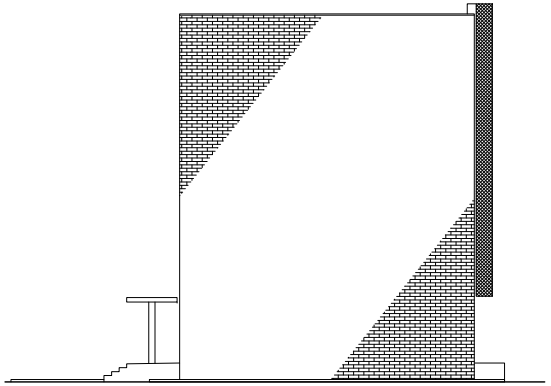
2，3階平面図　4階平面図　屋根伏図（8CR/8CR-S）S=1/300
2,3rd FLOOR PLAN, 4th FLOOR PLAN, ROOF PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

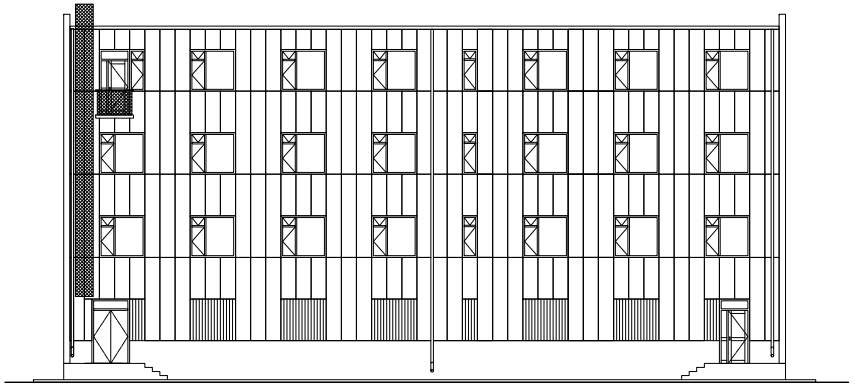
A14



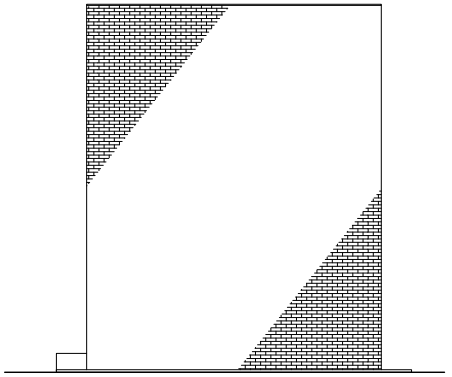
ELEVATION C



ELEVATION B



ELEVATION A



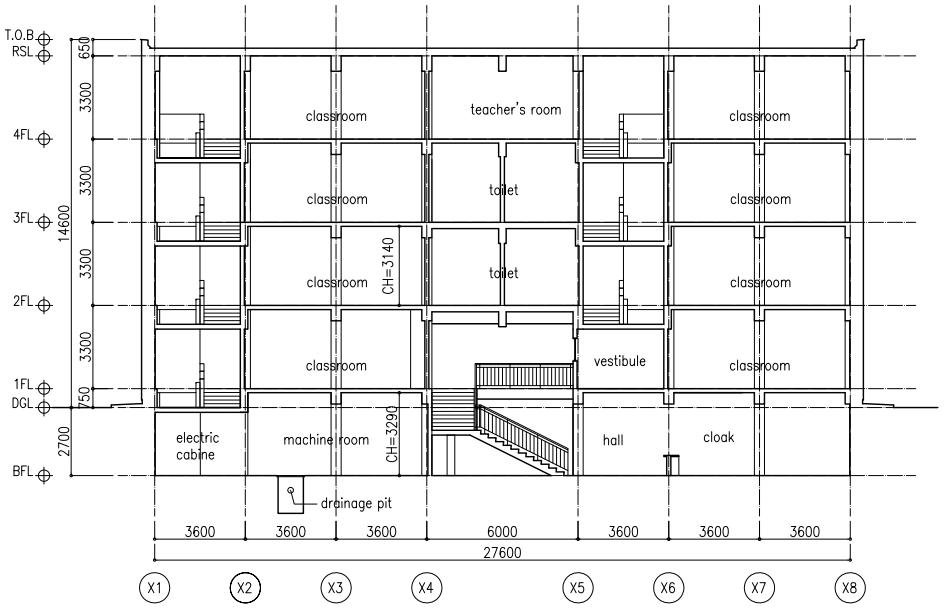
ELEVATION D

0 2.5 5 10m

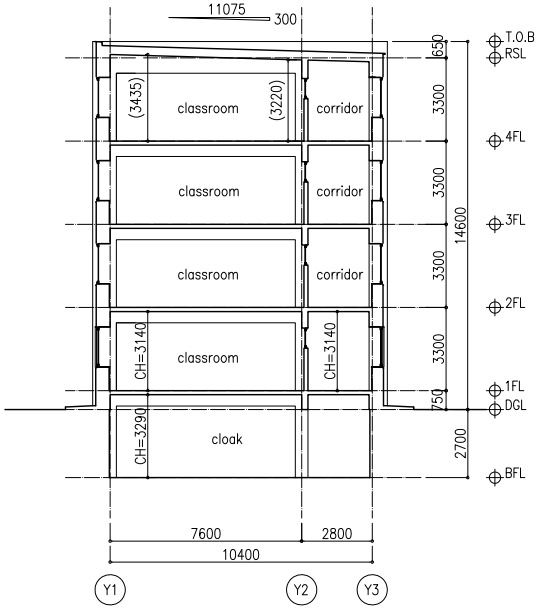
立面図（8CR/8CR-S） S=1/300
ELEVATION

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

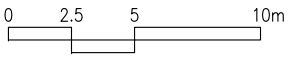
A15



SECTION X–X



SECTION Y–Y

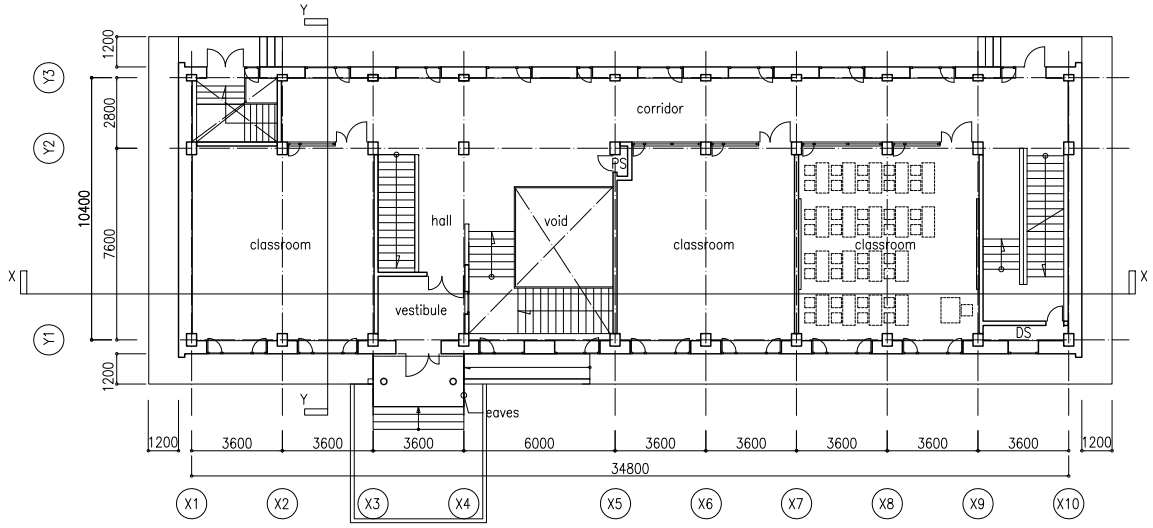


断面図（8CR/8CR-S）
SECTION

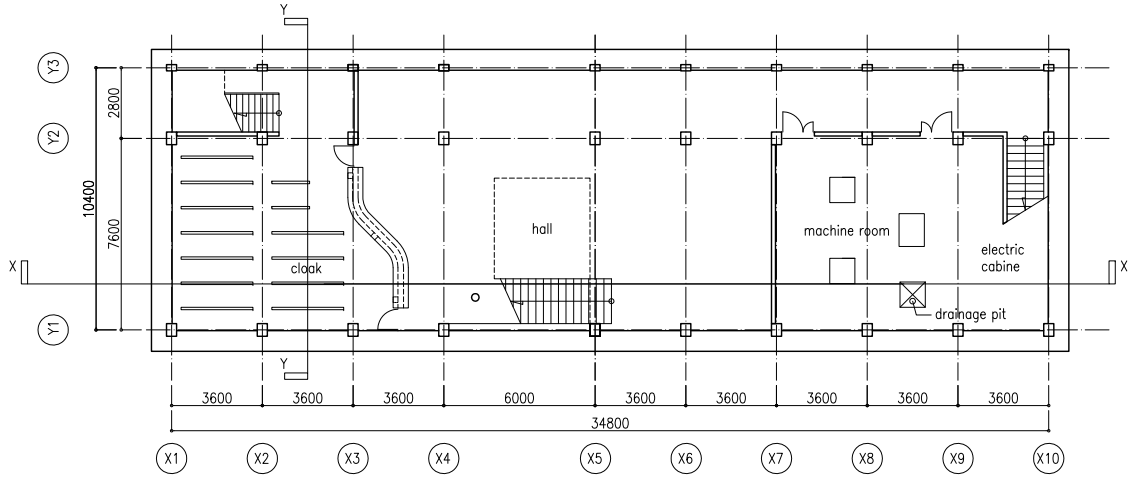
S=1/300

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

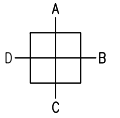
A16

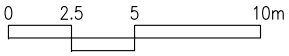


1st FLOOR PLAN



BASEMENT FLOOR PLAN

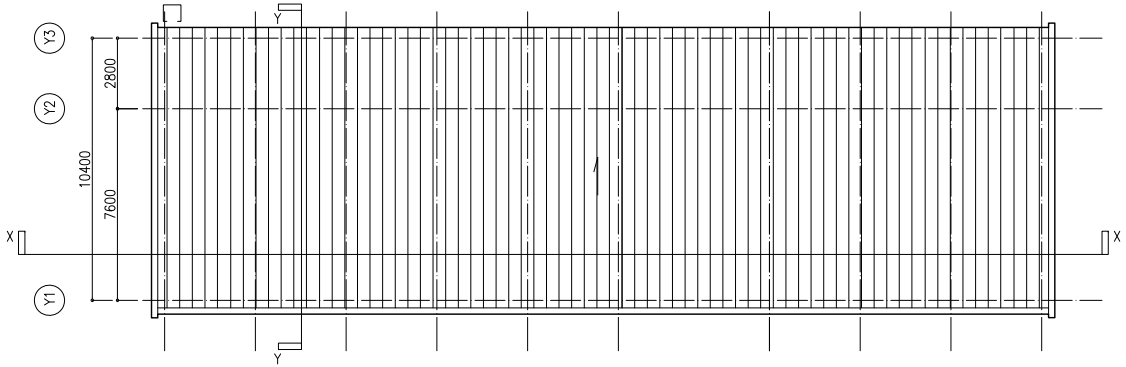




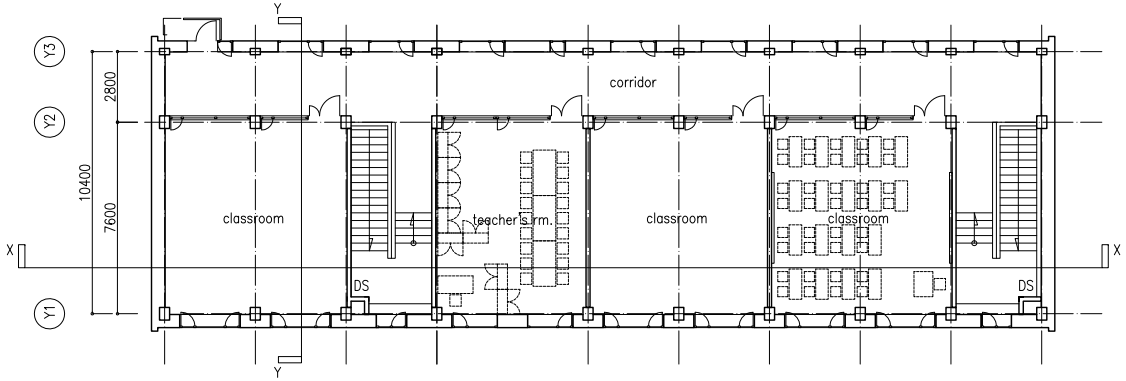
地下１階平面図　１階平面図（12CR-S/12CR-BS）　S=1/300
BASEMENT FLOOR PLAN, 1st FLOOR PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

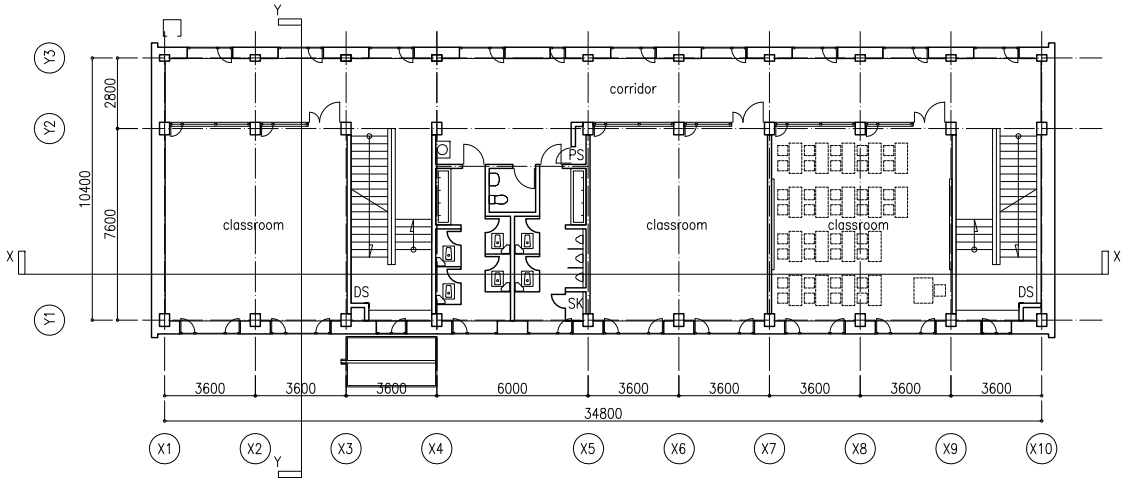
A17



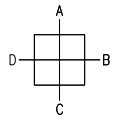
ROOF PLAN

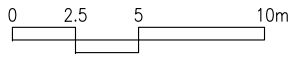


4th FLOOR PLAN



2,3rd FLOOR PLAN

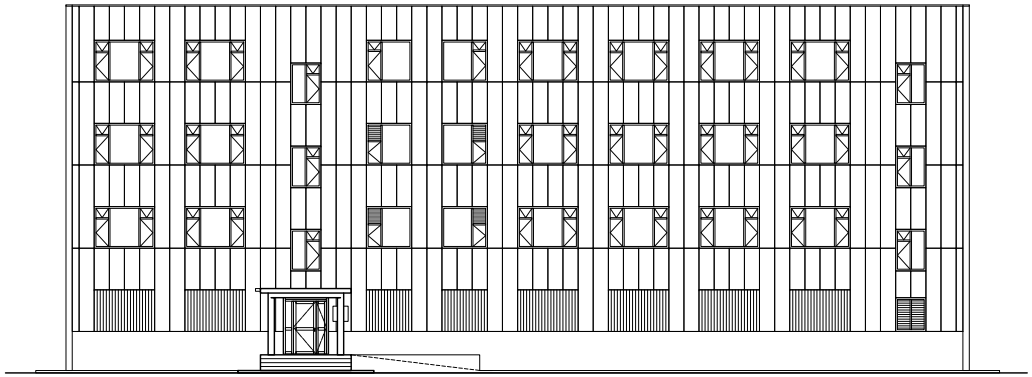




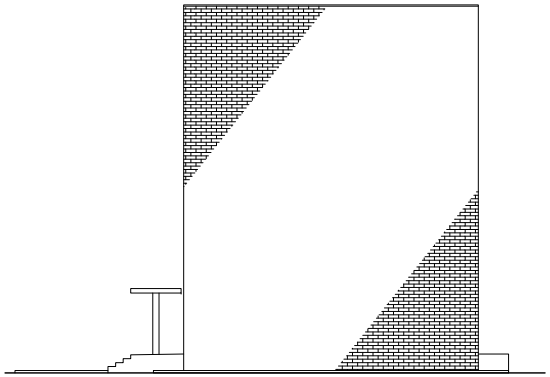
2．3階平面図　4階平面図　屋根伏図（12CR-S/12CR-BS）S=1/300
2,3rd FLOOR PLAN, 4th FLOOR PLAN, ROOF PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

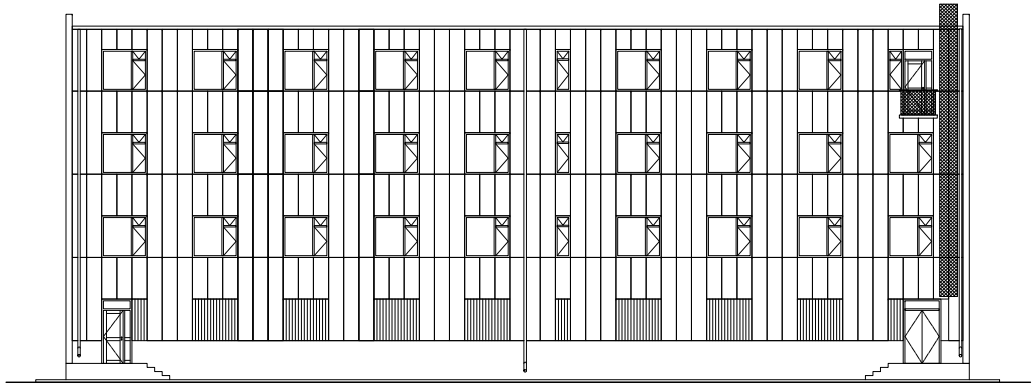
A18



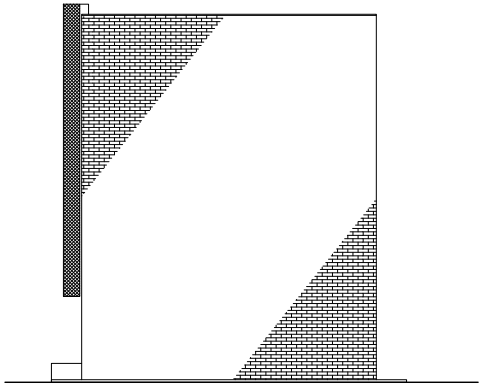
ELEVATION C



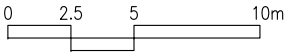
ELEVATION B



ELEVATION A



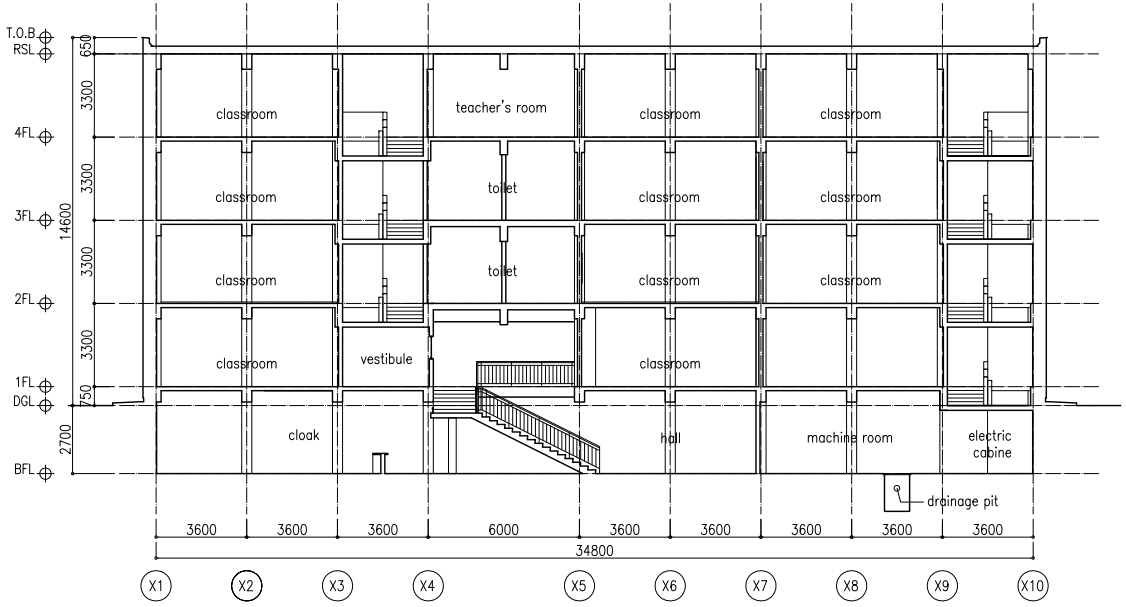
ELEVATION D



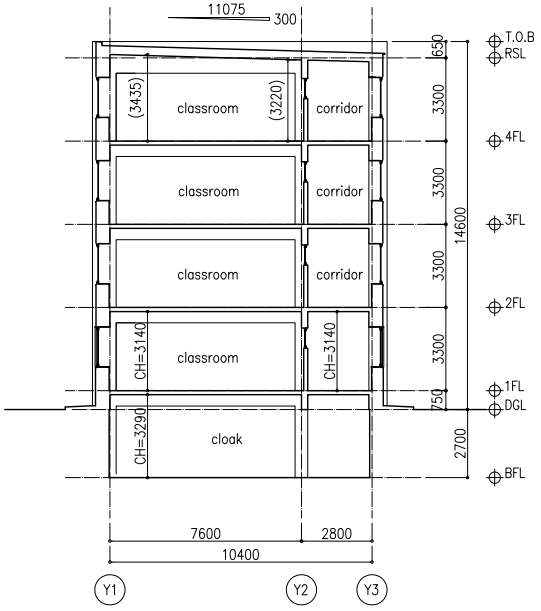
立面図（12CR-S/12CR-BS）　S=1/300
ELEVATION

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

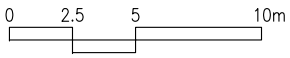
A19



SECTION X–X



SECTION Y–Y

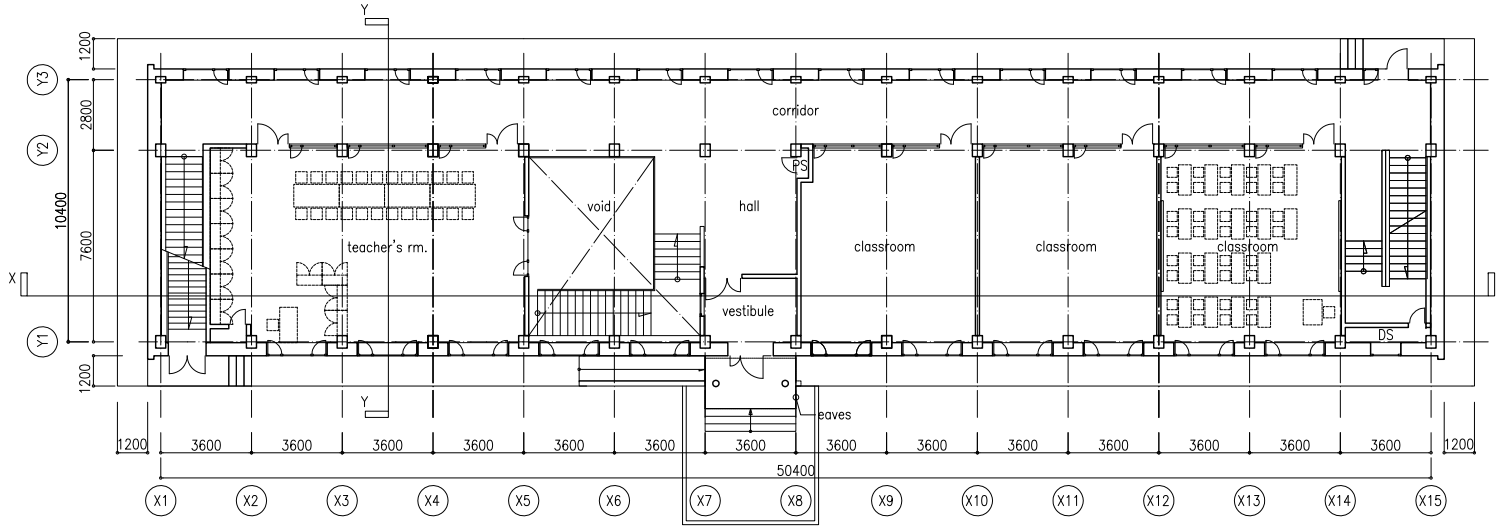


断面図（12CR-S/12CR-BS）
SECTION

S=1/300

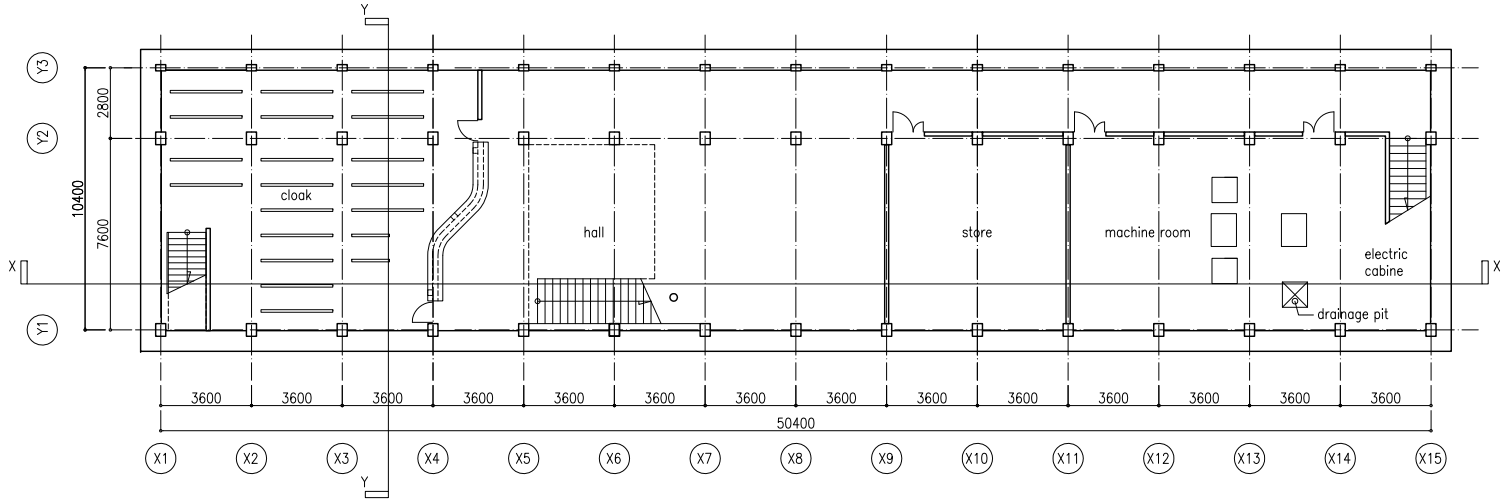
モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A20

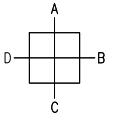


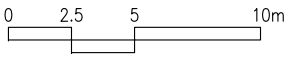
1st FLOOR PLAN

ENT



BASEMENT FLOOR PLAN

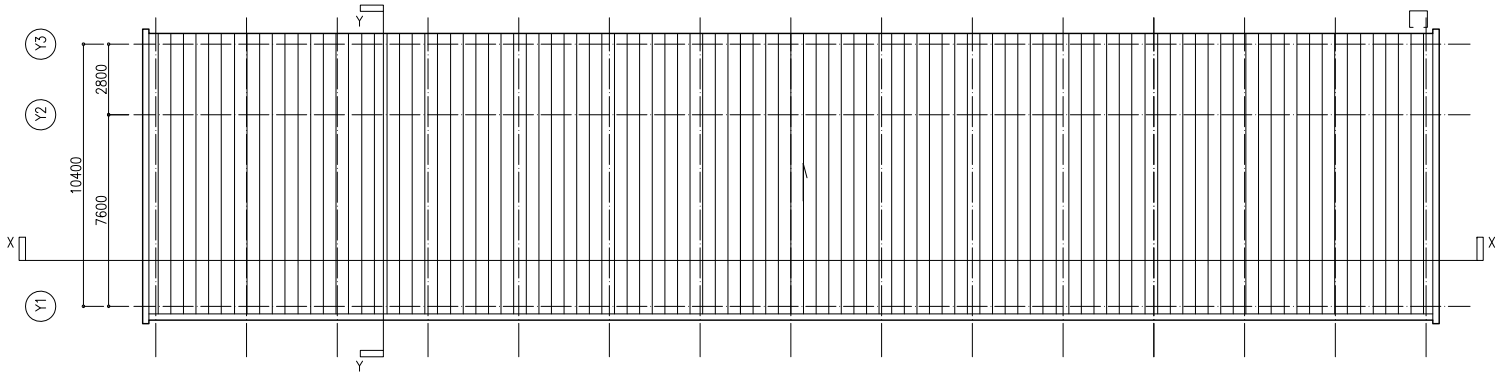




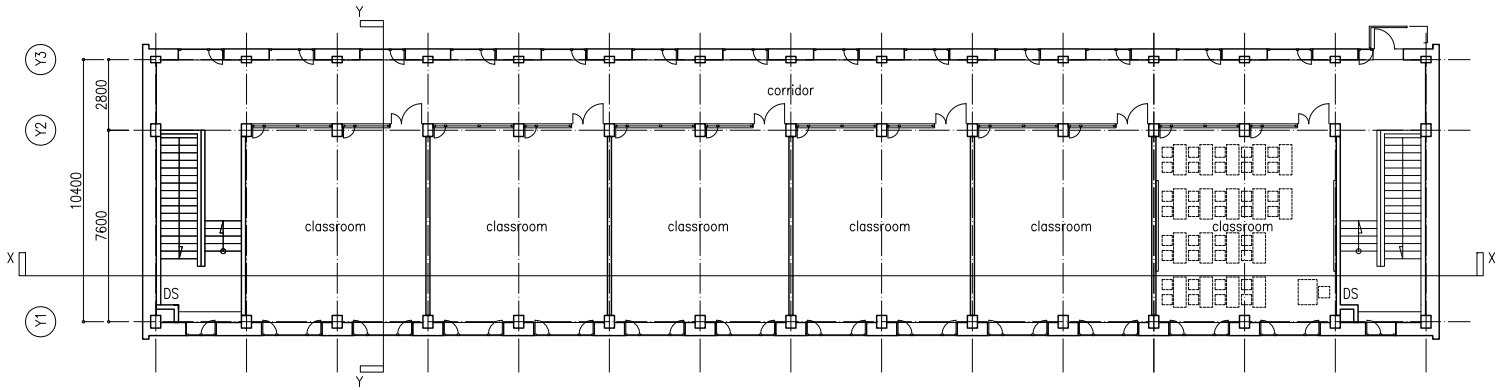
地下１階平面図　１階平面図（19CR）　S=1/300
BASEMENT FLOOR PLAN, 1st FLOOR PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

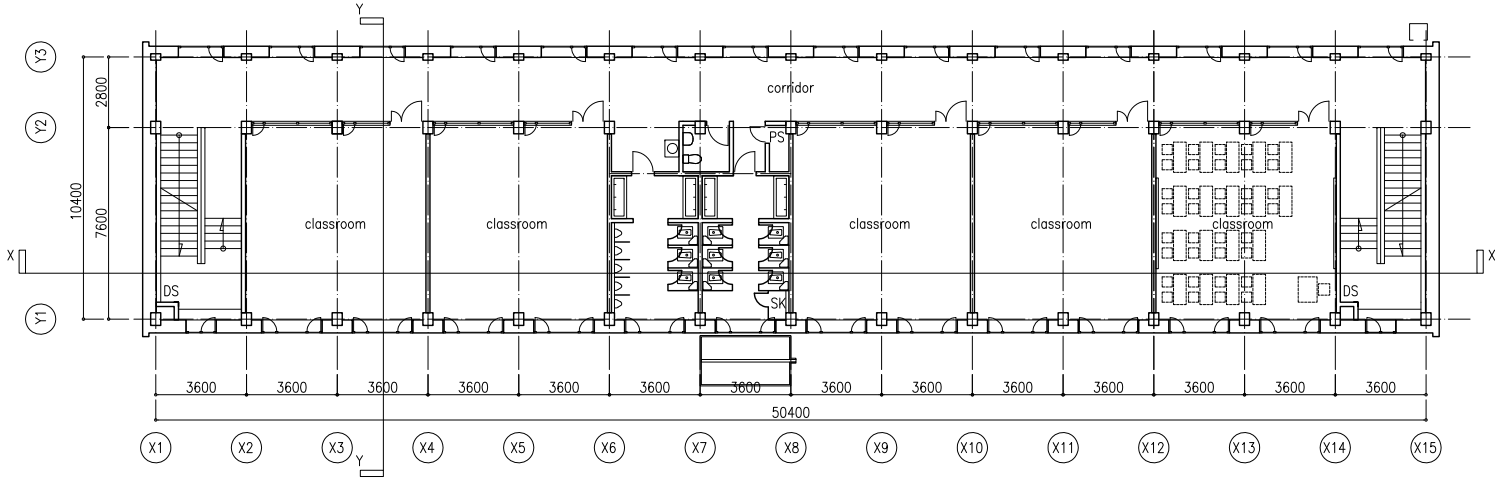
A21

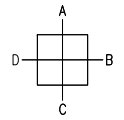


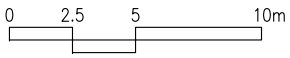
ROOF PLAN



4th FLOOR PLAN





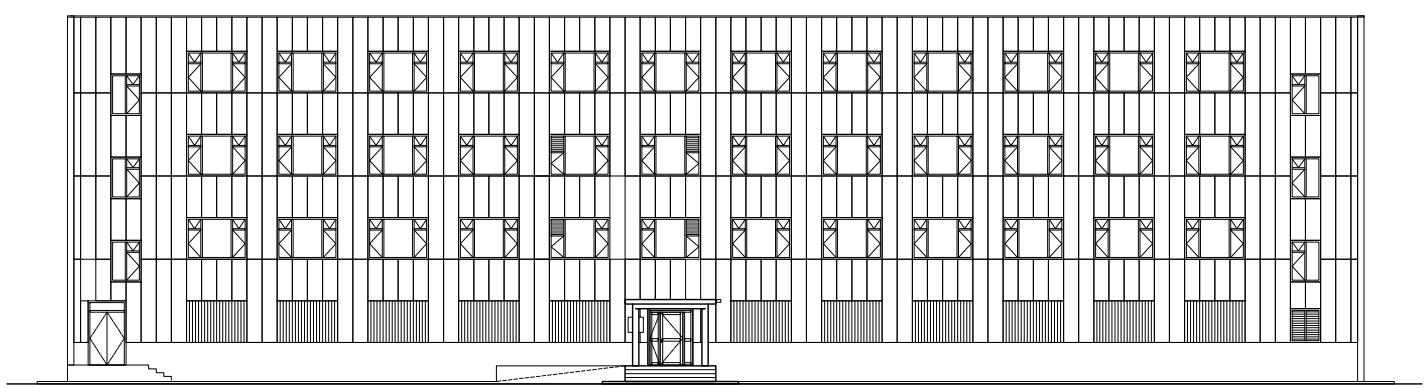


2nd,3rd FLOOR PLAN

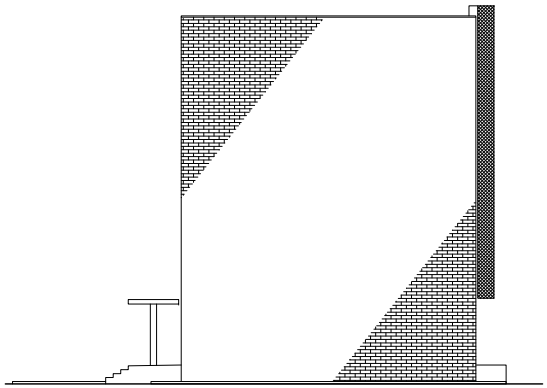
2，3階平面図　4階平面図　屋根伏図（19CR）　S=1/300
2,3rd FLOOR PLAN, 4th FLOOR PLAN, ROOF PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

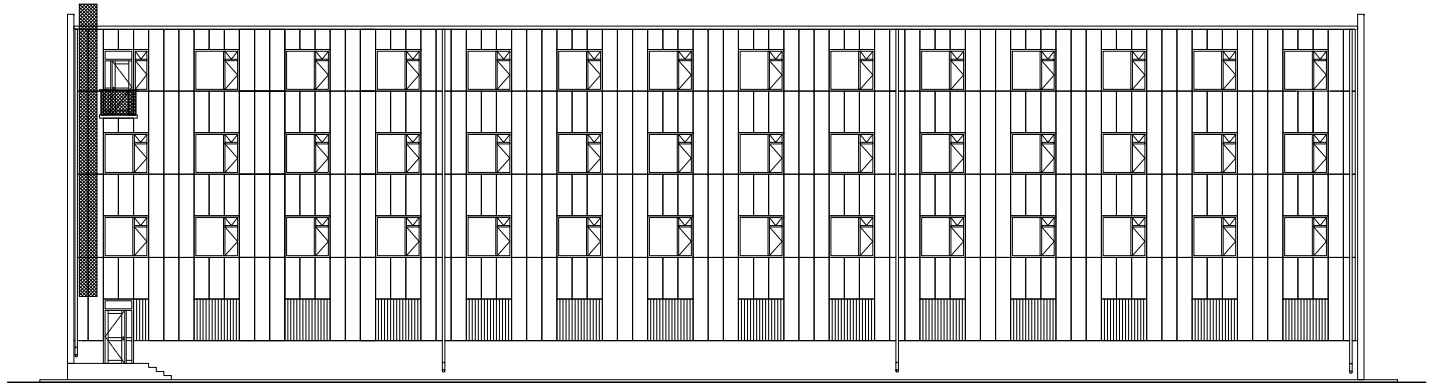
A22



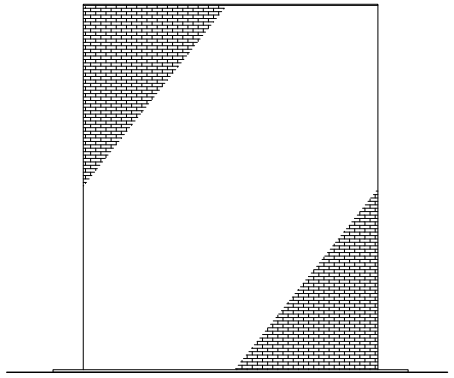
ELEVATION C



ELEVATION B



ELEVATION A



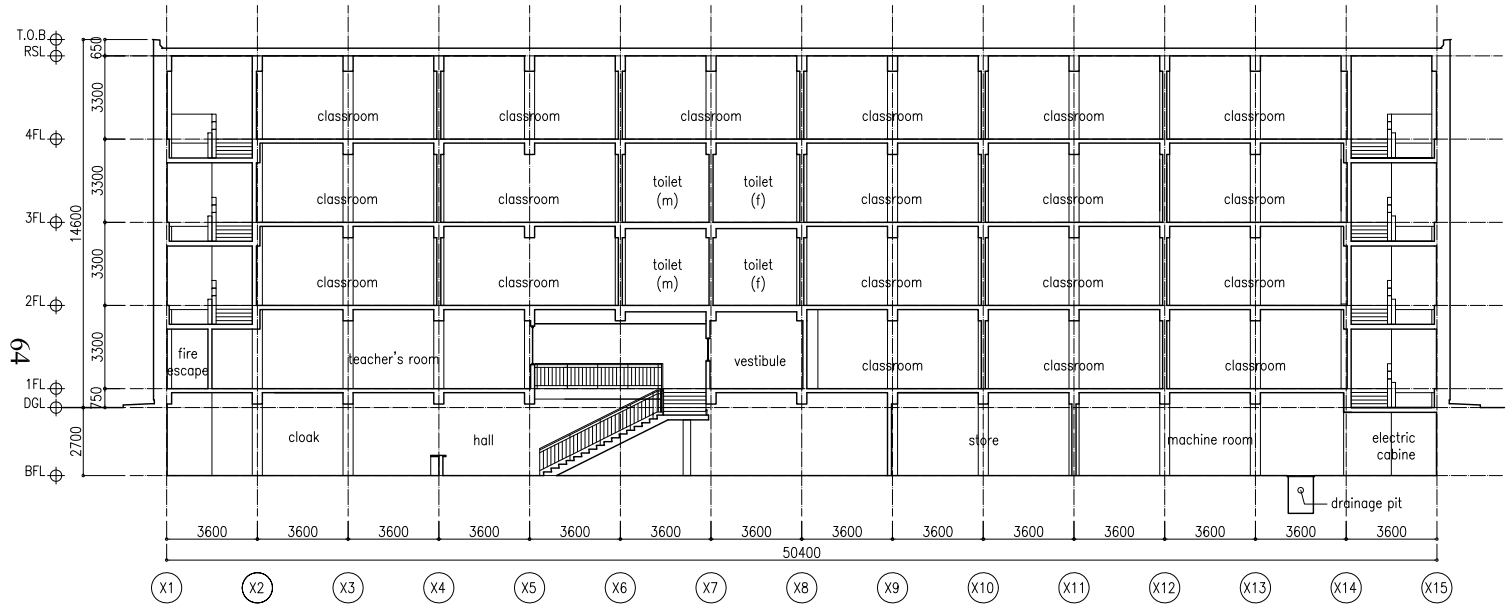
ELEVATION D

0 2.5 5 10m

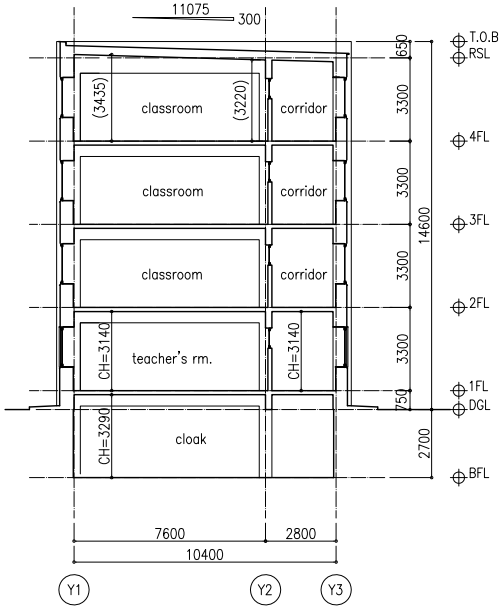
立面図（19CR） S=1/300
ELEVATION

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A23



SECTION X–X



SECTION Y–Y

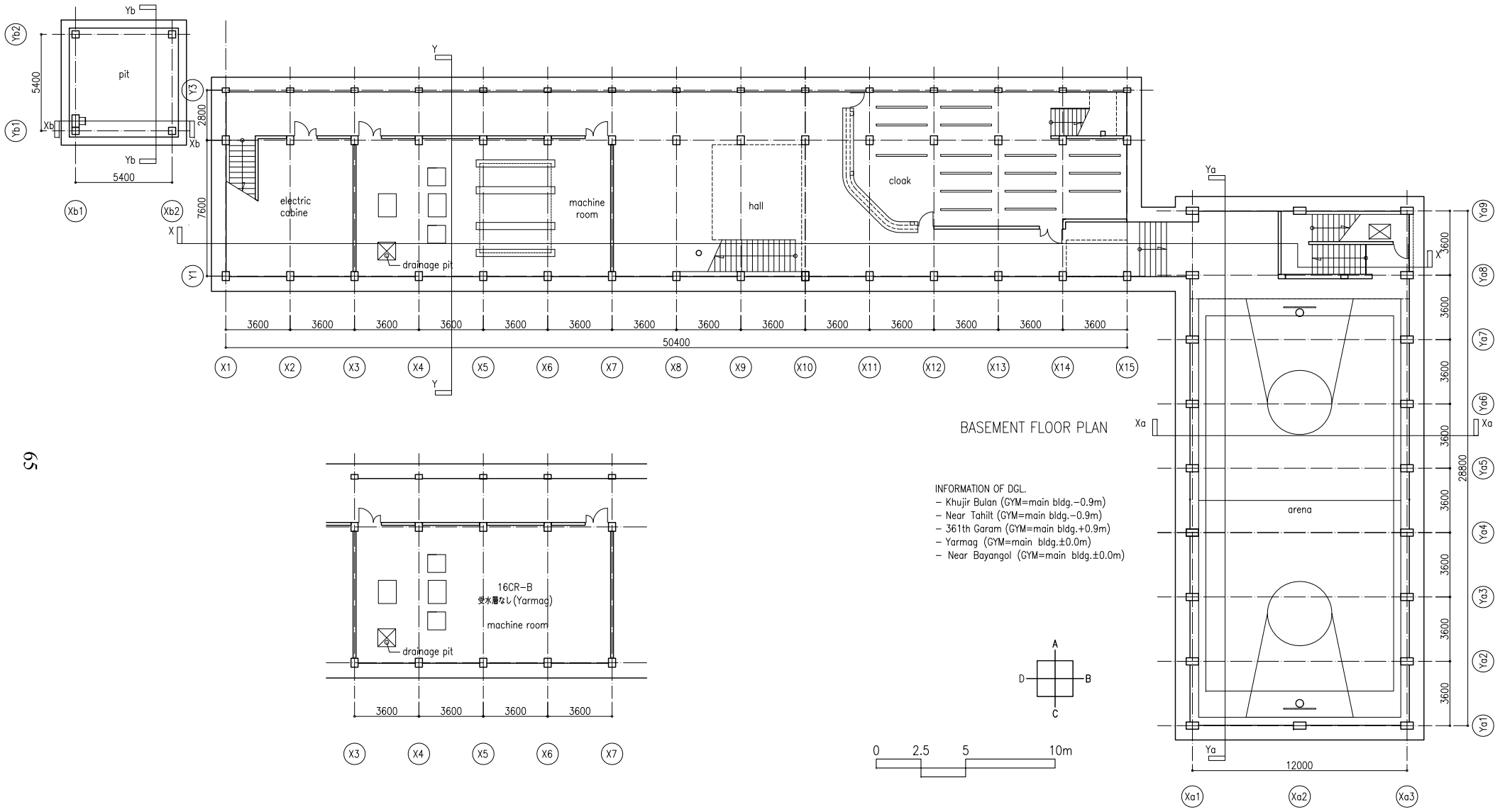
0 2.5 5 10m

断面図（19CR）
SECTION

S=1/300

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A24

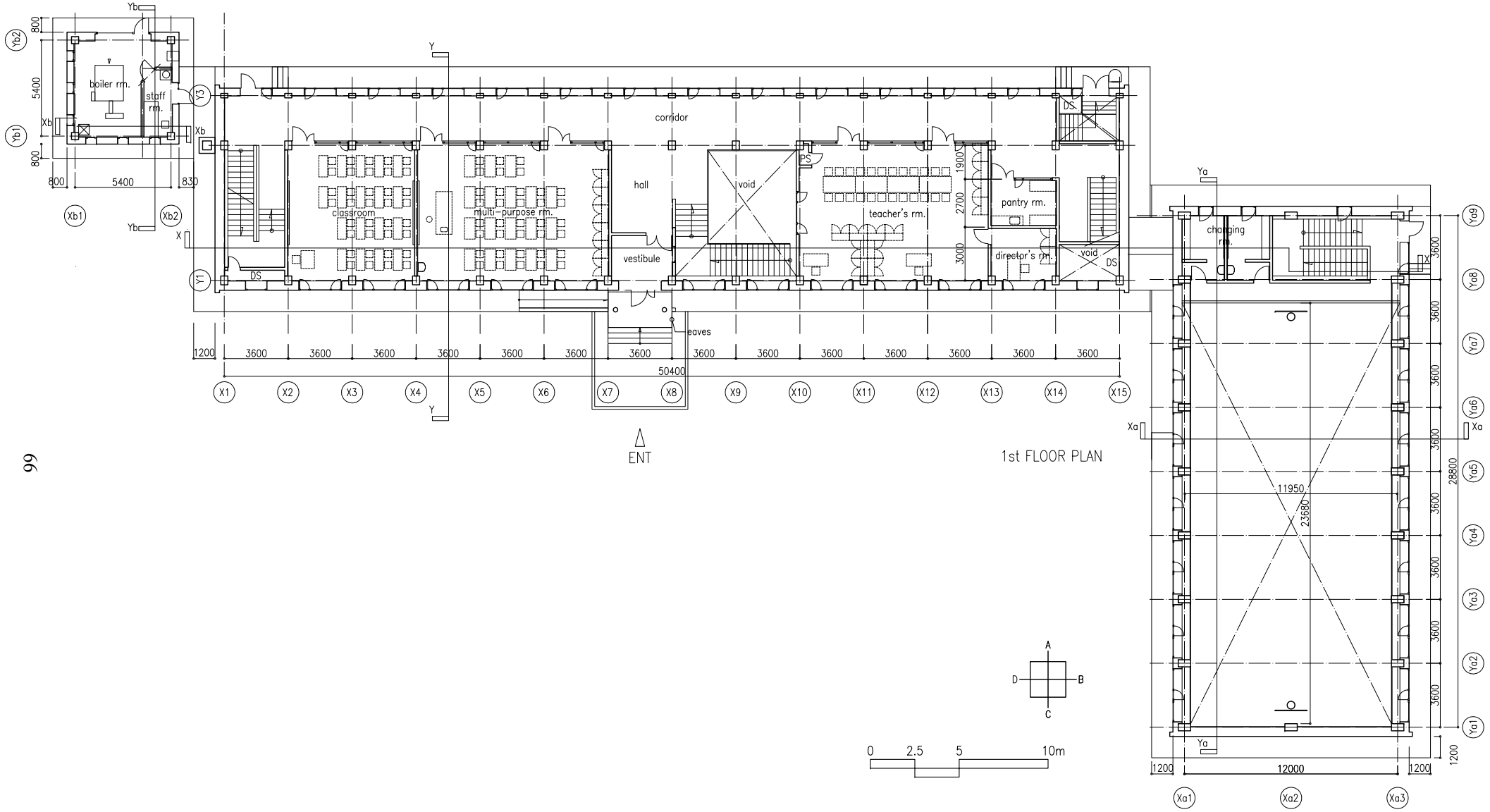


BASEMENT FLOOR PLAN

地下１階平面図（16CR-BW/16CR-B, GYM, BOILER ROOM）S=1/300
BASEMENT FLOOR PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A25

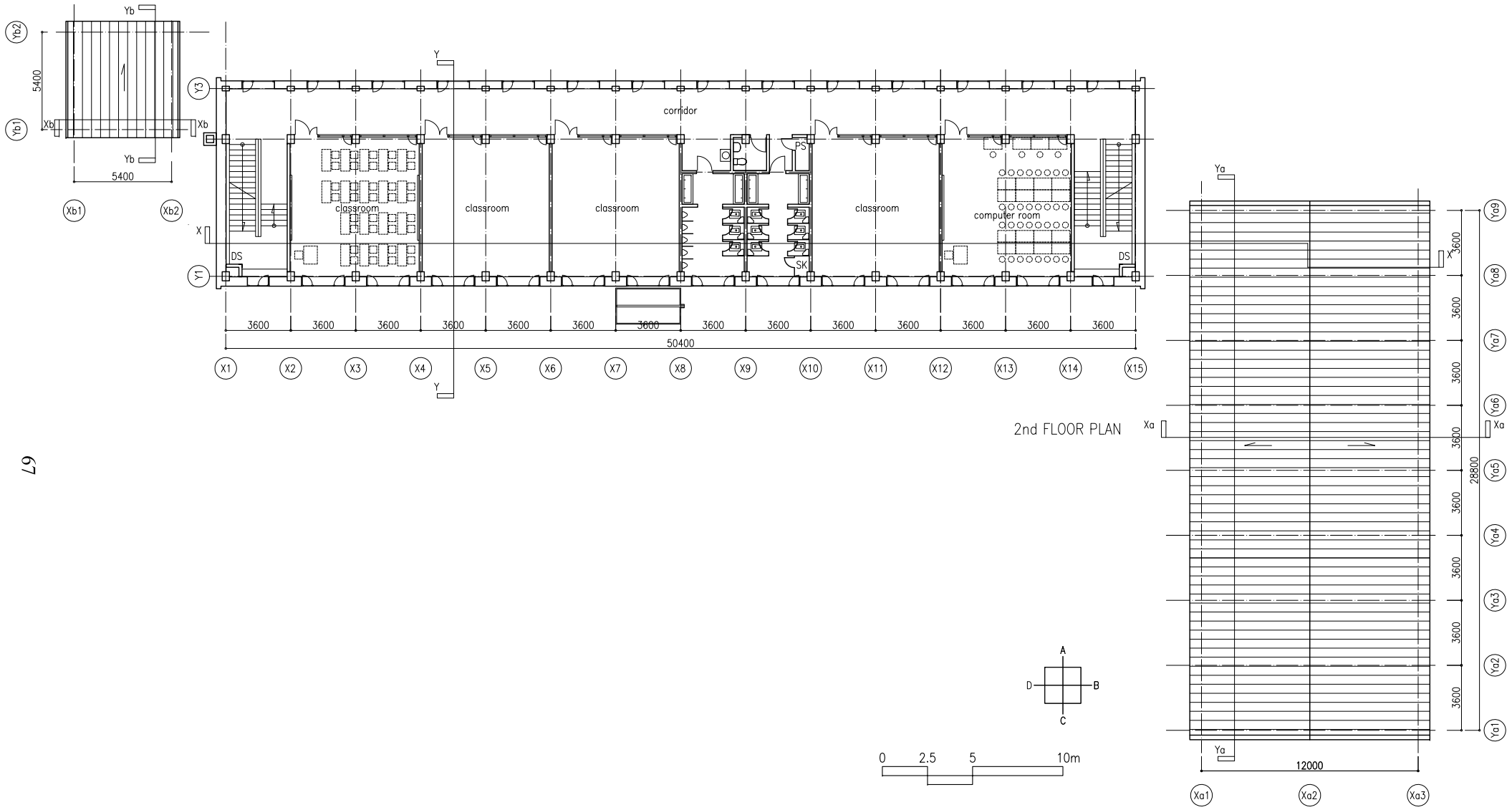


1st FLOOR PLAN

1階平面図（16CR-BW/16CR-B, GYM, BOILER ROOM） S=1/300
1st FLOOR PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A26

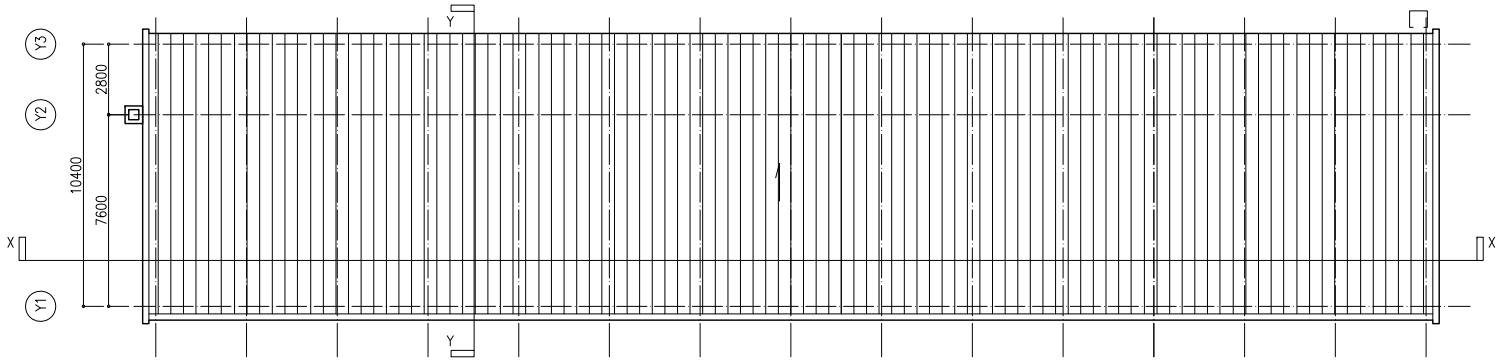


2nd FLOOR PLAN

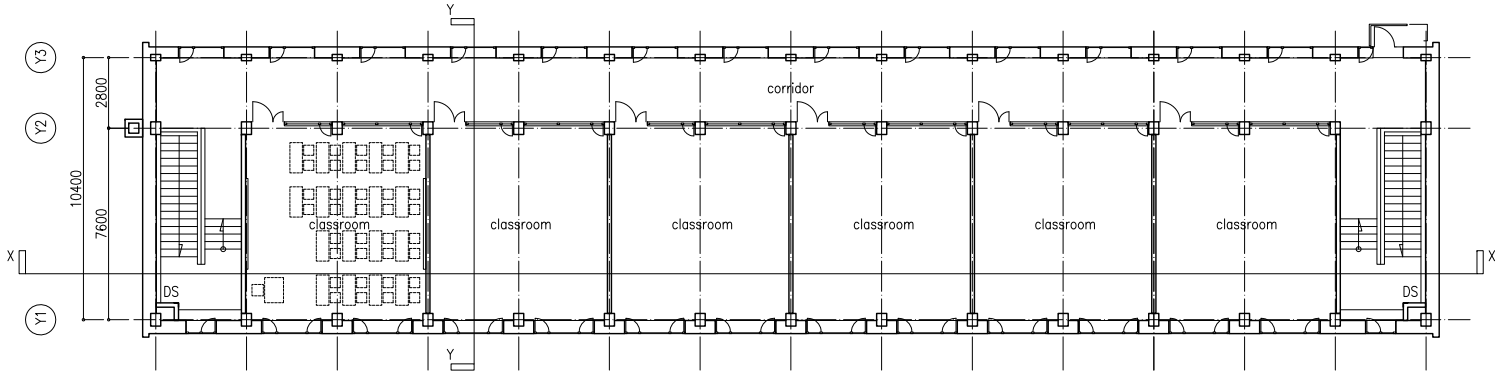
2階平面図（16CR-BW/16CR-B, GYM, BOILER ROOM）　S=1/300
2nd FLOOR PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

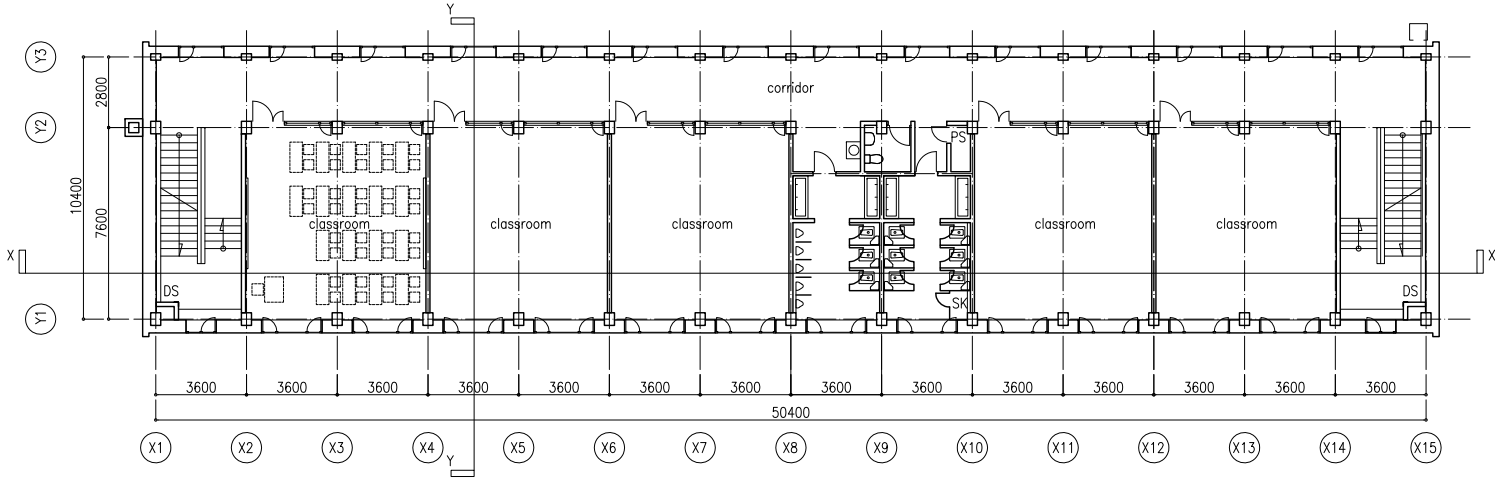
A27

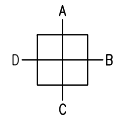


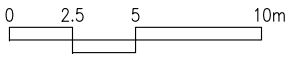
ROOF PLAN



4th FLOOR PLAN





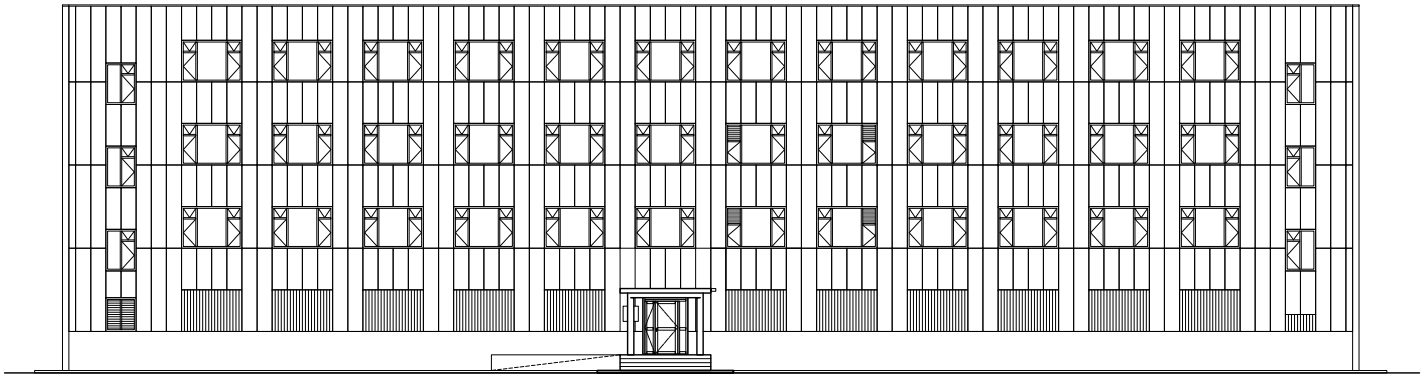


3rd FLOOR PLAN

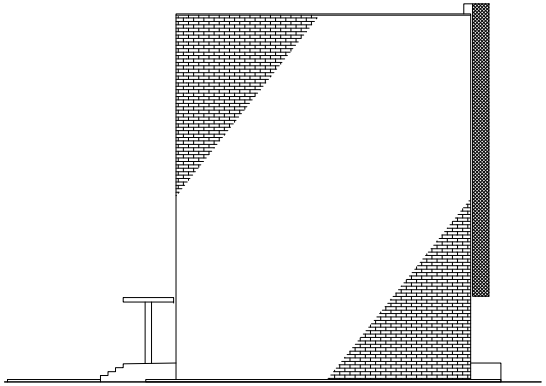
3階平面図 4階平面図 屋根伏図 (16CR-BW/16CR-B) S=1/300
3rd FLOOR PLAN, 4th FLOOR PLAN, ROOF PLAN

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

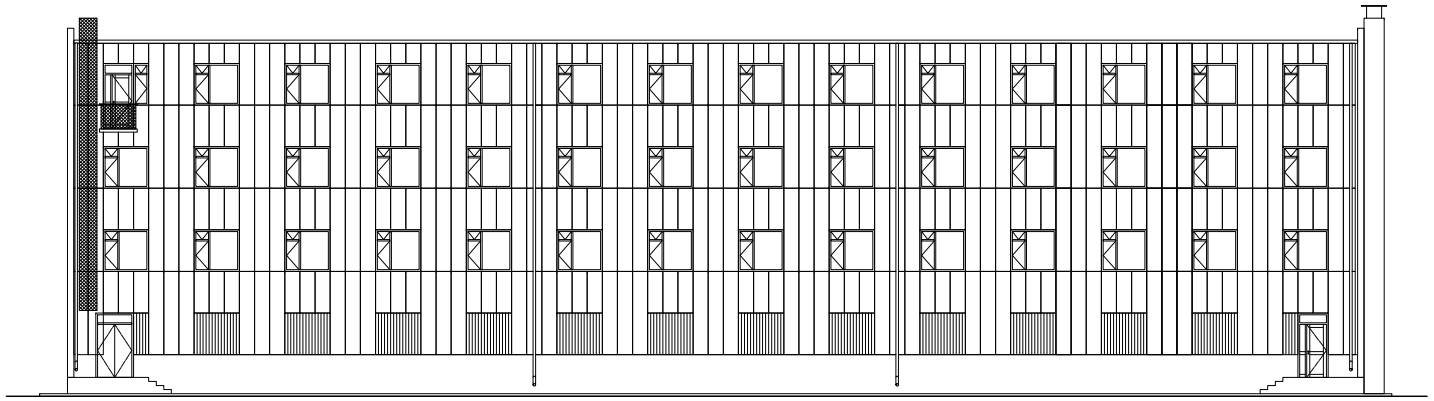
A28



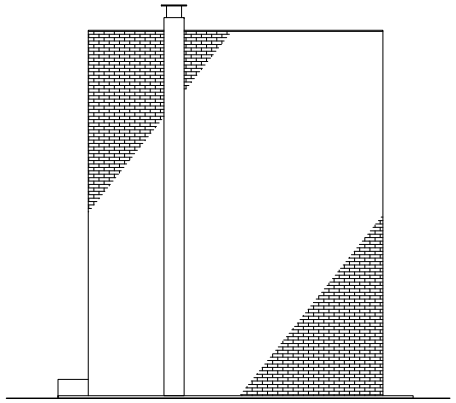
ELEVATION C



ELEVATION B



ELEVATION A



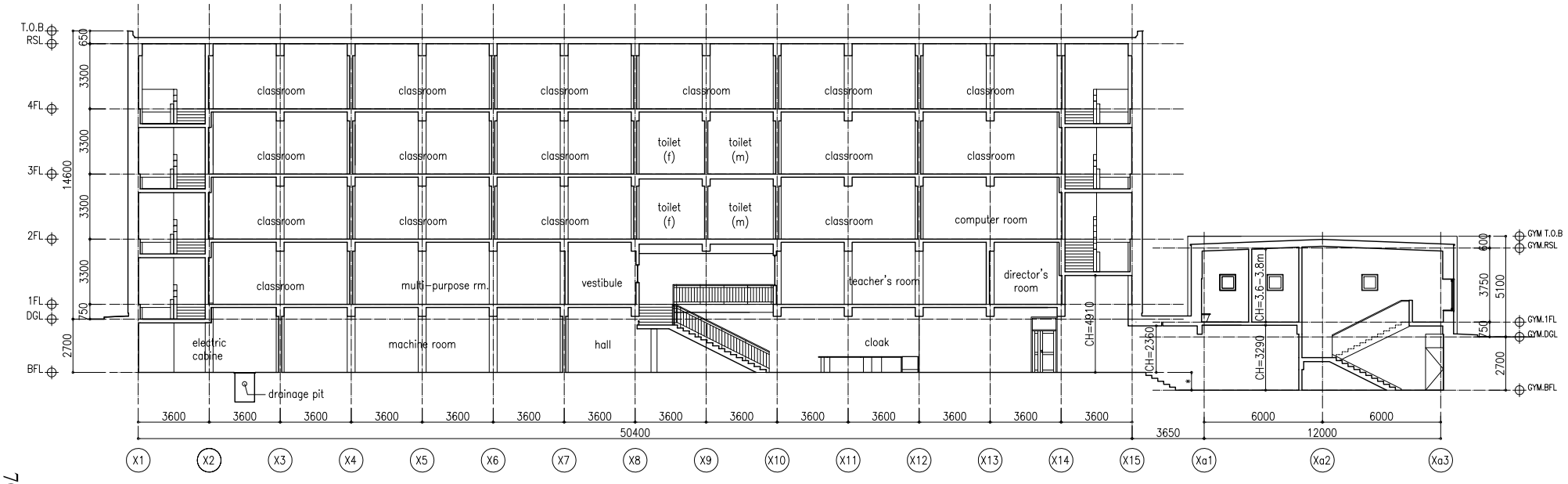
ELEVATION D

0 2.5 5 10m

立面図（16CR-BW/16CR-B） S=1/300
ELEVATION

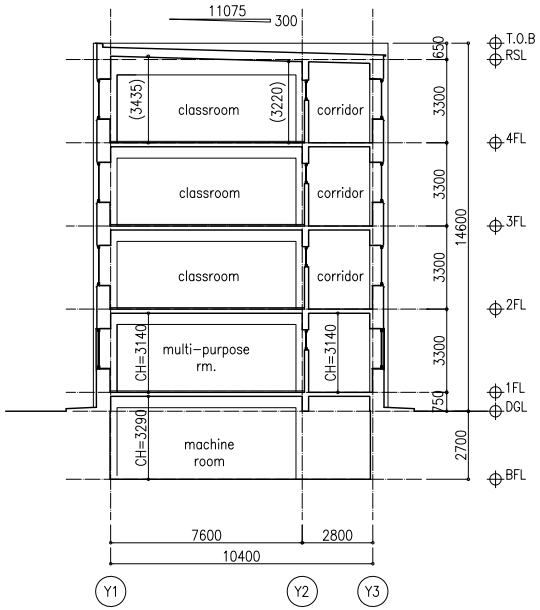
モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A29



SECTION X–X

* INFORMATION OF DGL.
- Khujir Bulan (GYM=main bldg.–0.9m)
- Near Tahilt (GYM=main bldg.–0.9m)
- 361th Garam (GYM=main bldg.+0.9m)
- Yarmag (GYM=main bldg.±0.0m)
- Near Bayangol (GYM=main bldg.±0.0m)



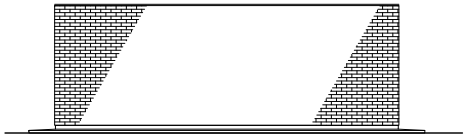
SECTION Y–Y

0 2.5 5 10m

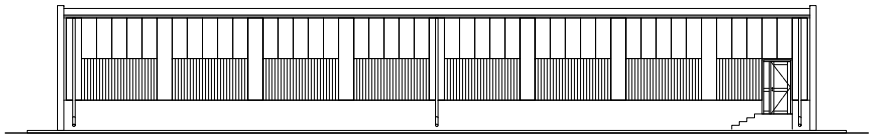
断面図（16CR-BW/16CR-B） S=1/300
SECTION

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

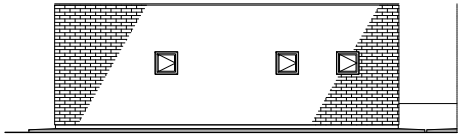
A30



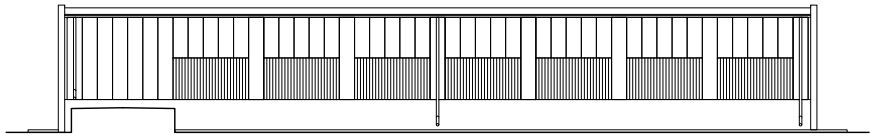
ELEVATION C



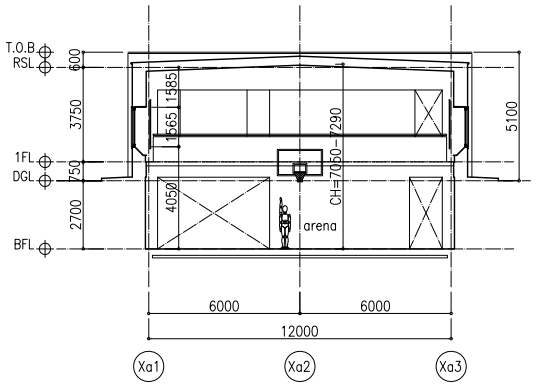
ELEVATION B



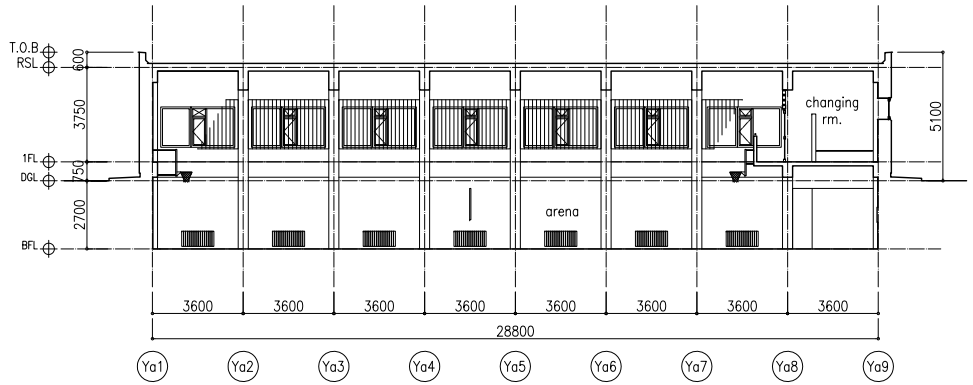
ELEVATION A



ELEVATION D



SECTION Xa–Xa



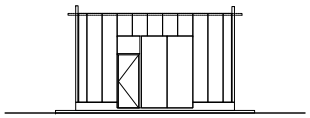
SECTION Ya–Ya

0 2.5 5 10m

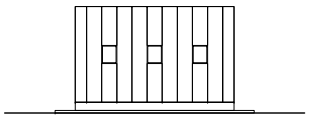
立面図　断面図（GYM）　S=1/300
ELEVATION, SECTION

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

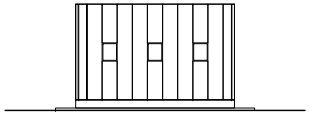
A31



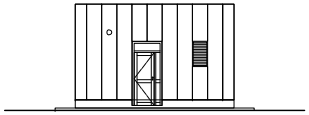
ELEVATION A



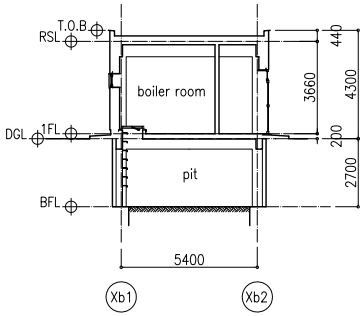
ELEVATION D



ELEVATION C



ELEVATION B



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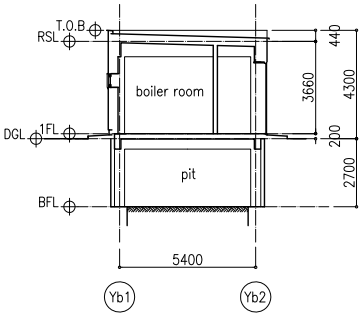

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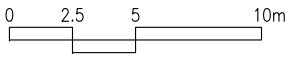


立面図　断面図（BOILER ROOM）　S=1/300
ELEVATION, SECTION

モンゴル国第４次初等教育施設整備計画
THE PROJECT FOR THE IMPROVEMENT OF PRIMARY EDUCATION FACILITIES (PHASE IV) IN MONGOLIA

A32

2-2-4 Implementation Plan

2-2-4-1 Implementation Policy

(1) Basic Conditions for Implementation of the Project

The Project will be implemented within the framework of Japan's grant-aid scheme after a cabinet approval of the GoJ and the signing of an Exchange of Notes (E/N) and a grant agreement (G/A) concerning the implementation of the Project between the two governments. Once the implementation is confirmed in these processes, the GoM and a Japanese consulting firm will enter into a consultancy agreement, which will in turn trigger the start of detailed designing of the facilities and equipment to be provided. Following the completion of detailed design drawings and tender documents, a competitive tender will be held targeting qualified Japanese contractors. The successful tenderer will make a contract with the GoM, concerning the construction of buildings and the procurement of equipment, which will then be executed accordingly.

(2) Project Implementation System

Implementation system on the Mongolian side

The responsible body for implementing the Project on the Mongolian side is the Ministry of Education, Culture and Science (MECS). Its Department of Finance and Economy will be the focal point for coordinating and promoting the Project on the whole. The MECS will also be responsible for concluding the consultancy agreement and the construction and procurement contract with Japanese companies, taking all procedures to open a bank account and make necessary payments, and earmarking budgets necessary for fulfilling the obligations of the Mongolian side. In the meantime, the Education Department of UBC will act as the implementing agency for all technical aspects of implementing the Project, including executing the works to be undertaken by the Mongolian side, acquiring necessary permissions, preparing project sites, and so on, under the supervision of the MECS. The Department will closely communicate with all parties concerned in implementing the Project, namely the Specialized Inspection Department, the Town Planning Department, Water Supply and Sewerage Authority, Heating Authorities, etc., in order to facilitate the performance of its tasks associated with the Project. As for the signing of the E/N and the G/A, the Mongolian Ministry of External Relations (the former Ministry of Foreign Affairs) will be the responsible entity.

Japan International Corporation Agency (JICA)

JICA is responsible for concluding the G/A with the entity responsible on the Mongolian side and monitoring and supervising the Project to be carried out pursuant to Japan’s grant-aid scheme.

Consultant

The Consultant will draw detailed designs for the facilities and equipment to be provided under the Project pursuant to the contents of this report and supervise the construction and procurement works by the contractor, based on the consultancy agreement to be signed between the Consultant and the responsible party of the Mongolian side. The Consultant will also prepare tender documents for selecting the construction and procurement contractor and support the Mongolian party in signing on the construction and procurement contract. In order to facilitate the efficiency in performing these tasks, the Consultant will create a collaborative relationship with the pertinent departments of the MECS and the implementing agency, the Education Department of UBC, and will dispatch supervising engineers as necessary during the construction and procurement periods.

Contractor

The Japanese company chosen as the construction and procurement contractor through competitive tendering will carry out the construction of buildings and the procurement of equipment pursuant to the contract documents within the predetermined period of time, based on the construction and procurement contract to be signed between the company and the responsible party of the Mongolian side. In actual performance of the construction and the procurement, the contractor will establish an efficient organizational structure suitable for the scale and contents of the works in the country.

Project Implementing structure

The following figure illustrates the relationships among the parties concerned and the structure to implement the Project at the implementation stage of the Project.

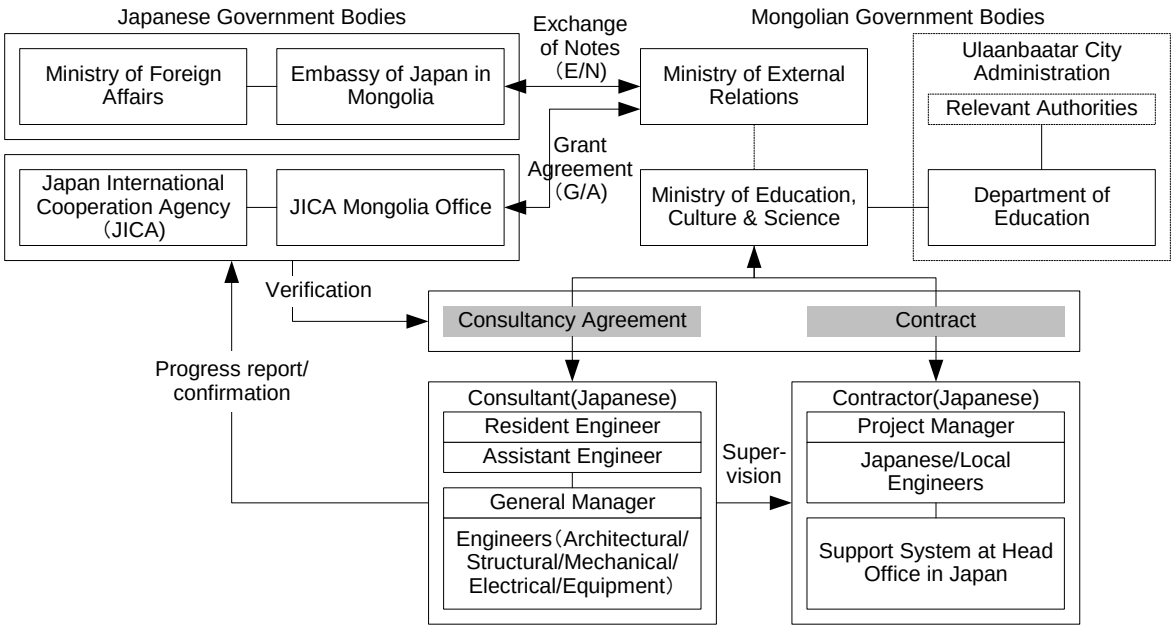


Figure 2-4 Project Implementation Structure

(3) Basic Policies on Construction and Procurement

The Project is to construct basic education facilities at multiple sites dispersed across UBC. The buildings to be constructed are expected to have the basic functions as education facilities and the quality comparable with the past projects carried out under Japan's grant-aid, while assuring a uniform level of qualities among the different project sites. Very importantly, moreover, the site organization and schedule of works to be put in place should be feasible down to the ground, by taking into consideration all constraints arising out of the long-lasting severe winter in the country, thereby achieving an overall cost reduction and efficient work execution. The following lists the basic policies on construction and procurement.

- Utilize local contractors and engineers in an appropriate manner and create an efficient construction management mechanism, with aims to implement the Project in an efficient and no-loss manner in consideration of the local conditions in the country and to achieve a required level of quality.
- Assure quality control, progress control and safety control by means of a uniform approach, in order to maintain an equal standard of construction at the different project sites and carry out the construction efficiently.
- Prepare detailed construction and procurement plans in advance of the commencement of construction with the constraints due to meteorological conditions taken into account, and carry out the construction and procurement in a well-planned manner.
- Carry out the Project with due understanding and cooperation of the schools, community members, and personnel in charge of the Project at UBC's relevant departments, and facilitate procedural work, such as acquisition of permissions, etc., by keeping close communication with the technical departments of UBC.

2-2-4-2 Implementation Conditions

(1) Conditions of Local Construction/Procurement Industry and its Characteristics

1) Situation concerning Local Construction Companies and Labor

UBC is enjoying a construction boom today, in consequence of the rapid growth of national economy and the ensuing investment in the development of infrastructure. Construction works of high-rise buildings and apartments and large-scale public facilities take place everywhere in the city, and there are many more large-scale projects coming up. The construction industry itself is developing speedily in terms of experience, capital strength, technical prowess, etc. Many of large companies are aggressively pouring capital investment into plants and construction machinery as part of their business expansion. The major works performed by these companies have proved to be at a decent level of quality and safety control and the completed works by means of local methods seems to pose no concern. As for labor force, skilled workers in various fields and

general labor are abundant in response to the active construction demand and their technical level raises no problem. On the other hand, as all main works concentrate on the six months in summer, some medium- and small-sized companies that are less capable of procuring labor may sometimes encounter with the shortfall of labor force to carry out their received works.

For the smooth implementation of the Project, local companies with a sufficient capability to procure labor and equipment, a broad spectrum of know-how, and a wide network in the country will be proactively employed. At the same time, the construction schedule without pressure have to be drawn, to ensure a reasonable work flow, by balancing the workload throughout the construction period and avoiding generating of excessive labor demand in the peak season.

2) Situation concerning Procurement of Construction Materials and Equipment

The Mongolian industry produces sand, crushed stones, cement, lumber, rebars, and bricks and also has started local production of industrial products, such as PVC fixtures, insulators, furniture, etc. Also, the supply system for ready-mixed concrete has been recently established and is commonly utilized. On the other hand, some materials are either unavailable or too expensive due to the active construction demand, and contractors continue to resort to China, South Korea, Europe or other parts of the world for major construction materials. The imports are still more advantageous in terms of price and quality. When purchasing imported materials, the buyer typically places an order directly to a large supplier or the producer abroad, because domestic suppliers are still immature. This means that it takes a certain period of time from ordering to delivery. The majority of imported goods are transported by railway via Zamyn-Uud at the border with China. However, the refurbishment of existing facilities cannot keep pace with the rapid increase in the transport volume driven by the economic growth, and as a result, cargos are often held at the border and delivered with delay.

In implementing the Project, the materials and procurement sources will be determined, in view of the latest situations concerning the trend in price hikes and stability in supply, in addition to quality and price. It is also critical to allocate a sufficient time to procurement and transportation for a well-planned procurement. Furthermore, in order to deliver necessary materials to the sites in an efficient and stable manner taking advantage of the scale of the Project, it will be effective to set up a construction base in the city to store a certain level of inventory, for a centralized procurement and management of materials.

(2) Other Conditions

In Mongolia, the building inspection system inherited from the socialists' era is applied to all construction projects. A project must obtain the building permit at the beginning of the project, and under go interim inspections at the completions of excavation, structural and finishing works, applications and inspections in association with public utilities, and a final inspection before being put to use. Without obtaining the progress permissions from governing authorities, such as UBC

and the State Specialized Inspection Agency, the project may not move on to the next stage.

For the smooth implementation of the Project, any feedback calling for corrective actions at these inspections must be avoided. To do so, engineers who have good knowledge of the local conditions at the design and construction stages will be employed for closely consulting with related departments, and the construction schedule will anticipate a sufficient period of time for the inspections and permissions procedures.

(3) Grouping of Sites

As the Project involves works of such a large scale as a total floor area of 30,000 m^2, the 12 project sites will be divided into three groups with different construction schedules, in consideration of the capabilities of local contractors and the appropriate scale as a Japan's grant-aid project. The details of each group are planned as follows so as to secure a standard period of time for the exteriors works, which are constrained in terms of workable months, and to strike a balance in respect of the total workload per term.

- The Project will start with the construction of Group 1, which will be assigned a moderately small scale to secure a sufficient preparation period and to establish well-planned construction and procurement systems and will commence early April and end in March the following year.
- The underground works for Groups 2 and 3 will be scheduled during summer of the initial year. The sites will be closed for the winter season and will be reopened in the following year for the rest of the works. With this schedule, a typical six-month period will be secured for the above-ground structural and exterior works and the installation of heating systems.
- The order of sites to carry out the construction is determined in consideration of the urgency and the balance of locations. Furthermore, the sites for new schools within the area where urban development projects is planned pursuant to the city's master plan will generally be included in the final group, due to the necessity for synchronizing with the infrastructure development.

Table 2-10 Grouping of Sites

Construction Stage	Site (District)	Combined scale	Contents of works per term			
			Term 1	Term 2	Term 3	Term 4
1	Shavi (Bayanzurkh), No.35 School (Sukhbaatar)	2 sites 27 classrooms	Preparatory works	Under/above-ground works	-	-
2	No.12 School (S.khairkhan), No.19 School (Bayangol), No.79 School (Bayanzurkh), Yarmag (Khan-Uul)	4 sites 44 classrooms	-	Underground works	Above-ground works	
3	Amgalan･Kujir Bulan (Bayanzurkh), No.52 School (Khan-Uul), 361st Garam･Near Tahilt･Near Bayangol(S.khairkhan)	6 sites 84 classrooms	-	-	Underground works	Above-ground works

2-2-4-3 Scope of Works

In the implementation of the Project under Japan's grant-aid scheme, the Japanese side and the Mongolian side will respectively bear the following responsibilities. The general demarcation under grant-aid projects is provided in the following chapter.

(1) Works to be undertaken by the Japanese Side

- Construction of Facilities
  - Construction of 12 school buildings (155 classrooms in total with incidental rooms)
  - Installation of water supply, drainage, sanitation, hot water service, safety control, ventilation, heating, electric, and communication systems necessary for the said buildings
  - Procurement and installation of educational furniture necessary for the said buildings
- Procurement of Equipment
  - Procurement of basic teaching equipment (teaching materials for classrooms, rulers, projectors, etc.)
  - Procurement of maintenance equipment (tools)

(2) Works to be undertaken by the Mongolian Side

- Appropriation of lands for constructing the new buildings
- Land preparation (removal of existing structures and underground obstacles, leveling, slope protection)
- Improvement of temporary access roads for construction vehicles
- Introduction of electricity and water supply temporarily for construction into the sites (where available)
- Introduction and connection of electricity, heating, water supply, sewerage, and telephone line at the sites where available.
- Provision of external facilities, such as gates and fences, parking lots, planting, pavement, etc.
- Procurement of furniture, equipment, fixture, educational equipment, consumables, etc. that are not covered by the Japanese side.

2-2-4-4 Consultant Supervision

(1) Basic Policies on Consultant Supervision

The Consultant, based on the understanding of the framework of Japan's grant-aid scheme and the contents of the Basic Design, will carry out its duties from the detailed design, tender-related

services, supervision of construction and procurement, through to the hand-over. During the supervision stage, the Consultant will closely communicate with and report to relevant government organizations of the two countries and provide the contractor with timely and appropriate guidance in order to ensure that the facilities and equipment of a quality level prescribed in the contract documents will be put in place without delay. Particular attention is required in the following points.

- The Consultant will prepare a supervision program, which articulates criteria for and points of supervision, in order to oversee the multiple sites dispersed in the city in an efficient and effective way, and pay regular visits to the construction sites for supervising.
- As for external walls and roofs that will use a construction method not popular in the country, the Consultant will review and inspect the construction plan in depth prior to actual works. Japanese engineers will thoroughly supervise the works through onsite verification, e.g., trial construction, and provision of guidance to the constructors, as necessary.
- The completion of the construction in accordance with the implementation schedule inevitably requires the completion of structural and exteriors works within the predetermined periods. The Consultant will closely coordinate with the parties concerned in order to facilitate the works to be undertaken by the recipient country and other relevant tasks, such as issuance of permissions, for completion without delay. The Consultant is also expected to have a grasp over the progress of works, including the procurement of labor and materials, and will act promptly should any problem occur.

(2) Consultant Supervision System

In order to carry out the supervision of works taking place in a number of sites in an adequate manner, a Japanese architect will be dispatched to Mongolia as a resident engineer throughout the entire construction and procurement period and he or she will assume the following tasks.

- Examine the plans for construction, schedule of works, procurement of construction equipment and materials, furniture and equipment, quality control, safety measures, etc., and guide, advise, and coordinate with the contractor as necessary;
- Verify and approve the shop drawings, fabrication drawings, samples, etc. to be submitted by the contractor.
- Understand the entire work schedule for both construction and procurement, ascertain the progress of works at individual sites, provide guidance to the contractor as necessary, and regularly report to the related organizations on both countries on the progress of the work;
- Inspect the quality and workmanship of various works and provide guidance and advice to the contractor;
- Coordinate technical aspects of implementation of works to be done by the Mongolian side and

confirm the progress;

- Support for the approval of the payments and the processing of necessary procedures at the time of completion of the works;
- Verify the specifications, contents and quantities of the equipment to be procured, and conduct necessary inspections; and
- Inspect the works at the time of completion and participate in the hand-over of the facilities and the equipment so as to confirm whether the contractor' instructions on operation and maintenance are appropriate.

The resident engineer to be stationed in Mongolia is expected to not only perform the supervision of the works but also make arrangements as necessary for the procurement of equipment as well as communicating and coordinating with the specialized authority and other parties concerned on the Mongolian side. In order to perform these wide-ranging tasks smoothly, the engineer must have ample expertise about building services and equipment, in addition to architecture, and deep knowledge on Japan's grant aid assistance. Furthermore, a local architect who is knowledgeable about local conditions will be hired to support the Japanese engineer.

In Japan, the Consultant will form a team, consisting of the project manager with engineers in charge of the relevant fields, for overall supervision of the Project as a whole, communication and coordination with the pertinent organizations in Japan, and supporting the resident engineer in Mongolia. The Consultant will also dispatch short-term experts at key points in accordance with the progress of the works for participation in inspections and provision of guidance on construction.

2-2-4-5 Quality Control Plan

The buildings to be constructed under the Project will have a four-story and one-basement structure with its main structure made of RC frames. Quality control in the Project will be focused on (i) the skeletons (rebars and concrete works), and (ii) exterior works, i.e., ALC, bricks, sash, roof, and heat insulation, which have great impact on the basic functions of the buildings, such as durability, heat insulation and water-tightness, and (iii) building services (heating system, etc.) which are vital for the building to function. To these ends, the following steps will be taken. Furthermore, the testing methods and materials specifications will conform to the standards acknowledged by the Mongolian authorities and refer to those used in Japan as necessary.

- Work plans will be prepared for major items of work, describing in detail the processes, specifications, materials, construction procedures, inspection methods, quality requirements, etc., and will be subject to verification and approval of the Consultant.
- Visual inspection will be performed with respect to the bearing ground to check if the soil conditions of the bedding surface after the excavation show no difference from the soil inspection reports at the respective sites and also to confirm freezing depth and impact of soil

freezing.

- Rebars will be inspected on delivery with regard to their quality as described in the supplier's product test report. They will also be subjected to tensile strength test per type by a public testing laboratory.
- Concrete materials, e.g., cement, aggregate, and water, will be checked with respect to their quality using the materials test data to be submitted by the concrete plant, at the time of design of mix proportion.
- Concrete will be mixed in accordance with the design mix established through trial mix, and quality of fresh concrete will be checked by verifying slumps, temperature, and the contents of air and chlorides at the time of delivery to the site. Compressive strength tests will be performed by a public testing laboratory on sample pieces taken out at the time of casting (per 150 m^3 per casting place) to confirm the compressive strength. Furthermore, the control of temperature at the times of casting and curing requires special attention, in the light of the weather conditions with a significant gap between the lowest and highest temperatures. In particular, the high temperature in summer and the low temperature in spring and autumn (April-May and September-October) may necessitate special treatments such as sheeting or warming.
- Detailed work plans will be prepared with respect to the ALC and metal roofing works, which are not familiar in the country, and the work procedures will be fully checked and explained through trial construction, etc. before actually taking up the work. Regarding ALC work, special attention will be paid upon proper detailing and painting to prevent frost damage.
- In heat insulation and exterior works, the shop drawings will be thoroughly checked to make sure that no heat bridge will be created, and the points of particular attention, such as the tie-in parts and supporting fixtures, will be clarified and carefully checked on site.
- The piping outside the buildings, which is premised to be subject to impact of freezing and frost heave, will be duly treated with insulation band, etc. and test-operated during wintertime in order to check that there is no defects.

2-2-4-6 Procurement Plan

(1) Construction Materials and Equipment

All materials and equipment necessary for the construction under the Project are basically what is used commonly in the country, except ALC panels for external walls and Zincalum steel sheets for roofing. Cement, aggregate, lumber, bricks, and other raw material products and some industrial products are produced in Mongolia while the rest is imported from outside, such as China, South Korea, and Russia. Those raw materials produced in the country may sometimes have problems in terms of supply, price and quality, such as steel bars and bricks. Thus, in planning an optimal procurement method, all options, including imported goods, will be compared and studied at large.

Moreover, direct procurement or direct import from the producers or foreign large suppliers is a general practice with regard to procurement of a large quantity of materials in a stable manner. Therefore, the procurement of major import materials will be planned as direct purchase from the origin of the products, in principle. The following table lists the items, specifications, and procurement sources of major construction materials.

Table 2-11 Procurement Plan of Major Construction Materials

Materials	Procurement from			Remarks
	Local	Japan	a third country	
Sand and gravels	○			From Darkhan or the subcontractor's plant.
Cement	○			Mongolian or Chinese cement (M400 to 500) available.
Concrete	○			Several plants are available in the city. No concern over the volume of supply and quality.
Rebars and section steels		○		Direct import of Japanese (JIS) products, which are stably supplied in terms of price and supply system.
Concrete blocks	○			Procurement from subcontractors or specialized supplier.
Bricks			○	Mongolian bricks are not suitable for facings. Chinese bricks, which are relatively advantageous in terms of price compared with Russian ones, will be imported.
ACL panels			○	Chinese products will be imported considering its competitive price. No concern over quality.
Plywood for forms		○		Direct import of Japanese products, considering price, quality and stable supply.
Lumber	○			Mongolian lumber is available in open markets.
Wooden fixtures and furniture	○			Produced at factories around UBC. No concern over quality and production capacity.
Steel fixture and ironware	○			Ditto.
PVC fixtures			○	Mongolian products are limited in supply volume and quality. Chinese ones pose no concern.
Glass			○	Direct import from China considering the price and the processing quality.
Steel roofing sheets			○	Direct import from China due to its competitive price. No concern in quality.
Ceiling and floor finishing materials		○		Direct procurement from Japan is most advantageous in terms of quality and price.
Water-proofing materials	○			Imported products will be procured from local suppliers.
Ceramic tiles	○			Ditto.
Paint			○	Chinese or European products will be directly imported considering their stable quality.
Insulation material	○			Polyethylene foam plates made in Mongolia will be locally procured.
Plumbing materials and sanitary equipment			○	Chinese products, which are widely used in the country, will be procured considering the ease of maintenance and the price.
Piping materials for the heating system	○			Materials that conform to the Mongolian standards will be procured from specialized suppliers.
Radiator for the heating system			○	Chinese products, which are most popular in the country, will be imported.
Boiler			○	Chinese products will be directly imported since Mongolian ones do no have enough exhaust capacity.
Wiring materials, lighting fixtures			○	Chinese products, which are widely used in the country, will be procured considering the ease of maintenance and the price.
Fire-alarm system and miscellaneous devices			○	Ditto.
Distribution panels			○	Ditto.
Pumps			○	Ditto.

(2) Equipment

The equipment to be procured under the Project consists of i) teaching equipment and ii) maintenance tools, which are all basic items requiring no special skills in the maintenance. The projectors to be procured as part of teaching equipment will be locally purchased from a maker who has a distributor in UBC, in view of the servicing at times of breakdowns and the replacement of lamps, which are consumables. The other equipment will be procured as listed below; it has been determined through a comparative study on price and supply condition.

Table 2-12 Supply Sources of Equipment

Item	Procurement from			Remarks
	Local	Japan	a third country	
Wall-hung teaching materials for classrooms	○			Locally procured from a supplier designated by the Education Department of UBC.
Rulers and other teaching equipment			○	Chinese products will be procured, considering their stability in supply and price.
Maintenance equipment (tools)			○	Ditto.
Projectors	○			Japanese or a third country products which have a distributor in Mongolia will be locally procured.

2-2-4-7 Soft Component Plan

General schools in Mongolia are managed by school management committees established per school; parents and community members participate in regular operations of the school such as maintenance of facilities and equipment. Furthermore, servicing staff for facilities will be deployed as necessary. Thus, there is no concern over a smooth operation and maintenance of the facilities and equipment to be provided under the Project. It is deemed as unnecessary to provide soft components for technical support.

2-2-4-8 Implementation Schedule

In case that the Project is to be carried out under Japan's grant-aid scheme, it is supposed to take the following steps after the signing of the E/N and the G/A between the two governments.

1) Detailed Design (app. 5.5 months)

The Consultant will sign on a consultancy agreement with the implementing agency of the Mongolian government and develop detailed design drawings as well as tender documents according to the contents of the Basic Design hereof. The Consultant will visit the country at the beginning and end of the detailed design work, to have discussion with the parties concerned on the Mongolian side and obtain an approval on the final outputs to wind up the work.

2) Tender (app. 2.5 months)

With the approval of the implementing agency on the tender documents, the Consultant will organize tendering in Japan on behalf of the agency: from prequalification (P/Q) via public announcement to opening of tenders submitted by qualified Japanese contractors in the form of competitive tendering with the attendance of the parties concerned. The tenderer who submitted the lowest price will become the successful tenderer when the contents of its tender are deemed adequate, and will then be entitled to signing a construction and procurement contract with the implementing agency of the Mongolian government. It will take approximately 2.5 months from the announcement of P/Q to the signing of the contracts.

3) Construction/Procurement (app. 38.5 months)

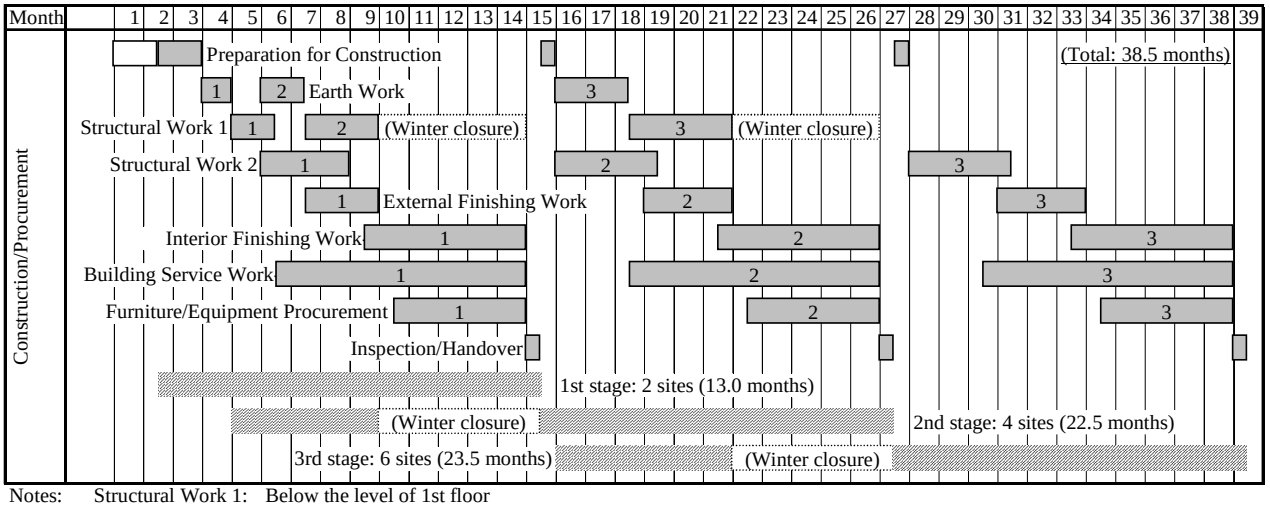
The selected construction and procurement company (contractor) will commence the work by dispatching necessary personnel to Mongolia, after the signing of the contract. The contractor will give due consideration to the meteorological conditions in the country, where an average temperature goes below zero in winter (between October and March) and any exterior work is infeasible in the meantime. The contractor will also secure a time period necessary for inspections and permissions by Mongolian authorities at the construction stage in the construction schedule. Furthermore, it is essential to allocate a certain period of time for transport and customs clearance as the majority of construction materials and equipment are to be imported from Japan or other third countries. The buildings to be constructed under the Project will typically have four stories and one basement, which require net 12 or 13 months for construction at each site. With the above-mentioned assumptions and the scale of the Project in mind, the whole work is divided into three construction groups, each of which will be carried out with a different schedule as follows.

- Group 1 : After securing a sufficient period of preparations for overall construction and procurement of construction materials, the construction will start at the Group 1 sites in early April when exterior works become feasible and it will be completed by March of the following year.
- Groups 2 and 3 : Underground structural works will start in the first year. The sites will be closed during winter and reopened for the rest of the work in spring the second year, which will allow an adequate time (6 months) for the skeletons of four stories above the ground and the exteriors works. The whole works will be completed in March of the third year.

The time needed for each group varies from 13.0 to 17.5 months according to the scale of actual processes.

An implementation schedule summarizing the above plan is provided as the following table.

Table 2-13 Project Implementation Schedule



Notes: Structural Work 1: Below the level of 1st floor
Structural Work 2: Above the level of 1st floor

2-3 Obligations of the Recipient Country

The following items were agreed as the obligations of the Mongolian side in implementing the Project during the Basic Design Study (B/D).

1) To secure the lands necessary for construction of the facilities and obtain the rights to use the lands for schools.

2) To dismantle and remove existing structures and any other obstacles at the sites, prior to the commencement of the construction works, if deemed necessary by the Japanese side.

3) To clear and level the lands and to provide slope protection measures such as retaining walls for assuring the safety of the lands, if necessary.

4) To improve and secure access roads necessary for the construction works.

5) To provide facilities for distribution of water supply, sewerage, electricity, heating, and telephone line into the sites, in accordance with the infrastructure systems available there.

6) To allocate necessary budgets and personnel (teachers and management staff) for the appropriate and effective operation and maintenance of the facilities and equipment to be provided under the Project.

7) To provide external facilities that are not included in the scope of the Japanese side, such as fences, gates, and playgrounds, as necessary.

8) To procure general furniture, equipment, fixture, and supplies that are not included in the scope of the Japanese side.

9) To accord Japanese nationals whose service may be required in connection with the supply of the products and services under the verified contracts, such facilities as may be necessary for their entry into Mongolia and stay therein for the performance of their work.

10) To exempt the Japanese nationals from customs duties, internal taxes including value added taxes, and other fiscal levies which may be imposed in Mongolia with respect to the supply of the products and services under the verified contracts.

11) To ensure prompt execution for unloading, tax exemption, and customs clearance of the products, machineries, equipment and materials purchased under the Grant Aid.

12) To bear the advising commissions of the authorization to pay (A/P) and the payment commissions to the Japanese bank for banking services based upon the banking arrangement (B/A).

13) To obtain permits, including building permits, approvals and any other authorizations required for the implementation of the Project.

14) To bear all the expenses, other than those to be borne by the Grant, necessary for the implementation of the Project.

The Education Department of UBC and MECS, both of which will be responsible for the undertakings of the Mongolian side as the implementing agency, have experiences in school construction projects under Japan's grant-aid and hence have carried out similar tasks in the past. Thus, no problem is presumed in their performing the above obligations.

Of the above obligations, Table 2-14 below extracts the details of the construction-related works. In addition, the Mongolian side will be called for to provide suitable planting around the buildings at all sites, after the completion of the construction, for the purposes of preserving the ground and preventing sand and dust.

Table 2-14 Works to be Undertaken by the Recipient Country by Site

Site	Works to be done prior to the commencement of construction				Works to be done after the commencement of construction				
	Removal or relocation of obstacles		Site clear-ance	Improve-ment of access road	Installation and connection of infrastructure (*1/2)				Provision of external facilities
	Removal	Relocation			Electri-city	Heating	Water supply	Sewer-age	
Existing schools									
1 No.35 School	Paving, curbs, fences, play equipment, trees	Aerial power line & poles	○	-	New connec-tion	-	-	-	-
2 No.19 School	Paving, curbs, play equipment	-	○	Partial improve-ment	Ditto	Branch-ing at the site	-	-	-
3 Shavi CS	Curbs, wooden fences	-	○	-	Ditto	Ditto	-	-	Approach path after relocating guards' huts (ger)
4 Amgalan CS	Buried pipes (unused), curbs	Aerial line	○	-	Ditto	Ditto	-	-	-
5 No.79 School	Buried pipes (unused), fences, play equipment	Aerial power line & poles	○	-	Ditto	-	New connec-tion	-	Gates, fences, approach path, coal shed, slope protection
6 No.52 School	Curbing, play equipment	-	○	-	Ditto	Branch-ing at the site	-	-	-
7 No.12 School	Buried pipes (unused), paving, curbs, play equipment	Aerial line	○	Partial improve-ment	Ditto	Ditto	-	-	-
New schools									
1 Kujir Bulan	Supports of fences	-	○	-	New connec-tion	-	-	-	Gates, fences, approach path, coal shed, slope protection
2 361st Garam	-	-	○	Construc-tion	Ditto	-	-	-	Gates, fences, approach path, coal shed
3 Near Tahilt	-	-	○	Ditto	Ditto	-	-	-	Ditto
4 Near Bayangol	-	-	○	Ditto	Ditto	-	New connec-tion	New connec-tion	Ditto
5 Yarmag	-	-	○	Ditto	Ditto	-	Ditto	Ditto	Ditto

*1 The Mongolian side will complete the application for and the provision of electricity and heating by the

time when the utilities will be needed temporarily for the construction.

*2 The demarcation of work between the Japanese and the Mongolian side with respect to the installation of infrastructure is defined as follows:

・Electricity: Where buried line is concerned, the Japanese side will cover up to the installation of an lead-in panel within the site and the Mongolian side will extend power line into the site and connect it to the panel. In case of aerial line, Japan will provide a lead-in pole within the site and the Mongolian side will extend power line to the pole.

・Heating: The Mongolian side will cover up to the branching at the existing main pipe inside the site and the Japanese side will undertake the rest of work. Japan will provide an inspection pit at the branching point.

・Water supply: As far as the connection with the existing water pipe inside the site is possible, the Japanese side will undertake all works associated with water supply. Otherwise, the Japanese side will provide an inspection pit inside the site and the Mongolian side will extend water pipe from the main to the inspection pit.

・Sewerage: Where the connection with the existing sewage pit inside the site is possible, the Japanese side will undertake all the works associated with sewage. Otherwise, Japan will provide a sewage pit inside the site and the Mongolian side will extend sewer pipe from the main to the pit.

2-4 Project Operation and Maintenance Plan

2-4-1 Operation plan

The facilities to be constructed either additionally or newly under the Project will be operated and maintained by individual schools under the supervision of the Education Department of UBC and the District Education Divisions. The schools will also be responsible for hiring teachers, planning and applying for school budgets, and formulating educational programs and action plans using the provided facilities within the framework of the educational standards set forth by the MECS.

In addition to teachers, staff dedicated to the operation of school and maintenance of facilities will be deployed at each school. Furthermore, a school management committee with the membership being the headmaster and representatives from the community, parents, and teachers is formed at each school and it discusses and decides on basic matters relating to school management, such as management plans and school budgets. The committee also collaborates with the school in maintenance of facilities and equipment or in solving other problems. Thus, the facilities to be provided under the Project will likewise be operated and maintained by the headmaster and teachers in cooperation with the committee.

Teachers and other school staff at public schools in UBC are most typically deployed as follows.

- The headmaster and managers in charge of the primary and secondary grades are positioned as management staff undertaking the school operation within the scope of respective responsibilities.
- In primary grades, class teachers give lessons of all subjects. As for physical exercise, music, and English, specialized teachers are generally assigned and they will give lessons to both primary and secondary classes.
- In secondary grades, teachers will be assigned according to their specialized subjects. At the public schools in UBC, the number of teachers corresponds to approximately 1.45 times the number of classes on average.
- School operation staff is employed, depending on the scale of school and the operational situation, including clerks, accountants, secretaries, social workers, medical staff, librarians, assistants to teachers, class coordinators, etc. In addition to that, personnel in charge of maintaining the school facilities are commonly employed. Such staff includes security guards, cleaners, and technicians to look after heating and electrical and plumbing systems.

With the above in mind, the teachers and school staff to be newly assigned for the operation and maintenance of the provided facilities are planned as follows:

- Teachers : A class teacher will be assigned to each class. The disparity between the necessary number of teachers and the existing number of class teachers will be bridged by the deployment of new teachers. At new schools, the same number of teachers, including subject teachers, as

that of existing schools—1.45 times the planned number of classes—will be deployed; therefore, in addition to class teachers in the planned number of classes, teachers equivalent to 45 percent of the number of classes will be assigned.

- School staff : At existing schools, three personnel will be newly hired for guarding and cleaning, which are difficult to cover with the current school staff. At new schools, all school staff will be deployed anew. Following the standard staffing at existing schools, each new school will employ three persons as management staff (headmaster, primary education manager, and secondary education manager), four administrative staff, four guards/cleaners, and two servicing technicians (electrical and plumbing), as permanent staff. At those schools where independent boilers will be installed, three boiler operators (working on three shifts) will be temporarily needed during the heating season.

As calculated in Table 2-15 below, the operation of the facilities to be constructed under the Project will additionally require 335 teachers, 104 school staff members (15 managers, 71 clerks, and 18 seasonal workers) in total. 230 teachers among those needed at new schools can partly be supplemented by the redeployment of incumbent teachers from existing schools where some of their students will move to the new schools.

Table 2-15 Teachers and School Staff Newly Required for the Project

Site	Building type	Planned no. of classes	Current no. of class teachers	New teachers needed		New school staff needed					Total number of teachers/ staff needed
				Class teachers	Subject teachers	Manage-ment staff	Admini-strative staff	Guards/ cleaners	Techni-cians	Boiler operator	
Existing schools (7)											
1 No.35 School	8CR-S	52	52	0	-	-	-	3	-	-	3
2 No.19 School	8CR	48	33	15	-	-	-	3	-	-	18
3 Shavi CS	19CR	76	40	36	-	-	-	3	-	-	39
4 Amgalan CS	12CR-S	74	60	14	-	-	-	3	-	-	17
5 No.79 School	12CR-BS	86	69	17	-	-	-	3	-	3	23
6 No.52 School	8CR	56	46	10	-	-	-	3	-	-	13
7 No.12 School	8CR	62	49	13	-	-	-	3	-	-	16
Total		454	349	105	0	0	0	21	0	3	129
New schools (5 schools)											
1 Khujir Bulan	16CR-BW	32	-	32	14	3	4	4	2	3	62
2 361st Garam	16CR-BW	32	-	32	14	3	4	4	2	3	62
3 Near Tahilt	16CR-BW	32	-	32	14	3	4	4	2	3	62
4 Near Bayangol	16CR-B	32	-	32	14	3	4	4	2	3	62
5 Yarmag	16CR-B	32	-	32	14	3	4	4	2	3	62
Total		160	0	160	70	15	20	20	10	15	310
Grand total		614	349		335	15			71	18	439

The number of teachers at general schools in UBC increased by 5.4% per annum on average (287 teachers) during the period between 2004/05 and 2007/08 while the number of students slightly

decreased. The number of students per teacher also decreased to 22.4 (23.9 at public schools), demonstrating a surplus trend on the whole. On the other hand, about 3,000 people graduate from the faculty of pedagogy or teacher training of higher education institutes across the country every year, meaning that there is no quantitative problem in the supply of teachers. Thus, it is deemed easy to secure teachers necessitated for the Project.

2-4-2 Maintenance Plan

Teachers and school staff will engage in daily maintenance activities of the school facilities under the instructions of the headmaster. Skilled staff employed by each school for maintenance of facilities will engage in the operation and maintenance of building services, such as heating and electrical systems, as well as the maintenance of equipment and furniture. Moreover, the school management committee, comprising parents and community representatives, will support in the improvement and the maintenance of school facilities as necessary. The maintenance of the facilities to be provided under the Project does not require special techniques, however, routine cleaning and inspection as well as adequate repair works in response to wear, damage and aging of facilities are vital for sustaining the facilities in good condition for a long term.

- Periodical cleaning : Students will clean their own classrooms every day under the supervision of teachers. Cleaners to be employed will clean the administrative section and common spaces, and will also conduct a general cleaning at the end of each school year.
- Routine repair of facilities : The facilities to be provided under the Project will be made mainly of maintenance-free materials and finishing in order to keep maintenance costs to the minimum. Periodical inspection and cleaning are recommended because proper routine maintenance will require no repair or mending for a few years after the handover. After that period, periodical repair works will be needed, such as repair and repainting of the painted sections (once in ten years approximately) and inspection and adjustment of fixtures (once in a year).
- Maintenance of building services : As for building services, daily operational control and regular inspections are essential to avoid repair of breakdowns or replacement of parts as much as possible. The facilities to be constructed under the Project will basically have no complicated systems but those that are widely used in the country. Nevertheless, it is still necessary to create an environment where the skilled staff at each school will routinely inspect the equipments, perform easy repair and mending, and replace parts.
- Maintenance of external facilities : In addition to regular cleaning around the buildings, the inspection and cleaning of pits will be needed roughly twice a year. Also proper caring of planting on slopes will contribute to the stability of the ground.

Ordinary budgets for maintenance of school facilities are distributed according to the applications for budget submitted by individual schools. An average budget for school operation is 387.8 million Tugrug (Tg), equivalent to roughly 35 million yen as of 2007/08, per school in UBC. Of

this amount, 70% is allotted to personnel cost and social security premiums, which leaves only 5.5 million Tg. (roughly 500,000 yen as of 2007/08) for facility maintenance (minor repairing) itself. This is not necessarily sufficient for maintaining the existing rundown facilities. Thus many schools have to collect a small amount of money, between 1,000 and 2,500 Tg., from each student and spend it on purchasing necessary equipments and supplies in classrooms and carrying out small-scale repair works. In order to make sure that the facilities to be provided under the Project will be properly maintained for a long term, the government's budget should imperatively cover a sufficient amount of money necessary for ordinary repair works of educational facilities and be stably distributed among schools as necessary. As for construction of additional facilities or large-scale repair works, schools must submit an application for a budget to the Education Department, and the department will formulate an annual plan and prepare an investment budget for the implementation.

2-5 Project Cost Estimation

2-5-1 Initial Cost Estimation

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

(1) Costs to be Borne by the Recipient Country

Table 2-16 Costs to be Borne by the Recipient Country

Item	Estimate cost (million Tg.)	(million yen)
Removal and relocation of obstacles	8.64	0.79
Clearance and leveling of the sites	74.53	6.78
Improvement of access roads	6.02	.055
Installation of infrastructures	33.15	3.01
Provision of external facilities (gates, fences, pavement, etc.)	202.33	18.39
Commissions to the bank based on B/A	36.62	3.33
Total	361.29	32.85

(2) Estimation conditions

1) Estimation as of : July 2008

2) Foreign exchange rate : US$1.00 = 106.08 Japanese yen = 1,167.02 Tg. (local currency), 1 yen = 11.00 Tg., 1 Chinese yuan = 15.26 yen

3) Implementation period : As shown in the project implementation schedule.

4) Other conditions : The Project will be implemented in accordance with the grant-aid scheme of the Government of Japan.

2-5-2 Operation and Maintenance Cost

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

(1) Operation Costs

1) Personnel Cost

As a result of implementing the Project, the 12 schools included in the Project will need additional 15 school managers, 335 teachers, 71 general staff, and 18 seasonal workers (boiler operators) in

total. Among them, teachers to be required at new schools can also be redeployed from existing schools to fill some of the positions, since it is planned to transfer students living in the school zone from existing schools when new schools are to open. Therefore, the Project plans to newly employ the surplus necessitated by an estimated increase in the number of students between the time of Basic Design study (B/D) and the completion of the Project. The personnel cost needed for such additional deployment is calculated as follows.

Table 2-17 Estimation of Additional Cost for Teachers and School Staff

Site	No. of teachers newly needed		No. of school staff newly needed					Increase in personnel costs
	Class teachers	Subject teachers	Manage-ment staff	Admini-strative staff	Techni-cians	Guards/ cleaners	Boiler operators*	
Labor cost ('000 Tg./year)	2,880	2,880	3,360	2,400	2,400	2,040	1,190	(1000 Tg.)
Existing schools (7)								
1 No.35 School	0	-	-	-	-	3	-	6,120
2 No.19 School	15	-	-	-	-	3	-	49,320
3 Shavi CS	36	-	-	-	-	3	-	109,800
4 Amgalan CS	14	-	-	-	-	3	-	46,440
5 No.79 School	17	-	-	-	-	3	3	58,650
6 No.52 School	10	-	-	-	-	3	-	34,920
7 No.12 School	13	-	-	-	-	3	-	43,560
New schools (5)								
1 Khujir Bulan	20	9	3	4	2	4	3	119,730
2 361st Garam	6	3	3	4	2	4	3	62,130
3 Near Tahilt	19	9	3	4	2	4	3	116,850
4 Near Bayangol	19	9	3	4	2	4	3	116,850
5 Yarmag	4	2	3	4	2	4	3	53,490
Total		205					104	817,860

* Boiler operators will be employed for the limited period of seven months during the heating season.

2) Facility Operation Costs

Expenses necessary for operating the facilities are calculated as follows.

- Water supply : Water expenses are calculated based on unit price per consumption volume: city water charge for the sites where city water is available, and price of a tank of water for the sites water is supplied by water trucks. The annual consumption is calculated based on assumptions that a student uses 15 litters/day for 175 school days (35 weeks x 5 days) and a teacher or a school staff uses 30 litters/day for 200 days (175 school days plus additional 25 days). The calculation results are given in Table 2-18.
- Sewerage : Sewerage expenses are also calculated based on unit price per treated volume: discharge charge where public sewer services are accessible, and price of disposal service by septic trucks for the other sites. As sewage and wastewaters are collectively treated, the amount of effluent will be equal to the amount of water consumption calculated above. The calculation results are given in Table 2-18.

Table 2-18 Calculation of Water Supply and Sewerage Costs

Site	Building type	Annual Consump-tion (m^3)	Annual water /sewerage expenses (1000 Tg.)					Assumptions
			Water supply	Drainage	Water truck	Septic truck	Total	
Existing schools (7)								No. of consumption days per year: ・Students-175 days ・Teachers/school staff -200 days Estimated consumption: ・Students-15l/head/day ・Teachers/school staff -30l/head/day Usage fee City water: 367.25 Tg./m^3 Sewerage: 170 Tg./m^3 Water trunk: 3000Tg./m^3 Septic truck: Ditto
1 No.35 School	8CR-S	1,632	599.4	-	-	4,896.0	5,495.4	
2 No.19 School	8CR	1,632	599.4	277.4	-	-	876.8	
3 Shavi CS	19CR	3,843	1,411.3	653.3	-	-	2,064.6	
4 Amgalan CS	12CR-S	2,436	894.6	-	-	7,308.0	8,202.6	
5 No.79 School	12CR-BS	2,436	894.6	-	-	7,308.0	8,202.6	
6 No.52 School	8CR	1,632	599.4	277.4	-	-	876.8	
7 No.12 School	8CR	1,632	599.4	277.4	-	-	876.8	
New schools (5)								
1 Khujir Bulan	16CR-BW	3,396	-	-	10,188.0	10,188.0	20,376.0	
2 361st Garam	16CR-BW	3,396	-	-	10,188.0	10,188.0	20,376.0	
3 Near Tahilt	16CR-BW	3,396	-	-	10,188.0	10,188.0	20,376.0	
4 Near Bayangol	16CR-B	3,396	1,247.2	577.3	-	-	1,824.5	
5 Yarmag	16CR-B	3,396	1,247.2	577.3	-	-	1,824.5	
Total							91,372.6	

- Heating : Heating expenses are calculated based on the monthly usage fee per building volume at the sites where the regional central heating or the private sector's source is available or on the fuel (coal) costs necessary for running boilers at the sites where independent boilers will be provided. The heating is assumed to be provided for the seven months in winter, during which the system will remain running around the clock even on those days when schools are closed. The calculation results are given in Table 2-19.

Table 2-19 Calculation of Heating Costs

Site	Building type	Volume of building (m3)	Annual heating expenses (1000 Tg.)			Assumptions
			Central heating	Private sector	Boiler	
Existing schools (7)						No. of operational days per year: 210 days Assumed operational hours: 24h/day Heating fee Central heating: 310.2Tg./m^3 Private sector: 440.0Tg./m^3 Amount of fuel needed for boilers 12CR type: 1.08t/day 16CR type: 1.08t/day Fuel cost for boilers Coal: 26,000 Tg/t
1 No.35 School	8CR-S	5,354	-	16,490.3	-	
2 No.19 School	8CR	5,354	11,625.7	-	-	
3 Shavi CS	19CR	9,634	20,919.7	-	-	
4 Amgalan CS	12CR-S	6,706	14,560.5	-	-	
5 No.79 School	12CR-BS	6,706	-	-	5,896.8	
6 No.52 School	8CR	5,354	11,625.7	-	-	
7 No.12 School	8CR	5,354	11,625.7	-	-	
New schools (5)						
1 Khujir Bulan	16CR-BW	12,498	-	-	9,828.0	
2 361st Garam	16CR-BW	12,498	-	-	9,828.0	
3 Near Tahilt	16CR-BW	12,498	-	-	9,828.0	
4 Near Bayangol	16CR-B	12,498	-	-	9,828.0	
5 Yarmag	16CR-B	12,498	-	-	9,828.0	
Total					141,884.4	

- Communication : Communication systems, such as telephony, will be provided by the recipient country, if necessary, and thus will not be covered in the cost estimation hereof.
- Electricity : Assuming a standard level of usage as a school, electricity expenses are calculated at the minimum level necessary for operating the facilities to be provided under the Project. The calculation was based on the following parameters and the calculation results are given in Table 2-20.
  - The number of school operational days per year is set as 200 days, combining the number of school days (35 weeks x 5 days = 175 days) and 25 days for administration, etc, provided that the power-driven equipment for heating in winter will be up an running around the clock throughout the seven winter months (210 days per year).
  - Schools will be open for 10 hours from 8:00 to 18:00 for two shifts. The use of artificial lighting is assumed as four hours per day on average, in the light of the building design that makes use of natural daylight to the extent possible.
  - Power expenses are calculated based on the simple tariff for corporate customers.

Table 2-20 Calculation of Electricity Costs

Site	Building type	Electricity consumption (kWh)					Annual cost	Assumptions
		Daily		Yearly				
		Heating	General use	Heating	General use	Total	(1000Tg.)	
Existing schools (7)								No. of operational days per year: ・Heating system-210 days ・General-200 days Assumed operational hours: ・Heating system-24 h/day ・Lighting-4 h/day ・Others-10 h/day Average demand rate: ・Lighting-0.85 ・Plug outlets-0.40 Electricity tariff: ・68Tg./kWh+VAT 10%
1 No.35 School	8CR-S	14.71	76.46	3,088.3	15,291.8	18,380.0	1,374.8	
2 No.19 School	8CR	14.71	76.46	3,088.3	15,291.8	18,380.0	1,374.8	
3 Shavi CS	19CR	60.73	144.71	12,753.1	28,941.0	41,694.1	3,118.7	
4 Amgalan CS	12CR-S	21.55	110.32	4,524.7	22,063.0	26,587.7	1,988.8	
5 No.79 School	12CR-BS	51.96	111.53	10,911.6	22,305.0	33,216.6	2,484.6	
6 No.52 School	8CR	14.71	76.46	3,088.3	15,291.8	18,380.0	1,374.8	
7 No.12 School	8CR	14.71	76.46	3,088.3	15,291.8	18,380.0	1,374.8	
New schools (5)								
1 Khujir Bulan	16CR-BW	71.46	205.50	15,006.6	41,099.0	56,105.6	4,196.7	
2 361st Garam	16CR-BW	71.46	205.50	15,006.6	41,099.0	56,105.6	4,196.7	
3 Near Tahilt	16CR-BW	71.46	205.50	15,006.6	41,099.0	56,105.6	4,196.7	
4 Near Bayangol	16CR-B	71.46	196.35	15,006.6	39,269.0	54,275.6	4,059.8	
5 Yarmag	16CR-B	71.46	196.35	15,006.6	39,269.0	54,275.6	4,059.8	
Total							33,801.0	

(2) Maintenance Costs

The costs required for malignance of the facilities and furniture to be provided under the Project are calculated as shown in the following table. The costs cover ordinary maintenance activities, such as partial repair works for external walls, repainting of steel and wooden components inside and outside the buildings, partial mending of finishing materials, partial repair works on roofs, replacement of damaged metallic materials and bulbs of lighting fixtures, partial replacement of

components of equipment, fixing of broken equipment, replacement of damaged furniture materials, etc. As for large-scale repair works, which will be needed for a long term, either the MECS or UBC will earmark a special investment budget. Furthermore, as the equipment to be provided under the Project mainly comprises basic teaching equipment and tools that are enduring enough, no special maintenance costs are expected to arise as long as it is used on normal conditions.

Table 2-21 Calculation of Maintenance Costs

Site	Building type	Floor area (m^2)	Annual maintenance costs (1000Tg.)			
			Facility	Building services	Furniture	Total
Existing schools (7)						
1 No.35 School	8CR-S	1,558.4	935.0	748.0	312.0	1,995.0
2 No.19 School	8CR	1,558.4	935.0	748.0	312.0	1,995.0
3 Shavi CS	19CR	2,852.3	1,711.0	1,369.0	741.0	3,821.0
4 Amgalan CS	12CR-S	1,974.5	1,185.0	948.0	468.0	2,601.0
5 No.79 School	12CR-BS	2,012.9	1,208.0	966.0	468.0	2,642.0
6 No.52 School	8CR	1,558.4	935.0	748.0	312.0	1,995.0
7 No.12 School	8CR	1,558.4	935.0	748.0	312.0	1,995.0
New schools (5)						
1 Khujir Bulan	16CR-BW	3,353.2	2,012.0	1,610.0	624.0	4,246.0
2 361st Garam	16CR-BW	3,353.2	2,012.0	1,610.0	624.0	4,246.0
3 Near Tahilt	16CR-BW	3,353.2	2,012.0	1,610.0	624.0	4,246.0
4 Near Bayangol	16CR-B	3,353.2	2,012.0	1,610.0	624.0	4,246.0
5 Yarmag	16CR-B	3,353.2	2,012.0	1,610.0	624.0	4,246.0
Total			17,904.0	14,325.0	6,045.0	38,274.0

* The ordinary maintenance costs for the facilities to be provided under the Project are calculated as follows, according to the contents and specifications of the facilities, based on building maintenance cost data in Japan.

- Facility maintenance cost: Initial construction cost (300,000Tg./m^2) × 0.2% = 600Tg./m^2
- Building services maintenance cost: Initial construction cost (100,000Tg./m^2) × 0.8% = 800Tg./m^2
- Furniture maintenance cost: Initial furniture cost (3,250,000Tg./classrooms) × 1.2% =39,000Tg./classroom

(The unit prices for facility and building service construction are derived from standard direct construction costs of the school constructed under the Mongolian government's budget.)

(3) Summary of Operation and Maintenance Costs

The total increase in annual operation and maintenance costs, which will be needed after the implementation of the Project, is estimated as follows by summing up all the above calculations.

Table 2-22 Calculation of Annual Operation and Maintenance Costs ('000Tg..)

Item	Increase by the implementation of the Project [A]	UBC's educational budget for general schools (actual of 2007/08) [B]	Burden sharing of the increase [A]/[B]
Personnel cost	817,860.0	22,407,053.0	3.7%
Water /sewerage cost	91,372.6	897,400.6	10.2%
Heating cost	141,884.4	3,514,492.1	4.0%
Electricity cost	33,801.0	421,922.7	8.0%
Facility maintenance cost	38,274.0	571,499.2	6.7%
Total of the above costs	1,123,192.0	1,123,623.9	4.0%
Total Budget for general schools		40,328,556.4	2.8%

The operation and maintenance costs for public schools in Mongolia, including personnel costs, are budgeted as the budget for general school education in the state's education budget. The total increase in costs as calculated above accounts for 3.7 to 10.2 percent of the total budget actually allocated to the corresponding items and 2.8 percent of the entire educational budget for general schools in UBC in the 2007/08 school year. UBC's educational budget for general schools (recurrent expenditure) has been swelling by more than 30 percent per annum for the past three years, in connection with the increased state budget brought about by the recent economic growth. Thus, it is deemed that the extra budget to be incurred for the Project can easily be secured.

2-6 Other Relevant Issues

The following issues may have direct impact on the smooth implementation of the Project, and thus need careful attention.

(1) Securement of the project sites

The five sites for constructing new schools and one site for extending the premises to construct an additional facility are clearly specified and confirmed on documents pursuant to the Mayor's order concerning the land use permit. However, there is no borderline clearly shown at the actual sites or any other measures put in place to prevent unlawful possession and the like. These six sites are all unused for the time being, but at the same time are situated in the vicinity of residential zones being rapidly developed. In order to ensure that the lands are secured for the Project until the construction works commence, the Mongolian side should set up piles, fences and signboards which clearly indicate the boundaries. The sites must be secured and managed by means of sufficient protection measures in cooperation with the Land Management Department of UBC and relevant districts' offices.

(2) Assurance of the performance of obligations of the recipient country

The completion of the recipient country's works is a prerequisite for the implementation of the Project. Among all, the following three are indispensable for the prompt implementation of Japan's undertakings.

- Improvement of access roads to the project sites, removal and/or relocation of obstacles at the sites, and land preparation of the project sites, prior to the commencement of construction works.
- Introduction of power lines into the sites prior to the commencement of above-ground works.
- Introduction and connection of the central heating, city water, and public sewerage systems prior to the start of the heating season.

These tasks must be carried out without delay in sync with the progress of works at each site. As the implementing agency, the Education Department of UBC is expected to draft an implementation plan and breakdown schedule for the necessary works in advance and take relevant procedures, such as an application for budgets and acquisition of permits, at right time, in order to assure the completion of their works.

(3) Acquisition of building permits, authorizations, etc.

All facilities to be constructed under the Project are subject to the building inspection and permission systems of Mongolia. Technical reviews and permissions by the governing authorities are needed at each stage of construction works, starting with the approval for land use to basic

designing, detailed designing, construction and start of using the facility. In particular, the commencement of construction works requires an assessment and approval on detailed designs and obtainment of a building permission. Therefore, as the implementing agency, the Education Department of UBC must take necessary procedures without any delay by anticipating sufficient time for such assessments and coordinating closely with the Japanese consultant. The department is also strongly expected to proceed with the administrative work necessary for the introduction and connection of electricity, water, sewerage, heating, etc. without delay so that necessary infrastructure will be available at each site at right time.

Chapter 3. Project Evaluation and Recommendations

Chapter 3 Project Evaluation and Recommendations

3-1 Project Effect

Present state and problems	Measures in the Project	Direct effects and expected improvement	Indirect effects and expected improvement
・While the number of students increased by 22 thousand between 2000 and 2007 in UBC, the development of education facilities has not kept pace with the growth. The lack of capacity is deteriorating the educational environment of existing schools. ・Peripheral areas of UBC are challenged by a population inflow from rural areas and rapidly-expanding urbanization resulting from the government's land endowment measure; as a result, there are many areas without schools and the children there are forced to travel far or board to go to school. ・Some schools in the areas experiencing a rapid population growth are suffering from overcrowded classrooms with 50 or more students each and are forced to give lessons on three shifts. ・Due to the lack of classrooms, most of schools in UBC are using laboratories or other special rooms and even corridors and halls as general classrooms.	・Construction of new primary and secondary schools in the five districts where there is no school today. - 80 classrooms - Teachers' rooms - Cloakrooms - Toilets/hand washing places - Special classrooms - Computer rooms - Gyms - Kitchenettes ・Construction of additional classrooms and incidental facilities at seven existing primary and secondary schools. - 75 classrooms - Teachers' rooms - Cloakrooms - Toilets/hand washing places ・Provision of educational furniture, basic teaching equipment and maintenance tools for the above facilities.	・A total of 155 classrooms will be build at the 12 project sites, which will accommodate additional 11,160 students. ・The number of public primary and secondary schools in UBC will increase from 104 by 5, which will improve the access to education for the children in the five zones where there is no school at the moment. ・75 classrooms (for 5,400 students) with a standard space and environment will be additionally constructed at 7 existing schools, which will improve the learning environment of approximately 13,200 students as follows: - The number of students per classroom will be reduced from 85 to 70, so that the schools will be able to give a lesson to a class of 35 students as set forth by the MECS. - 21 three-shift classes will be solved. - 21 classrooms that do not meet the MECS standards will be solved.	・At those existing schools near the sites of newly established schools, overcrowding will be alleviated since some students will move to the new schools. ・Children in the areas of newly established schools will be able to walk to school without extra cost for travelling far or boarding to go to school. Consequently, children who are not attending a school due to financial reasons will have access to education. ・Facilities with basic teaching equipment and adequate learning environment in place will make it possible to manage lessons effectively and provide high-quality education. ・Toilets in a sanitary environment and heating and ventilation facilities suited to the severe weather conditions will contribute to the maintenance of sanitary and health conditions for students.

3-2 Recommendations

The recipient country is expected to give due consideration to the following points, in order to make sure that the facilities and equipment to be provided under the Project will be continuously and effectively utilized and appropriately managed and maintained in the future.

(1) Appropriate Staffing

The MECS and the Education Department of UBC, in collaboration with the schools, need to find teaching and administrative personnel needed as a result of the implementation of the Project by hiring new staff or relocating existing human resources at right time so that adequate staff will be in place immediately after the completion of construction. In particular, the new schools to be created by the Project need to have qualified and competent teaching staff in accordance with the educational levels and subjects. In order to make most use of the facilities to be developed, the Project assumes technical staff dedicated to the facility maintenance to be hired, in addition to staff in charge of administration, security, cleaning, etc. It is called for to assign appropriate skilled personnel to this position. Incidentally, school staff has to be appointed from the standpoints of not only filling vacant positions at the target schools but also striking a fair balance among schools. In so doing, sufficient collaboration is needed at the city and district levels.

(2) Establishment of School Management Systems and Appropriate Relocation of Students and Teachers at New Schools

The Project plans to build five schools in the areas where no school exists at the moment. The emergence of these new schools necessitates redrawing of school zones and transferring teachers and students from nearby existing schools according to the new zoning. In order to ensure that the new schools will immediately be put to use when they are completed, it is vital to establish a school management system at an appropriate time before the scheduled school opening and carry out adequate preparatory work to be ready for the inauguration. Furthermore, it is necessary to purchase equipment, fixture, appliances, and other goods and materials necessary for school operation yet not included in the Project. The relevant authorities in the education sector at the city and district levels are called for to draw up a schedule for necessary planning and preparatory work, such as the appointment of headmasters and other management staff, creation of school organizations, hiring of teaching staff, redrawing of school zones, and relocation of students, and actually carry out the work according to the plan. At the same time, they are expected to secure necessary budgets. After the school organizations are established, more detailed preparation for school opening, such as the registration of students and the procurement of necessary goods, will necessarily be carried out under the leadership of the headmasters in consultation with the Japanese side.

(3) Strengthening of Maintenance and School Improvement Activities

In order to make sure that the facilities by the Project will be appropriately maintained and effectively utilized for a long term, it is necessary for the schools, communities, and education administrations (at the city and district levels) involved in the school management to work together to carry out maintenance activities in a sustainable and organized manner. Daily, routine maintenance work, which requires no special skills or budgets, will be conducted by the schools themselves. On the other hand, the city and districts are expected to 1) secure and provide regular maintenance budgets on a scale suitable for the needs of the schools, 2) improve the current administrative-level school maintenance system, in which only one engineer belonging to the Education Department of UBC takes care of all the schools, in order to establish a sufficient structure for supporting schools, and 3) put in place a system for constant monitoring and supervising the maintenance activities of the schools. In addition, many schools make self efforts in planting, purchasing of play equipment, paving, etc. The city- and district-level entities are called for to provide technical and financial assistance to the schools in this respect and to further promote the improvement activities at the school level.

(4) Renovation and Repair Work of Existing Facilities

The scope of the Project covers construction of new and additional facilities only and not renovation of existing facilities that are deemed as feasible for the continued use. Although no existing facility seems to require immediate care as a whole, some walls, roofs, openings, etc. are damaged, particularly those built in 1950s, as no major repair work has been conducted since 1990s. All schools seem to perform careful routine maintenance of their facilities, though the lack of money does not allow optimal large-scale renovation on the whole. Furthermore, the old specifications of the openings and the outdated building service systems mean difficulties in effective heating and ventilation. In order for these facilities to be sustainably maintained, it is essential to carry out large-scale renovation at right time. Thus, the MECS and the Education Department of UBC are expected to earmark adequate budgets for such major repair work and carry forward the renovation of existing schools in a planned manner.

(5) Planned and Sustainable Development of Classrooms

A large-scale housing development is taking place at a number of locations in UBC, and people from rural areas continue to flow into the city. The Project will provide basic education facilities to sites and schools given the highest priority based on current school demand predicted for the year of the completion of the Project. In order to sustain the outcomes of the Project as part of the efforts to maintain and improve the overall educational environment in UBC, the GoM must continue to autonomously respond to the mid- and long-term school demand to be induced by the ongoing housing plan and new projects for expanding urban areas and to the needs for higher-quality facilities in relation to future improvement of educational curricula. More precisely,

UBC's Education Department should form a mechanism for planning and implementing an orderly school improvement plan based on future city development plans in coordination and collaboration with the Town Planning Department, Land Management Department, and other relevant organizations, and actually engage in the improvement activities in a planned manner.

(6) Coordination with Japan's Technical Assistance and Other Donors' Projects

As of September 2008, there are 32 Japan Overseas Cooperation Volunteers (JOCV) dispatched to Mongolia and some of them are engaged in improving lessons at schools and instructing and advising teachers mainly on the subjects such as the Japanese language, sciences and mathematics, art, physical exercise, etc., in their respective positions at schools and provincial education departments or on a visiting basis. Furthermore, a Technical Cooperation Project (TCP) which aims to develop and promote a new child-centered teaching methods, responding to the new education standards introduced in 2005, called the "Teaching Methods Improvement Project towards Children's Development in Mongolia" started in 2006. Though the TCP can not have a direct link with the Project since it will be closed by July 2009, some of the schools in UBC covered by the previous grant-aid projects are chosen as model schools for the TCP, and therefore, it will be desirable if the teachers or Japanese volunteers who participate in the TCP are deployed at some of the schools to be developed under the Project, in order to maximize the outcomes of the TCP. In this way, the facilities to be developed and improved under the Project can be fully utilized to realize the provision of higher quality education, which will contribute to a greater effect of the assistance.

As for coordination with other donors, the Asia Development Bank has been continuously providing comprehensive support to Mongolia's education reform, which has its axis on the shift to the twelve-year schooling system. As part of this effort, the ADB specifically carries out the renovation of existing facilities, training of teachers, development and promotion of new curricula and teaching materials, improvement of the education environment and teaching methods for the lowest grades to be incorporated in the primary education anew, and so forth. If the upcoming project slated to start in 2009, though its details are not known yet, covers the capacity building for school operation and management and qualitative improvement of curricula or renovation of existing school facilities not included in the Project, the target schools will be able to realize an overall educational development in both the hard and soft aspects. This will contribute to a greater effect of the assistance. Thus, it is appropriate to monitor the progress of ADB's plan for possible collaboration.

Appendices

1. Member List of the Study Team

1-1. Member of the Basic Design Study（June 2 to July 2, 2008）

Mr. Akihiko HOSHINO	Team Leader	Director, Project Management Division II, Grant Aid and Loan Support Department, Japan International Cooperation Agency
Ms. Ayako WATANABE	Project Coordinator	Project Study Division II, Grant Aid and Loan Support Department, Japan International Cooperation Agency
Mr. Tomohiro OSAWA	Chief Consultant/ Facility Planning	Matsuda Consultants International Co., Ltd.
Ms. Toshiko SHIMADA	Education Planning/ Social Environment	IC Net Limited
Mr. Kenji KAWAZOE	Building Design 1	Matsuda Consultants international Co., Ltd.
Mr. Toshio TAMURA	Building Design 2/ Mechanical Design	Matsuda Consultants international Co., Ltd.
Mr. Naoto NISHIYA	Procurement Planning/ Cost Estimation	Matsuda Consultants international Co., Ltd.
Mr. Tatsuji TSUCHIYA	Building Design 3	Matsuda Consultants international Co., Ltd.
Mr. Toshiyuki HANDA	Interpreter	Matsuda Consultants international Co., Ltd.

1-2. Member of the Explanation on Draft Report（October 12 to 22, 2008）

Mr. Kazutoshi Onuki	Team Leader	Deputy Resident Representative, Japan International Cooperation Agency Mongolia Office
Ms. Ayako WATANABE	Project Coordinator	Urban and Regional Development Division 3, Economic Infrastructure Department, Japan International Cooperation Agency
Mr. Tomohiro OSAWA	Chief Consultant/ Facility Planning	Matsuda Consultants International Co., Ltd.
Mr. Kenji KAWAZOE	Building Design 1	Matsuda Consultants international Co., Ltd.
Mr. Naoto NISHIYA	Procurement Planning/ Cost Estimation	Matsuda Consultants international Co., Ltd.
Mr. Toshio TAMURA	Building Design 2/ Mechanical Design	Matsuda Consultants international Co., Ltd.
Mr. Toshiyuki HANDA	Interpreter	Matsuda Consultants international Co., Ltd.

2. Study Schedule

2-1. Study Schedule of the Basic Design Study

			Official members		Consultant's members			
			Leader	Project Coordinator	Chief Consultant /Facility Planning	Education Planning /Social Environment	Building Design 1	Procurement Plan. /Cost Estimation
1	2 Jun.	Mon.		Arrival at UBC				
2	3 Jun.	Tue.	Arrival at UBC	Courtesy call to MECS/UBC DoE, Ministry of Foreign Affairs, JICA Mongolia office				
3	4 Jun.	Wed.	Discussion with MECS/UBC DoE					Contractors survey
			Visit at requested site and similar projects (No.35 School, No.102 School, No.104 School)					
4	5 Jun.	Thu.	Discussion with MECS/UBC DoE					Contractors survey
			Visit at construction sites of Japan's Phase III Project (No.44 School, No.17 School)					
			Courtesy call to Ministry of Finance				Building material survey	
5	6 Jun.	Fri.	Discussion with MECS/UBC DoE, Meeting with relevant authorities under UBC administration					Building cost survey
			Documentation		Discussion with DoE	Survey on education	Discussion with UBC DoE	
6	7 Jun.	Sat.	Visit at requested site and similar projects (Setgemj School, No.33 School, Ngoori Zoori requested site)					
7	8 Jun.	Sun.	Documentation		Team meeting			
8	9 Jun.	Mon.	Signing of Minutes of Discussions with MECS/UBC DoE				Building material survey	
			Reporting to JICA Mongolia office, Embassy of Japan in Mongolia				Discussion with DoE	Building cost survey
9	10 Jun.	Tue.	Departure from UBC					

			Consultant's members					
			Chief Consultant /Facility Planning	Education Planning /Social Environment	Building Design 1	Building Design 3	Building Design 2 /Mechanical Design	Procurement Plan. /Cost Estimation
8	9 Jun.	Mon.				Arrival at UBC	Arrival at UBC	
9	10 Jun.	Tue.	Courtesy call to ADB Survey on education sector		Meeting with UBC relevant authorities	Preparation of site survey	Meeting with UBC & state specialized authorities	
10	11 Jun.	Wed.	Site survey (Shavi CS, No.79 School, Amgalan CS)		Meeting with UBC relevant authorities	Site survey	Meeting with UBC relevant authorities	
								Contractors survey
11	12 Jun.	Thu.	Discussion with DoE	Survey on education	Discussion with DoE	Survey on Japan funded schools		Discussion with DoE
			Data collection at MECS		Meeting with UBC relevant authorities			Contractors survey
12	13 Jun.	Fri.	Site survey (No.2/3/16 School) on school condition		Confirmation of construction site with UBC authorities Site survey (No.2/3/16 School) on land condition			
13	14 Jun.	Sat.	Site survey (No.5/57 School) on school condition, survey on Japan funded schools		Site survey (No.5/57 School) on land condition			Survey on procurement
14	15 Jun.	Sun.	Team meeting, documentation					
15	16 Jun.	Mon.	Site survey (No.21/52/73 School) on school condition		Confirmation of construction site with UBC authorities Site survey (No.21/52/73 School) on land condition			Building cost survey
16	17 Jun.	Tue.	Site survey (No.40/20/35 School) on school condition, collection of documents		Site survey (No.40/20/35 School) on land condition			Ditto
17	18 Jun.	Wed.	Site survey (361st Garam, Tahilt, Bayangol, Yarmag)				Departure from UBC	Site survey
			Survey on Japan funded schools		Processing of survey results			
18	19 Jun.	Thu.	Site survey (Nogoori Zoori, Khjir Bulan, No.22 Horoo, etc.)					Building cost survey
			Discussion with DoE	Survey on education	Discussion with DoE	Documentation		
19	20 Jun.	Fri.	Site survey (No.85/12/19 School) on school condition		Confirmation of site with UBC authorities, Site survey (No.85/19/Amgalan School)			Ditto
20	21 Jun.	Sat.	Processing of survey results		Site survey (No.79/12/Shavi School) on land condition			Ditto
21	22 Jun.	Sun.	Team meeting, documentation					
22	23 Jun.	Mon.	Supplementary survey at MECS/UBC DoE		Discussion with UBC authorities & DoE	Preparation of preliminary facility design		Building cost survey
			Discussion with DoE	Documentation				
			Meeting with GTZ team (model school design)					
23	24 Jun.	Tue.	Survey on education sector Survey on UBC development plan		Survey on building standards	Ditto		Building cost survey
24	25 Jun.	Wed.	Supplementary survey	Departure from UBC	Discussion with UBC authorities & DoE	Ditto		Discussion with UBC authorities & DoE
25	26 Jun.	Thu.	Reporting to MECS/UBC DoE		Reporting to MECS/UBC DoE			Reporting to MECS/UBC DoE
			Documentation		Meeting with UBC Town Planning Dept.			Suppl. survey

			Consultant's members					
			Chief Consultant /Facility Planning	Education Planning /Social Environment	Building Design 1	Building Design 3	Building Design 2 /Mechanical Design	Procurement Plan. /Cost Estimation
26	27 Jun.	Fri.	Reporting to JICA/ Embassy of Japan		Reporting to JICA/ Embassy of Japan	Data processing		Reporting to JICA/ Embassy of Japan
27	28 Jun.	Sat.	Departure from UBC		UBC→Shanghai	Departure from UBC		UBC→Shanghai
28	29 Jun.	Sun.			Data processing			Data processing
29	30 Jun.	Mon.			Building material survey			Building material survey
30	1 Jul.	Tue.						
31	2 Jul.	Wed.			Departure/ Shanghai			Departure/ Shanghai

DoE: Department of Education of Ulaanbaatar City

2-2. Study Schedule of the Explanation on Draft Report

			Official members		Consultant's members			
			Leader	Project Coordinator	Chief Consultant /Facility Planning	Procurement Plan. /Cost Estimation	Building Design 1	Building Design 2 /Mechanical Design
1	13 Oct.	Mon.		Arrival at UBC				
2	14 Oct.	Tue.	Discussion with MECS/UBC DoE (Explanation on Draft Report)			Preparatory meeting with UBC DoE		
			Courtesy call to JICA Mongolia office					
			Courtesy call to Ministry of Finance			Suppl. survey	Discussion with DoE	
3	15 Oct.	Wed.		Discussion with MECS/UBC DoE (Explanation on Draft Report)				
				Documentation	Discussion with UBC Town Planning Dept./DoE			Arrival at UBC
4	16 Oct.	Thu.	Discussion with MECS/UBC DoE				Meeting with UBC authorities & utility suppliers (Fire-fighting, Heating, etc.)	
				Documentation	Discussion with UBC DoE			
5	17 Oct.	Fri.	Signing of Minutes of Discussions with MECS/UBC DoE, Reporting to JICA				Meeting with UBC utility suppliers (Water & sewerage, Heating, etc.), Discussion with UBC DoE, Supplementary. site survey	
			Reporting to Embassy of Japan		Supplementary site survey, Reporting to Embassy of Japan			
6	18 Oct.	Sat.		Departure from UBC	Supplementary site survey, Visit at construction sites of Japan's Phase III Project			
7	19 Oct.	Sun.			Team meeting, documentation			
8	20 Oct.	Mon.			Supplementary site survey			
					Suppl. survey at MECS	Suppl. survey on procurement	Discussion with UBC DoE	
9	21 Oct.	Tue.			Documentation	Ditto	Meeting with power distribution company	
					Final discussion with UBC DoE			
10	22 Oct.	Wed.			Departure from UBC			

DoE: Department of Education of Ulaanbaatar City

3. List of Parties Concerned in the Recipient Country

Mongolian Organizations

Ministry of Education, Culture and Science

Mr. Mishigjav Buurunkhii	State Secretary
Mr. Ganbaatar Jadambaa	Acting Director, Department of Finance and Economy
Mr. Sanja Narantsogt	Director, Department of Finance and Economy
Mr. N. Enkhbat	Acting Director, Department of Primary and Secondary Education
Ms. Chimedlkham	Officer, Department of Primary and Secondary Education
Mr. Erdenechimeg	Manager, External Cooperation Division
Ms. Zolzaya Erdenebayar	Officer, External Cooperation Division
Mr. Battuya	Director, Investment Working Unit
Mr. Jantsandorj Bahzrai	Manager, Investment Working Unit
Ms. Lkhogvahand Shagdar	Engineer, Investment Working Unit
Mr. Batbold	Officer, Monitoring & Evaluation Unit
Mr. Jigmidsambuu Otgonbat	Officer, Monitoring & Evaluation Unit

Ministry of Finance

Mr. Khurenbaatar Baavgai	Director-General, Department of Policy and Co-ordination for Loans and Aid
Mr. Togmid Dorjkhand	Deputy Director-General, Department of Policy and Coordination for Loans and Aid
Mr. Baajiikhuu Tuguldur	Specialist, Department of Policy and Coordination for Loans and Aid

Ministry of Foreign Affairs

Mr. Jagir Sukhee	Deputy Director-General, Asian Department
Ms. Erdenetsogt Sarantogos	Second Secretary, Asian Department

Ulaanbaatar City Administration

Mr. Baldan Baatarzorig	Vice Mayor
Mr. Enkhbayar Demberel	Superintendent, Education Department
Mr. Bayarmagnai Erdene	Manager, Capital Investment, Education Department
Mr. Batbayar Baasankhuu	Senior statistician, Education Department
Mr. Erden Ohirg	Director, Town Planning Department
Mr. O. Odbayar	Architect, Town Planning Department
Mr. Sandi Tsendsuren	Deputy Director, Land Management Department
Mr. Baatarjav	Officer, Land Management Department

Mr. Munkhjargal	Director, Specialized Inspection Department
Mr. Tsagaantsooj	Electrical Engineer, Specialized Inspection Department
Mr. Munkhasaikhan	Heating Engineer, Specialized Inspection Department
Mr. Bold	Town Planner, Specialized Inspection Department
Mr. Battulga	Senior Inspector, Fire-fighting Division, Emergency Management Department

Ulaanbaatar City Water Supply & Sewerage System Co., Ltd.

Mr. Uran Chimeg	Engineer

Central Regional System Electric Distribution Network

Mr. Battsetseg	Connecting Engineer

Ulaanbaatar Heating Transmission Company

Ms. Altannavich	Director, Consumer Division
Mr. Munkh Jargal	Chief Engineer

Ano Service Company

Mr. Injnnash	Chief Executive Officer

Tusigtkhangai Company

Mr. Tse Batjargal	Director

State Professional Inspection Agency

Mr. Bassan Bat-Ulziii	Deputy Director

National Emergency Management Agency

Ms. Togoonyam	Senior Officer, Fire Department

Asian Development Bank

Ms. Itgel Lonjid	Social Sector Consultant, Mongolia Resident Mission

GTZ (Deutsche Gesellschaft fur Technische Zusammenarbeit)

Ms. Ruth Erlebeck	Program Director, Integrated Urban Development, Construction Sector and VET Promotion Program

District Administrations of the Ulaanbaatar City

Mr. Yo.Sukhbaatar	Deputy Governor of Bayanzurkh District
Ms. D. Olgonjargal	Head of the Education Department, Bayanzurkh District
Mr. Ulziisaikhan	Officer of the Education Department, Khan-Uul District
Ms. Uranchimeg	Governor of Songinokhairkhan District
Ms. Odontungalagtuul	Head of the Education Department, Songinokhairkhan District

Requested Schools

Ms. Dashnyam Tungalag	Headmaster, Shavi Complex School
Mr. R. Temuujin	Headmaster, Amgalan Complex School
Ms. L. Tsengelmaa	Headmaster, No. 2 School
Ms. Sarangerel Tserendorj	Headmaster, No. 3 School
Mr. Seseer Dorj	Headmaster, No. 5 School
Ms. E. Altan Tsetseg	Headmaster, No. 12 School
Ms. L. Dolgorjav	Headmaster, No. 16 School
Ms. D. Namgar	Headmaster, No. 19 School
Mr. Sh. Boldbaatar	Headmaster, No. 20 School
Mr. G. Ariunbold	Headmaster, No. 21 School
Mr. L. Khurelbaatar	Headmaster, No. 35 School
Ms. Ulziibayar Ragchaa	Headmaster, No. 40 School
Mr. Batbayar Irvelikham	Headmaster, No. 52 School
Ms. Odmandakh Sanjaa	Headmaster, No. 57 School
Ms. S. Batshukh	Headmaster, No. 73 School
Ms. R. Tuya	Headmaster, No. 79 School
Ms. S. Enkhjargal	Headmaster, No. 85 School

Other Schools

Ms. Enkhlargal	Headmaster, No. 104 School
Ms. Enkutuya	Teacher, Setgemj School
Mr. Tsog	Headmaster, No. 33 School
Ms. D. Ariunaa	Headmaster, No. 114 School

Japanese Organizations

Japanese Embassy in Mongolia

Mr. Takahiro Ishizaki	First Secretary
Mr. Masaru Hirahara	Third Secretary

Japan International Cooperation Agency (JICA) Mongolia Office

Mr. Yukio Ishida	Resident Representative
Mr. Kazutoshi Onuki	Deputy Resident Representative
Mr. Kiyotaka Miyazaki	Assistant Resident Representative
Ms. P. Enkhzaya	Officer