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UNITED NATIONS INDUSTRIAL DEVELOPMENT ORGANIZATION

(UNIDO)

Project of the Government of the
Mongolian People's Republic.

PROJECT DOCUMENT.

Title: Development of the construction sector in Mongolia
First phase: Technical assistance to the Production
Research Institute of the Mongolian Ministry of
Construction and Building Materials

Number: DP/MON/78/001

Primary function: Direct support to the Institute in organizing applied
research for purposes of industrializing the con-
struction sector in Mongolia

Secondary function: General application of advanced experience in
construction

Sector: Industry

Sub-sector Construction and the building materials industry

**Government Implementing
Agency:** Ministry of Construction and Building Materials

Executing Agency: UNIDO

Starting date: 1 January 1979

Government inputs: 7,013,200 tugriks **UNDP inputs:** 402,700

**Government
cost-sharing:** _____

id.78-1934

PART I.

LEGAL CONTEXT

1. This Project Document shall be the instrument referred to in Article I, paragraph 2, of the Agreement between the Government of the Mongolian People's Republic and the United Nations Development Programme, in the part dealing with assistance under the Special Fund component of the United Nations Development Programme, signed by the Parties on 1 January 1966.

PART II

A. Development objective

A general rapid development of the construction sector in Mongolia is required by the country's industrialization objectives, as formulated in the 1976-1980 Five-Year Plan, and by the control figures for development up to 1990.

At the present stage, the construction sector of the Mongolian economy requires:

1. Expanded development of construction research through the establishment of new research groups and laboratories and through improvement of the work of existing research organizations;
2. Establishment of a single centre for construction information, based on the existing information services, and organization of the exchange of information on an international basis;
3. Organization of the retraining of national engineering and technical personnel and of methodological guidance in the training of skilled building workers;
4. Expansion of the productive capacity of construction organizations and of the enterprises making building materials, prefabricated sections and structural members, through concentration and specialization of production on the basis of industrialization of the principal construction processes with the use of modern equipment and technology;

5. Improvement of building design through the establishment of a unified system of building standards and modules for Mongolia, with emphasis on the country's particular soil and climatic conditions and its seismicity.

B. Immediate objective

The immediate objective of the project is direct technical assistance to the Ministry of Construction and Building Materials in efforts to promote a sharp increase in the quality of construction and an improvement in the skills of workers employed in construction.

For the attainment of that objective it is planned to do the following:

1. Furnish technical assistance to the Production Research Institute in expanding its scientific base and in organizing applied research on problems of construction.

For this purpose, it is proposed:

- (a) To expand the soil-mechanics laboratory and to organize research in the laboratory with a view to formulating recommendations for design and construction organizations on building in permafrost and seismic areas;
- (b) To expand the construction-physics laboratory and to organize applied research in the laboratory on the sound-conducting, fire-resisting and aging properties of structural elements, etc.;
- (c) To prepare a project for a laboratory to test wide-span structural sections, panels and other large-sized elements of buildings and other structures;
- (d) To establish new laboratories concerned with heating and ventilation and with water supply and sewerage. These new laboratories will also engage in applied research and prepare recommendations for design and construction organizations on pollution control and environmental protection;
- (e) To establish a laboratory for developing building standards and norms and regulations governing construction work;
- (f) To set up a programming group to prepare instructions and programmes for particular problems in the organization and management of construction that require processing on the computers of the Mongolian Central Statistical Office.

It is planned to use this group later as a basis for creating a unified automatic control system for the Ministry.

2. Furnish technical assistance to the Ministry in organizing an information service and raising the level of skills of construction workers, for which purpose it is proposed:

(a) To establish an information centre at the Institute, which will include:

- A technical library;
- A patents library;
- A copying and reproduction laboratory;
- A film and photographic laboratory;
- An office for information on advanced construction methods;
- An editorial office for a periodical bulletin of scientific and technical information, and
- An abstracts service.

(b) To establish a methods centre at the Building and Architectural Institute for further training of building workers. The centre will include:

Permanent courses for advanced training of the engineering and technical personnel of the organizations and administration of the Ministry of Construction and Building Materials;

A school of advanced methods of work designed to improve the qualifications of crew-leaders, technicians and foremen. Organizationally, the centre and school will come under the Ministry of Construction and Building Materials.

D. Background and justification

At the present time most of the principal building materials, such as cement, bricks, reinforced concrete sections and a number of other materials are produced locally in the country. The quantity and quality of these materials, however, do not always meet the demand or the requirements set by the standards.

What is more, a significant proportion of building materials, such as ceramic products, rolled materials, paints, bitumen materials, sanitary equipment, metals, etc., are imported by the country, which is thus compelled to spend a considerable part of its foreign-exchange resources on these items.

Adequate reserves of mineral resources for the production of building materials have been discovered in Mongolia and to some extent are being worked and processed.

Control of construction and building-material production is wholly concentrated in the Ministry of Construction and Building Materials. An organizational chart of the Ministry is contained in annex I to this document. General information concerning the volume of building and installation work done by the Ministry is given in annex II. The quantities of the main building materials produced, their specifications and estimates of future requirements, including the part to be covered by imports, are given in annex III.

A Production Research Institute has been established and is operating as part of the system of the Ministry of Construction and Building Materials, with the following main tasks:

Research on the economics of construction and building-materials production;

Physical and chemical research on raw materials, building materials and structural sections;

Development of recommendations for technological improvement of building-materials production;

Improvement of the methods of conducting construction and installation work and of the quality of construction.

Basic data concerning the Institute, including an organizational chart, are given in annex IV.

The training of engineering and technical staff for the construction industry is at present concentrated in the Building Trades College, which comes under the Ministry of Construction and Building Materials, and in the Construction Department of the Polytechnic Institute attached to the Mongolian State University at Ulan Bator.

The annual output of the College is 200 technicians in seven specialities, while that of the Construction Department is 150 engineers in seven specialities.

In addition, there are some technicians and engineers who are trained in other countries. The annual numbers trained in this way are 10 technicians and 16 engineers.

There are also a number of specialists with higher and secondary specialized education in economic, technological and other fields who are employed in the country's construction sector.

At present, the system of the Ministry of Construction employs:

(a) Engineering and technical personnel	2132
(including those in the Ministry's administration)	92
(b) Workers	19032
(including skilled workers)	15130

Thus, with a total volume of 364 million tugriks worth of building and installation work, there are six engineering and technical personnel per million tugriks.

As may be seen from the above data, Mongolia needs additional engineering and technical staff for its expanding programme of building and installation operations, and in particular it is experiencing a keen shortage of skilled workers.

Moreover, in view of the specific local conditions, which are marked above all by great dispersion of construction sites and centres and by the absence of a developed infrastructure, particularly a road network, Mongolia's building sector is suffering from the following shortcomings:

High cost of building and installation work;

Long construction periods;

Relatively high design and service costs.

Further contributing factors are:

- (a) An inadequately developed system of uniform and standard designs;
- (b) Lack of specialization by construction organizations and enterprises producing building materials;
- (c) An insufficiently high level of technical management of construction and a generally low level of technical training among skilled building workers.

It is to remove these shortcomings and improve the general indicators for construction that the Government of the Mongolian People's Republic decided to undertake this project.

It was decided to base the project on the existing Production Research Institute of the Ministry of Construction and Building Materials.

For the successful fulfilment of the task of speedy development of Mongolia's building sector, it is planned to divide the implementation of the present project into three successive phases.

During the first phase, to which this project document relates, it is planned to give the Institute technical assistance in organizing applied construction research, as explained in section B. 1. of this chapter, and to provide the Ministry of Construction and Building Materials with technical co-operation in organizing an information service and improving the qualifications of skilled workers employed in construction, as indicated in section B. 2. of this chapter of the project document.

For this, maximum use is to be made of the scientific resources of the Institute, which recently moved into a new building and began the installation of laboratory equipment in the premises. As may be seen from annex IV, the Institute has at its disposal a certain number of qualified personnel and sufficiently modern equipment. In the planning and construction of the Institute, account was taken of the possibility of its expansion. As the Institute is situated in Ulan Bator, it will be possible to bring in additional specialist personnel for consultative assistance and for particular tasks, with utilization of the additional laboratory resources of the Polytechnic Institute.

It is proposed to make use of the practical results obtained in the course of scientific work in the Institute for recommendations to organizations and enterprises of the Ministry in their practical activities.

It is planned to organize the main activities for further training of engineering and technical personnel at a methods centre attached to the Architectural and Building Department of the Polytechnic Institute of the Mongolian State University. It is planned at a later stage to convert this Department into a separate institute.

The second phase of the project envisages assistance to the Ministry of Construction and Building Materials in establishing industrial construction facilities in the administrative districts. A detailed project document for the second phase is to be drawn up at the end of the first phase, with the help of the international expert and consultancy personnel participating in the final stage of implementation of phase I of the present project.

If phase II is approved and successfully completed, the project may have a third phase. The main objective of the third phase will be to assist the Ministry of Construction and Building Materials in improving project planning. The project document for the third phase can be prepared at the end of phase II.

The duration of phases II and III of the project will be determined in the process of consideration and approval of the project documents relating to those phases.

E. Outputs

(a) To achieve the immediate objective of the project described in Part II. B. 1. (a) of this document, it is planned:

1. To work out a plan for expanding the soil mechanics laboratory, with a detailed plan for the installation of equipment;
2. To prepare specifications for additional equipment and instruments;
3. To work out the methodology for investigating examples of foundations, particularly for permafrost areas;
4. To organize the training of laboratory and scientific workers in accordance with the laboratory's research programme;
5. To teach laboratory staff the methods and procedures of investigating foundations, with use of the most modern instruments and equipment;
6. To work out the methodology of arriving at conclusions concerning foundations, especially for seismic and permafrost areas.

(b) For Part II. B. 1. (b) of this project, it is planned:

1. To work out a plan for the expansion of the building physics laboratory with a view to creating subdivisions dealing with building acoustics, fire-resistance of structural sections, thermal insulation of buildings and other structures, and other matters depending on the details of the research programme;
2. To draw up specifications for the additional equipment and instruments necessary for carrying out investigations in accordance with the laboratory's scientific programme;

3. To draw up a plan for instruction and training of laboratory staff in the use of the new instruments and equipment;
4. To work out the methodology for conducting various types of tests in accordance with the laboratory's operational programme;
5. To assist in working out a plan for the layout of the equipment, taking into account the new equipment and instruments;
6. To teach the staff of the building physics laboratory modern research methods and procedures, with use of the latest instruments and equipment.

(c) For Part II. B. 1. (c) of the present project, it is proposed:

1. To prepare a survey dealing with similar laboratories in other countries;
2. To work out proposals for laying out the laboratory and equipping it with engineering systems;
3. To prepare, in conjunction with Mongolian specialists, a comprehensive project for the laboratory;
4. To assist in the preparation of the constructional and technological part of the working project for the laboratory;
5. To provide consultative assistance, if demanded, in the erection of the laboratory building.

(d) For Part II. B. 1. (d) of the present project, it is planned:

1. To work out plans for the installation of the heating and ventilation laboratory and of the water-supply and sewerage laboratory;
2. To draw up specifications for the equipment and instruments needed for the two laboratories;
3. To draw up proposals, based on the needs of the construction industry, for the operational programmes of the laboratories;
4. To prepare a plan and work out methods for teaching laboratory staff and improving their skills;

5. To teach laboratory staff modern research methods and procedures relating to problems of heating, ventilation, water supply and sewerage, with use of the latest instruments and equipment;
6. To work out a long-term research programme on environmental protection and pollution control.

(e) For Part II. B. 1. (e) of the present document, it is proposed:

1. To co-operate in setting up the laboratory of building standards and norms and regulations for construction work;
2. To make a comparative study of selected foreign and international building standards and of standards for the principal building materials;
3. To draw up a proposal for the creation of a national system of building standards;
4. To work out methods for the preparation, approval and application of building standards and norms and regulations governing construction work;
5. To carry out preparatory work on a unified codification of existing building standards in the light of recommendations of the International Standards Organization.

(f) For Part II. B. 1. (f) of the present document, it is proposed:

1. To co-operate in establishing the programming group;
2. To draw up some programmes on particular problems of the organization and management of construction;
3. To draw up specifications for the computing equipment needed by the programming group;
4. To work out proposals for the use of computer time at the computing centre of Mongolia's Central Statistical Office for processing the construction programmes.

(g) For Part II. B. 2. (a) of the present document, it is proposed:

1. To assist in the establishment of the technical library at the Production Research Institute;
2. To co-operate in the establishment of the patents library at the Institute, which would include also a library of international, foreign and national building standards;
3. To make proposals on the establishment of the copying and reproduction unit in the Institute, having regard to the necessary equipment and to alternative layouts;
4. To assist in the establishment of the film and photographic laboratory at the Institute and to work out proposals concerning its layout and equipment;
5. To co-operate in the establishment of the office for information on advanced construction methods as part of the technical library;
6. To work out measures for the establishment of the abstracts service and to organize the issue of a periodical bulletin of scientific and technical information in the field of construction;
7. To assist in the establishment of the abstracts service.

(h) For Part II. B. 2. (b) of the present document, it is proposed:

1. To co-operate in the creation of permanent courses for further training of engineering and technical personnel;
2. To work out programmes and study plans for the courses and provide methodological assistance in these matters;
3. To co-operate in the organization of a school of advanced techniques for crew-leaders and foremen;
4. To develop plans and study programmes and prepare the necessary methods manuals for the organization of the teaching process;
5. To assist in the organization and formation of the methods centre for further training.

F. Activities

The activities to be carried out by the project staff are the following:

1. The work described in Part II. E. (a) (1-6) of this Project Document will be carried out by an international expert on soil mechanics in close co-operation with the local personnel of the soil and foundation mechanics laboratory.
2. The work described in Part II. E. (b) (1-6) of this document will be performed by two international experts on construction physics, one of whom will be concerned with the general organization and expansion of the laboratory. He will also work on the heating and lighting systems of the buildings and their fire-proofing. The second expert will be concerned with building accoustics.
3. The work described in Part II. E. (c) (1-5) of this document will be carried out by an international expert on the testing of wide-span structures and elements in close co-operation with a group of Mongolian specialists, who will be responsible for preparing the plans for the laboratory to be used for testing such structures.
4. For the work described in Part II. E. (d) (1-6) it is proposed to recruit two international experts to work with two groups of local specialists, who will later form the nucleus of the staff of the two new laboratories: the heating and ventilation laboratory and the water supply and sewerage laboratory. The first expert will have to be a heating and ventilation specialist and the second a specialist in water-supply and sewerage systems.
5. In order to bring about the results mentioned in Part II. E. (e) (1-5) of this document, it is proposed to recruit one international expert on building standards, who will work in close contact with local specialists of the building standards and regulations laboratory.
6. The work described in Part II. E. (f) (1-4) of the document will be carried out by an international expert on the use of computers in construction, who will work together with a specially selected group of local programmers.

7. In order to produce the results described in Part II. E. (g) (1, 2 and 5) of this document, it is planned to recruit an international expert on the organization of technical libraries, who will work in close contact with the library group of the Production Research Institute.

8. The activities described in Part II. E. (g) (3 and 4) will be carried out by a group of local specialists under the direction of the national project leader in consultation with specialists from other Mongolian organizations.

9. The outputs indicated in Part II. E. (g) (6) of this document will be the responsibility of an international expert on technical information, who will work in close contact with local information specialists.

10. The work described in Part II. E. (h) (1-5) of this document will be performed by an international expert specializing in the organization of advanced training programmes in the building sector, who will work in close contact with a group of specialists from the Ministry of Construction and Building Materials under the direction of the deputy national project leader.

G. Inputs

1. Inputs of the Mongolian Government

The Government of Mongolia undertakes to provide the following inputs for the implementation of this project:

(a) Assignment of national project personnel

The bulk of the national project personnel will be furnished by the Building Production Research Institute and the Ministry of Construction and Building Materials, both located in Ulan Bator.

Some additional high-level specialists will be invited to take part in the project on the basis of contracts with the Institute, for which a specific sum will have to be allocated in the project budget covering the local-currency contribution of the Mongolian Government. The additional technical personnel needed for the project will be recruited locally and will perform all the work connected with project activities, including the secretarial and other services that the experts may require.

The Government will also provide and pay the national project leader and his deputy, who will be responsible for the general co-ordination and direction of the project with respect to both local and international staff.

(b) Premises, installations, equipment and services furnished by the Mongolian Government

The project will function as an independent operation in the building of the Institute and the other organizations involved in the project activities, which will make available working premises and other services, including transport, to the United Nations experts and other project personnel, should this be required in order to expedite the work of the project.

The project's local and international staff are entitled to use the existing laboratory facilities of the Institute and the other organizations, and also the library facilities and other services required for the work of the project.

(c) Description of UIDP expenditure

1.	<u>Experts</u>	<u>Duty station</u>	<u>Start of work</u>	<u>Duration of work or cost</u>
(a)	Expert on soil mechanics, with wide experience in experimental soil-mechanics research and the organization of such activities, preferably in developing countries, in addition to practical experience in the preparation of equipment specifications and a knowledge of the principles involved in the designing of soil-mechanics laboratories.	Ulan Bator	June 1980	3 man-months
(b)	Expert on building physics, with wide practical experience in the organization of building physics laboratories, and especially in heat engineering, fire-proofing and, preferably, lighting engineering; he will be called upon to exercise overall supervision over the expansion of the building physics laboratory.	Ulan Bator	June 1979	4 man-months
(c)	Expert on building acoustics, with wide practical research experience in this area and practical experience in training specialists in building acoustics, preferably in developing countries.	Ulan Bator	January 1981	2 man-months
(d)	Expert on dynamic structural testing, with wide research experience in the testing of wide-span structures; he must also be familiar with the organization and equipping of laboratories for such testing and must understand the principles underlying their planning and construction so that he can advise on and direct work in this area.	Ulan Bator	June 1980	4 man-months with possible extension

	<u>Experts</u>	<u>Duty station</u>	<u>Start of work</u>	<u>Duration of work or cost</u>
(e)	Expert on the heating and ventilation of buildings and structures, with wide practical experience in the organization and conduct of applied laboratory research; he must also be experienced in the design of heating and ventilation laboratories so that he can take charge of and direct such work for the project (see (f) below)	Ulan Bator	January 1981	3 man-months
(f)	Expert on water-supply and sewerage systems, with practical experience in the organization of laboratory research in this area; he must be able to direct local specialists in the design and equipping of a water-supply and sewerage laboratory. This expert and the heating and ventilation expert (see (e) above) must have a knowledge of the principles and techniques of environmental protection and be prepared to advise on measures to combat environmental pollution.	Ulan Bator	January 1981	3 man-months
(g)	Expert on building standards, with wide practical experience in the formulation and classification of building standards; he must also be familiar with the principles guiding the formulation and application of building standards and work rules and must have practical experience in the establishment of building-standards laboratories in order that he may direct the activities of local specialists in this area.	Ulan Bator	June 1979	3 man-months with possible extension

	<u>Experts</u>	<u>Duty station</u>	<u>Start of work</u>	<u>Duration of work or cost</u>
(h)	Expert on the use of computers in construction work, with extensive practical experience in this area; he must also be experienced in the writing of computer programmes for the organization and direction of construction activities and have practical experience in the training of programmers in this area.	Ulan Bator	June 1980	3 man-months with possible extension
(i)	Expert on the organization of technical libraries, with wide practical experience in this area and also in the organization of patent and standards libraries.	Ulan Bator	September 1979	3 man-months
(j)	Expert on information science relating to the construction sector; he must have wide practical experience in this area and a knowledge of the principles of technical information and of how to set up an abstracts and bulletin service. In addition, he must be familiar with the dissemination and use of information for development purposes.	Ulan Bator	September 1979	2 man-months with possible extension
(k)	Expert on training, with wide practical experience in organizing retraining programmes for senior and middle-level supervisory personnel in the building sector; he must be experienced in organizing further training courses and schools for training in advanced construction techniques.	Ulan Bator	June 1980	3 man-months with possible extension

2. <u>Consultant experts</u>	<u>Duty station</u>	<u>Start of work</u>	<u>Duration of work or cost</u>
To deal with special and urgent problems which may arise during the course of the project, consultant experts will be recruited for periods to be agreed upon with the national project leader. The job descriptions for these consultants will be drawn up at the project work site in accordance with actual requirements.	Ulan Bator	From June 1979 to June 1981	10 man-months

3. Training of local personnel

A detailed training programme for each specialist listed below will be prepared by the international experts in agreement and close contact with the national project leader and his deputy.

(a) Soil and foundation mechanics (construction in permafrost regions)	USSR USA Canada	1979-1980	2 man-months
(b) Construction in regions subject to earthquakes	USSR Yugoslavia Japan	1979-1980	2 man-months
(c) Building heating systems	USSR FRG Finland	1980-1981	2 man-months
(d) Fire-proofing of buildings	FRG Great Britain USSR	1980-1981	1 man-month
(e) Building lighting systems	USSR Poland Finland Austria	1980-1981	1 man-month
(f) Building acoustics	France Sweden USSR Hungary	1980-1981	2 man-months
(g) Testing of wide-span structures	Hungary FRG USSR	1981-1982	2 man-months

<u>Experts</u>	<u>Duty station</u>	<u>Start of work</u>	<u>Duration of work or cost</u>
(h) Heating and ventilation	USSR FRG Sweden Czechoslovakia	1980-1981	2 man-months
(i) Water-supply and sewerage systems	USSR FRG Sweden Czechoslovakia	1980-1981	2 man-months
(j) Environmental protection	Yugoslavia USSR USA Italy	1980-1981	1 man-month
(k) Building standards	USSR Switzerland	1980-1981	2 man-months
(l) Use of computers in building	USSR USA France Poland	1981-1982	3 man-months
(m) Organization of technical libraries	USSR	1981-1982	2 man-months
(n) Building information services	USSR Poland Hungary Austria	1981-1982	2 man-months
(o) Further training programmes for building specialists	USSR Austria Denmark	1981-1982	2 man-months
(p) ^{1/} Other aspects of construction			6 man-months

4. Equipment

The total equipment required for the project has been broken down into three categories.

^{1/} Item (p) allows for the possibility of training abroad for a number of additional specialists not covered by this training programme or, in some cases, of extending the period of training for those covered by the programme, should conditions in the host country so require.

	<u>Duty station</u>	<u>Start of work</u>	<u>Duration of work or cost</u>
(a) <u>Equipment for the Institute laboratories</u>	Ulan Bator	June 1981 ^{1/}	110,000 ^{2/}

^{1/} This is the latest date for deliveries for this project. A detailed delivery schedule for individual machines and equipment will be submitted by the national project leader not later than six months after the start of the project.

^{2/} This is the total expenditure on equipment. Detailed equipment specifications will be found in annex 5 to this document.

(b) <u>Office, calculating and other auxiliary equipment</u>	Ulan Bator	June 1981	35,000
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This category also includes the equipment for the film and photographic laboratory, together with the necessary reproduction and projection equipment.

(c) <u>Miscellaneous equipment</u>	Ulan Bator	December 1981	15,000
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Additional specifications for the equipment under (b) and (c), together with a delivery time-table, will be submitted by the national project leader, not later than 12 months after the start of the project in the case of the equipment under (b), and not later than 24 months in the case of the equipment under (c).

5. <u>Miscellaneous expenses</u>			5,000
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It is planned to allocate additional resources to cover expenditure connected with project implementation.

H. Work Plan

Description of the work	1978				1979				1980				1981			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Preparatory mission																
Clearance and approval of the project																
Appointment and approval of the national project leader and his deputy																
Preparation of specifications for the basic laboratory equipment																
Preparation of specifications for the auxiliary equipment																
Preparation of specifications for the remaining equipment																
Delivery and installation of the basic equipment																
Delivery and installation of the auxiliary equipment																
Delivery and installation of the remaining equipment																
Expansion of the soil mechanics laboratory																
Expansion of the building physics laboratory																
Establishment of the building acoustics section																
Preparation of the project for the laboratory for the testing of wide-span structures																
Establishment of the heating and ventilation laboratory																
Establishment of the water-supply and sewerage laboratory																
Establishment of the building standards laboratory																

Description of the work	1978				1979				1980				1981			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Organization of the programmer group																
Reorganization and expansion of the technical library							3				3					
Organization of the information centre																
Establishment of the training methods centre							2				3					
Review of the project and formulation of the Project Document for the second phase																1/2

I. Preparation of the framework for effective participation of national and international staff in the project

The activities necessary to produce the indicated outputs and achieve the project's immediate objectives will be carried out jointly by the national and international staff assigned to it. The respective roles of the national and international staff will be determined in consultation with, and on the decision of, the national project leader and his deputy at the beginning of the project and set out in a Framework for effective participation of national and international staff in the project. The Framework which is to be regarded as an annex to this document, may subsequently be reviewed from time to time. The respective roles of the national and international staff shall be in accordance with the established concept and specific purposes of technical co-operation.

J. Development support communication

Not envisaged.

K. Institutional framework

1. The Building Production Research Institute of the Ministry of Construction and Building Materials will function as the government implementing agency in this project and, using the assistance provided by UNDP, will carry out the measures specified in the Work Plan.

2. Due allowance being made for possible expansion of the Institute, it may be reliably assumed that it will be fully able to carry out the work required for the project.

3. At a later stage in the project, a number of subordinate divisions, such as the building information centre, the construction workers training methods centre and the programmer group, may be made into independent organizations.

4. However, during the first stage it would be best if these divisions were to be operated under a single management and, as far as possible, located in the Institute building.

L. Prior obligations and prerequisites

(a) Prior obligations

1. For the successful launching and completion of the project the Mongolian Government will have to meet the following prior obligations:

To appoint the national project leader and his deputy from among the senior officials of the Ministry and the Institute, bearing in mind that one of them will be called upon to deal with matters relating to the expansion of the Institute, while the other will be involved in the organization of advanced training courses, information systems and programmes for the automatic control system to be established in the future;

To allocate the necessary additional funds for the start of work on the project;

To carry out the necessary consultations, with the participation of all potential partners, for the purpose of formulating a common course of action to ensure the project's successful completion.

2. As the executing agency, UNIDO will have to meet the following prior obligations:

To organize a preparatory mission with the basic task of assisting the Mongolian Government in the preparation of the Project Document and the request to UNDP;

To familiarize the national project leader and his deputy, through briefings at UNIDO Headquarters, with their rights and duties, and also with any additional rules and instructions relating to the implementation of the project.

3. The Project Document will be signed by the UNDP Resident Representative in Mongolia on behalf of UNDP, and UNDP assistance to the project will be provided only if the prior obligations stipulated under sections 1 and 2 above have been met to UNDP's satisfaction.

(b) Prerequisites

1. In order to ensure the successful completion of the programme, the Mongolian Government will have to comply with the following prerequisites before the start of the project:

To authorize the Building Production Research Institute to act in the name of the Mongolian Government in all matters relating to the implementation of the project;

To take all necessary measures to support the project with such transport and other facilities as may be required from the outset of the project. A detailed list of these measures will have to be drawn up by the national project leader and his deputy and submitted in good time to the Ministry of Construction and Building Materials for approval and action.

2. UNIDO will have to prepare a briefing programme for the national project leader and his deputy and hold consultations with the Mongolian organizations concerned for the purpose of co-ordinating activities with a view to successful completion of the project.

3. The Project Document will be signed by the Resident Representative on behalf of UNDP, and UNDP assistance to the project will be provided only when the prior obligations and prerequisites set forth in Part II. L. (a) and (b) of the Project Document have been fulfilled. If the measures contemplated in this section are delayed or fail to materialize, UNDP may suspend or terminate its assistance to this project.

M. Future UNDP assistance

1. This project may entail two subsequent phases, as indicated above.
2. The procedure for determining the advisability of extending the project and the nature of the subsequent phases have been described in detail in Part II. D.

PART III

Schedules of monitoring, evaluation and reports

The project will be subject to periodic review in accordance with the policies and procedures established by UNDP for monitoring project and programme implementation.

This Project Document provides that the first such evaluation will be made at the end of phase I of the project and subsequent evaluations as required by the further progress of the programme.

The organization, terms of reference and timing of the evaluation will be decided by consultation between the Government, UNDP and UNIDO.

The national project leader will submit a progress report every six months. The form and content of this report must be in accordance with UNDP requirements for the drafting of such documents.

Following the completion of phase I, as described in detail in this Project Document, the national project leader will submit a terminal report, which will also include an assessment of the project, proposals regarding its follow-up, and also, should there be a need for a further phase, a draft Project Document for phase II.

PART IV

BUDGETS

A. UNDP contribution

	Total		1979		1980		1981	
	m/m	\$US	m/m	\$US	m/m	\$US	m/m	\$US
10-00 <u>Project personnel</u>								
11-00 <u>Experts</u>								
11-01 Expert on soil mechanics	3	13,200			3	13,200		
11-02 Expert on building physics	4	17,600	4	17,600				
11-03 Expert on building acoustics	2	8,800					2	8,800
11-04 Expert on dynamic testing of structures	4	17,600			4	17,600		
11-05 Expert on heating and ventilation	3	13,200					3	13,200
11-06 Expert on water-supply and sewerage systems	3	13,200					3	13,200
11-07 Expert on building standards	3	13,200	3	13,200				
11-08 Expert on the use of computers in building	3	13,200			3	13,200		
11-09 Expert on the organization of technical libraries	3	13,200	3	13,200				
11-10 Expert on building information services	2	8,800	2	8,800				
11-11 Expert on advanced training programmes	3	13,200			3	13,200		
11-12 Consultants	10	14,000	2	8,800	5	22,000	3	13,200
11-99 Total	43	189,200	14	61,600	18	79,200	11	48,400
15-00 Official travel		4,000		1,000		1,500		1,500
16-00 Preparatory mission		2,200		2,200		-		-
16-01 Mission for the review of the project and the preparation of the second phase		1,500		-		-		1,500
19-00 Total personnel component	43	196,900	14	64,800	18	80,700	11	51,400
30-00 Specialist training (training of local personnel)								
31-00 Individual fellowships								
31-01 Soil mechanics (construction in permafrost regions)	2	2,400	-	-	2	2,400	-	-
31-02 Construction in regions subject to earthquakes	2	2,400	-	-	2	2,400	-	-
31-03 Building heating systems	2	2,400	2	2,400	-	-	-	-
31-04 Fire-proofing of buildings	1	1,200	1	1,200	-	-	-	-
31-05 Building lighting systems	1	1,200	1	1,200	-	-	-	-
31-06 Building acoustics	2	2,400	-	-	-	-	2	2,400
31-07 Testing of wide-span structures	2	2,400	-	-	2	2,400	-	-
31-08 Heating and ventilation	2	2,400	-	-	-	-	2	2,400
31-09 Water-supply and sewerage systems	2	2,400	-	-	-	-	2	2,400
31-10 Environmental protection	1	1,200	-	-	-	-	1	1,200

A. UNDP contribution (continued)

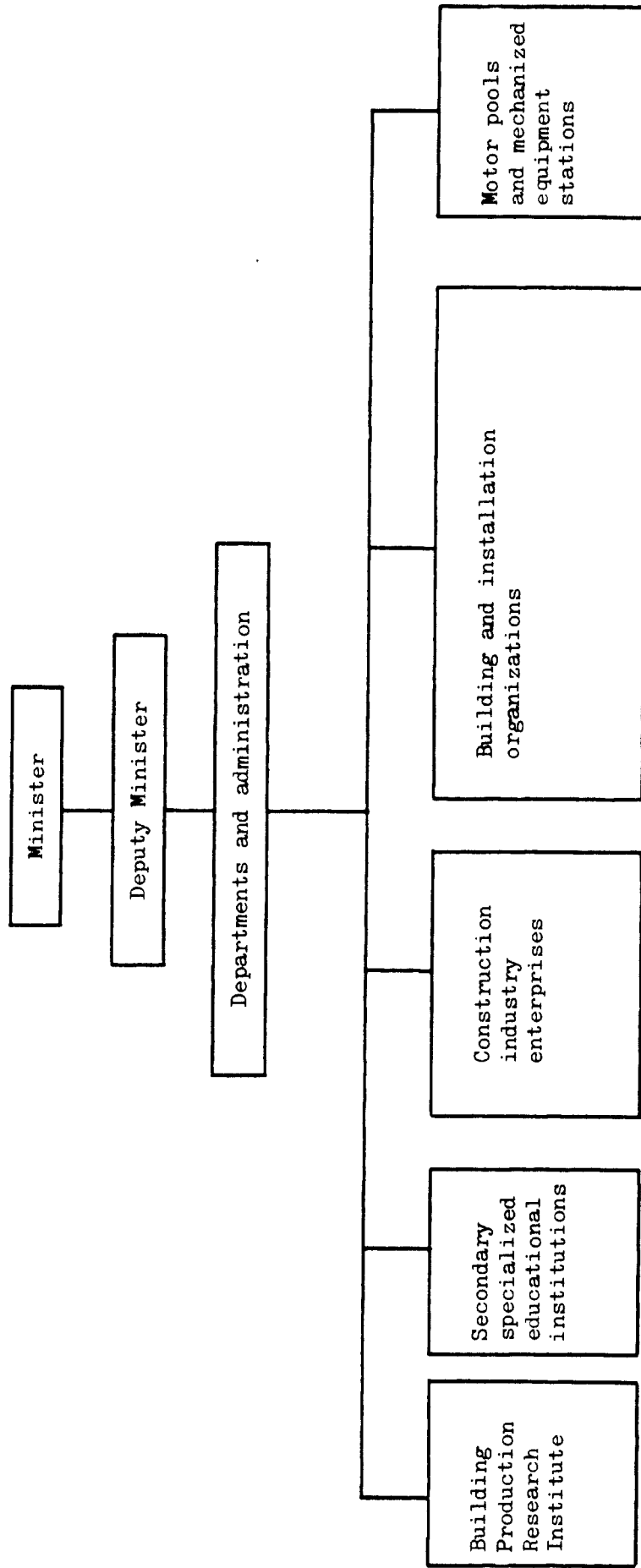
	Total		1979		1980		1981	
	m/m	\$US	m/m	\$US	m/m	\$US	m/m	\$US
31-11 Building standards	2	2,400	2	2,400	-	-	-	-
31-12 Use of computers in building	3	3,600	-	-	3	3,600	-	-
31-13 Organization of technical libraries	2	2,400	2	2,400	-	-	-	-
31-14 Building information services	2	2,400	2	2,400	-	-	-	-
31-15 Organization of advanced training programmes	2	2,400	-	-	2	2,400	-	-
31-16 Other fellowships	6	7,200	2	2,400	2	2,400	2	2,400
Total specialist training component	34	40,800	12	14,400	13	15,600	9	10,800
49-00 Equipment								
49-01 Laboratory equipment	-	110,000	-	20,000	-	60,000	-	30,000
49-01 Office and auxiliary equipment	-	35,000	-	20,000	-	15,000	-	-
49-02 Other equipment	-	15,000	-	-	-	5,000	-	10,000
Total equipment component		160,000		40,000		80,000		40,000
59-00 Other direct expenses	-	5,000		1,000		2,000		2,000
99-00 Grand total for section "A", UNDP contribution	77	402,700	26	120,200	31	178,300	20	104,200

B. Government contribution

	Total		1979		1980		1981	
	m/m	tugriks	m/m	tugriks	m/m	tugriks	m/m	tugriks
10-00 Local project personnel	1,656	1,122,000	552	374,000	552	374,000	552	374,000
40-00 Equipment		2,209,200						
43-00 Buildings and installations		3,682,000						
		7,013,200	552	374,000	552	374,000	552	374,000

Annex 1

Organizational Diagram of the Ministry of Construction and Building Materials of the Mongolian People's Republic



Annex 2

Production Programme of the Ministry of Construction
and Building Materials of the
Mongolian People's Republic

Volume of construction and installation work		Unit	1977 (actual)	1978 (planned)	1980 (planned)
	Total	Thousands of tugriks	305,686.7	356,400	451,200
including	Industrial construc- tion	"	40,417.1	49,896	72,192
	Housing	"	58,601.5	71,280	94,752
	Social and cultural facilities	"	92,528.2	106,920	139,872
	Other	"	114,139.9	128,304	144,384

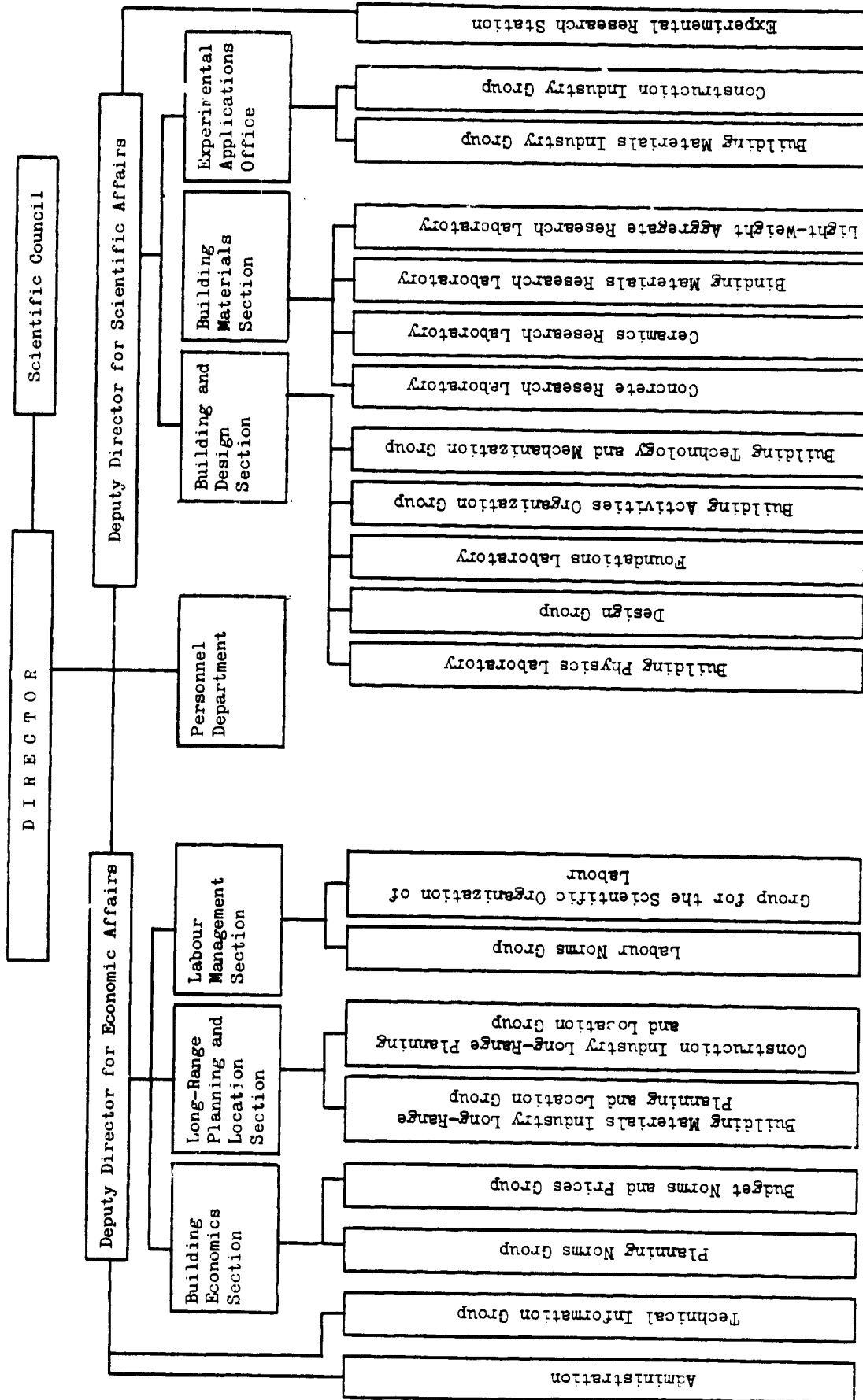
Annex 4

Basic Information on the Building
Production Research Institute

1. Number of scientific staff and laboratory workers	241 persons
2. Value of the laboratory equipment	2,229,200 tugriks
3. Value of the building	3,682,000 tugriks
4. Laboratory area	1,450 m ²

Annex 4

Organizational Diagram of the Production Research Institute of the Mongolian Ministry of Construction and Building Materials



Annex 5

List of equipment required for the Structural Ceramics Laboratory

No.	Designation, type, model	Unit	Quantity	Country and producing plant	Remarks	Approximate price in roubles
1.	Laboratory vacuum press, model VP-100	Complete unit	1	USSR, Iskitim Mechanical Engineering Plant, Novosibirsk Region		250
2.	Crystal dilatometer for determining the coefficient of thermal expansion	Complete unit	1	USSR, Coke and By-products Combine, Kharkov		1,200
3.	"Silicotherm" - instrument for determining silicon content	Complete unit	1	Hungary, "MOM" Optics Plant, Budapest		1,150
4.	Microscope with high-temperature heating unit, type MWO-2	Complete unit	1	German Democratic Republic, Karl-Zeiss Works, Jena		2,500
Total:						5,800

Annex 5

List of equipment required for the Chemistry Laboratory

No.	Designation	Model	Quantity	Country and supplier	Approximate price in roubles
1.	Laboratory balance	VLA-200	2	USSR, "Glavsoyuzpribor"	80
2.	Laboratory balance	VLA-20M	2	"	80
3.	Balance	VLTK-5	2	"	75
4.	Balance	VLTK-500	2	"	70
5.	Weights	G-2-210	2	"	3
6.	Weights	2-4-211, 10	2	"	3
7.	Laboratory thermometer	TL-2, No. 1-5	2 sets	"	30
8.	Thermometer	TL-4, No. 1-8	2 sets	"	40
9.	Electric furnace	SMOL	2	"	120
10.	Drying cabinet	Sh-0,05	2	"	100
11.	Distillation apparatus	DL-3	2	"	100
12.	Shaft furnace	ShP-1	2	"	130
Total:					831

Annex 5

List of Equipment for the Binding Materials Laboratory

No.	Designation	Model	Quantity	Country and supplier	Approximate price in roubles
0	1	2	3	4	5
1.	Electrical laboratory autoclave, for 8 atm. gauge	-	1	USSR, "Glavsoyuzpribor"	200
2.	Laboratory steam chamber	-	1	"	50
3.	Still	PK-2	2	"	20
4.	Cement sifting screen	STs	2	"	10
5.	Set of sieves	KSV	2	"	10
6.	Instrument for determining grind fineness	SMM	2	"	220
7.	Mixing vessel	ChZ	2	"	2
8.	Ladle	LZ	4	"	2
9.	Suttard viscosimeter	VS	2	"	2
10.	Vicat apparatus	OGTs-1	2	"	24
11.	Jarring table	LVS	1	"	80
12.	Laboratory bath	LV-2	2	"	35
13.	Laboratory bath	LV-3	2	"	35
14.	Steam chamber	PK	1	"	120
15.	Laboratory instrument for determining solution density	PCR	1	"	10
16.	Vibration table	435A	2	"	130
17.	Plates for the compression testing of the half-sections of small beams	75x40x20	4	"	5
18.	Beam mould	NBS 40x40x160	10	"	50

List of Equipment for the Binding Materials Laboratory (cont'd)

	0	1	2	3	4	5
19.	Mould					50
20.	Laboratory mixer for mixing cement mixtures		LO1-10	10		
21.	Metallographic microscope		MA-1A	1		213
22.	Grinding apparatus		MIM-8M	2		350
23.	Polishing apparatus		-	1		100
24.	Microhardness measuring instrument		-	1		100
			PWT-3	1		200
						<hr/>
						Total: 1,988

Annex 5

List of Equipment and Instruments Required for the Light-Weight Filler
and Concrete Laboratory

"Soyuzglav-pribor" number	Designation and purpose	Model	Technical characteristics	Quantity	Approximate price in roubles
1	2	3	4	5	6
1126083	Technical laboratory balance, first class, for weighing materials in high-precision technical analysis	VLT-1kg-1 (TI-10)	Capacity 1.0 kg; weight 20 kg; graduated 10 mg.	2	2 x 72 = 144
	Pycnometer for determining the specific gravity of solid bodies	PSV-2	Rated capacity 100 ml	50	50 x 0.42 = 21
	Electric drying cabinet	ShL-1	Working temperature 220°C	3	100
	Electric laboratory autoclave, for 8 kg/cm ²	-	Maximum temperature 200°C	1	200
	Electric laboratory autoclave, for 15 kg/cm ²	-	" " "	1	300
0728110	Vessel for preparing cement mixture	ChZ	Outer diameter 400	3	3 x 0.95 = 3.0
0728136	Ladle for mixing binding materials	LZ	Radius of sphere 220, diameter 100, length 212	3	3 x 0.65 = 2.0
0728039	Vicat apparatus for determining the normal consistency and setting time of cement mixtures	OPTs-1	Over-all dimensions: 180 x 130 x 336	1 set	12.2
0728314	Mechanical device for determining the setting time of cement mixtures	APSS-6	Automatic recording system	1 set	546
0728152	Graduated metal vessels for measuring dry materials; capacities 1, 2, 3, 5, 10 litres	MP	Capacities 1, 2, 3, 5 and 10 litres	1 set	100
0728268	Metal mould for cube 100 x 100 x 100 mm	LO1-08	Weight 1 kg	50	50 x 4.3 = 21.5

Filler and Concrete Laboratory Equipment (cont'd)

1	2	3	4	5	6
0728195	Sieve for inert materials	KSI	Wire netting No. 014V, 0315V, 063V, 125V, 25V; mesh 5, 10, 20, 40 mm	2 sets	30 x 2 = 60
130602	Two-indicator timer (Soviet State Standard GOST 5072-67)	S-P-1 (51-SD)	Dial graduations 0.1 sec.	5	60
	Technical viscosimeter for determining the suitability of concrete mixtures for laying	-	-	1 set	200
	6-cavity moulds for cement samples, 2 x 2 x 2 cm	-	-	10 sets	10 x 6.3 = 63
	Belyachkov spring-actuated pistol for testing concrete	-	-	1 set	50
	Steel cylinders with removable bottom and plunger	-	Diameter 75, 150 mm	2 sets	2 x 10 = 20
	Laboratory jaw breaker	DShch 100 x 600	Maximum size of crushed piece 40 mm; minimum size 5 mm	1	200
	Fast-acting technical balance	VTK-500	Capacity 500 grams; graduation 0.1 gram; damping time 10 seconds	2	170 x 2 = 340
	Device with quick-response heater and binocular microscope for determining the swelling properties of rocks	-	Maximum temperature of the quick-response heater 1,400°C; microscope type MBS-1	1 set	400
	Le Chatelier tester for determining the specific gravity of mineral and glass fibre	-	-	3	20
	High-temperature viscosimeter for measuring the viscosity and density of melts	-	Viscosity test range 102 - 106; maximum working temperature 2,300°C	1 set	120

Filler and Concrete Laboratory Equipment (cont'd)

1	2	3	4	5	6
Device for determining the surface tension of melts		-	Working temperature of the electric furnace	1 set	100
Device for determining slab compaction under load		-	-	1 set	20
Device for determining the viscosity and maximum shear stress of aerated concrete mixtures		-	-	1 set	100
Roasting sintering vessel with furnace		-	Height not less than 220 mm; sintering area 300 cm ²	2	300
Bar grate		-	Useful area of the grate not less than 14%	4	30
Bellows device		-	Negative pressure not less than 500 mm Wg; efficiency 1 m ³ /sec.	1	400
Air-blowing device		-			
Plate-type granulator		-	Diameter 1,500, 800 mm	2	70
Hygrometer -20		-	-	1	20
Electric shaft furnace		-	Working temperature 1,200° C; working area 100 x 100 x 200 mm	2	400
Thermocouple		-	Length 500 mm	3	40
Thermocouple		-	" "	3	35
Recording potentiometer		-	-	2	35
Vacuum gauge		-	-	3	35
<u>Total:</u>					<u>5,567.7</u>

Annex 5

List of Equipment Required for the Concrete Laboratory

No.	Designation	Model	Quantity	Country and supplier	Approximate price in roubles per unit of equipment
0	1	2	3	4	5
1.	Hydraulic press for compression and bending testing of concrete samples	P-250	1	USSR, "Glavsoyuzpribor"	9,400
2.	Laboratory vibration table	435-A	1	"	100
3.	Impact-testing machine for testing the impact-resistance of stone samples	KP	2	"	35 x 2 = 70
4.	Laboratory cavity drum for determining the wear-resistance of stone materials	BL-2	2	"	50 x 2 = 100
5.	Motor-driven drilling machine with pobedite-tipped drill bits for drilling cylinders of 50, 70 and 100 mm in diameter	2 sets	2 sets	"	75 x 2 = 150
6.	Laboratory jaw breaker	ShL	4	"	120 x 4 = 480
7.	Automatically controlled refrigeration cabinet for testing materials for frost-resistance	2	2	"	500 x 2 = 1,000
8.	Ultrasonic device for quality-control testing of concrete	UKB-IM	2 sets	"	1,320
9.	Device for testing the strength of welded joints directly in reinforced concrete elements	PA-7	2 sets	"	120 x 2 = 240
10.	Devising for measuring prestressing of concrete re-inforcement	IPN-6	2 sets	"	150 x 2 = 300
11.	Mechanical device for determining the setting times of cement mixtures	APSS-6	2	"	35 x 2 = 70
12.	Laboratory device for determining the consistency of building mortar	PCR	4	"	25 x 4 = 100

Concrete Laboratory Equipment (cont'd)

0	1	2	3	4	5
13.	"Stroitsnil" cone, laboratory type, with stand		2 sets	USSR, "Glavsoyuzpribor"	20 x 2 = 40
14.	Ditto, field type 14a. Articulated hammer for concrete testing, Fiesdl system		2	"	5 x 2 = 10
15.	Ditto, Kashkarov system		2	"	10 x 2 = 20
16.	Binocular microscope		2	"	45 x 2 = 90
17.	Technical laboratory balance	VLP-1kg	5	"	72 x 5 = 360
18.	Pycnometer for determining the specific gravity of solids	PSV-2	200	"	0.5 x 200 = 100
19.	Metal cylinders for determining the bulk density of loose materials	MP; 1, 2, 3, 5, 10 litres	4 sets	"	15 x 4 = 60
20.	Steel cylinders with removable bottom and plunger; 75 and 150 mm	-	2 sets	"	8 x 2 = 16
21.	Sieve for inert materials	KSI	10 sets	"	10 x 10 = 100
22.	Fast-acting technical balance	VTK-500	2	"	75 x 2 = 150
23.	Mechanical stone-hardness indicator for analysis of grains of fragile rock in crushed stone	T-3	2	"	15 x 2 = 30
24.	Pneumatic surface gauge for determining the specific surface of sand	PKh-4	2	"	20 x 2 = 40
25.	Technical viscosimeter for determining the rheological properties of concrete mixtures	-	2 sets	"	35 x 2 = 70
26.	Pointer indicator, with stand, for determining linear deformation in concrete	-	5 sets	"	30 x 5 = 150
27.	Steel moulds for samples, with the following sizes: 20 x 20 x 20 cm 15 x 15 x 15 cm 10 x 10 x 10 cm 7 x 7 x 7 cm 2 x 2 x 2 cm		30 30 45 30 20	"	180

Total: 14,856

Annex 5

List of Instruments and Equipment Required for the Foundation Laboratories

No.	Designation	Unit	Type and model	Quantity	Country and supplier	Price in roubles
1.	Hydraulic jack	Unit	DG-100	2	USSR; Ivanovo Test Instrument Plant (ZIP); Ivanovo	80 x 2 = 160
2.	Tokor dynamometer	Unit	DOSM-200	4	USSR; Training and Experimental Plant, Zhdanov Polytechnic Institute; Gorky	52 x 4 = 208
3.	Maksimov deflectometer for determining the magnitude of structural deflection (with screw clamps)	Unit	-	6	USSR; Production shops, Mining Institute of the Academy of Sciences of the USSR; Moscow	5 x 6 = 30
4.	Extensible soil thermometers for measuring soil temperature	Set	TPV-50	8	USSR; Klin Thermometer Plant; Klin, Moscow Region	85 x 8 = 680
5.	Pressure meter	Unit	D-76	1	USSR; Scientific Research Institute of Foundations and Underground Structures	350 x 1 = 350
6.	Low-temperature chamber	Unit	RI-30 (-40° - +80°)	1	Japan; Toboi Mec. Co. Ltd.	500 x 1 = 500
					Total:	1,928

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43
1

Annex 5

List of the Instruments and Equipment Required for the Building Structures Laboratory

No.	Designation and purpose	Model	Quantity	Country and manufacturing plant	Approximate price in roubles
1.	Ultrasonic device for quality-control testing of concrete, brick, glass-fibre-reinforced plastic, etc.	UKB-IM	2	USSR; "Elektrototochpribor", Kishinev	1,320 x 2 = 2,640
2.	Portable ultrasonic pulse-type thickness gauge for determining the thickness of metal insulation, piping, etc.	Kvarts-6	2	USSR	240 x 2 = 480
3.	Set of magnetometrical testing instruments: (a) Coating thickness meter (b) Stress and fissure gauge (c) Reinforcement characteristics gauge	ITP-1 INT-M2 IPA	2 sets	USSR	2,000 x 2 = 4,000
4.	Test stand	SIS-40	1 set	USSR, Armavir	2,800
5.	U-BIX (reproduction machine using ordinary paper)	750S	1	Japan, Tokyo; Bozki Ltd.	10,000
Total:					19,920

Annex 5

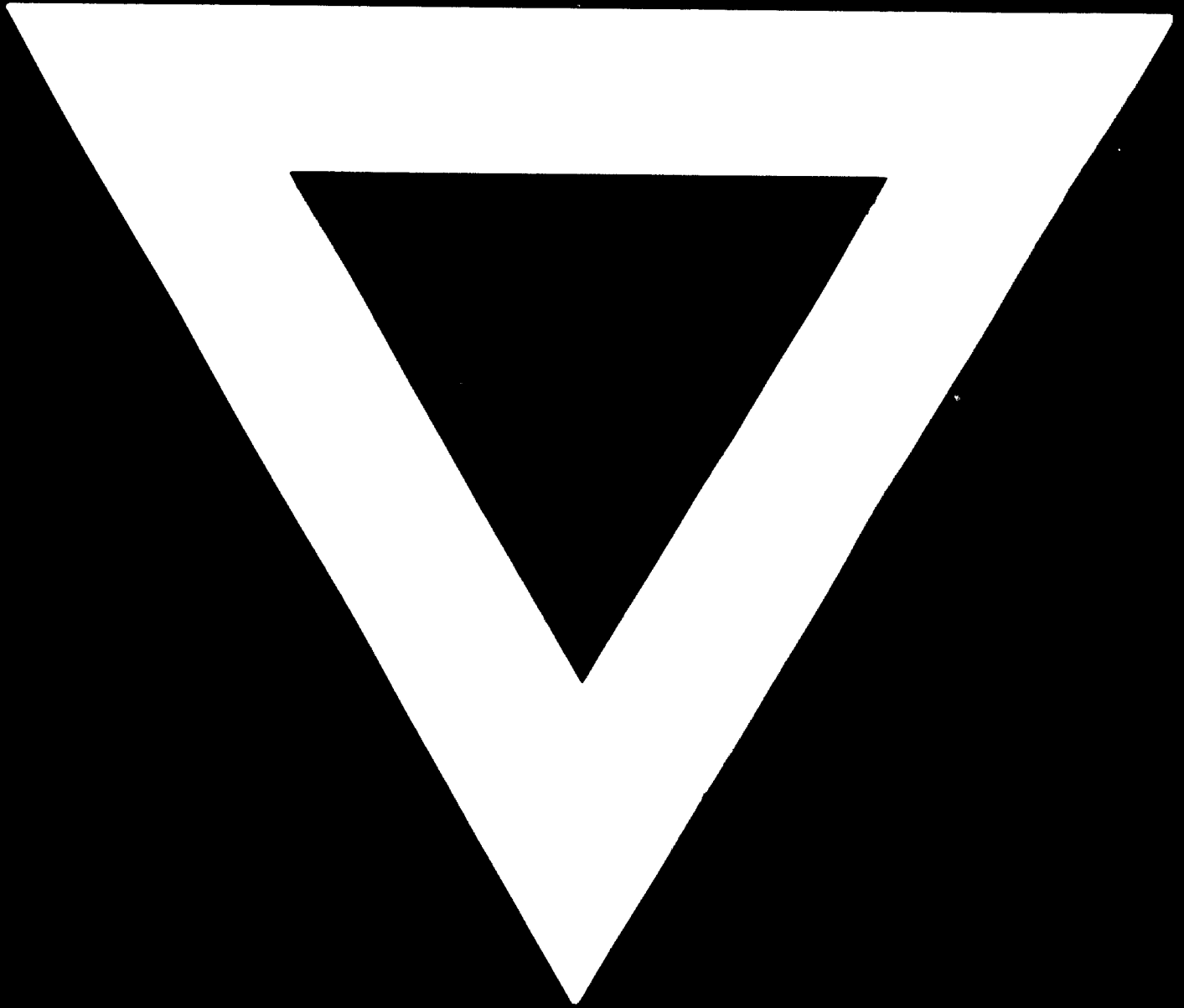
Diagnostic Equipment for the Construction and Road Machine Proving Ground

No.	Designation	Model	Quantity	Purpose	Manufacturing organization	Approximate price in roubles
1	2	3	4	5	6	7
1.	Mobile diagnostic unit	KI-4270	1	Used for complete general and component-by-component diagnostic inspections of machinery on the basis of a large number of indicators; makes it possible to determine the kind of repair required (major overhaul, routine); it provides an extensive range of diagnostic functions and can be used to determine the cause of equipment failure.	State All-Union Research and Technological Institute for the Repair and Operation of Machine and Tractor Fleets (GOSNITI)	25,000
2.	Mobile dynamometer unit with extensometer carrier mounted on a car chassis	GAZ-66	1	For traction and speed readings.	GOSNITI	35,000
3.	Motor tester	KI-4897 (SAN-1020, krypton)	1	For determining a number of machinery characteristics at the time of technical inspection No.3 and scheduled repairs.	GOSNITI	3,000
4.	Stand	KI-4856	1	For checking traction characteristics	GOSNITI	5,000
5.	Stand	KI-4872	1	For checking drive wheel alignment	GOSNITI	4,000
6.	Stand	KI-4998	1	For checking the braking performance of motor vehicles	GOSNITI	3,000

Construction and Road Machine Proving Ground Equipment (cont'd)

1	2	3	4	5	6	7
7.	Diagnostic, testing and forecasting system	DIPS	1	Measures up to 399 characteristics of machinery; prints out the results of both external inspections and stationary and non-stationary testing.	GOSNITI	8,000
8.	Portable set of instruments	KI-13901	1	For technical inspections Nos. 1 and 2.	GOSNITI	1,000
9.	Equipment for a permanent diagnostic station	KI-5308	1	For technical inspection No. 3 and scheduled repair.	GOSNITI	2,000
10.	Diagnostic device	KI-4887	1	Flow-meter for measuring the gases making their way into the crankcase.	GOSNITI	2,000
11.	Diagnostic device	IMD-2 M (Sib IME) EMDM (LSKHL)	1	Measures engine power.		1,000
12.	Forecasting and analysing device	Sib IME	1	Computes maximum remaining service life of structural components.		5,000
13.	Forecasting analysing device	GOSNITI	1	Computes optimal and maximum remaining service life of structural components.		
						Total: 96,000

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