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DEPARTMENT OF STATE  
AGENCY FOR INTERNATIONAL DEVELOPMENT  
Washington, D.C. 20523

CAPITAL ASSISTANCE PAPER

Proposal and Recommendations  
For the Review of the  
Development Loan Committee

4890689

KOREA - KOREA ADVANCED INSTITUTE OF SCIENCE

489-H-081

A.I.D.  
Reference Center  
Room 1688 MS

AID-DLC/P-984

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AGENCY FOR INTERNATIONAL DEVELOPMENT  
Washington, D.C. 20523

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AID-DLC/P- 984

June 17, 1971

MEMORANDUM FOR THE DEVELOPMENT LOAN COMMITTEE

SUBJECT: Dollar Development Loan  
Korea Advanced Institute of Science Loan

Attached for your review are the recommendations for authorization of a loan in an amount not to exceed \$6,000,000 to the Government of Korea to finance the foreign exchange costs of scientific equipment and technical assistance needed in connection with the establishment of the Korea Advanced Institute of Science (KAIS), a graduate level of college of applied science and engineering.

This loan proposal is scheduled for consideration by the Development Loan Staff Committee at a meeting on Wednesday, June 23, 1971.

Rachel R. Agee  
Secretary  
Development Loan Committee

Attachments:

Summary and Recommendations  
Project Analysis  
ANNEXES I - V

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Summary and Recommendation

1. Borrower: The Government of the Republic of Korea (ROKG).  
Beneficiary: The Korea Advanced Institute of Science (KAIS).
2. Amount: Not to exceed \$6 million
3. Terms: Principal to be repaid over a period of 40 years, including a 10-year grace period; interest to be repaid semi-annually, beginning six months after the first disbursement under the loan at the rate of 2% per annum during the grace period, and 3% per annum thereafter.
4. Description of Activity to be Financed: Proceeds of the loan will be used to finance the foreign exchange costs of laboratory equipment and related materials and supplies, library books and materials, related services (e.g. ocean transportation and insurance), and technical assistance in the field of education.
5. Purpose: The purpose of this loan is to assist the ROKG in the establishment and development of a new graduate-level college of applied science and engineering.
6. Estimated Cost of Activity: \$14.8 million.
7. Other Sources of Financing: Financing, on comparable terms, for this project is not known to be available from other free-world sources. The Export-Import Bank of the U.S. and the I.B.R.D. have indicated that they are not interested in financing this Project.
8. Mission Views: The Mission (a) feels that the establishment of this institution will greatly enhance Korea's ability to make

the necessary inputs of human resources into the continuing development effort, and accordingly (b) strongly recommends authorization of this loan.

9. Issues: There are no issues presented by this loan proposal.
10. Statutory Criteria: All statutory criteria have been met (see Annex IV).
11. Recommendation: Authorization of a loan in the amount of \$6 million to the ROKG, in accordance with the terms and conditions stated in the Draft Loan Authorization (see Annex V).

Project Committee:

Loan Officer and Chairman:  
Assistant Loan Officer:  
Educational Advisors:

Country Desk Officers:

Engineers:

Legal Counsel:  
Contracting Advisor:  
Technical Advisor:

Richard B. Perry, EA/CDF  
Elmer S. Lee, EA/CDF  
William M. Williams, EA/TECH  
Bascom H. Story, USAID/Korea  
Chester S. Bell, Jr., EA/NEAP  
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Drafted by:

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## I. Background and Introduction

### A. Korean Economic Development and Manpower Needs

Korea is rapidly becoming a modern industrialized nation. Its population is now about 32 million. Its gross national product (GNP) has expanded from \$3.0 billion in 1960 to \$6.6 billion 1969 (1968 prices) with per capita income growing from \$121 to \$212. During the same period, exports rose from \$20 million to \$658 million. During the years 1969 and 1970, the Korean economy continued to grow vigorously, as indicated by GNP growth rates of 15% and 9.7%, industrial production growing 21.3% and 16.7%, and commodity exports increasing 34.5% and 34.9%, respectively. Much credit for this progress toward a self-sustaining economy is due to the successive five-year national economic plans started in 1962 by the present Korean Government, which has provided a stable environment for development during the last decade.

The Korean Government is now reviewing a Third Five-Year Economic Plan (TFYP) in which earlier gains will be consolidated and expanded in the 1972-1976 period.

A major feature of the TFYP is that industrialization is to continue at a rapid pace led by the continuation of a strong export drive. In support of this objective, the Plan calls for manpower development programs - strengthening of vocational education and technical training - so as to increase the number of persons engaged in scientific and technological fields from 414,900 in 1969 to 930,300 in 1976. Physical facilities of vocational schools and engineering colleges will be increased substantially. This requirement for technical manpower was also identified in the study of the Korean Ministry of Science and Technology (MOST) done in 1968. The MOST study, "Long-term Manpower Forecast and Development Policy 1967-1968," projected the need for scientific and technical manpower in Korea to be 934,100 in 1976 (7.7% of total employment) and 2,427,400 in 1986 (15.0% of all employment).

With this rapid pace of development, particularly with the emphasis on industrialization having a high degree of technology, has come the realization that Korea's system of higher education is not producing the type of graduates in the fields of applied science and engineering required by such an economy. An immediate result of this deficiency is the need to import a substantial amount of technology in the form of consultants, operational technicians, processes, systems, etc. In the long run this problem will have even more serious implications as Korea will increasingly be called upon to plan, manage and sustain its continued development in competition with other countries.

Another consequence of Korea's deficiency in this area is the typical "brain drain", as many Koreans - particularly in the fields of science and education - go abroad to supplement their education, and then decide to remain abroad.

## B. The Origin of the Korea Advanced Institute of Science (KAIS)

As an approach to the problem, the idea was put forward that a new institution should be established which would overcome the weaknesses of the present system. Dr. KunMo Chung, a Korean national and an associate professor of electrophysics at the Polytechnic Institute of Brooklyn, wrote to A.I.D. in July 1969 with a proposal for a Korean graduate school of applied science and technology. Dr. Chung believed there was a need for such a school to meet the requirements of Korean industry for graduate-trained scientists and engineers. When the proposal was transmitted through A.I.D. to the ROKG in early 1970, there was an immediate enthusiastic response by the Korean Government. In March 1970, Dr. Chung was invited to Korea by the ROKG to discuss the proposal and assist in the Government's planning for a new institute to be called the Korea Advanced Institute of Science (KAIS). The Government moved rapidly to establish planning committees and to draft enabling legislation. A.I.D. assistance was requested for KAIS in April 1970 and it was agreed that A.I.D. would send a team of science education experts to Korea to assist in evaluating the need for the school and draw up a phased plan for its development.

The AID-financed team was headed by Dr. Frederick E. Terman, retired Dean of Engineering at Stanford University. The other four team members were:

Dr. Franklin A. Long, Professor of  
Chemistry, Cornell University

Dr. Donald L. Benedict, formerly  
President, Oregon Graduate Center

Dr. Thomas L. Martin, Dean, Institute of  
Technology, Southern Methodist University

Dr. KunMo Chung, Associate Professor,  
Polytechnic Institute of Brooklyn

The team went to Korea in the summer of 1970 and its report (herein called the "Terman Report") was issued in December 1970. The Terman Report strongly recommended the establishment of the institution and provided broad guidelines to be followed if the institution were to accomplish its goals. The report was well-received by the ROKG, who viewed it as an accurate assessment of the situation. The recommendations and guidelines of the report have been adopted, with certain minor modification, as the official plan for establishing the institution.

The ROKG moved quickly to bring KAIS into being. Appropriate legislation was enacted which, among other provisions, (1) gave KAIS special status by exempting it from the existing rigid educational laws and public employees acts, (2) empowered KAIS to recruit and support faculty.

on terms that will make it possible to bring back to Korea well qualified scientists now abroad, and (3) provided special treatment for KAIS students with respect to military service.

Also, the ROKG immediately began discussions with A.I.D., leading to the loan proposal contained herein.

## II. Technology and the Korean Economy

### A. Recent Institutional Developments

Many developing nations look toward education and toward science and technology to provide the motive power for their economic development; Korea is no exception. Under the First Five Year Plan, Korea worked for a 100% literate population. Under the Second Five Year Plan, a concentrated effort toward technical training is being carried out to balance the traditional emphasis on cultural training. In the Third Five Year Plan, which will start in 1972, technical competence at advanced levels is being given top priority. In this connection, the Korean Government has in recent years been building the necessary foundation for this next step by systematically developing new support institutions in the area of science and technology.

The Korea Scientific and Technological Information Center (KORSTIC) was the first of these new institutions. It was established in 1962 as a government-funded, independent organization to collect domestic and foreign scientific information for the benefit of any user in Korea.

The Korea Institute of Science and Technology (KIST) was established in 1966 with aid from the U.S. Government. KIST is an independent, non-profit research organization which carries out research and development work for Korean industry and the Korean Government. By providing excellent facilities and attractive working conditions, including a realistic salary scale and conveniently located modern apartments for its staff, KIST has been able to recruit highly trained individuals, including over 50 holders of PhD degrees. Included among these are a number of Korean scientists and engineers who had been working abroad; subsequently, numerous other expatriate Koreans have indicated an interest in positions at KIST. Already within its brief operating life, KIST has demonstrated its value by completing useful feasibility studies of industrial undertakings and successfully carrying out a number of significant research and development projects. KIST spearheads the modernization of the Korean scientific and technical environment, and the growing success of this institution symbolizes the industrialization of Korea.

The Ministry of Science and Technology (MOST) was established in 1967 to coordinate the overall governmental effort in science and technology. As soon as it was established, MOST drew up a comprehensive master plan for the development of science and technology in Korea during the twenty-year period from 1967 to 1986. Recognizing the fact that Korea has acquired almost all of its technical know-how from abroad (during the 1950-61 period, \$100 million was spent on such non-hardware items as licenses, fees and training), and that domestic technology is vital for continued development of advanced industries, the plan calls for an intensive effort on the part of Korea to strengthen the technological base of its industries. In this connection, MOST has made a projection of long-term manpower requirements for the period 1967-86, and is establishing appropriate development plans to meet the indicated manpower needs.

B. Technological Education in Korea. Korea has an extensive system of higher education, and offers undergraduate instruction in the usual fields of science and engineering at a total of 30 institutions. In 1968-69, 4,863 BS degrees were awarded in science and engineering. About two-thirds of these were in engineering, corresponding to an annual output of approximately 100 BS engineers per million people; this is to be compared with approximately 200 BS engineers per million people produced in the United States, and appears adequate in numbers to meet Korea's needs.

While the quality of BS students varies greatly between the best and poorest Korean schools, it is clear from the performance of Korean students enrolled in the graduate divisions of U.S. institutions that the better science and engineering graduates of the better Korean colleges have had an adequate undergraduate training.

At the same time, there are obvious weaknesses in the Korean undergraduate programs in science and engineering, even at the best Korean universities. Laboratory facilities are very inadequate by western standards, and the amount of laboratory instruction is relatively small. Students are typically taught to memorize what is in their textbooks, with the result that the training is heavily theoretical, with minimum attention given to the application of this knowledge to real problems. Engineering professors typically have had no industrial experience, and have little knowledge of the living world of engineering that exists in industry outside the campus. In addition, many Korean faculty members lack adequate training in modern science and engineering and have seldom had an opportunity to update their knowledge. These factors, combined with the slow turnover in faculty which has been characteristic of the past two decades, has caused undergraduate education in science and engineering to lag behind the needs of the dynamic and rapidly developing Korean industrial economy.

At the graduate level, education in science and engineering in the U.S. sense is almost entirely lacking in Korea. To begin with, there is relatively little graduate instruction being carried on, and what exists is highly fragmented. At one of the best schools, Seoul National University, the quota for engineering students entering the MS program is 40 per year, and these students are distributed among 11 major fields of engineering. In 1968-69 there were 600 graduate students in science and engineering working for the MS degree in Korea; 302 of these were in engineering. These 600 students were distributed among 152 departments in 22 schools. With such small numbers of students per curriculum at a given school, it is impossible to provide properly organized programs of graduate study. Moreover, the equipment necessary for advanced instruction is lacking, and many professors have only limited experience and qualifications for graduate level instruction and research. Financial support for graduate students is totally inadequate. Again, the graduate work being carried on is strongly oriented toward training scholars for entering academic life, or toward providing students with the credentials that will enable them to go abroad for further study.

As a result of these factors, the Korean graduate schools in science and engineering have had little, if any, impact on the Korean economy. In fact, industrial spokesmen doubt that MS graduates from existing Korean schools are significantly better prepared for industrial work than are BS graduates. This situation is reflected in starting salaries for engineers in industry, which are reported to be typically the same for holders of MS degrees from Korean schools as for BS graduates.

### C. Foreign Training and the Brain Drain

Because of the lack of well functioning graduate programs in Korea and also because financial support for graduate students is more available to Korean students in the U.S. than in Korea, a large number of college graduates in science and engineering (451 in 1968) leave Korea every year for the U.S. and other developed nations to obtain graduate training. Only a small fraction of these return to Korea, with the result that in 1968 there were over 2,000 Korean scientists and engineers living abroad.

Even if a substantial fraction of the Korean students who now go abroad for advanced studies could be induced to return to Korea, foreign training has limitations as far as advancing Korean industry is concerned. Foreign training tends to be oriented toward the conditions in the developed nations, instead of the situation existing in Korea; foreign training does not reflect the nature and special problems of Korean industry, and cannot provide the close collaboration with local industry that is required for rapid and effective response to Korea's industrial needs.

Foreign training is also relatively expensive and consumes scarce foreign exchange. Short-term intensive foreign training such as is often sponsored by private industries and the government is even more expensive, and has the further disadvantage that it is typically rather specialized in character and so does not provide the base needed to give independent, indigenous strength to Korean industry.

While foreign training has provided the minimum level of skilled manpower required in the initial development of Korean industry, and will continue to be essential in many specialized areas, a self-sustaining Korean economy needs a local supply of high quality scientific and engineering manpower for its maturing industry.

### III. Project Description

#### A. General

The Project consists of the establishment of the Korea Advanced Institute of Science (KAIS), a graduate-level college of engineering and applied science. The purpose of establishing this institution is to meet a critical need of Korea's rapidly-developing economy for engineers and scientists who have received graduate education not only of a quality comparable to that available in fully developed countries, but also of an orientation and direction required to deal with the particular technological problems presented by the country's patterns of development. In order to meet this need within a reasonable period of time, it is felt necessary to go outside the existing system of higher education and establish the institution completely anew; it will not be a part of or related to any other college or university in Korea. Accordingly, the Project encompasses the physical construction and equipping of the institution, as well as the planning and implementation of its organizational structure, the development of its policies and procedures (both administrative and academic), the development of its total approach to the educational task which it faces, and the recruitment of faculty and staff.

#### B. Organization and Administration

The legislative act which created KAIS and established its legal identity was passed by the Korean National Assembly on July 16, 1970, and was promulgated into law on August 7, 1970. The law provides for a Board of Trustees, a president and other administrative and academic officers, a faculty and staff. The organizational chart of KAIS appears as Figure 1

Board of Trustees. The law specifies that the fundamental responsibility for the institution shall be in the hands of the Board. There shall be up to 15 trustees, of whom the President of KAIS, the President of KIST, the Vice Ministers of the Economic Planning Board, the Ministry of Education, and the Ministry of Science and Technology, and one or two foreign representatives are to be ex-officio members; the remaining members represent academic and industrial circles in Korea, and are to be chosen by the Board itself, except for the initial members, who were appointed by the President of Korea. The Board is to be a working body, responsible for determining the major policies of KAIS, including financing policies.

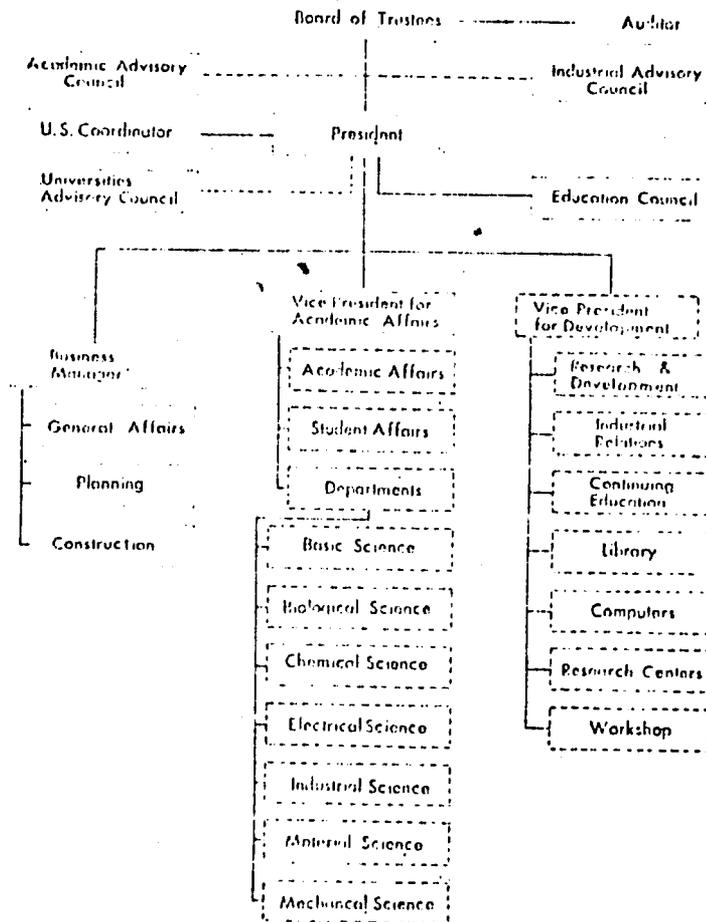
Advisory Councils. It is contemplated that the KAIS Board of Trustees will appoint two Councils of Advisors to assist it and the President of KAIS. One council is to be chosen from academic circles, both in Korea and abroad. It will furnish expert knowledge on academic matters and advise the Board in decisions concerning academic procedures. The other council will be composed of industrial leaders who would assist the Board in financial matters, and in defining the needs of industry for scientists and engineers.

President. The president is designated by the law as the chief executive officer of KAIS. The first president was appointed by the President of Korea. In the future, however, the Board of Trustees will appoint the

Figure 1

Korea Advanced Institute of Science

ORGANIZATION



president, and the president will answer to and serve the Board at its pleasure. The presidency will be a most demanding position rather than an honorary title; the president is responsible for administering the Institute's academic and financial matters, and also its relations with outside groups, particularly industry. In A.I.D.'s judgment, KAIS is fortunate to have as its first president Dr. Lee Sang-Soo, a Korean scientist of outstanding abilities, who was most recently Chairman of the Atomic Energy Commission of Korea.

Faculty. KAIS's faculty is to be headed by a Vice President for Academic Affairs, and will be composed of regular full-time professors, associate professors, assistant professors, and instructors. There will also be provision for visiting faculty, part-time adjunct faculty, and part-time lecturers. The faculty will be grouped into departments according to the various disciplines, each department headed by a chairman. The Vice President for Academic Affairs is Dr. Chung Kun-Mo, a Korean national who is an Associate Professor of Electrophysics at the Polytechnic Institute of Brooklyn. Dr. Chung was instrumental in the establishment of KAIS, is dedicated to its success, and brings to the institution a particularly valuable background in science and engineering education.

Auditors. KAIS will have an auditing staff, responsible to the Board of Trustees. The Auditors may attend and participate in Board meetings, but will not have a vote.

Development Staff. As shown in KAIS's organization chart, there will be a Vice President for Development, who will have direct responsibility for the Library, Workshop, Computer and Research "Centers" and for such activities as Research and Development, Industrial Relations, and Continuing Education. Considering KAIS's basic objective of training scientists and engineers for Korean industry, Industrial Relations is one of the most important responsibilities of the Vice President for Development. He must plan and direct the formation of a close working relationship between industry and KAIS, which will result in a thorough, continuously-updated understanding by KAIS of industry's problems and needs, and a complete awareness by industry of KAIS's capacity to deal with the situation. Recruitment for this position is underway.

Business Staff. The business management aspect of an organization is no less important to an academic institution than to a commercial enterprise. The Business Manager and his staff should be capable of efficiently managing the day-to-day operations of the institute with a minimum involvement of, or inconvenience to the academic aspect of KAIS. This will be a task of some difficulty during the first three years of KAIS's existence when major construction and academic expansion are proceeding apace.

### C. Educational Plan

#### 1. Degree Programs

The educational plan for KAIS contemplates a two-year Master's (MS) program with an enrollment of 200 students, together with more advanced

programs (Engineer and Doctoral) enrolling approximately 200 additional students.

The MS program is designed to provide a superior educational experience emphasizing those fields of engineering and applied science that are of particular importance to Korean industry. The purpose is to bridge the gap existing between the background of BS students trained by Korean universities in engineering and science, and the knowledge required to deal effectively with the problems in engineering and applied science with which Korean industry will be concerned in the years ahead.

This knowledge gap exists to some degree in every industrial nation. In the USA the MS degree is increasingly regarded as a prerequisite for truly professional work in engineering, and approximately one-third of those graduating with a BS in engineering in the USA carry their studies to the MS level. In Korea, the gap is particularly serious in view of the theoretical character of Korean undergraduate training in science and engineering, and the lack of attention given in present university curricula to industrial applications of technical and scientific principles.

Korean industry can advantageously use a gradually increasing number of individuals who have training in depth in those areas of technology and applied science that are important in industry, and who have the background required to assimilate advanced techniques and theories and to apply them in useful ways in Korean industry. These individuals must be able to adapt the world's science and technology to Korean processes, methods and materials, to create distinctive designs and products for Korean markets, both domestic and foreign, and to make Korean products fully competitive in international trade in both quality and cost.

The MS program represents the principal means by which KAIS will carry out the above objectives.

The proposed Engineer degree requires one year or possibly two of course work beyond the MS degree. It is designed for those students who hold a Master's degree and desire still more training, but do not want to work for the ScD degree with its emphasis on research and specialization in depth. The Engineer degree aims to provide an exceptionally high level of general competence in advanced technology, and will give the student a broader education than a doctoral degree.

The Doctor of Science (ScD) degree at KAIS will require a minimum of three years of study beyond the MS degree, and will include the submission of an acceptable dissertation based on original research and the passing of appropriate examinations. The primary objective of this program will be to satisfy the needs of Korean industry and Korean research establishments for highly trained and innovative specialists, rather than to add to the world's store of basic knowledge. The ScD program would accordingly reflect this objective both in its character and its size. Since the present needs for such specialists is limited, it is KAIS's intention that the ScD program start slowly and be allowed to build up only as the demand

for such specialists grows. At the same time, it is planned that a small number of ScD candidates be enrolled in KAIS from the outset. This will give KAIS experience with its ScD program, and will also test the magnitude of Korea's need for very highly trained specialists in engineering and applied science.

At the end of the initial build-up period, KAIS will have a regular resident faculty numbering about 50 individuals distributed appropriately between senior and junior faculty grades. To provide a faculty of "critical mass" in each major subject, and also to insure a reasonable enrollment in each course, it is anticipated that the institution will not offer MS degree programs in more than six of the highest priority fields of engineering and applied science.

## 2. Initial Fields of Instruction

Giving primary consideration to the recommendations of the Terman Report, which were based on extensive interviews with government officials, university people, business leaders and foreign representatives stationed in Korea, and a study of the Korean economic and industrial situation, KAIS will concentrate its teaching efforts in seven high priority fields, as follows:

### (1.) Industrial Science

To deal with problems of efficient design and control of production processes and of organizations, also development economics (including econometrics), economic planning, and quality control.

### (2.) Material Science

To include materials (metals and alloys), materials processing, basic thermodynamics (including heat transfer).

### (3.) Mechanical Science

This will include machine design, dynamics and vibration, and fabrication.

### (4.) Electrical Science

To include active/passive devices, properties of electronic materials, circuit networks and their applications, control systems.

### (5.) Chemical Science

To include chemical processes and synthesis, ceramics, catalyzed reactions, polymer technology, and basic fluid mechanics.

### (6.) Biological Science

To cover the aspects of biological sciences related to various industrial problems.

(7.) Basic Sciences and Applied Mathematics (Physics and Applied Mathematics)

A small, high quality interdisciplinary group that will accept a teaching role that is primarily of service to the engineering programs, but which will develop some research programs, and participate in the supervision of theses and dissertations in the degree-granting areas. Fields of study will include Computer Science, Statistics, Mathematical Physics and Experimental Physics.

In the first year KAIS plans to accept students in only the Industrial Science Department, and also to offer some course work under the Basic Science Department. This will require a minimum of laboratory exposure, and instruction can be given before the laboratories and related facilities have been constructed and equipped to accommodate the other disciplines.

3. Curricula Considerations. Careful attention is being given to planning the curricula to insure that the objectives of KAIS are carried out. This is particularly important in the MS program.

All MS students, irrespective of specialty, will normally be expected to enroll in certain "core" courses. Topics such as the following will be included:

Statistics (including probability)

Principles of Quality Control

Computer Programming (introductory course)

Materials (survey course)

Engineering Economics (i.e. factors entering into the cost of industrial operations)

Industrial Organization and Management (survey course)

Ordinary and Partial Differential Equations

Economic Development in Korea

Introduction to Instruments

Combination lecture and laboratory course that surveys the field of instrumentation, and will give every KAIS student "hands-on" experience with a wide variety of modern measuring instruments.

It is contemplated that between one-fifth and one-third of the two-year program of study for the MS degree be devoted to subjects in the common core.

In addition to the common core, each individual MS curriculum will have a recommended program, consisting of certain courses that would normally be

required of all students majoring in that particular specialty, plus additional courses that are optional, and some completely free electives.

#### 4. Instruction Policies

In training students, KAIS intends to encourage problem-solving and ability to apply knowledge. Comprehension and reasoning are to be emphasized rather than memorization of knowledge. Independent study will play a significant role. First-hand laboratory experience will be extensive. Research projects will typically include practical considerations or applications. Many examinations are to be open-book type to test the ability to make use of the knowledge in books and the ability to solve problems. And, very importantly, students will learn to make regular use of libraries and computers, and go on field visits to industrial plants. KAIS also intends to give attention to reducing the traditional passivity of the Korean student, and strengthen his ability in verbal and written communication. Seminars so conducted as to require student participation are especially helpful in this connection.

The graduates of KAIS can be expected to have a significant leadership role in Korean industry. Therefore, KAIS will provide training designed to enhance leadership qualities. Continuous exposure to the overall Korean economic situation, and training in making decisions will be included. Through formal and informal contacts with faculty members, industrialists and senior students, KAIS students should acquire a sense of responsibility to Korea.

#### 5. Research

Research will be an important part of KAIS's educational program. Through involvement in research, students will learn how to recognize a problem, how to obtain the answer to the problem when the answer is not in the textbook, how to evaluate the answer, and finally how to report the results to others. KAIS intends to provide excellent facilities, good supporting services, and adequate funds for research activities. Besides the important role of research in the training of graduate students, it must be remembered that the continued intellectual liveliness of the faculty will depend in large measure on its continued involvement in professional studies and research work. Most faculty members would therefore be expected to participate in research projects personally.

It should be clarified, however, that research at KAIS will be academic research, in which the end objective is typically defined only in general terms, and in which rigid time schedules are not necessarily adhered to. In contrast, research at KIST is carried on for clients that have specific problems, the solution of which requires highly concentrated effort directed to the clients' particular objective.

#### D. Current Status of the Project

KAIS has selected a Master Plan' (see Section IV. D. 1.) to be followed in the establishment and initial development phase of the institution. The site has been established and surveyed. Preparation of detailed design work and engineering plans and specifications is under way.

The ROKG is providing considerable support for the Project and appropriated W 550 million (\$1.7 million) for use by KAIS in 1971 for administrative expenses, architectural and engineering fees, and to begin construction. The ROKG has also made known its intentions (1) to provide an endowment fund, which KAIS will invest and finance its operating expenses from the earnings, and (2) to finance all construction costs. It has been estimated that annual operating expenses will be approximately \$1.5 million to \$2.0 million equivalent per year when the institution is fully operational. A condition precedent to disbursement of the loan will be the submission of a plan, satisfactory to AID, for (1) the establishment of the endowment fund according to a schedule which will produce income in sufficient amounts to meet KAIS's needs for operating funds, and (2) the provision of all necessary funds for construction purposes. The loan agreement will also contain a general covenant that the ROKG will continue to provide support to KAIS as may be necessary for its operations.

KAIS has an immediate need for assistance and professional advice in various aspects of planning, faculty recruitment, etc. To provide this necessary technical assistance on an interim basis prior to the time which more permanent, long-term arrangements can be made for such services, AID is grant-financing a contract with the Polytechnic Institute of Brooklyn (PIB).

Under this contract, PIB will perform the following:

- (1) assist KAIS in the preparation of a detailed, long-range (five-year) plan, including cost estimates, for technical assistance requirement of KAIS in such areas as instructional methodology, faculty and staff recruitment and training, faculty organization, and research;
- (2) assist in making a survey of prospective candidates for KAIS's faculty in the U.S. and Western Europe, making initial contacts to explain KAIS's concepts and objectives, and make recommendations regarding selection;
- (3) provide advice concerning laboratory equipment for the establishment of various departments of KAIS and the development of the instructional program;
- (4) consult with members of the Terman Survey Team and other representatives of the U.S. scientific, engineering and educational communities regarding proper academic policies and organizational arrangements for KAIS.

#### IV. Project Justification and Analysis

A. KAIS as an Independent Institution. Against the above backdrop, KAIS is being planned as a separate institution, not formally affiliated with any other university or academic institution. There are compelling reasons for this action. It permits a new start on graduate education in science and technology in the current Korean atmosphere of fragmentation of fields of study and small numbers of graduate students per program. Independence also permits the development of a new and appropriate organizational structure for graduate training in science and technology, free of the limitations, restrictions and practices which presently hamper existing Korean universities. It likewise enables a new start to be made in the criteria governing the selection of faculty and in the procedures for the selection of students. Finally, relations with industry should be very much easier to develop in the context of a single institution oriented towards science and technology. The recognition of these advantages is not unique to Korea; thus, in the U.S. context, they have in the past led to the founding of the Massachusetts Institute of Technology, the California Institute of Technology, and similar institutions.

A separate institution does at the same time have disadvantages. These show up in possible difficulties of arranging interdisciplinary graduate programs which might involve sociologists, psychologists, or medical scholars working in cooperation with engineers or applied scientists. Other disadvantages are the non-availability of non-technical subjects, and the absence of stimulation from classmates with different interests and philosophies. There is also the ever-present danger that KAIS will lose its commitment to high scholarship and become a trade school instead of a great institute of technology. However, the President and Academic Vice President of KAIS are aware of the disadvantages of being independent, and intend to make a special effort to maintain close and continuing associations with universities and other institutions that have a broad spectrum of interests in higher education.

In the special situation that exists in Korea, the Terman Survey Team feels that an independent KAIS is not only justified, but actually represents the only way that a graduate institution for applied science and technology oriented towards the needs of the Korean economy can be developed with the required rapidity. An attempt to accomplish an equivalent result either through the consortium of universities, or by reconstituting the science and engineering activities of a single existing institution, would encounter numerous difficulties, not the least of which would be the time and the pain required to effect the drastic changes required in staff qualifications and in educational practices. The present universities operate under laws and traditions designed to serve objectives quite different from those of KAIS. The present tenured faculties in science and engineering at Korean universities were selected and developed to serve purposes entirely unlike those

of KAIS, and so, with a very limited number of notable exceptions, are incompatible with a KAIS type of operation. For such reasons, the situation calls for a fresh start that involves a new pattern of graduate education, a pattern specifically oriented to serve the needs of Korea's developing industry without delay and without compromises.

B. Availability of Qualified Undergraduates, and Demand for KAIS's Graduates. The question of whether Korean colleges and universities graduate adequate numbers of qualified students to support an institution such as KAIS was considered by the Terman Survey Team. In 1969, Korean institutions awarded over 4,800 BS degrees in science and engineering, approximately two-thirds of which were in engineering. At the same time, there were approximately 600 students enrolled in MS programs in science and engineering. In other words, roughly one-eighth of BS graduates in these fields went on to graduate study. Given the increasing college population in Korea, the emphasis placed on technological education, and the great value placed on higher education in general by Koreans, it seems clear that there are and will continue to be hundreds of BS graduates each year who would be highly satisfactory students for KAIS. Also, it is anticipated that once KAIS is established and has demonstrated its ability in terms of excellent training, Korean industrial firms will in many cases desire to sponsor promising young employees as students at KAIS.

The selection of students for any school is an important matter. The traditional Korean method is based solely on entrance examinations; previous scholastic records, recommendations, or special aptitudes are ignored. KAIS does not intend to follow such selection procedures. The basic requirements of a BS degree and qualifying examinations - designed to reveal proficiency in English and basic knowledge of mathematics and the major field - would be supplemented with a thorough review of past achievements, character, etc., and interviews to determine personal plans, ambitions, etc.

For those students admitted, support will be generous. Expenses of tuition, fees, room and board, books and supplies will be borne by KAIS. Students being sponsored by industry, however, will likely be asked to contribute to the expense of their education. Further, KAIS students will receive special consideration with regard to the customary compulsory military service, although the details of such consideration remain to be decided.

With regard to the demand for KAIS graduates, it is to be remembered that the first "class" admitted will be in the fall of 1972 and will consist of 25-30 students. The number of students admitted will increase gradually up to approximately 250-275 per year by 1977. The MS program, which will graduate by far the largest percentage of those at KAIS, requires two years. Therefore, given the rate of growth of the economy, particularly the industrial sector, it is reasonable to conclude that the Korean job market can readily absorb KAIS' graduates - assuming continued growth of the economy and the success of KAIS in providing the quality of training which it intends to provide.

## C. Financial Analysis

### 1. Total Cost of the Project

The estimated capital costs\* of the Project, which total \$14.8 million in foreign exchange and local currency equivalent, are shown in Table 1. For purposes of this Project, capital costs are defined to include the following categories:

- (a) Building construction, related site work, utilities installation and A&E fees;
- (b) Laboratory equipment and spare parts, consumable materials for experimentation, and other teaching materials;
- (c) Library books, equipment and related materials;
- (d) Technical Assistance.

The local currency costs of W 2.827 billion (\$8.83 million) will be financed by the ROKG. The foreign exchange requirements of \$6 million will be met by the proposed A.I.D. loan.

Not included as capital costs are the value of the land for KAIS - which is being furnished by the ROKG and requires no outlay of funds - and the annual operating and administrative expenses.

### 2. ROKG Contribution

In addition to the land, the ROKG will finance all construction costs, and all costs of operations and administration (except for certain U.S. dollar costs of salaries and related expenses for U.S. visiting professors and other experts who will be provided as part of the technical assistance component). Construction costs will be funded by direct ROKG annual appropriations.

Operating and administrative expenses for the current year (1971) were also funded by a direct appropriation. In future years, these costs will be met with income from an endowment fund. The ROKG has recently advised that the endowment will be established with a ₩500 million budget appropriation in 1972. Equal amounts will be appropriated annually to increase the fund to ₩2 billion in 1975, which will generate annual earnings slightly in excess of ₩500 million (\$1.5 million equivalent). If KAIS's requirements exceed the income produced, the ROKG will increase the amount of the endowment fund.

### 3. The Proposed A.I.D. Loan

a. Use of Loan Proceeds. The \$6 million proceeds of the A.I.D. loan will be used to finance the foreign exchange costs of (1) laboratory equipment and other teaching materials (including spare parts and consumables), and library books and materials, (2) technical assistance,

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\*An analysis of these costs is given in Section D., following.

consisting of a broad range of professional services and expertise needed by KAIS during its establishment and development. Table 2 is a condensed schedule of the estimated amounts to be used for each of the above purposes. It is anticipated that most, if not all, of the equipment and materials, as well as the technical assistance, will come from the U.S., and that there will be no advance effect on the U.S. Balance-of-Payments.

b. Loan Terms. The loan will be extended to the ROKG on terms of 40-year repayment, including a 10-year grace period on repayment of principal; interest at 2% per annum during the grace period and 3% per annum thereafter (see Section IV.E. below).

It is not anticipated that KAIS, the beneficiary of the loan, will have any debt-servicing capacity. It will not be a self-supporting institution; it will be dependent upon outside sources for its financial needs. Accordingly, unless A.I.D. otherwise agrees in writing, the ROKG will make the proceeds of the loan available to KAIS on a grant basis.

#### D. Technical Analysis

##### 1. The Master Plan for Construction

KAIS is to be located approximately 10 kilometers from downtown Seoul, on the grounds of an area known as the Seoul Science Park, which is the site of KIST, KORSTIC, the Korean Forestry Experimentation Station (KFES) and a national memorial. This same area will also be the site of the Korean Development Institute (KDI), an institute being established to perform economic research and planning, and of the Research Agency for Defense Sciences (RADS). Given the scarcity and high cost of land in the Seoul area, the location is considered exceptionally favorable. The pleasant surroundings, the proximity of the other institutions, and the allocation of space are all well-suited to KAIS's needs. Figure 2 is a layout of the Science Park.

The planning and engineering to date has been accomplished through the KAIS Master Plan Advisory Council, composed of KAIS's president and ten architects and engineers from Korean universities and research institutions. Three alternate master plans were prepared and reviewed by the Advisory Council; one plan was recommended and subsequently accepted by KAIS as its Construction Master Plan. It establishes the general layout and construction plan for the institution. The Plan is based on the development and growth projections of KAIS as given in the Terman Report. Prime consideration was given to the distribution of buildings and associated facilities, emphasizing function, flexibility for future expansion, architectural design patterns and skylines, in order to harmonize buildings with their environment. (The Plan calls for the construction of five inter-connected multi-winged buildings of reinforced concrete, with utilities, roads and landscaping. This group of buildings will house the main activities of KAIS, and consists of the following:

Table 1  
Korea Advanced Institute of Science

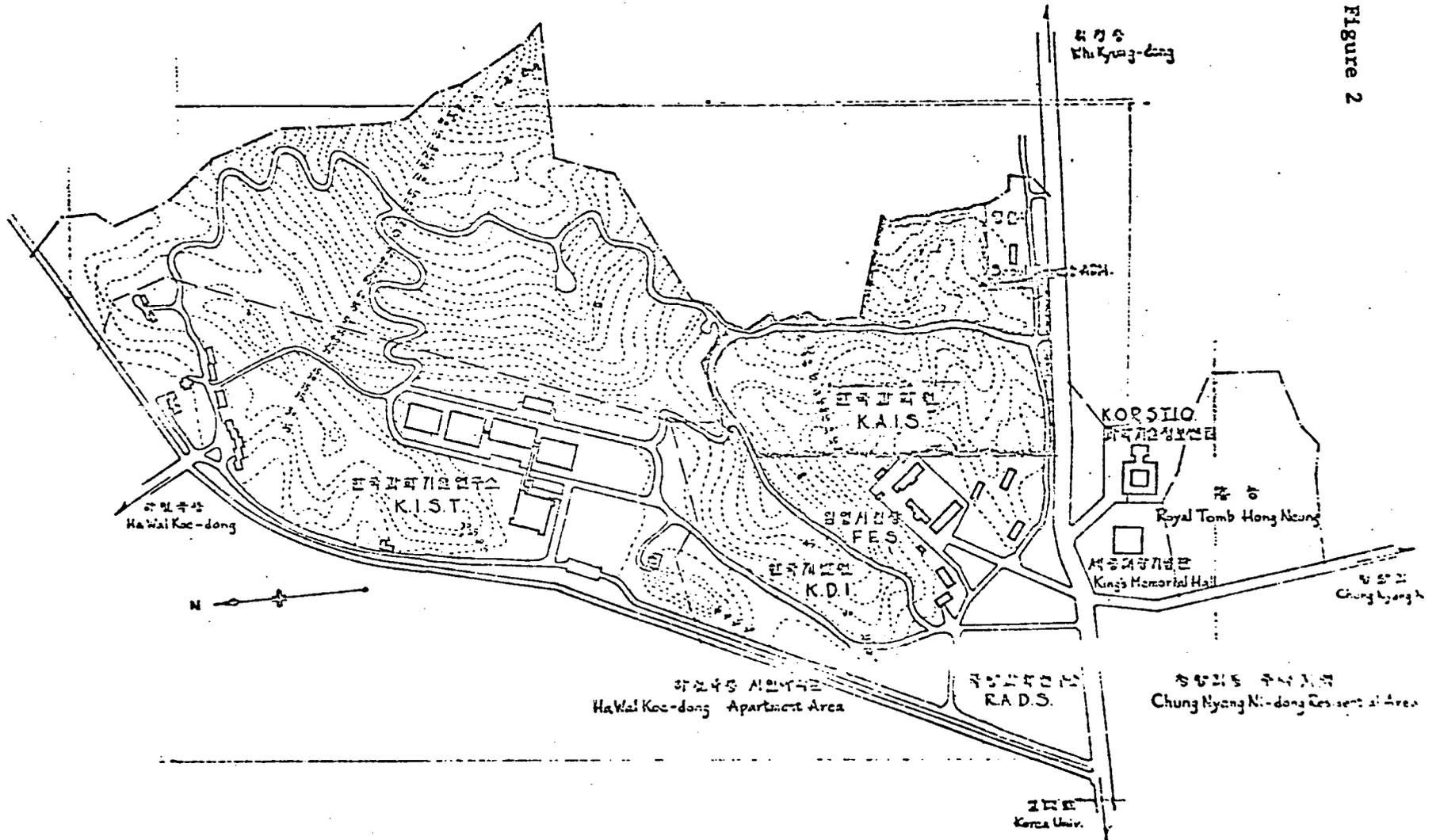
|  | (₩ billion)         | (\$ million) |
|--|---------------------|--------------|
| Building Construction, Site<br>Work, Utilities, A&E Fees<br>(\$US equivalent of ₩ Costs) | ₩2.827              |              |
| Laboratory Equipment, Spares<br>Consumable Materials                                     |                     | 3.6          |
| Library Books and Materials  |                     | .6           |
| Technical Assistance   |                     | 1.5          |
| Contingencies  | _____               | <u>.3</u>    |
| Total Local Currency   | <u>₩2.827</u>       |              |
| Total Foreign Exchange   |                     | <u>\$6.0</u> |
| Total Project Cost<br>(\$US equivalent)  | <u>\$14,830,000</u> |              |

Table 2

## Loan Financed Project Costs

|   |             |                    |
|---|-------------|--------------------|
| 1. Basic Science Department   |             |                    |
| Applied Physics   |             | \$ 219,400         |
| Applied Mathematics   |             | 155,000            |
| Electrical Science Department   |             | 386,500            |
| Chemical Science Department   |             | 365,700            |
| Mechanical Science Department (with Work Shop)                          |             | 447,600            |
| Material Science Dept. (with Cryogenics Plant)                          |             | 514,600            |
| Biological Science Department   |             | 137,200            |
| Industrial Science Department   |             | <u>74,000</u>      |
|   | Subtotal    | 2,300,000          |
| 2. Library  |             | 600,000            |
| 3. Technical Assistance   |             | <u>1,500,000</u>   |
|   | Subtotal    | 4,400,000          |
| 4. Contingency  |             | 300,000            |
| 5. Reserve for Faculty Equipment<br>50 Faculty Members at \$20,000 each |             | 1,000,000          |
| 6. Reserve for Spare Components<br>and Consumable Materials             |             | 300,000            |
|   | Grand Total | <u>\$6,000,000</u> |

Figure 2



# THE SITE OF K.A.I.S.

SCALE 1:5000

1. Administration Building, including the Auditorium
2. Student Union Building, including Library and Dining Hall
3. Departments of Industrial Science, Materials Science and Basic Science, and Computer Laboratory
4. Departments of Chemical Science and Biological Science
5. Departments of Mechanical Science, Electrical Science, and Machine Shop and Cryogenic Plant.

In addition there will be threestudent dormitories, three faculty apartment houses, three official residences, and garage, storage and residential service facilities, and recreational facilities. Figure 3 is a layout of KAIS's facilities.

The estimated cost of building construction is \$8.83 million equivalent. This cost, as well as that of local architectural and engineering fees, will be financed by the ROKG (see Table 1), and the land has been provided to KAIS by the ROKG. Nearly all of the required construction materials are available in Korea, and the construction will be performed by Korean contractors supervised by local architects and engineers under the general supervision of KAIS.

Although the proceeds of the proposed A.I.D. loan will not be used to finance costs of construction, the Master Plan has been reviewed by A.I.D.'s engineers in the Mission and in Washington. The Plan is considered to be comprehensive and technically sound, lending itself well to the anticipated future expansion of all facilities and housing. The building design is felt to be functional as well as aesthetically compatible with the environs and with contemporary Korean architecture. The space allocations for laboratories, housing, etc., are well within the normal space allowed for comparable facilities today. In order to avoid the need for passenger elevators, the buildings have been designed not to exceed four stories. Another functional and economic feature of the design is the interconnection between the buildings. Our Mission in Korea confirms that the unit costs for building construction and related site and utility work (₩69,000 per m<sup>2</sup>) are reasonable and comparable to costs for similar construction in Korea at the present time.

The engineering schedule for design and preparation of bid documents calls for three months of preliminary design (The Master Plan), to be followed by approximately six months of detailed design, and preparation and review of plans and specifications. The fifteen months planned for the construction of buildings, utilities and site work is also reasonable for this type of construction.

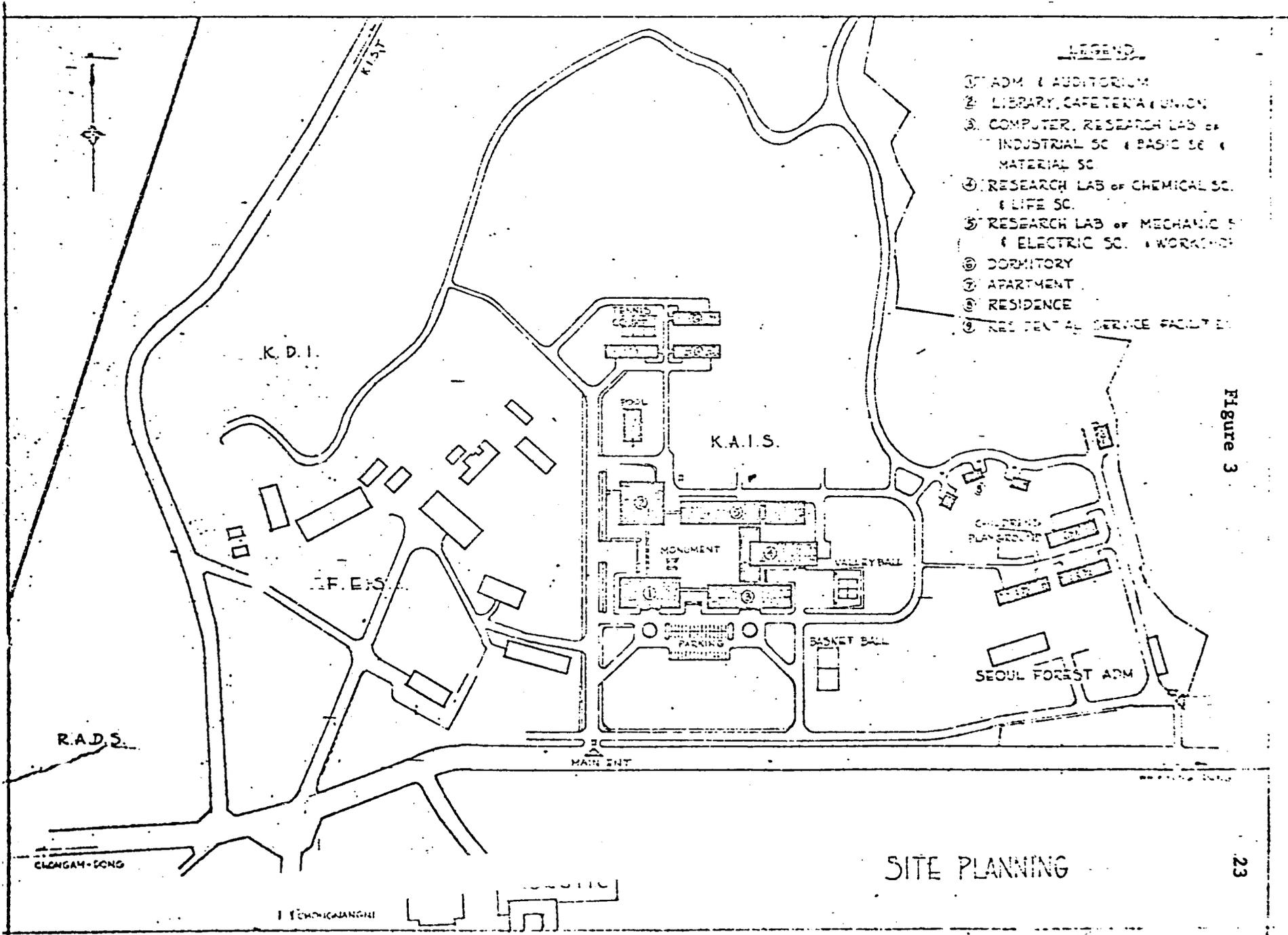


Figure 3

SITE PLANNING

A.I.D. engineers are of the opinion that the engineering planning performed by KAIS represents sufficient preliminary investigations and surveys to identify all significant technical problems, to establish the location of the institution and to establish the general design criteria and standards of construction. The preliminary designs are of sufficient detail to permit a reasonably firm estimate of costs to construct the buildings and perform general site work and utilities installation.

## 2. Equipment, Materials and Library

In developing the basic equipment requirements and related cost estimates for the departments of KAIS, representatives of KAIS and A.I.D. consulted with the engineering and science faculties of the University of Maryland, and with the Polytechnic Institute of Brooklyn. Both institutions submitted separate lists of equipment (and cost estimates) which were considered necessary to initially equip each of the departments. The original lists were carefully reviewed and refined by KAIS and A.I.D. in order to develop a compilation which would illustrate as closely as possible the basic equipment needed by KAIS. It is to be noted that this compilation, which appears as Annex I, is the basic equipment required for basic instruction and related research. This list is considered entirely adequate for purposes of establishing reasonable cost estimates. However, it is essential that KAIS have all reasonable flexibility in the final selection of specific equipment to be purchased, as some of the final selections should properly be made by KAIS department chairmen and professors who will identify specific equipment needs in conjunction with course and curricula considerations. An independent review of the equipment list was made by Professor Edmund T. Cranch, Associate Dean of Engineering, Cornell University, who concluded generally that the list was sound and reasonable for its purpose.

In addition to the above equipment, each faculty member will be allowed a certain amount for discretionary equipment and material purchases which can only be identified at a later date. Although the actual amounts required may well vary considerably among faculty members, it has been estimated that an average of \$20,000 each will be required. A faculty size of 50 is anticipated; accordingly, up to \$1 million of loan proceeds will be reserved for this purpose.

A quality technical reference library is vital for such a graduate learning and research institution as KAIS. The library is estimated to require a minimum of 30,000 volumes dealing with a wide range of technical subject matter. In addition, it will require approximately 350 journals and 700 bound journals, as well as microfilming and other reproduction and information storage facilities. The total foreign exchange requirement for all library materials is estimated at \$600,000.

### 3. Technical Assistance

The cost estimate of \$1.5 million for this component of the Project is based on anticipated man/year and related overhead rates required to provide the various categories of services discussed in Sections V. A. and B., plus provisions for contingencies, travel, etc. In actuality, the costs of specific services may vary from the estimates, but \$1.5 million is considered to be a reasonably firm estimate for the overall range of assistance to be provided over the contemplated five-year time period.

### 4. Conclusion - Section 611 of the Foreign Assistance Act

Based on the various reviews of the data presented herein concerning the components of this Project, it is considered that the requirements of Section 611(a) of the Foreign Assistance Act have been met with respect to adequate Project planning and preparation of related cost estimates. Also, the Director, USAID/Korea has certified, pursuant to Section 611 (e); as to the ROKG's capabilities to effectively utilize and maintain the Project (see Annex IV).

### E. Balance of Payments and Debt Service Considerations

In looking ahead toward Korea's economic self-sufficiency, a key issue clearly is whether the country's Balance of Payments (BOP) can be managed in such a way as to sustain international financial confidence and thereby insure a continuing flow of foreign capital. In 1968 and 1969 Korea experienced rapid economic growth with real GNP increasing 13.3 percent and 15.9 percent, respectively. Although exports grew in excess of 35 percent each year, the trade deficit increased from \$835 million in 1968 to \$990 million in 1969. The rapid overall economic growth during this period stimulated substantial increases in imports which accounted for the rising trade deficit.

Recently, USAID/Korea prepared a set of BOP projections for the period 1970-74. Using a national income accounts macro-model, three sets of assumptions were examined with different BOP implications. An explanation of the assumptions and a table of the comparative projections were presented in the Capital Assistance Paper for the recently-authorized Agricultural Credit Loan for Korea (AID-DLC/P-967; AID Loan No. 489-H-080). As stated in that paper, A.I.D. now considers the most likely set of assumptions (and related BOP projection) to be that based on a 9 percent annual rate of growth in Gross National Product and an adjustment in the domestic price/foreign price ratio amounting to a 35 percent devaluation in the effective rate of exchange during the time period (see Table 3).

Under the above assumptions, the trade gap would be \$306 million in 1974 and net foreign capital requirements would remain substantial, amounting to \$590 million. In other words, even though Korea's overall BOP position will probably improve over the next few years, a continued influx of fairly high levels of foreign capital will be required to finance her economic development needs.

It is estimated that Korea's principal and interest payments on foreign loans of over one year maturity rose from \$127 million in 1969 to \$314 million in 1970, and will increase to roughly \$600 million in 1974 (see Table 4). According to USAID projections, annual debt service payments as a percentage of foreign exchange earnings are expected to rise from 11 percent in 1969 to 25 percent in 1971, then drop somewhat to about 22 percent in 1974 (foreign exchange earnings include receipts for goods and services and investment income).

In view of Korea's BOP situation, continuation of A.I.D.'s concessional development lending terms is deemed appropriate for this loan. On these terms, servicing of this loan will require no more than \$120,000 in any one year during the ten-year grace period and a maximum of approximately \$380,000 per year thereafter, that amount gradually declining as principal is repaid. With export earnings projected to increase regularly and substantially over the coming years above the 1969 level of \$568 million, and with the trade gap projected to decline from the 1969 level, it is judged that there are reasonable prospects for the repayment of this loan.

TABLE 3

## KOREA: BALANCE OF PAYMENTS: OPTION (C)

| Item   | Actual  |         | Projected |         |         |         |         | Millions of Dollars |  |
|--|---------|---------|-----------|---------|---------|---------|---------|---------------------|--|
|  | 1968    | 1969    | 1970      | 1971    | 1972    | 1973    | 1974    |                     |  |
| 1. Exports, F.O.B.                                     | 466.2   | 658.3   | 838.0     | 1,165.0 | 1,494.0 | 1,832.0 | 2,294.0 |                     |  |
| 2. Imports, F.O.B.                                     | 1,322.0 | 1,650.0 | 1,748.0   | 1,959.0 | 2,155.0 | 2,369.0 | 2,600.0 |                     |  |
| 3. Trade gap (1-2)                                     | -855.8  | -991.7  | -910.0    | -794.0  | -661.0  | -537.0  | -306.0  |                     |  |
| 4. Net receipts for services                           | 174.7   | 201.9   | 160.8     | 113.8   | 25.9    | -34.1   | -90.3   |                     |  |
| 5. Net investment income                               | -5.4    | -4.6    | -57.2     | -82.9   | -119.5  | -159.1  | -195.3  |                     |  |
| 6. Net goods & services (3+4+5)                        | -686.5  | -794.4  | -756.4    | -763.1  | -754.6  | -690.2  | -592.1  |                     |  |
| 7. Net transfer receipts                               | 226.1   | 243.6   | 157.0     | 114.7   | 107.6   | 91.5    | 75.2    |                     |  |
| 8. Net current account (6+7)                           | -460.4  | -550.8  | -599.4    | -648.4  | -647.0  | -598.7  | -516.9  |                     |  |
| 9. Changes in foreign exchange holdings (increase (-)) | -40.4   | -161.8  | -25.0     | -21.0   | -16.0   | -39.0   | -71.0   |                     |  |
| 10. Net capital requirements (8+9)                     | 476.7   | 716.6   | 624.4     | 669.4   | 663.0   | 627.7   | 587.9   |                     |  |
| 11. Errors & omissions                                 | +4.1    | -4.0    | 0         | 0       | 0       | 0       | 0       |                     |  |

Note : Projection assumes low growth and improvement in exchange rate.

TABLE 4

## KOREA: DEBT SERVICE RATIOS

| Item   | Million of dollars |                |                   |                |                |                |                |
|--|--------------------|----------------|-------------------|----------------|----------------|----------------|----------------|
|  | Actual<br>1968     | 1969           | Projected<br>1970 |                | 1971           | 1972           | 1973           |
| A. Foreign Exchange Earnings   | <u>880.2</u>       | <u>1,150.7</u> | <u>1,373.2</u>    | <u>1,621.8</u> | <u>1,904.8</u> | <u>2,279.4</u> | <u>2,687.8</u> |
| 1. Export, F.O.B.  | 486.2              | 658.3          | 838.0             | 1,165.0        | 1,494.0        | 1,882.0        | 2,294.0        |
| 2. Service earnings  | 381.6              | 454.5          | 443.2             | 414.2          | 367.5          | 350.0          | 340.4          |
| 3. Investment income receipt   | 12.4               | 37.9           | 42.0              | 42.6           | 43.3           | 47.4           | 53.4           |
| B. Principal and Interest Payments<br>on Debt of Maturities 3 Years<br>and Above                             | 59.6               | 102.0          | 180.2             | 243.5          | 310.8          | 341.1          | 411.6          |
| C. Principal and Interest Payments<br>on Debt of One to Three Years  | 16.6               | 25.0           | 134.0             | 157.0          | 120.0          | 130.0          | 148.0          |
| D. Debt Service Ratio on Foreign<br>Obligations with Maturities of<br>Three Years and Above<br>D = B/A x 100 | 6.8                | 8.9            | 13.1              | 15.0           | 16.3           | 15.0           | 16.4           |
| E. Debt Service Ratio on Obligations<br>with Maturities of One Year and<br>Above<br>E = B + C/A x 100        | 8.7                | 11.0           | 22.9              | 24.7           | 22.6           | 20.7           | 21.9           |

## V. Project Implementation

### A. KAIS's U.S. Coordinator

The successful implementation of this Project involves every aspect of KAIS's establishment and development into the institution described in this paper - construction of physical facilities, recruitment of faculty and staff, formulation of policies and procedures (academic and administrative), procurement of equipment and other educational material, and selection of students for admission. With the possible exception of a final design review by a U.S. architectural consultant, all activity related to construction will be carried out in Korea under the general supervision of KAIS with appropriate assistance from the ROKG. As to the other aspects of this Project, KAIS - being a new institution attempting to accomplish a difficult task involving the utilization of modern educational concepts and procedures in a situation which for the most part is characterized by rigid, "old school" methods - will need a significant amount of professional guidance and assistance. A common procedure in such cases would be to arrange for a "sister" institution to provide the necessary assistance. Battelle Memorial Institute's relationship to KIST is an example. With KAIS, however, it is felt that the traditional role of such a "sister" institution needs to be broadened so that, instead of providing a majority of the required services from its own resources, the "sister" institution will function as a coordinating agency which will search out and utilize capabilities from many sources. KAIS, because of its special nature, will require a wider range of academic inputs than can likely be provided by one institution. Accordingly, KAIS will seek, through a contractual arrangement, to establish a "U.S. Coordinating Office", tied to an appropriate institution, but which would be free to tap sources throughout the country. Such a coordinating office would necessarily have to be headed by a scientist/educator of mature judgement and established reputation who is knowledgeable of and well-connected in U.S. academic and scientific circles. He would be expected to devote approximately one-quarter of his time to KAIS, and would be supported by a full-time assistant responsible for implementation of necessary actions and general administration of the coordinating office. Other staff would likely include various specialists (e.g. equipment procurement specialist), and secretarial and clerical support.

As previously stated, arrangements are being made for the Polytechnic Institute of Brooklyn to assist KAIS in the preparation of a detailed long-range technical assistance plan, which plan will serve as the basis for the scope of work to be performed by the permanent U.S. Coordinating Office. Preparation and submission of this plan and the related scope of work, satisfactory to A.I.D., will be a condition precedent to the disbursement of loan funds. KAIS officials have already given preliminary attention to the technical assistance plan, and view the required assistance as falling into the following major categories:

(1) Architecture and Engineering - to consult with and provide advice to the Korean architects and engineers in the preparation of final designs and specifications;

(2) Administration - to assist in planning the development of KAIS, and in refining KAIS's organizational structure and administrative systems and procedures;

(3) Recruitment and Training of Faculty - survey the academic and scientific communities for qualified prospective faculty members, determine their teaching and research interests and plans, and make appropriate recommendations; in cases where specialized training may be required, such training will be provided or arranged for;

(4) Instructional Assistance - arranging for several visiting U.S. professors to spend approximately one year each at KAIS to provide various assistance in curricula planning, instruction and research to the several departments of KAIS;

(5) Equipment Procurement - this function is discussed in detail in Section B below;

(6) Liaison Services - providing information on current industrial technology and academic trends, information on possible financial assistance for KAIS, and arranging for KAIS's participation in international meetings and other appropriate activities.

#### B. Equipment Procurement

The procurement of laboratory equipment and library materials will be one of the major responsibilities of the U.S. Coordinating Office, who will act as purchasing agent for KAIS. The U.S. Coordinating Office will assist and work closely with KAIS in the selection and procurement of items for the institute's seven Science Departments and reference library. The Coordinating Office will, in accordance with the A.I.D. Capital Projects Guidelines, prepare instructions to bidders and bid terms and conditions, establish delivery requirements, prepare technical specifications, issue invitations for bids, establish evaluation factors for review of bid proposals, prepare justifications for waivers, review and analyze technical and cost proposal submissions, make written recommendations for contract awards to KAIS for final approval and, when required, obtain A.I.D.'s approval of proposed awards. Because of the highly specialized nature of such equipment as will be purchased by KAIS, it is expected that waivers for proprietary procurement will be necessary in many instances. Further, KAIS will not be required to consider the possible availability of U.S. Government Excess Property (see Annex III. pg. 15, item 4).

It is important that laboratory equipment and related materials be as compatible as possible with the actual instruction and research to be carried out at KAIS. Accordingly, it is desirable for the final

selection of a certain portion of the equipment to be made by department chairmen and senior professors. Recruitment for such positions is well underway, and KAIS officials anticipate no major problem in terms of filling these positions by dates which will permit the subsequent equipment procurement to proceed in a timely fashion.

KAIS will seek the technical expertise, through the U.S. Coordinating Office, of U.S. equipment specialists and technicians in the final selection, operation and maintenance of KAIS laboratory equipment and materials.

#### C. Selection of the U.S. Coordinator

KAIS officials and A.I.D. share the feeling that the technical assistance to be provided by and through the U.S. Coordinating Office is of considerable importance to the effective implementation of this Project and to the ultimate success of KAIS. In order to provide the wide range of services, the U.S. Coordinating Office should be a combination of individual and institutional resources which includes (1) overall managerial capacity, (2) technical expertise in such areas as procurement of scientific equipment, planning of curricula and courses, instructional methodology, (3) experience and interest in assisting education in less developed countries, (4) access, at a fairly high level, to the appropriate academic and industrial communities and scientific institutions, and (5) a thorough understanding of the Korean scene as it relates to the objectives and purposes of KAIS. Key officials of KAIS have given this matter careful consideration and have concluded that Stanford University, with the personal involvement of Dean Frederick Terman, represents a particularly well-qualified prospect to be the U.S. Coordinator. Preliminary discussions are being held, and in the event that mutually satisfactory contractual arrangements can be agreed to, A.I.D. is prepared to consider the selection, on a "sole source" basis, subject to the signing of the loan agreement, the fulfilling of conditions precedent, and approval of the proposed contract. Should an agreement not be reached with Stanford and Dean Terman, alternative institutional/individual arrangements which meet the basic requirements will be sought.

#### D. A.I.D.'s Implementation Responsibilities

Implementation responsibility for this Project will necessarily be divided between Washington (AID/W) and the Mission. It is anticipated that the loan agreement will be prepared in Washington, but negotiated and signed by the Mission. Basic implementation instructions will be prepared by the Mission with assistance from Washington. Review and approval of documentation submitted in satisfaction of conditions precedent will be performed by the Mission, with the concurrence of AID/W. Final approval of the contract between KAIS and the

U.S. Coordinator, and of equipment procurement will be AID/W's responsibility with Mission comments. Implementation responsibility in AID/W will be carried out by the Office of Capital Development and Finance, Bureau for East Asia, with the appropriate assistance of the Bureau Offices of Engineering, Procurement and Technical Services, and of the Area General Counsel and Country Desk.

The development of KAIS, to its "full capacity" as described herein, is expected to require five years. The life of the contract for technical assistance and, accordingly, the disbursement period of loan proceeds will be five years.

Implementation Schedule. It is estimated that the implementation of the A.I.D.-financed portion of this Project will proceed as follows:

|  |                |
|--|----------------|
| Loan Authorization . . . . .   | June 28, 1971  |
| Signing of Loan Agreement : . . . . .  | August 1, 1971 |
| Issuance of Implementation Letter No. 1 . . . . .  | August 5, 1971 |
| Satisfaction of Conditions Precedent (which includes<br>signing of contract with U.S. Coordinator) . . . . . | Oct. 1, 1971   |
| Opening of Letter of Commitment for Technical<br>Assistance . . . . .  | Oct. 10, 1971  |
| Procurement Procedures Established and Approved by<br>A.I.D. . . . .   | Nov. 10, 1971  |
| Opening of First Letter of Commitment for Equipment<br>Procurement . . . . .                                 | Dec. 10, 1971  |
| Terminal Date for Requesting Letters of Commitment . .   | Dec. 31, 1975  |
| Terminal Disbursement Date . . . . .   | Dec. 31, 1976  |

ILLUSTRATIVE LIST OF EQUIPMENT

|   |                |
|---|----------------|
| 1. Industrial Science Department                    | 74,000         |
| 2. Mechanical Science Department                    | 447,600        |
| 3. Electrical Science Department                    | 386,500        |
| 4. Chemical Science Department                      | 365,700        |
| 5. Material Science Department                      | 514,600        |
| 6. Biological Science Department                    | 137,200        |
| 7. Basic Science Department                         |                |
| Applied Physics                                     | 219,400        |
| Applied Mathematics                                 | <u>155,000</u> |
| Total Laboratory Equipment                          | 2,300,000      |
| Library Materials                                   | <u>600,000</u> |
| Total Laboratory Equipment<br>and Library Materials | \$2,900,000    |

NOTE: Equipment requirements of the various departments are summarized in this Annex I. A detailed, item-by-item listing is available on request to the Office of Capital Development and Finance, Bureau for East Asia (Richard B. Perry or Elmer S. Lee, x29048).

Industrial Science Department . . . . . \$ 74,000

Desk Calculators and VTR Units.

Mechanical Science Department . . . . . \$447,600

Includes such equipment as transducers, accelerometers, thermocouple units, voltmeters, cameras, oscilloscopes, various testers, recorders, generators, amplifiers, analyzers, potentiometers, pyrometers, temperature bath, water tunnel, turbomachine, testing machines, rolling mill, strain gauges and recorders, and a work shop.

Electrical Science Department . . . . . \$386,500

Includes oscilloscopes, generators, transistor test curve tracers, various testing equipment, integrated circuits equipment, modulators, transmitters, receivers, servos and analyzer, vacuum unit, wave analyzer, magnet system, power generators, and a S-band microwave tube and components.

Chemical Science Department . . . . . \$365,700

Includes spectrophotometers, spectrograph polarograph, chromatograph, basic package for NMR, ESR and PMR, spectrometer, polarimeter, vacuum equipment units, general lab equipment, distillation apparatus, flow birefringence device, flow lines for molten polymers and solutions, fraction collector, blender, extruder, scanning calorimeter, balances, microscopes, and spectrofluorophotometer.

Biological Science Department . . . . . \$137,200

Includes refrigerated centrifuge, ultracentrifuges (preparation and analytical), amino-acid analyzer, freeze drying equipment, respirometry, French-pressure cell, spectra-fluorometer, autoclave, microscopes, germ-free hoods, sterile room, and glassware.

Material Science Department . . . . . \$514,600

Including crystal growing industrial melting unit, furnaces, plasma beam zone melting unit, rolling mill, swage and hydraulic press; electron beam zone refining unit, spark cutting machine, vacuum induction melting unit, metallographs, X-ray unit, cameras, forming forge, extrusion press, wire and tube drawing unit testers, microscopes, differential thermal

analysis unit, vacuum sintering and pressing unit, furnaces, metal press, vacuum casting unit, recording microbalance, and cryogenic plant.

Basic Science Department . . . . . \$374,000

Including vacuum evaporator, electron beam system, leak detector, pumps monochrometers, optical component unit, interferometers, lasers, modulators, thermionics equipment, Hall-effect unit, various meters, oscilloscopes, spin and dip coaters, spray etcher, die bonders and related equipment, analog computer, small, teaching-oriented time-sharing computer and related equipment, and calculators.

Library . . . . . \$500,800

Books, journals, reproducing equipment, micro-film viewers, etc.

Workshop . . . . . \$141,300

Including lathes, borers, drills, gauges, balances, cutting machines, engraving, shearing, grinding and milling machines, furnaces, welding equipment, hobbying machine and blueprint machine.

Cryogenic Plant . . . . . \$129,000

Dry ice plant, liquid nitrogen and helium plants and dewars.

June 17, 1971



ECONOMIC PLANNING BOARD  
REPUBLIC OF KOREA  
Seoul, Korea

June 9, 1971

The Honorable  
Michael H.B. Adler, Director  
USAID/K  
Seoul, Korea

Dear Mr. Adler:

I would like to present my Government's request for a loan in the amount of \$6 million under the Development Loan financing for the procurement of necessary laboratory equipment and technical service required for operation of the Korea Advanced Institute of Science (KAIS) located in Seoul, Korea which was established on February 16, 1971. The KAIS is designed to train and produce highly qualified engineers and scientists needed for Korean industries and academic institutions by providing the students therein not only academic trainings but also practical research works.

As you may be aware, timely provisions of highly qualified engineers and scientists needed on a massive scale for the Korean industries are indispensable to support the steady industrial development of this country. In view of the importance of the development of manpower, given high priority in the Third Five Year Economic Development Plan, the Government is predicated to spend a considerable greater share of investment resources to this area on a continual phase.

The proposed project calls for installation of scientific and experimental equipment and construction of administrative and laboratory buildings. The construction of the physical plant will be financed with local currency, while the experimental equipment as well as technical assistance is planned to be financed with the proposed loan fund.

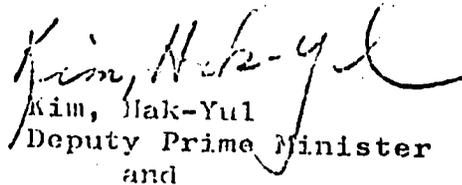
This project will be completed by 1973, composed of seven graduate departments such as mechanical science,



chemical science, material science, electronic science, biological science, industrial science and basic science. With the completion of the Institute, 175 students for Master of Science together with 63 students for Doctor of Philosophy and Doctor of Engineering could be enrolled in the said seven departments from 1973.

In view of the foregoing, I do hope that you share with us a sense of the high priority of the proposed project. Also, it is hoped that our loan request will be favorably considered and concluded at the earliest possible date.

Sincerely yours,



Kim, Hak-Yul

Deputy Prime Minister  
and

Minister of Economic Planning Board

June 17, 1971

## STATUTORY CRITERIA CHECKLIST FOR DEVELOPMENT

ASSISTANCE: Development Loan Fund

COUNTRY PERFORMANCEA. Programs Towards Country Goals

1. FAA Sec. 201(b)(5), 201(b)(7), 201(b)(8), 208. Discuss the extent to which the country is:  
 (a) making appropriate efforts to increase food production and improve means for food storage and distribution;

(a) from 1960 through 1969 the National Income accounts show that the value added in the agriculture sector increased by 50% (an average growth of 5% per year or a growth rate of 4.3%). Significantly, this decade included the two drought years of 1967 and 1968; however, significant investments have been made in irrigation facilities which will minimize future weather influences on production.

In the past two years, rice prices have been allowed to increase substantially more than the 5% increase allowed in the previous three years. This increase will provide additional incentive for farmers to use fertilizer and pesticides required to increase production.

Substantial effort and expenditure is being made to introduce new rice varieties, and to increase and improve food storage capacity.

(b) creating a favorable climate for foreign and domestic private enterprise and investment;

(b) Korea has taken a number of effective steps to create a favorable investment climate. A liberal foreign investment law was enacted, and intensive study is being undertaken by the ROKG of means of expanding capital markets. An investment center has been established.

The 1969 U.S. Industrial Machinery Exhibition held in Seoul produced sales amounting to \$4.6 million dollars worth of U.S. manufactured machinery and equipment. A similar exhibition is due to be held during 1971 in Seoul.

Domestic investment has been assisted by a number of A.I.D. loans such as the loan to the Korea Development Bank.

(c) increasing the people's role in the developmental process;

(c) Koreans are basically a homogeneous people whose society is relatively free and politically stable. Korea does not possess deep sectional, religious or social cleavages. Korea's rapid economic development benefits increasingly larger segments of the population.

(d) allocating expenditures to development rather than to unnecessary military purposes or intervention in other free countries' affairs;

(d) Korea has wisely allocated its resources in such a way as to maximize its economic development while maintaining sufficient military forces to insure a relative freedom from threatened external aggression. Korea is not intervening in other free and independent nations' affairs.

(e) willing to contribute funds to the project or program;

(e) The total capital cost of this Project is estimated to be \$14.8 million equivalent; of this amount, the ROKG will contribute \$8.8 equivalent in local currency (won) for construction purposes. Also, the ROKG is providing the land, and financing the ongoing operational and administrative requirements of the institute.

June 17, 1971

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(f) making economic, social and political reforms such as tax collection improvements and changes in land tenure arrangement; and making progress toward respect for the rule of law, freedom of expression and of the press, and recognizing the importance of individual freedom, initiative, and private enterprise;

(g) responding to the vital economic, political and social concerns of its people, and demonstrating a clear determination to take effective self-help measures.

(f) Korean land reform programs have eliminated the large land-holding class and have created a large number of independent farmers who own their own small farms. The ROKG has assisted in the establishment of a number of farm and fishery cooperatives which have been of significant assistance to the independent farm and fishery communities. Our Mission has also assisted the ROKG in its efforts to reform the equity of tax rates and collection procedures.

These reforms have greatly increased both the amount of taxes collected and the equity with which the program is administered. The promotion of democratic institutions in Korea is covered in detail in TOAID A-994, 3/6/67 and TOAID A-1220, 2/26/68.

(g) The ROKG has made significant progress in its efforts to provide a better life for the average Korean citizen. The Government has encouraged the rapid expansion of small and medium industry, stimulated the development of farmer credit unions and fishing cooperatives and has helped in many other ways to better the lot of its people. (See TOAID A-994 and TOAID A-1220).

B. Relations with the United States

1. FAA Sec. 620(c). Is the government indebted to any U.S. citizen for goods or services furnished or ordered where: (a) such citizen has exhausted available legal remedies, including arbitration, or (b) the debt is not denied or contested by the government, or (c) the indebtedness arises under such government's or a predecessor's unconditional guarantee?

1. No situation is known to exist.

2. FAA Sec. 620(d). If the loan is intended for construction or operation of any productive enterprise that will compete with U.S. enterprise, has the country agreed that it will establish appropriate procedures to prevent export to the U.S. of more than 20% of its enterprises annual production during the life of the loan?

2. The loan is not intended for such purposes.

3. FAA §620(e)(1). Has the country's government, or any agency or subdivision thereof, (a) nationalized or expropriated property owned by U.S. citizens or by any business entity not less than 50% beneficially owned by U.S. citizens, (b) taken steps to repudiate or nullify existing contracts or agreements with such citizens or entity, or (c) imposes or enforced discriminatory taxes or other exactions, or restrictive maintenance or operation conditions? If so, and more than six months has elapsed since such occurrence, identify the document indicating that the government, or appropriate agency or subdivision thereof, has taken appropriate steps to discharge its obligations under international law toward such citizen or entity? If less than six months has elapsed, what steps if any has it taken to discharge its obligations?

3. No such actions are known.

4. FAA Sec. 620(j). Has the country permitted, or failed to take adequate measures to prevent, the damage or destruction by mob action of U.S. property, and failed to take appropriate measures to prevent a recurrence and to provide adequate compensation for such damage or destruction?

4. No such situation is known to have occurred.

5. FAA Sec. 620(l). Has the government instituted an investment guaranty program under FAA Sec. 221 (b)(1) for the specific risks of inconvertibility and expropriation or confiscation?

5. Yes.

6. FAA §620(o). Fisherman's Protective Act of 1954, as amended, Section 5. Has the country seized, or imposed any penalty or sanction against, any U.S. fishing vessel on account of its fishing activities in international waters? If, as a result of a seizure, the U.S.G. has made reimbursement under the provisions of the Fisherman's Protective Act and such amount has not been paid in full by the seizing country, identify the documentation which describes how the withholding of assistance under the FAA has been or will be accomplished.

6. No.

7. FAA Sec. 620(q). Has the country been in default, during a period in excess of 6 months, in payment to the U.S. on any FAA loan?

7. No.

8. FAA Sec. 620(t). Have diplomatic relations between the country and the U.S. been severed? If so, have they been renewed?

8. Diplomatic relations between Korea and the United States have not been severed.

C. Relations with Other Nations and the U.N.

1. FAA Sec. 620(i). Has the country been officially represented at any international conference when that representation included planning activities involving insurrection or subversion directed against the U.S. or countries receiving U.S. assistance?

2. FAA Secs. 620(a), 620(n);  
Has the country sold, furnished, or permitted ships or aircraft under its registry to carry to Cuba or North Vietnam, items of economic, military or other assistance?

3. FSS Sec. 620(u); App. Sec. 108. What is the status of the country's U.N. dues, assessments or other obligations? Does the loan agreement bar any use of funds to pay U.N. assessments, dues or arrearages?

1. Korea is not known to have been so represented.

2. No.

3. The Republic of Korea is not a member of the United Nations. The loan agreement will stipulate that only eligible commodities and services can be procured with the proceeds of the loan.

D. Military Situation

1. FAA Sec. 620(i). Has the country engaged in or prepared for aggressive military efforts directed against the U.S. or countries receiving U.S. assistance?

2. FAA Sec. 620(s). What is (a) the percentage of the country's budget devoted to military purposes, and (b) the amount of the country's foreign exchange resources used to acquire military equipment, and (c) has the country spent money for sophisticated weapons systems purchased since the statutory limitation became effective?

1. No.

2. (a) Korean defense budget expenditures as a percent of GNP have risen only slightly from 3.7% in 1965 to 4.1% in 1969. For the period 1967-1969 these expenditures were 4.1% of GNP, not significantly above the mean for the region.

(Findings on these questions are to be made for each country at least once each fiscal year and, in addition, as often as may be required by a material change in relevant circumstances.)

(b) Foreign exchange purchases of military items were about \$3 million over the period 1965 to 1968 and accounted for a negligible portion of the defense budget. In 1969 they were about \$1 million, or 1% of total imports. Korean requirements for imports of military equipment have been provided under the Military Assistance Program.

State and A.I.D. have reviewed Korean actions under the Symington Amendment and have concluded that Korea is not diverting U.S. development assistance or PL 480 sales to military purposes. They also determined that Korea is not diverting its own resources to unnecessary military expenditures to a degree which materially interferes with its development. The Country Team concurs. The following points were among those taken into account in reaching this conclusion.

It is United States policy to assist South Korea in developing the capability to defend itself from Communist attack from the north and to counter Communist attempts at internal subversion. We also support South Korean contributions to regional mutual security efforts in Southeast Asia. At present South Korea has 50,000 troops participating in the allied war effort in South Vietnam. Substantial military expenditures are necessary to support these objectives, and we are contributing to the Korean defense budget to help them finance these costs.

Korean defense budget expenditures as a percent of central government expenditures have declined from 32.0% in 1965 to 20.4% in 1969, below the mean for the region of 27.2%.

U.S. military budget support derived from PL 480 and Supporting Assistance proceeds has been decreasing, and at the same time the Koreans have been increasing their own military expenditures. The self-financed portion of the Korean defense budget has increased from 38.1% in 1965 to 75.5% in 1969. However, these expenditures have remained relatively stable as a percent of total central government expenditures: 11.7% in 1965 as compared to 15.4% in 1969. Korean self-financed defense expenditures as a percent of GNP rose from 2.7% in 1968 to 3.2% in 1969.

(c) . No.

CONDITION OF THE LOAN

A. General Soundness

— Interest and Repayment

FAA Secs. 201(d), 201(b)(2).  
Is the rate of interest excessive or unreasonable for the borrower? What capacity does the borrower have to repay the loan at a reasonable rate of interest? Is the rate of interest less than 2% per annum during the grace period? Less than 3% per annum following the grace period? Is the rate of interest higher than the country's applicable legal rate of interest?

The proposed loan contains a rate of interest which is concessionary. The borrower has the capacity to repay the loan at the rates of interest to be required. The rates in the proposed loan are 2% per annum during the grace period and 3% per annum thereafter for the remaining thirty years of the repayment period. The interest rate is not higher than the country's applicable legal rate of interest.

-- Financing

FAA Sec. 201(b)(1). To what extent can financing on reasonable terms be obtained from other free-world sources, including private sources within the U.S.?

No other free-world financing institution has expressed an interest in financing this project, and it is unlikely that Korea could obtain this financing on comparable terms from another free-world source.

-- Economic and Technical Soundness

1. FAA Secs. 201(b)(2), 201(e). Indicate the activity's economic and technical soundness; does the loan application, together with information and assurances, indicate that funds will be used in an economically and technically sound manner?

1. The project is economically and technically sound, and the loan application and other information available to the Mission indicates that the loan funds and local currencies generated thereby will be used in an economically and technically sound manner.

2. FAA Sec. 611(a)(1). If substantive technical or financial planning is required, have engineering, financial, and other plans necessary to carry out assistance, and a reasonably firm estimate of the cost of assistance to the U.S., been completed?

2. The necessary financial and other planning has been completed.

3. FAA Sec. 611(b); App. Sec. 101. Have plans for a water or related land resource construction project or program included a cost-benefit computation? Does the project or program meet the relevant U.S. construction standards and criteria used in determining feasibility?

4. FAA Sec. 611(e). If this is a Capital Assistance Project with U.S. financing in excess of \$1 million, has the principal A.I.D. officer in the country certified as to the country's capability effectively to maintain and utilize the project?

3. This Project does not involve water or related land resources. The Project does meet the relevant U.S. construction standards and criteria used in determining feasibility.

4. The principal A.I.D. officer in Korea has so certified (see Annex IV).

B. Relation to Achievement of  
Country and Regional Goals

-- Country Goals

1. FAA Secs. 207, 281(a).  
Describe this loan's relation to:

(a) institutions needed for a democratic society and to assure maximum participation on the part of the people in the task of economic development;

(b) enabling the country to meet its food needs both from its own resources and through development, with U.S. help, of infrastructure to support increased agricultural productivity;

(c) meeting increasing need for trained manpower;

(d) developing programs to meet public health needs;

(e) assisting other important economic, political and social development activities, including industrial development; growth of free labor unions, cooperatives and voluntary agencies; improvement of transportation and communication systems; capabilities for planning and public administration; urban development; and modernization of existing laws.

2. FAA Sec. 201(b)(4). Describe the activity's consistency with and relationship to other development activities, and its contribution to realizable long-range objectives.

1. (a) The graduate-level training to be provided by KAIS will assist in overcoming a major educational deficiency in science and technology, thereby making it possible for more Koreans to play an important part in the task of economic development.

(b) There is not likely to be a direct relationship of the loan to this goal.

(c) The basic objective of the Project is to provide highly-trained scientists and engineers for Korea's needs.

(d) There is not likely to be a direct relationship of the loan to this goal.

(e) By its very nature, KAIS may be expected to have a definite positive impact on industrial development, the improvement of transportation and communications systems, planning capabilities and urban development. There is no direct relation to the other activities cited.

2. The Project will be considered benefit to the modernization of Korean industry, thereby contributing to Korea's overall efforts to build a strong economy that is competitive in the world export market. This is one of Korea's major long-range objectives, and the chief means by which her continued economic development will be financed.

3. FAA Sec. 201(b)(9). How will the activity to be financed contribute to the achievement of self-sustaining growth?

3. See 2. above.

4. FAA Sec. 201(f). If this is a project loan, describe how such project will promote the country's economic development, taking into account the country's human and material resource requirements and the relationship between ultimate objectives of the project and overall economic development.

4. See 1. and 2. above

5. FAA Sec. 201(b)(3). In what ways does the activity give reasonable promise of contributing to development of economic resources, or to increase of productive capacities?

5. See 1. and 2. above.

6. FAA Sec. 281(b). How does the program under which assistance is provided recognize the particular needs, desires, and capacities of the country's people; utilize the country's intellectual resources to encourage institutional development; and support civic education and training in skills required for effective participation in political processes?

6. The loan recognizes the basic need of the Korean people for agricultural development which will enable them to utilize to the fullest possible extent available agricultural resources. There is at best only an indirect relationship between the loan and development of intellectual resources and support of civic education and training in skills required for effective participation in political processes.

7. FAA Sec. 601(a). How will this loan encourage the country's efforts to: (a) increase the flow of international trade; (b) foster private initiative and competition; (c) encourage development and use of cooperatives, credit unions, and savings and loan associations; (d) discourage monopolistic practices; (e) improve technical efficiency of industry, agriculture, and commerce; and (f) strengthen free labor unions?

8. FAA Sec. 202(a). Indicate the amount of money under the loan which is: going directly to private enterprise; going to intermediate credit institutions or other borrowers for use by private enterprise; being used to finance imports from private sources; or otherwise being used to finance procurement from private sources.

9. FAA Sec. 611(a)(2). What legislative action is required within the recipient country? What is the basis for a reasonable anticipation that such action will be completed in time to permit orderly accomplishment of purposes of loan?

-- Regional Goals

1. FAA Sec. 619. If this loan is assisting a newly independent country, to what extent do the circumstances permit such assistance to be furnished through multilateral organizations or plans?

7. As previously stated, use of loan-generated local currency should contribute to improving the technical efficiency of agriculture and through disbursal of local currencies in the private agricultural sector encourage development and use of domestic financial institutions; otherwise, there will be little or no effect on the specific development objectives stated in this section (601(a)) of the FAA.

8. \$4.5 million of the loan funds will be used to finance imports of laboratory equipment and library materials from private sources, and \$1.5 million of loan funds will be used to finance technical assistance which will be provided largely by universities.

9. Legislative action is required to appropriate funds for the costs of construction and to establish an endowment for the continued operation of KAIS. The ROKG has given every indication of complete support for this Project by providing land and all necessary local cost financing thus far. Conditions precedent to disbursement of the loan will require appropriate planning for construction financing and establishment of an endowment fund on a time schedule satisfactory to A.I.D. and to the actual needs of the Project.

1. Korea is not a newly independent nation.

2. FAA Sec. 209. If this loan is directed at a problem or an opportunity that is regional in nature, how does assistance under this loan encourage a regional development program? What multilateral assistance is presently being furnished to the country?

2. This loan is not directed at a regional problem.

Korea is a member of the Asian Development Bank (ADB) and is receiving assistance from the World Bank. Both of these organizations are expected to become increasingly active in Korea.

C. Relation to U.S. Economy

— Employment, Balance of Payment, Private Enterprise

1. FAA Secs. 201(b)(6); 102, Fifth. What are the possible effects of this loan on U.S. economy, with special reference to areas of substantial labor surplus? Describe the extent to which assistance is constituted of U.S. commodities and services, furnished in a manner consistent with improving the U.S. balance of payments position?

1. There is no adverse effect from this loan on the U.S. economy or on areas of substantial labor surplus. The U.S. will be an eligible source country of commodities made eligible under the loan. Also, 50/50 shipping will apply.

2. FAA Secs. 612(b), 636(h). What steps have been taken to assure that, to the maximum extent possible, foreign currencies owned by the U.S. and local currencies contributed by the country are utilized to meet the cost of contractual and other services, and that U.S. foreign owned currencies are utilized in lieu of dollars?

2. The loan proceeds will be used exclusively to finance foreign exchange costs. All local currency costs will be financed by the host country.

3. FAA Sec. 601(d); App. Sec. 109. If this loan is for a capital project, to what extent has the Agency encouraged utilization of engineering and professional services of U.S. firms and their affiliates?

3. Proceeds of the loan will not be used to finance construction costs; host country engineers and architects will be utilized.

If the loan is to be used to finance direct costs for construction, will any of the contractors be persons other than qualified nationals of the country or qualified citizens of the U.S.? If so, has the required waiver been obtained?

4. FAA Sec. 608(a). Provide information on measures to be taken to utilize U.S. Government excess personal property in lieu of the procurement of new items.

4. U.S. Government Excess Property will not be utilized for this Project. The highly technical nature of the equipment to be procured, and the necessity of having the most recently-produced equipment precludes use of excess property.

5. FAA Sec. 602. What efforts have been made to assist U.S. small business to participate equitably in furnishing of commodities and services financed by this loan?

5. Equipment procurement under the loan will be according to established A.I.D. procurement procedures and will follow normal commercial trade practices to the maximum extent allowable, thereby assisting U.S. small business to participate in furnishing the commodities to be financed.

6. FAA Sec. 621. If the loan provides technical assistance, how is private enterprise on a contract basis utilized? If the facilities of other Federal agencies will be utilized, in what ways are they particularly suitable; are they competitive with private enterprise (if so, explain); and how can they be made available without undue interference with domestic program?

6. Facilities of U.S. agencies will not be used. Due to the specialized nature of the technical assistance required for the Project, it is anticipated that a U.S. university or other institution will provide the assistance on a contractual basis.

7. FAA Sec. 611(c). If this loan involves a contract for construction (that obligates in excess of \$100,000), will it be on a competitive basis? If not, what factors make that impracticable?

The loan does not involve such a construction contract.

-- Procurement

1. FAA Sec. 604(a). Will commodity procurement be restricted to U.S. except as otherwise determined by the President?

1. Commodity procurement under this loan will adhere to the President's directives regarding the untying of AID procurement as set forth in applicable AID Regulations.

2. FAA Sec. 604(b). Will any part of this loan be used for bulk commodity procurement at adjusted prices higher than the market price prevailing in the U.S. at time of purchase?

2. No.

3. FAA Sec. 604(e). Will any part of this loan be used for procurement of any agricultural commodity or product thereof outside the U.S. when the domestic price of such commodity is less than parity?

3. No.

D. Other Requirements

1. FAA Sec. 201(b). Is the country among the 20 countries in which development loan funds may be used to make loans in this fiscal year?

1. Yes.

2. App. Sec. 112. Does the loan agreement provide, with respect to capital projects, for U.S. approval of contract terms and firms?

2. Contracts financed by the loan will have such approval.

3. FAA Sec. 620(k). If the loan is for construction of a productive enterprise, with respect to which the aggregate value of assistance to be furnished will exceed \$100 million, what preparation has been made to obtain the express approval of Congress?

3. Not applicable.

4. FAA §620(b), 620(f);  
App. §102(b). Has the  
President determined  
that the country is not  
dominated or controlled  
by the international  
Communist movement? If  
the country is a Commu-  
nist country (including,  
but not limited to, the  
countries listed in FAA  
§620(f) and the loan is  
intended for economic  
assistance, have the  
findings required by  
FAA §620(f) and App.  
§102(b) been made and  
reported to the Congress?

4. Yes, the required determi-  
nation has been made.

5. FAA §620(E). What  
steps have been taken  
to insure that the loan  
will not be used in a  
manner which, contrary  
to the best interest of  
the United States, pro-  
motes or assists the  
foreign aid projects of  
the Communist-bloc  
countries?

5. The loan agreement will con-  
tain a provision covering this  
requirement

6. App. §118. Will any  
funds be used to finance  
procurement of iron and  
steel products for use in  
Viet-Nam other than as  
contemplated by §118?

6. No.

7. FAA §636(i). Will any part of this loan be used in financing non-U.S.-manufactured automobiles? If so, has the required waiver been obtained?

7. No

8. FAA §§620(a)(1) and (2), 620(p); App. §117. Will any assistance be furnished or funds made available to the government of Cuba or the United Arab Republic?

8. No.

9. FAA §620(g). Will any part of this loan be used to compensate owners for expropriated or nationalized property? If any assistance has been used for such purpose in the past, has appropriate reimbursement been made to the U.S. for sums diverted?

9. No. No assistance has been used for such purposes in the past.

10. FAA §201(f). If this is a project loan, what provisions have been made for appropriate participation by the recipient country's private enterprise?

10. The construction work will be accomplished through direct hire of personnel and subcontract with private firms in the recipient country.

11. App. §104. Does the loan agreement bar any use of funds to pay pensions, etc., for persons who are serving or who have served in the recipient country's armed forces?

11. Yes. The loan agreement will cover this requirement.

13. IMA § 901.b. Does the loan agreement provide for compliance with U.S. shipping requirements, that at least 50% of the gross tonnage of all commodities financed with funds made available under this loan (computed separately by geographic area for dry bulk carriers, dry cargo liners, and tankers) be transported on privately owned U.S.-flag commercial vessels to the extent such vessels are available at fair and reasonable rates for U.S. flag vessels?

13. Yes.

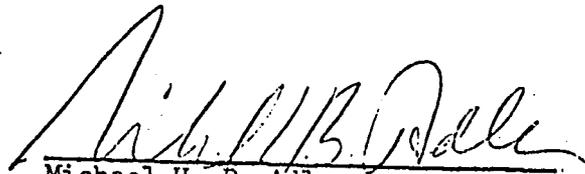
Annex IV

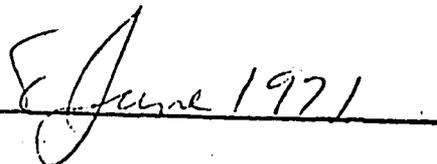
AID-DLC/P-984

June 17, 1971

CERTIFICATION PURSUANT TO SECTION 611 (e) OF  
THE FOREIGN ASSISTANCE ACT OF 1961, AS AMENDED

I, Michael H. B. Adler, the principal officer of the Agency for International Development in Korea, having taken into account among other things, the maintenance and utilization of projects in Korea previously financed or assisted by the United States, do hereby certify that in my judgment Korea has both the financial capability and the human resources capability to effectively utilize the capital assistance to be provided by the Korea Advanced Institute of Science loan.

  
Michael H. B. Adler

  
Date

DRAFT

Annex V  
Page 1

A.I.D. Loan No.

AID-DLC/P-984

June 17, 1971

CAPITAL ASSISTANCE LOAN AUTHORIZATION

Provided from: Development Loan Funds  
(Korea: Korea Advanced Institute of Science)

Pursuant to the authority vested in the Assistant Administrator, Bureau for East Asia, of the Agency for International Development (A.I.D.) by the Foreign Assistance Act of 1961, as amended, and the Delegations of Authority issued thereunder, I hereby authorize the establishment of a loan pursuant to Part I, Chapter II, Title 1, the Development Loan Fund, to the Government of the Republic of Korea (Borrower) of not to exceed Six Million Dollars (\$6,000,000) to assist in financing the foreign exchange costs of the procurement of laboratory equipment and related materials and supplies, library books and materials, and technical assistance in the field of education for the use of the Korea Advanced Institute of Science (Beneficiary). The loan is to be subject to the following terms and conditions:

1. Interest Rate in Terms of Repayment

The interest on this loan shall be two percent (2%) per annum on the disbursed balance of the loan during the first ten years (10) years of the loan and three percent (3%) per annum for the remaining thirty (30) years of the loan. The principal of the loan shall be repaid in full within forty (40) years from the date of the first disbursement under the loan and such repayment shall include a grace period of not to exceed ten (10) years from the date of the first disbursement

2. Currency of Repayment

Provision shall be made for repayment of the loan and payment of the interest in United States dollars.

3. Other Terms and Conditions

a. Unless A.I.D. should otherwise agree in writing, equipment, materials and services financed under this loan shall have their source and origin in countries under A.I.D. Geographic Code 941 (Selected Free-World).

b. The Borrower will make the proceeds of the loan available to the Beneficiary in the form of a grant on such terms and conditions as may be agreed upon by A.I.D.

c. No disbursements of the loan funds will be made until:

(1) Beneficiary has submitted a plan to A.I.D. for the utilization of the technical advisory assistance which specifically identifies Beneficiary's needs and related scopes of work for such services;

(2) Beneficiary and a contractor satisfactory to A.I.D. have entered into a contract satisfactory to A.I.D. for technical advisory services;

(3) Borrower has submitted a plan satisfactory to A.I.D. for the establishment of an endowment fund for use by the Beneficiary, together with a description of the manner that construction, operation and administration costs will be funded in accordance with the projected financial requirements of the Beneficiary.

d. Borrower will covenant that it will establish an endowment fund out of its regular appropriations for the use of Beneficiary, and said fund shall be established no later than Dec. 31, 1973.

e. The loan shall be subject to such other terms and conditions as A.I.D. may deem advisable

---

Roderic L. O'Connor  
Assistant Administrator, East Asia

---

Date

Drafted by: GC/EA:SKay

Clearance:

A/CONT:Charles F. Flinner \_\_\_\_\_  
PPC/CA:John H. Kaufman \_\_\_\_\_  
EA/CDF:Selig A. Taubenblatt \_\_\_\_\_  
EA/DP:Charles Breecher \_\_\_\_\_  
GC/EA:Herbert E. Morris \_\_\_\_\_  
EA/NEAP:Chester Bell \_\_\_\_\_  
EA/ENGR:Merten Vogel \_\_\_\_\_  
EA/PROC:Adolph J. Bennett \_\_\_\_\_

PROJECT APPRAISAL REPORT (PAR)

PD-APP-466-G1

PAGE 1

|                                  |   |                     |                             |
|----------------------------------|---|---------------------|-----------------------------|
| 1. PROJECT NO.<br>489-22-660-689 | 2. PAR FOR PERIOD:<br>8/31/71 TO 11/23/76 | 3. COUNTRY<br>Korea | 4. PAR SERIAL NO.<br>1977-3 |
|----------------------------------|---|---------------------|-----------------------------|

5. PROJECT TITLE

Korea Advanced Institute of Science (KAIS) 11p.

|   |   |                          |                           |
|---|---|--------------------------|---------------------------|
| 6. PROJECT DURATION: Began CY 1971 Ends CY 1977 | 7. DATE LATEST PROP<br>Project Paper<br>6-17-71 | 8. DATE LATEST PIP<br>NA | 9. DATE PRIOR PAR<br>None |
|---|---|--------------------------|---------------------------|

|                  |                                    |                                    |  |
|------------------|------------------------------------|------------------------------------|--|
| 10. U.S. FUNDING | a. Total Obligation : \$ 6 million | b. Current FY Estimated Budget: \$ | c. Estimated Budget to completion After Current FY: \$ |
|------------------|------------------------------------|------------------------------------|--|

11. KEY ACTION AGENTS (Contractor, Participating Agency or Voluntary Agency)

| a. NAME   | b. CONTRACT, PASA OR VOL. AG. NO.        |
|---|--|
| Korea Advanced Institute of Science (KAIS)          | Implementing Agency of the Loan Project. |
| U.S. Coordinating Office (USCO) Stanford University | Institutional Contract                   |

I. NEW ACTIONS PROPOSED AND REQUESTED AS A RESULT OF THIS EVALUATION

| A. ACTION (X) |       |      | B. LIST OF ACTIONS | C. PROPOSED ACTION COMPLETION DATE |
|---------------|-------|------|--------------------|------------------------------------|
| USAID         | AID/W | HOST |                    |                                    |

No new actions are proposed or requested as a result of this evaluation.

|   |                               |                              |                                 |  |                                |                               |  |
|---|-------------------------------|------------------------------|---------------------------------|--|--------------------------------|-------------------------------|--|
| D. REPLANNING REQUIRES                                |                               |                              |                                 |  |                                | E. DATE OF MISSION REVIEW     |  |
| REVISED OR NEW:                                       | <input type="checkbox"/> PROP | <input type="checkbox"/> PIP | <input type="checkbox"/> PRO AG | <input type="checkbox"/> PIO/T                         | <input type="checkbox"/> PIC/L | <input type="checkbox"/> PROT |  |
| PROJECT MANAGER: TYPED NAME, SIGNED INITIALS AND DATE |                               |                              |                                 | MISSION DIRECTOR: TYPED NAME, SIGNED INITIALS AND DATE |                                |                               |  |
| Mary C. Neville <i>mcn</i> 11/23/76                   |                               |                              |                                 | AID/REP: Dennis P. Barrett 12/1/76                     |                                |                               |  |

**II. PERFORMANCE OF KEY INPUTS AND ACTION AGENTS**

| A. INPUT OR ACTION AGENT<br>CONTRACTOR, PARTICIPATING AGENCY OR VOLUNTARY AGENCY | B. PERFORMANCE AGAINST PLAN |   |              |   |   |              |   | C. IMPORTANCE FOR ACHIEVING PROJECT PURPOSE (X) |        |   |   |      |   |
|--|-----------------------------|---|--------------|---|---|--------------|---|---|--------|---|---|------|---|
|  | UNSATISFACTORY              |   | SATISFACTORY |   |   | OUT-STANDING |   | LOW   | MEDIUM |   |   | HIGH |   |
|  | 1                           | 2 | 3            | 4 | 5 | 6            | 7 |   | 1      | 2 | 3 |      | 4 |
| 1. KAIS  |                             |   |              |   |   |              | X |   |        |   |   |      | X |
| 2. USCO, Stanford University   |                             |   |              |   |   |              | X |   |        |   |   |      | X |
| 3.   |                             |   |              |   |   |              |   |   |        |   |   |      |   |

Comment on key factors determining rating

KAIS has already recruited 98% of the project target number of faculty members, and they are unique in Korea in that 1) with the exception of a few members, they were educated in American universities in science and engineering graduate programs which are considered strong by U.S. standards, and 2) all of them hold Doctoral Degrees. This phenomenon is a striking contrast to the typical Korean university situation in which few faculty members have had professional preparation in graduate programs of a quality which is internationally acceptable, few are Doctoral Degree holders, and few have had the teaching, research, and industrial

(Cont'd)

|                         |  |  |  |  |  |  |   |  |  |  |  |  |  |   |
|-------------------------|--|--|--|--|--|--|---|--|--|--|--|--|--|---|
| 4. PARTICIPANT TRAINING |  |  |  |  |  |  | X |  |  |  |  |  |  | X |
|-------------------------|--|--|--|--|--|--|---|--|--|--|--|--|--|---|

Comment on key factors determining rating

A total of 35 KAIS faculty members have completed study/training programs in the U.S. as described in IV.B.2.b.(2) of this report. In the placement of these faculty members, USCO has attached special importance to the study/training programs and implemented excellent arrangements in placing faculty members in U.S. (Cont'd)

|                |  |  |  |  |   |  |  |  |  |  |  |  |  |   |
|----------------|--|--|--|--|---|--|--|--|--|--|--|--|--|---|
| 5. COMMODITIES |  |  |  |  | X |  |  |  |  |  |  |  |  | X |
|----------------|--|--|--|--|---|--|--|--|--|--|--|--|--|---|

Comment on key factors determining rating

Out of \$3.9 million allocated for laboratory equipment procurement, KAIS has purchased \$2,640,000 worth of equipment from March 1973 to date. The equipment purchased thus far includes critical equipment required for the seven departments and this equipment has been utilized fully for both the Master's and Doctoral (Cont'd)

|                        |              |  |  |  |  |  |   |  |  |  |  |  |  |   |
|------------------------|--------------|--|--|--|--|--|---|--|--|--|--|--|--|---|
| 6. COOPERATING COUNTRY | a. PERSONNEL |  |  |  |  |  | X |  |  |  |  |  |  | X |
|                        | b. OTHER     |  |  |  |  |  | X |  |  |  |  |  |  | X |

Comment on key factors determining rating

KAIS' achievement in developing in a brief period of time an entirely new and innovative institution, free of the limitations of traditional institutions, with 9 degree programs in 7 departments currently in operation has been recognized by leaders in industry and government especially in the Ministry of Science and Technology (MOST). The ROKG has committed in local currency an equivalent of \$11,370,000 for KAIS and their actual budget appropriation has exceeded the committed level to insure adequate financial support to compensate for cost escalation resulting from inflation.

|                 |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|
| 7. OTHER DONORS |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
|-----------------|--|--|--|--|--|--|--|--|--|--|--|--|--|--|

(See Next Page for Comments on Other Donors)

II. A. Comment on key factors determining rating (Cont'd)

experience which characterizes the capabilities of KAIS faculty members. With their outstanding qualifications, KAIS faculty members have offered graduate programs in applied science and engineering of a quality far higher than that of other Korean institutions. These programs have resulted in 100% employment of KAIS graduates in major industries and research institutes. This record is particularly noteworthy by comparison with the employment record of other Korean institutions where graduates in science and engineering encounter some difficulty in finding employment in the area in which they were trained.

Stanford University through USCO provided KAIS with the highest quality of leadership and continued direction through shuttle-type consultative services in 1) planning the institutional development of KAIS including KAIS' organizational structure and administrative systems and procedures; 2) identifying and selecting well-qualified prospective faculty members from Korean scientists in the U.S.; 3) arranging for appointments of top-level U.S. visiting professors to assist KAIS in planning curriculum, instruction, and research in the various departments; 4) designing tailor-made study/training programs for KAIS faculty members as stated in IV.B.2.h(2); and 5) assisting procurement of laboratory equipment and library materials as stated in III.H. The USCO headed by the Provost Emeritus and former Dean of Stanford's College of Engineering made available to KAIS the relevant resources of Stanford as required. The services of USCO can scarcely be surpassed in that throughout the life of the project they provided KAIS with the formulas for the development of a graduate school of applied science and engineering, vitally responsive to the needs of Korean industry.

II. A. 4. Participant Training (Cont'd)

universities which have strong applied science and engineering programs relevant to KAIS. In these study/training programs, faculty members from KAIS worked with counterparts at U.S. institutions and established professional relationships which

#### II. A. 4. Participant Training (Cont'd)

resulted in a two-way flow of scientific know-how and information. These programs were also valuable in enabling KAIS faculty members to identify laboratory equipment best-suited to the specific needs of Korean industry. See IV.B.2.b.(2) for additional information.

#### 5. Commodities (Cont'd)

programs, not only by faculty members for the teaching and research programs but also by students for regular class preparation and research assignments. See III. C. for further information. Out of \$600,000 allocated for library procurement, KAIS has ordered \$535,000 worth of library materials and has received \$292,000 worth of library materials in country. These materials have been utilized adequately by faculty members for preparation of course content, lectures, and laboratory work and by students for day-to-day study and for thesis and dissertation preparation.

### III. Outputs and Output Indicators

#### A. Construction of Buildings

With local currency KAIS has constructed an administration building which houses the library, the auditorium, the cafeteria and office space for 103 administrative and technical staff; one large building housing faculty offices and classrooms and laboratories for 650 students; and one faculty apartment building containing 60 units.

#### B. Faculty Recruitment

Against the original target of 50 regular members of faculty, KAIS to date has recruited a total of 49 (98%) all of whom hold Doctoral Degrees in the fields of science and engineering. See IV.B.2.b.(1) for additional information.

#### C. Laboratory Equipment

Whereas a total of \$3.9 million was originally allocated for laboratory equipment, spare parts and supplies for the 7 departments, KAIS to date has contracted \$2,814,000 and has received \$2,640,000 worth of laboratory equipment procurement. Delay in satisfaction of one of the Conditions Precedent (CP's) which was met in February 1973 resulted in a delay in the laboratory equipment procurement. KAIS is currently expediting laboratory procurement and it will meet the target by the end of 1977. Under the general guidance of USCO, precaution was taken in regard to the selection of equipment, to avoid overlap in equipment to be purchased for various departments and to insure that the laboratory equipment and related materials are compatible with the instruction and research programs at KAIS. The equipment installed at KAIS has been and is being appropriately utilized, by faculty for teaching and research purposes and by students for regular class preparation and research assignments including work on theses and dissertations.

#### D. Library

Whereas the original target for the library called for procurement of \$600,000 worth of books, journals and other library materials and equipment, KAIS to date has processed all requisitions to meet the target, has ordered through USCO \$535,000 worth of library materials, and has received \$292,000 worth of the library procurement.

### III. Outputs and Output Indicators (Cont'd)

Because of the unique nature of the KAIS program which emphasizes comprehension, reasoning, problem-solving, independent study and application of knowledge, the library has a important role in the instructional program. As stated in item C above, delay in the library procurement resulted from the delay in satisfaction of one of the CP's by ROKG. However, KAIS is expected to meet the target by the end of 1977.

#### E. Curriculum

In the two-year Master's programs, KAIS offers 9 degree programs within the 7 departments. In September 1975, the three-year Doctor of Science program was inaugurated at KAIS, and the first Doctoral Degrees are expected to be conferred in 1978.

#### F. KAIS Graduates

To date KAIS has graduated a total of 237 Masters of Science, 92 in August 1975 and 145 in February 1976, as described in IV.B.2.a. The original plan called for increasing class enrollment in the two-year Master's Degree programs to approximately 250 by 1977. Current class size is 150, and with the academic year beginning in March 1977, KAIS will reach the target admission of 250.

To date a total of 33 students are enrolled in Doctor of Science programs, 21 having started in September 1975 and 12 in 1976. As originally designed the Doctoral program is to start slowly and build up only as the demand for such specialists grows, to satisfy the needs of Korean industry and Korean research establishments.

#### G. Study/Training Programs for Faculty

Approximately 35 members of KAIS faculty have participated in study/training programs in the United States. These programs are scheduled normally two years following the faculty member's recruitment from the U.S. for the purposes described in IV.B.2.b.(2)

### III. Outputs and Output Indicators (Cont'd)

#### H. Consultative Services of the U.S. Coordinating Office (USCO)

From December 1, 1971 to date, USCO has provided comprehensive and coordinated services including the following: 1) assistance in planning the development of KAIS and in refining KAIS's organizational structure and administrative systems and procedures; 2) assistance in recruitment of the total number of KAIS faculty and arrangements for training of KAIS faculty as required and as described in IV.B.2.b.(2); 3) assistance in recruitment of U.S. visiting professors who have provided services equivalent to 6 professor-years, to assist in curriculum planning, instruction and research at KAIS; 4) assistance in equipment procurement including preparation of technical specifications, establishment of evaluation factors for review of bid documents, preparation of justification for waivers as required, review and analysis of technical and cost proposal submissions, preparation of recommendations to KAIS for contract awards as required, and procurement of urgently required laboratory equipment, spare parts and supplies; 4) assistance in library procurement as described in III.D.

|                     |             |                 |         |                |
|---------------------|-------------|-----------------|---------|----------------|
| AID 1020-25 (10-70) | PROJECT NO. | PAR FOR PERIOD: | COUNTRY | PAR SERIAL NO. |
| PAGE 4 PAR          |             |                 |         |                |

**IV. PROJECT PURPOSE**

A. 1. Statement of purpose as currently envisaged.

2. Same as in "PROP"?  YES  NO

To establish by 1977 a graduate school of applied science and engineering oriented toward the needs of Korean industry.

| B. 1. Conditions which will exist when above purpose is achieved.   | 2. Evidence to date of progress toward these conditions.   |
|---|--|
| <p>a. A qualified graduate program for Master's degree and Doctoral degree in seven(7) fields of industrial science, material science, mechanical science, electrical science, chemical science, biological science, and basic science and applied mathematics functioning by 1977.</p> <p>b. Teaching and research capability for graduate programs.</p> <p>c. Relationships established for school-industry cooperation and relevant feedback for curriculum improvement.</p> <p align="right">(Cont'd)</p> | <p>a. KAIS admitted their first class of 106 students in September 1973, their second class of 146 students in March 1974, their third class of 135 in March 1975, and their fourth class of 145 in March 1976. KAIS graduated their first class of 92 Master of Science (M.S.) Degree holders in August 1975; their second class of 145 M.S. Degree holders in February 1976, making a total output of 237 M.S. Degree holders to date. Each class (Cont'd)</p> <p>b.(1) Against the original target of 50 regular members of faculty, KAIS has recruited a total of 49 (98%) since the establishment of KAIS in 1971. (Cont'd)</p> <p>(2) In addition to the teaching, research and industrial experience cited in item b.(1) above, 35 members of the KAIS faculty have completed study/training programs in the U.S. since 1972, during periods of time ranging from 2 to 6 months. (Cont'd)</p> |

**V. PROGRAMMING GOAL**

A. Statement of Programming Goal

To produce high quality scientific and engineering personnel to meet needs of Korean economic development.

B. Will the achievement of the project purpose make a significant contribution to the programming goal, given the magnitude of the national problem? Cite evidence.

Korea's Third Five-Year Plan predicted a tremendous need for high-level scientific and technical personnel to cope with rapid industrialization precipitated by the continuation of the strong export drive in Korea. With the rapid pace of development, including emphasis on the major role of technology to expedite industrialization, there was a growing awareness that the Korean higher education system was not producing the type and quality of graduates in the fields of applied science and engineering required by the Korean economy. At the graduate level, education in applied science and engineering in the U.S. sense was almost entirely lacking in Korean universities. Laboratory facilities were very inadequate by Western standards, and the amount of laboratory instruction was relatively small. Students were typically taught to memorize what was in their textbooks, with (Cont'd)

PAGE 4 PAR

IV. B. 1. Conditions which will exist when above purpose is achieved (Cont'd)

d. Reverse brain drain and fewer Koreans going abroad for graduate study in applied science and engineering.

IV. B. 2. Evidence to date of progress toward these conditions (Cont'd)

a. (Cont'd)

contained 25-35 students from industry, and these students returned to positions in their industries upon completion of their Master's program at KAIS. The Doctoral program at KAIS was inaugurated in September 1975. A total of 33 Master of Science Degree holders from KAIS have been admitted to this program. All other KAIS graduates had commitments for employment by major industries and research institutes such as Pohang Steel Mill Co., Youngnam Chemical Co., Daehan Electronic Co., Hyundai Shipbuilding Co., GM Korea Co., KIST, etc., in advance of their graduation and took up their employment immediately upon graduation from KAIS.

b.(1) (Cont'd)

Except for a few faculty members, all others were educated in the U.S., earned their doctoral degrees from American universities, and obtained substantial teaching, research and industrial experience in the U.S. In addition to the 49 regular members of faculty, KAIS has appointed 21 part-time adjunct professors, to strengthen and supplement the capability of KAIS faculty.

b. (2) (Cont'd)

The purpose of these study/training programs is a) to update and strengthen the teaching and research capability, and b) to increase the industrial know-how of KAIS faculty members. These study/training programs were tailored by USCO, Stanford University, to build a KAIS faculty with the academic preparation and research ability to offer courses required for quality degree programs in each of the departments.

IV. B. 2. Evidence to date of progress toward these conditions (Cont'd)

c. In the initial years beginning in 1971 KAIS made major efforts to establish a close relationship with the public and especially with leaders of industry. These efforts have sensitized them to KAIS' unique role in meeting a critical need of Korea's rapidly-developing economy. This need is for scientists and engineers who have received graduate education not only of a quality that is internationally acceptable, but also of an orientation and direction required to deal with the particular technological problems presented by Korean patterns of development. These sensitization efforts were aimed at developing a mutually beneficial school/industry relationship under which KAIS students would receive on-the-job training at industrial plants, to provide the students a practical understanding of the real situation of industry. In this reciprocal process, industries benefited from the expertise of KAIS professors involved in the program. On the basis of feedback obtained, the KAIS curriculum has been modified appropriately to reflect the desires and needs of industry vis-a-vis course content and laboratory/research work. All graduates of the first two KAIS classes received substantial in-plant training.

d. The fact that to date KAIS has repatriated from the U.S. almost all of the 49 current members of the regular KAIS faculty is an objectively verifiable indicator of reverse brain drain. If KAIS did not exist with the type of program it has, taught by highly qualified faculty members 100% of whom have Doctoral Degrees, a significant number of the students who have studied or are studying at KAIS might have gone abroad for graduate education in applied science and engineering. In addition to the incentive provided by the type and quality of the program, KAIS students are also attracted by valuable fringe benefits. Expenses of tuition, fees, and dormitory accommodations are borne by KAIS, and students receive an allowance for books and food, and are exempted from military service after graduation from KAIS. Full functioning of KAIS by 1977 will lead to a decrease in the number of Koreans pursuing graduate study of this nature in foreign countries.

V. B. Will the achievement of the project purpose make a significant contribution to the programming goal, given the magnitude of the national problem? Cite evidence. (Cont'd)

the result that the training was heavily theoretical, with minimum attention given to the application of knowledge and technical know-how to real problems. Professors of applied science and engineering had no industrial experience, and little knowledge of the living world of applied science and engineering that existed in industry outside the campus. In addition, many Korean professors lacked adequate training in modern science and engineering and had seldom an opportunity to update their knowledge. As a result of these factors, the Korean graduate schools in applied science and engineering were not producing high quality scientific and engineering personnel to meet the specific needs of the Korean economy, and they had little impact on the Korean economy.

The creation of KAIS was a bold and dramatic breakthrough toward the establishment of a unique institution destined not only to remedy the ills of the educational system described above, but also to launch a new graduate education in applied science and engineering characterized by emphasis on problem-solving ability, on application of knowledge rather than on rote memorization of content, and on first-hand laboratory experience, all oriented toward the needs of Korean industry, and thereby resulting in the production of scientific and engineering personnel required for the economic development of Korea.

Korean industrialists and leaders in the science and engineering community realize that with the establishment of KAIS, AID has sown a seed and the seed is growing to meet the demands of Korean industry.