TECHNICAL MANPOWER DEVELOPMENT FOR AFGHANISTAN AT KABUL UNIVERSITY

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United States Agency for
International Development
Kabul, Afghanistan

Gentlemen:

Herewith is the draft of the report concerning Technical Manpower Development for Afghanistan, prepared by the Academy for Educational Development, Inc. Because of its nature, a few additional words of explanation are required to supplement the report.

The report recommends interventions in the program of the Faculty of Engineering designed specifically to improve the capability of graduates for work on projects directly useful to the rural poor people, as required in the scope of work statement. This major part of the overall program can be accomplished whether or not the other recommendations affecting AIT and VTE are activated.

As the team learned more about the whole situation in Kabul, it became evident that our project design should be expanded to include the recommended changes in AIT and VTE, although administrative considerations may prevent adoption of these parts of the project. Strong synergistic relations pertain which, if politically possible, make the package program both logical and highly cost-effective.

As a further possible division of the project, the 13th and 14th years of the Engineering Technicians Program can go forward at AIT, even though VTE is not transferred to AIT. This Engineering Technicians Program at AIT could serve as a "topping off" for graduates of grade 12 of other vocational schools throughout the country.

Before leaving this subject, the team should report its conclusion that unless AIT and VTE are given help as recommended in this report, both will probably succumb for lack of sustenance.

Very sincerely yours,

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B

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The consulting team wishes to express its appreciation to the many persons who assisted them during their six weeks at Kabul University. The University provided office space and secretarial assistance through the courtesy of CECSAR. The team was responsible to Dr. Stanley Handleman of AID, who assigned direct responsibility for all day-to-day support to Dr. Richard E. Gibson.

Conferences were held with AID and Embassy personnel, Kabul University Faculty of Engineering administrative and teaching staff, Afghanistan Institute of Technology officials, and several people in the Ministries of the Government of Afghanistan. All of these people were highly cooperative and contributed to the ability of the team to perform its assigned task effectively and to understand the local constraints and social mores.

Particular appreciation must be expressed for the great interest of Dr. Richard E. Gibson and his associate, Dr. Norman F. Bolyea, in providing background material, in contributing their own professional evaluations, in scheduling appointments with the people conferred with, and in the giving of their personal time to assure our personal comfort.

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C

TABLE OF CONTENTS

NOTE: The paragraph and Annex numbering and lettering accords with standard USAID format for project papers (PP).

d

I. PROJECT ISSUES
(I. E)

1. There must be agreement by students, faculty, and the GOA that most graduates of the Construction Engineering curriculum will be assigned for their first jobs to field service on rural development projects. The whole purpose of the new curriculum is to train the graduates to be practical and capable in such field work. If they are not so utilized, there is little reason for this project. Provision is made to counsel the students and to enlist the help of the faculty in understanding this matter. The employing ministries must also be encouraged to have a similar understanding.

2. The Vocational Technical Education (VTE) program should be transferred to AIT only if AIT is under the same control as the University of Kabul. Although VTE needs access to the laboratory and shop facilities at AIT, it is vital that it also have available the general courses offered by the various departments at KU. It needs the University umbrella under which to conduct its laboratory school and grant degrees. As indicated in the Letter of Transmittal, the decision on this issue is not fatal to the basic aim of the project, which is improvement of the engineering graduate.

3. The proposed constitution for the Center for Engineering Consulting Services and Applied Research (CECSAR), or one accomplishing essentially the same aims, must be approved. The restriction of the present operating rules practically eliminates the possibility of realizing the potentialities for solving the numerous development problems of the rural areas, while simultaneously giving the faculty the needed opportunity for practical research and professional experience. CECSAR can make a major contribution toward making practical the experience of both the students and the members of the Faculty of Engineering. If CECSAR cannot be made a viable organization, this project should be modified by adding an Engineering Experiment Station to the Faculty of Engineering.

4. Chronic continuing program failures and inefficiencies at both KU and AIT are directly attributable to the failure of the Government of Afghanistan to procure and to spend minimally adequate operating and maintenance funds on a regular basis. There must be some assurance that these deficiencies will be corrected. Adequate provision must be made for continuing procurement of required commodities. The project provides internships for procurement personnel and minimal commodities funds.

II. PROJECT BACKGROUND AND DETAILED DESCRIPTION (II. A, II. B)

A. Background

During the past several months, AID/W and USAID/A have been in an intense dialogue endeavoring to develop a concept for the Technical Manpower Development (TMD) project which would provide useful assistance to the engineering faculty and meet AID's program regulations that all AID-funded projects must directly benefit the rural population.

Another constraint in developing the concept has been the restricted AID funding of education projects the world over. The project proposed herewith should fall within the allocated funding limitations.

Before proceeding with the details of the TMD concept, it should be presented as part of AID's effort to be responsive to GOA's oft-repeated request for assistance in manpower development projects, especially at the various levels of technical skills. In the past, several manpower-related programs have been proposed. One of these, the Intermediate Technical Skills (ITS) project, is of particular relevance to the TMD project.

As the TMD project is designed, it includes much of the basic output of technicians from AIT for work on rural development programs that were included in the ITS project. The major thrust of this TMD project, however, is directed to changes in the curricula of the Kabul University Faculty of Engineering to make its graduates more capable of direct involvement in projects benefiting the rural poor.

The Government of Afghanistan has determined that one of its greatest needs for trained manpower is in engineering. Having been assured of U.S. support to meet its needs, the GOA increased the first-year enrollment in

engineering to provide a 4.2-fold increase in graduates, from 110 to 465, and spent about $1,400,000 of its own funds as its commitment to get the U.S. support, expected to be in the order of $25,000,000. In accordance with policy of the Congress of the United States, and after review by AID/W, this amount was reduced to $7,000,000 and resulted in the following stated objective for the TMD team:

> "The objective of the Work Order is to assist the GOA in the development of a technical manpower project by developing a series of project design recommendations for proposed interventions in the training program of the Kabul University Faculty of Engineering aimed at enhancement of the capacity of Kabul University Engineering graduates to carry out technical tasks of rural engineering."

The "PID" for the project further states (on page 6, paragraph 1, a. 4):

> "The present curricula must be redesigned for a more practical orientation, and to reduce present high attrition rates."

The same paragraph states:

> "The TMD project would further promote practical and applied teaching by continuing a modest support for the Center for Engineering Services and Applied Research (CECSAR)."

In the "Scope of Work" provided the TMD team prior to arrival in Afghanistan, it is stated on page 3 that "they (members of the TMD team) must address but are not limited to:

> "a. Improvement in the quality of Kabul University engineering graduates flowing into rural-oriented construction and water projects designed to assist the rural poor.

"b. Strengthening core courses at Kabul University Engineering for all engineering students, with special attention to those student streams moving towards the construction and water engineering elements of rural infrastructure development.

"c. Establishing engineering management thinking as a part of the curriculum at Kabul University Engineering, with particular reference to those student streams moving towards construction and water engineering elements of rural infrastructure development.

"d. Establish on-going research/monitoring concerning the utilization of engineering graduates trained to work on rural-oriented matters and creation of some system for projecting demand.

"e. Consideration of a division of the KU curriculum into two or more tracks, with the possibility of an applied engineering track producing a more field-oriented, less theoretically-skilled engineer/technician for rural development activities.

"f. Qualitative changes deriving from the actual development needs of Afghanistan rather than quantitative changes."

In attempting to meet this multiplicity of challenges, the TMD team visited rural construction sites, conferred with KU Faculty of Engineering administrators and teachers, AID personnel, and government officials. From these many hours of discussions, it became apparent that special consideration had to be given to the training of high-level technicians, and that the involvement of the Afghan Institute of Technology in the development of an appropriate program became highly desirable. The assistance of personnel with intermediate technical skills is so essential for the effective functioning of an engineer--and particularly on small rural projects directly impinging on the poor --that an integration of AIT into the overall educational program recommendation could not be avoided.

B. Detailed Description

The GOA has recognized that the future development of Afghanistan is, to a large extent, dependent upon the training of technical manpower, particularly as it pertains to the graduates of the Faculty of Engineering of Kabul University. In order to meet the needs of its Seven-Year Plan, the GOA greatly increased the number of admissions to the Faculty of Engineering. The TMD team, in consideration of its scope of work (paragraph A, above), decided that both the Faculty of Engineering of KU and the Afghan Institute of Technology had to be involved in the project, the former to produce the engineers, and the latter to produce some of the high-level engineering technicians required to enable the engineer to work effectively in the field.

For convenience, the specific recommendations of the TMD team are listed under four major headings, i.e., Kabul University Faculty of Engineering, CECSAR, AIT, and Vocational Technical Education (VTE).

1. Kabul University Faculty of Engineering

a. Five-Year Curriculum Called Construction Engineering

This entirely new curriculum is designed to train an engineer in a broad spectrum of topics from all fields of engineering, including eight hours of management and supervision techniques. He becomes a generalist and thus can have immediate impact on the types of problems encountered and decisions to be made in the rural construction environment. The curriculum is considered terminal and does not lend itself to the pursuit of graduate degrees. (See Annex)

b. Modification of Present Curricula

The core program for all curricula (except architecture, which remains one year) is reduced from five semesters to four, and includes a new seven hours of Afghan History and Economics. Beyond the core, each curriculum has eight hours of management-related topics added. (See Annex)

c. Professional Practice

This semester of on-the-job training is to be developed in such a way that students will get valuable field experience, particularly in the construction of small structures in rural areas. Appropriate consultants will be provided over a two-year period, their objectives being improved logistics, preliminary planning, and objective evaluations of the students' experiences. If a viable program cannot be established in two to three years, this graduation requirement should be dropped.

d. Textbooks for Construction Engineering Graduates

A set of basic textbooks, handbooks, and a slide rule are to be given to each graduate of the Construction Engineering curriculum if he accepts an assignment to work in a rural area. He must have his "tools" available at all times, or he is like a carpenter without a hammer and a saw. Alternate reference sources are not available to him.

e. Organization of the Faculty of Engineering

The adoption of a department head system of organization is recommended in order to reduce the inordinate number of students and faculty reporting directly to the Dean. The delegation of authority and responsibility along academic lines must be accomplished in order for the Dean and his office to be an expediter of planning, policy development, budgeting, etc.

f. Engineering Library

Government of Afghanistan funds should be provided for the growth and development of the Engineering Library. This pertains particularly to current periodicals in each of the appropriate fields in order that the faculty has a continuing "outside contact" to help keep them up-to-date.

g. Vocational Technical Education

This much needed and good program should be transferred to AIT. It is not engineering, and to be viable must be in a location where it has access to a wide range of shops giving "hands-on" experiences. The Faculty of Engineering has no such facilities and VTE thus is a "step-child" in the Faculty of Engineering and surely will "die on the vine" if it remains there. (See paragraph 4 for further discussion)

h. Advisor to FE of KU

A full-time advisor for a five-year period is recommended. He also is to be Chief-of-Party and should be a civil engineer with academic experience who understands the problems of small, labor-intensive, rural projects. (See Annex)

i. Consultants

Short-time consultants, usually six weeks to six months, will be provided in the areas of management, curriculum development, and training of the faculty; chemistry, physics, and mathematics; practical experience; teaching methodology, audio visual aids, programmed learning, etc; design and set-up of a reproduction center; procurement; space utilization; computer selection, location, and scheduling the modus operandi; and other special course consultants to outline, develop, and perfect new and improved courses as the need arises during the five-year life of the program. A total of 144 man-months is called for. (See page 86)

j. Participants

The Faculty of Engineering looks on participantships as a salary subsidy, and every member of the faculty is looking for a way and/or means of getting to the United States for one or more years of graduate study and/or professional experience. This project supports a limited number of participantships, restricted almost entirely to areas of supported faculty strengthening. Four participantships lead to the PH.D. degree in the engineering curricula (CE, EE, ME, and Construction Engineering); three lead to the Ph.D. degree in Chemistry, Physics, and Mathematics (one each), for in these areas such a degree is absolutely necessary for achieving professional competence. The Ph.D. support is for three years and the M.S. support for two years, of which one and one-half years would be in school. The additional six months is for gaining practical experience, if possible. A total of 175 man-years is planned, of which 24 are for the B.S. level of training, 114 for the M.S., and 21 for the Ph.D. The short-term internships are planned for members of the administrative staff and directors of professional practice. The numbers of people involved are seven and two, respectively, for a total of five man-years. Eleven visiting lectureships are provided for a total of 10 man-years. These will help mature members of this young faculty by giving them teaching experience at American colleges of engineering.

k. Architecture

This appears to be a good program, generally outside the scope of this project.

l. Itemized Renovation/Equipment

A few of the laboratories will require minor renovations to provide for effective instruction. (See Annex) Certain of the existing laboratories will require limited amounts of new equipment. The proposed new laboratories will also require new equipment. (See Annex)

The largest single capital expenditure will be the computer, estimated to cost about $150,000. A consultant will be provided to assist in its

selection, installation in a controlled environmental room, and development of a modus operandi. (See Annex)

The successful operation of these laboratories, as well as those of the entire Faculty of Engineering and at AIT, depends upon the availability of certain minimal U.S. dollar funds for the purchase of parts for laboratory equipment and supplies for U.S.-built machines and/or instruments. (See Annex)

2. Center for Engineering Consulting Services and Applied Research (CECSAR)

Many of the land-grant universities in the United States have engineering experiment stations in their colleges of engineering whose purpose is to foster, coordinate, and publish the results of faculty research and research requested and paid for by industry and government. It is believed that CECSAR can serve these same purposes for the Faculty of Engineering. In addition, CECSAR can provide a means for members of the faculty to gain much-needed professional practice. It is on these bases that the following provisions are made for the strengthening and continued growth of CECSAR.

a. Develop a Journal or Bulletin Series

The Faculty of Engineering needs an outlet for publishing the results of its research and other professional experiences so that it can report to the technical community of Afghanistan, as well as to other countries. A portion of the indirect charges for professional services should be available to support the initiation of applied research by members of the faculty working under CECSAR guidance. A practical means of researching many problems of direct benefit to the rural poor thus is proposed. In many cases, the research performed will result in the employment of students, also giving them much-needed practical experience.

b. Advisor

A full-time advisor for five years is recommended. He will serve as a stimulus of faculty research on

rural development problems and direct the establishment of the proposed publication, possibly serving as editor.

c. Consultants

There is no specific recommendation for consultants, but they can be obtained under the heading of "other consultants," the need for which may become evident during the program.

3. Afghan Institute of Technology

a. New Two-Year Engineering Technicians Programs

The AIT is admirably equipped to extend its programs to the 13th and 14th grade levels and granting a technician or "Assistant Engineer" certificate. Such well-trained supporting personnel (in the ratio of about five technicians to one engineer) are required for the effective use of an engineer, particularly in the rural areas where one engineer could be responsible for several small projects. The seven proposed curricula, all new and in the category of higher education, can be grouped under three general headings, which follow.

* Engineering Areas

  --Civil;

  --Electrical; and,

  --Mechanical

* Specialized Areas

  --Inspection;

  --Soils; and,

  --Surveying

* Business and Record Keeping

---Site Business Management

b. Vocational Technical Education

This program for the training of teachers for vocational high schools should be transferred from the Faculty of Engineering of Kabul University to AIT because AIT has many of the needed shops. Further, the transfer would bring together under one administration three types of programs--all of which require shops and hands-on experiences; the traditional 9th through 12th grade programs; the new 13th and 14th grade technicians programs; and VTE. This combining of related programs will change the traditional nature of AIT by significantly raising the level of its course offerings and by enabling it to become the most outstanding school in Afghanistan to train high-level engineering technicians and vocational secondary school teachers.

NOTE: To effectively implement the merging of programs as recommended and to continue them on a successful operating basis, it will be necessary for the GOA to regularly provide AIT with additional funds of considerable magnitude.

c. Advisor to AIT

A full-time advisor for a five-year period is recommended. He is to be experienced and adept at directing instruction in sub-engineering programs at grades 13 and 14. He also will help evaluate programs as they are activated.

d. Consultants

Four to six short-time consultants, to assist in setting up the seven new technician programs, for a total of 21 man-months, are recommended.

e. Participantships

The teachers for the seven technician programs should hold a B.S. degree. Provision is made for eight teachers to spend a maximum of three years each (24 man-years) in the United States. In addition, there is provision for a procurement specialist to spend six months in the United States.

f. Itemized Renovation/Equipment

A few of the laboratories will require minor renovations to provide for effective instruction. (See Annex) Certain of the existing laboratories will require limited amounts of new equipment. The new laboratories proposed will also require new equipment. (See Annex) The successful operation of these laboratories, as well as those of the entire Faculty of Engineering and AIT, depends upon the availability of certain minimal U.S. dollar funds for the purchase of parts for laboratory equipment and supplies for U.S.-built machines and/or instruments.

4. Vocational Technical Education (VTE)

Vocational Technical Education is a four-year B.S. program in the Faculty of Engineering, even though it is not an engineering program. Its purpose is to train teachers for the vocational high schools, the number of which is to be almost doubled under the current seven-year plan of GOA. The number of entering students was increased this year from 20 to about 200. To achieve its purpose, VTE must have a variety of shops at is disposal to give its students a wide variety of hands-on shop experiences. There are no such shops in FE, whereas they are available at AIT. The economical use of available facilities indicates that all programs requiring the extensive use of shops be combined into one institution. It is thus recommended that VTE be transferred to AIT, that the VTE curriculum be modified to accept advanced standing students completing the new 13th and 14th grade technician programs, that enrollments in the present AIT 9th through 12th grades be reduced so that they can become a laboratory school for the practice teaching of VTE students, and that the entire combination of activities be transferred to the

Ministry of Higher Education, where it could be recognized as a separate faculty of Kabul University or a separate institution.

NOTE: It will be necessary for the GOA to provide AIT with additional funds of considerable magnitude to effectively carry out the complete development of the VTE transfer, as described, and for the operation of the new two-year high-level technician programs described in paragraph 3. a.

III. PROJECT ANALYSIS
(III. A)

A. Technical Analysis

1. The Problem

a. General

The GOA has determined that one of its greatest needs for trained manpower is in engineering. Consequently it had the FE of KU increase, this year, its entering class more than fourfold. The TMD charge, stated briefly, is to develop a series of project design recommendations for proposed interventions in the training program of the Kabul University Faculty of Engineering graduates to carry out technical tasks of rural engineering. The ultimate objective is to assist the rural poor.

b. The Question of Quality in the FE

There is no doubt in the team's mind that the quality of the faculty and, in turn, of the graduate engineer is the highest in Afghanistan. There also is no doubt that the quality of each is spotty and, more worrisome, that both are in immediate jeopardy of significant decline.

The conditions of facilities, equipment, and library, as well as staff, are such that typical U.S. accreditation undoubtedly would be withheld, should such standards be applied in Afghanistan. Several points may be highlighted:

--One-half of the instructional facility (the new addition has not yet been completed) is not kept clean and probably will have no heat again this winter. This exists after several years in a similar status, even though the FE has taken beneficial occupancy.

--Teaching laboratores at the core level are underequipped, requiring that six or more students must work as a group to perform one experiment. In other cases, only a single piece of apparatus is available, which is demonstrated to the

laboratory section.

--The FE library has less than 5,000 volumes (exact count not available); these are not modern texts, for most are 15 years old. No current journals in any field are regularly received and made available to the faculty and students. No plan for continous updating and enlargement of the collection is in operation. Scholarly work is neither reasonable nor possible under the circumstances.

The average preparation and experience of the faculty is low by U.S. standards. The morale, too, is low as a result of the very low governmental salaries, living conditions available within their income, and the lack of participation in planning by the faculty concerning future goals. These points are worthy of some dissection:

--The salary of faculty members is on a par with other civil servants, who might have four to six years less education and who function with considerably less responsibility. This leads many faculty to outside efforts which yield supplemental incomes, an action which diverts attention and energy away from their primary responsibility to the University. Of all the benefits available to the faculty, the possibility of obtaining a U.S.-assisted participantship ranks as a major portion of the perceived "compensation" of being a member of the faculty. This could lead to a graduate degree proliferation which is not focused towards long-range faculty expertise in accordance with objectives as they relate to the needs of Afghanistan.

--Living conditions available to the faculty in Kabul are better than in other areas of the country, but enormously less than reasonable to people schooled in the knowledge of modern sanitary standards, heating, lighting, nourishment, and construction. The drive to obtain better living conditions pushes hard on the area of compensation, forcing faculty to seek extra income secondary jobs. Consideration by the GOA for provision of faculty housing on a self-amortizing basis is warranted.

--Planning and goals are not evident. The Dean has not moved real powers to the discipline level, and the time pressures on the senior official are such as to preclude his efforts toward long-range planning and setting forth challenges and chores for his faculty. The delegation of budget control and other day-to-day matters to departments formed around the major disciplines is extremely necessary. Doing so will free the Dean from a thick blanket of trivia, and will be of great assistance in the maturation of the faculty.

The responsibility of the Government of Afghanistan toward its support is possibly unrecognized but certainly is unfulfilled. Indeed, there seems to be no perception among the faculty that the GOA either knows or cares about what incremental assistance is needed by FE/KU or AIT. The TMD team feels that the foregoing, operating in concert, will lead to a precipitous decline in the already fragile quality of instruction and faculty capability which exists.

c. The New Challenge to Quality

The quality of engineering education has improved in recent years due to the provision, now, of textbooks, drawing instruments, and soon-to-arrive laboratory equipment for freshmen. The analysis of the nation's seven year Plan has led to estimates of the need for trained engineers many times the current production rate. This led the Ministry of Planning to instruct the FE to begin a freshmen intake sufficient to produce 350 engineering and architectural graduates per year. Discussions at the time, late 1976, led all parties concerned to believe that additional significant resources would immediately become available to FE from both GOA and U.S. sources. Therefore, the entry class was expanded fourfold to almost 1,000 entering students.

However, the expected support from U.S. sources has not become available. This current project design is a successor to the earlier indication of support, and is limited to technical manpower development to benefit the rural poor and qualitative improvements in FE curricula and staff. In brief, the support expected for the quantitative expansion will not be forthcoming from the project. Therefore, the team is compelled to look at quality of the future as effected by the sudden rise in freshmen and the feed-through of these students into the advanced courses courses.

The surge of students will be diminished by attrition of

at least 40 percent prior to the March 1978 semester. However, an approximate "four times" increase will appear in the upper-level courses in 1979, and that leads to the greatest sources of danger. The current available teaching staff numbers about 60, supplemented by Peace Corps volunteers in the basic sciences and English. The saturation population based upon current freshmen inputs and a continuation of present attrition is in excess of 2,600 students in Engineering and Architecture. Even with undesirably high credit hour teaching loads for each member, the faculty needed would exceed 170.

Discussions with the Dean and others indicate such a faculty size is attainable only by hiring the more capable of the new graduates in the next several years, there are few other sources of faculty suitable for the English teaching methodology of the FE. In addition, the current staff need upgrading to the M.S. level, and doing so removes the badly needed faculty from the available staff. The result is an enormous decrease in the average age and experience of the on-duty staff. The team believes this will lead to a distressing decline in the already worrisome quality of instruction and will result in an inferior product for the critical needs of Afghanistan. While we believe that instructional facilities and equipment, as well as general operating support and organization, are not geared to this sudden burden, no amount of GOA or other support can produce the human resources--the faculty--needed to meet this surge of students and maintain reasonable quality of the engineering education. The team believes that Afghanistan has more to gain from producing a limited number of properly educated engineers than from a large number of graduates unable to be functional in their desciplines.

The team urges all decision makers within the Ministries of Planning and Higher Education, as well as the officials of FE and KU, to assess the situation with a view toward reducing the input of freshmen, beginning in March 1978, and maintaining a lower but increasing number until a more mature, larger faculty and additional instructional and office facilities become available. This time pace may well take on the order of five years or more.

2. The Solution

The recommended solution is rather broad-based and can be most easily summarized under four headings--Faculty of Engineering (FE), Center for Engineering Consulting Services and Applied Research (CECSAR), Afghan Institute of Technology (AIT), and Vocational Technical Education (VTE).

a. Faculty of Engineering

The curricular and faculty needs are met by:

--Establishment of a new five year curriculum called Construction Engineering, producing a graduate with a breadth of training appropriate for working on small projects in rural areas. The curriculum and a course brief follow.

CONSTRUCTION ENGINEERING CURRICULUM

CORE SEM 1, 2, 3, 4, (65 HR)

5th SEM	CR HR	TEACH DEPT
ENGR MECH II	3	CONS
STRENGTH MATLS (4)	3	CE
* MGMT HUMAN RES	3	CONS
ELECT ENGR I	3	EE
MFG PROCESS I	3	ME
	15	

6th SEM		
THERMO I	3	ME
HYDROLOGY I	3	CE
** SURVEY II (4)	3	CE
STRUC ANAL I	4	CE
* WATER MGMT	2	CONS
* SHOP FOUNDRY PROJ	2	ME
	17	

7th SEM		
* CONS TECHNIQUES I	4	ARCH
GEOLOGY I	3	CE
REINFORCED CONCR I	4	CE
* PRINC of SANITATION	3	CONS
* ENGR ECON & ACCT'G	3	CONS
	17	

8th SEM	CR HR	TEACH DEPT
CONS TECH II	4	ARCH
CONS MGMT & ECON	3	CONS
ELEC DISTR SYSTEMS	2	EE
MOBILE POWER SOURCES	4	ME
SPECS & CONTR (CE)	2	CONS
NON-TECH ELECTIVE	2-3	
	17-18	

9th SEM	
PRACTICE	17
	17

10th SEM		
COMPUTER LANG & PROGRAM	3	CE
TRANSPORTATION	4	CE
CE ELECT	3-4	
ME EE ELECTR	3-4	
NON-TECH ELECTIVE	3	
	17	

Key * NEW
** REVISED

HOURS TO GRADUATE - 167
(QUAL PTS BASED ON 150)

CONSTRUCTION ENGINEERING CURRICULUM (cont'd)

YEARS 3, 4, and 5	HRS	
* MGMT HUMAN RES	(3)	Psychology Sociology-based: Effective people management, training, work measurement, safety.
0 SURVEY II (4)	(3)	Reduce Credit: Reduce depth of coverage, field time.
* PRINC of SANITATION	(3)	Modern micro-biological concepts applied to problems of water pollution, effects on human health.
* SHIP FOUNDRY PROJECT	(2)	Student required to complete one project on machine tools, one project foundry/ forge.
* MOBILE POWER SOURCES	(4)	I.C. engines, power transmission, conveyor systems, farm and small construction machinery. Lab and field study, surface and deep water use and control as practiced.
* WATER MGMT	(2)	In Afghanistan: Future improvements and designs.
* ENGR ECON & ACCTG	(3)	Effective use of manpower, cost considerations, cost control and accounting, estimating building, drawing procedures, plans sections, elevations, details.
* ELEC DIST SYSTEMS	(2)	Study of town-size secondary distribution systems, load calculations, transformer sizing, house and building (non-industrial) systems, protection, and safety.
* SPECS & CONTR	(2)	Sample writing Different Seq. Cons. EE & ME.
* COMPUTER	(3)	Programming and use of digital computer systems. Laboratory with sample problems.
* PRACTICE	(17)	Pass-fail. Closely coordinated work experience with interpretive report paper from student to stress identification of problems encountered or perceived and solutions accomplished or proposed. Employers to report on standardized format on student performance.

OTHER NEW COURSES

* ENGR MGMT	(3)	For EE, ME, MGMT in a technical environment, responsibilities of an engineering manager, social/public side of management, responsibility, use of budget information, computer applications to management.
* CONSTRUCTION TECHNIQUES I AND II	(4)	I. For Constr. Curric. Construction drawing methods, working drawings, materials,

applications, costs.
II. Continuation of I. Lab experience in construction techniques - wood, masonry, concrete, effects of poor quality, control of basic material, mixing, or installation.

Key
* New
0 Modified

(2) Present curricula in CE, EE, and ME are modified to reduce the core curriculum from five to four semesters. A new seven hours of Afghan history and economics is included in all curricula.

MODIFIED PRESENT CORE CURRICULUM

	CR HRS	
1st SEM - SPRING		
ENGL I (4)	4	NO CHANGE
0 MATH I (4)	3	DECREASE CREDIT. Algebra - Trigonometry
ENGR DWG I (3)	3	NO CHANGE
0 INTROD to ENGR (4)	2	DECREASE CREDIT. Measurements, least squares, graphs, logs, slide rules, no laboratory. Reduce redundancy with physics.
* AFGAN HISTORY	3	1/3 Ancient, 1/3 Modern, 1/3 World Relationships
	15	
2nd SEM - FALL		
ENGL II (4)	4	NO CHANGE
0 MATH II (4)	3	DECREASE CREDIT. Analytic geometry. Differential calculus, integral calculus
ENGR DWG II (3)	3	NO CHANGE
0 PHYSICS I (4)	4	Shorten treatment, add heat part of Phys II
* AFGHAN ECON	2	Development of the Republic Economic Systems, seven year Plan, goals and needs
	16	
3rd SEM - SPRING		
ENGL III (2)	2	NO CHANGE
0 MATH III (4)	3	DECREASE CREDIT. Integration, determinates plane analytic geometry
PHYSICS II (4)	4	Drop heat, keep electricity, add magnetism and light from Phys III
CHEM I (4)	4	NO CHANGE

SURVEY I (3)	2	Basic surveying, errors and analysis, angle measurement, traverse computations, topographic maps. Lec I lab
* WORLD ECON	2	FREE trade, currency systems, credits, financial cycles, oil economy, inflation, Afghan position
	17	

4th SEM- FALL

* TECHNICAL ENGL	4	Serial combination of Engl IV and technical communication
0 MATH IV (4)	3	Solid geometry differential equations, vectors, series (some topics from current math V)
* ENGR MAT'LS	3	Nature and performance of commonly used engineering materials under loads greater, composition and processing effects. Lab.
CHEN II (4)	4	NO CHANGE
ENGR MECH I (3)	3	NO CHANGE
	17	

65 HR TOTAL

(3) Beyond the core, the CE, EE, and ME courses are modified to include a new eight hours of management related courses.

The modified curricula follow.

MODIFIED CURRICULUM - CIVIL ENGINEERING

CORE SEM 1, 2, 3, and 4 - 65 HRS

5th SEM	CR HRS	TEACH DEPT
ENGR MECH II	3	CE
STR MTLS (4)	3	CE
ELECR ENGR I	4	EE
* MGMT HUMAN RESOURCE	3	CONS
* COMPUTER	3	EE
	16	

6th SEM	CR HRS	TEACH DEPT
HYDROLOGY	3	CE
SURVEY II (4)	3	CE
STRUCT ANAL I	4	CE
THERMO I	3	ME
FLUID MECH	4	CE
	17	

7th SEM	CR HRS	TEACH DEPT
HYDRAULICS	5	CE
GEOL I	3	CE
REINF CONC I	4	CE
CONSTRUC TECH I	4	ARCH
* SPECS & CONTRS (CE)	2	CONS
	18	

8th SEM	CR HRS	TEACH DEPT
SOIL MECH	4	CE
REIN CONC II	4	CE
TRANSPORT	4	CE
WATER SUPPLY	4	CE
CONSTR MGMT & ECON	3	CONS
	19	

9th SEM	CR HRS
PRACTICE	17
	17

10th SEM	CR HRS	TEACH DEPT
FOUNDATIONS	4	CE
DESIGN PROJECT	3	CE
WASTE WATER ENGR	4	CE
TECH ELECT	3	CE
NON-TECH ELECT	3	
	17	

COURSES DESIGNATED/SELECTED
WITH ADVISOR TO ENHANGE SPECIFIC
AREA OF INTEREST.

168 HOURS TOTAL

MODIFIED CURRICULUM - ELECTRICAL ENGINEERING

CORE SEM 1, 2, 3, and 4 -- 56 HRS

5th SEM	CR HRS	TEACH DEPT
EL ENGR I	4	EE
STR MATLS (4)	3	CE
ENGR MECH II	3	CONS
MATH V (4)	3	
* MGMT OF HUM RES	3	CONS
	16	

6th SEM		
ELEC ENGR II	4	EE
MATH VI	3	
FLUID MECH	4	CE
THERMO I	3	ME
* COMPUTER	3	EE
	17	

7th SEM		
ELEC ENGR III	3	EE
ELECTRONICS I	3	EE
ENERGY CONV I	3	EE
EE LABORATORY	2	EE
TECH ELECT	3	EE
NON-TECH ELECT	-	
	17	

8th SEM	CR HRS	TEACH DEPT
ELECTRONICS II	3	EE
POWER SYSTEMS	3	EE
CONTROL SYSTEMS	3	EE
EE LABORATORY	2	EE
* ENGR MGMT	3	CONS
TECH ELECTIVE	3-4	EE
	17-18	

9th SEM	
PRACTICE	17
	17

10th SEM		
ENERGY CONV II	3	EE
TRANSMISS LINES	3	EE
COMMUNICATIONS	3	EE
EE LAB	2	EE
DESIGN PROJ	3	EE
NON-TECH ELECT	2	EE
* SPECS & CONTRS (FE)	2	CONS
	18	

COURSES/SELECTED WITH ADVISOR
TO ENHANCE SPECIFIC AREA OF INTEREST

167 TOTAL HOURS

MODIFIED CURRICULUM - MECHANICAL ENGINEERING

CORE SEM 1, 2, 3, and 4 - 65 HRS

5th SEM	CR HRS	TEACH DEPT
ENGR MECH II	3	CONS
STRENGTH MATLS (4)	3	CE
* MGMT HUMAN RES	3	CONS
ELECT ENGR I	3	EE
MATH V (4)	3	
	17	

6th SEM		
FLUID MECH	4	CE
THERMO	3	ME
KINEMATICS	2	ME
ELECT MACHINERY	4	EE
NON-TECH ELECT	3	
	16	

7th SEM		
DYNAMICS OF MACH	4	ME
THERMO II	4	ME
MGF PROSC I	3	ME
TECH ELECT	3	ME
* COMPUTER	3	EE
	17	

8th SEM	CR HRS	TEACH DEPT
ME LAB I	2	ME
SEMINAR	2	ME
HEAT TRANSFER	3	ME
* ENGR MGMT	3	CONS
TECH ELECTIVE	3	ME
NON-TECH ELECT	3	
* SPECS & CONTRS (ME)	2	CONS
	18	

9th SEM	
PRACTICE	17
	17

10th SEM		
ME LAB II	2	ME
DESIGN PROS	3	ME
TECH ELECT	3	ME
TECH ELECT	3	ME
TECH ELECT	3	ME
NON-TECH ELECT	3	
	17	

167 HOURS TOTAL

4. The semester for on-the-job professional practice is to be strengthened by the granting of 17 hours of credit; by consultants working with appropriate faculty members to improve logistics, preliminary planning, and objective evaluation of the students' experiences; and by practice internships to several faculty members.

5. A set of basic textbooks, handbooks, and a slide rule is to be given to each graduate of the Construction Engineering curriculum if he accepts an assignment to work in a rural area. He must have his "tools" available at all times, for alternate reference sources are not available to him.

6. The adoption of a department head system of organization is recommended for the FE in order to reduce the inordinate number of students and faculty reporting directly to the Dean. The delegation of authority and responsibility along academic lines must be accomplished in order for the Dean and his office to be an expeditor of planning, policy development, budgeting, etc.

7. The Engineering Library urgently needs GOA funds for growth and development. This pertains particularly to current periodicals in each of the appropriate fields in order that the faculty and students have a continuing "outside contact" to keep them up-to-date on what is going on in their specialties.

8. Vocational Technical Education should be transferred to AIT because it is not engineering and because it belongs where there are ships for "hands-on" experience of its students.

9. A full-time advisor for a five-year period is to be Chief-of-Party of the project team.

10. Short-time consultants, usually for periods of six weeks to six months will be provided, particularly in the areas of management, curriculum development, and in-house training of the faculty; in chemistry, physics, and mathematics; in practical experience; in teaching methodology, audio visual aids, programmed learning, etc.; in design and set-up of a duplicating center; in procurement; in space utilization; and in computer selection, location, scheduling, and modus operandi. Other special course consultants to outline, develop, and perfect new and improve courses will be selected as need develops. (See Annex.)

11. A counseling and placement consultant will assist in setting up a student counseling and placement office. He will work

with two to three members of the faculty who will be identified as part-time career guidance counselors. Students will be counseled regarding the advantages of enrolling in the Construction Engineering curriculum, the possible desirability of the student transferring from engineering to an engineering technician program, and, at graduation, the acceptance of a position in the rural areas of Afghanistan. The consultant also will assist in establishing alumni records of such nature that the employment of graduates and their success can be maintained.

12. Many participantships and internships are to be provided. It is most unfortunate that members of the faculty look at these opportunities as a salary subsidy rather than as an opportunity to do a better job of teaching. Only four are recommended to lead to Ph.D. degrees in the engineering curricula because such academic training does not directly improve a teacher's capability to better prepare students for careers in rural areas to benefit the poor. There also are one each leading to the Ph.D. degree in chemistry, physics, and mathematics, for in those areas such a degree is necessary for achieving professional competency and for developing the strong science and mathematics programs required for the engineering students. Most of the participantships are for the M.S. level of training because the large number of new B.S. hirings must be given the opportunity for obtaining an M.S. degree as soon as possible. Internships are provided for members of the administrative staff and directors of professional practices in order that they gain first-hand experience in other successful administrations.

13. Architecture has a good curriculum. The various new courses in the Construction Management curriculum will add significantly to its teaching load.

14. Some of the laboratories require minor renovations to provide for effective instruction, and some laboratories require some new equipment.

b. <u>Center for Engineering Consulting Services and Applied Research</u>

CECSAR was established to give members of the Faculty of Engineering an opportunity to gain badly needed professional practice and to stimulate research. To strengthen CECSAR's ability to function as intended and involve more members of the FE, the following items are recommended.

--Develop a journal or bulletin series to provide a publication outlet to the FE.

--Have a portion of indirect charges for professional services return to CECSAR to support the initiation of applied research by the FE, particularly as it applies to benefiting the rural poor.

--There will be an advisor for five years. He will serve as a stimulator of faculty research on rural development problems and direct the proposed CECSAR publication, possibly serving as editor. (See Annex)

--There are no specific recommendations for consultants, but if a need develops they can be obtained under the heading of "other consultants." (See Annex)

c. Afghan Institute of Technology

For an engineer to work effectively, particularly in rural areas, he must be supported by well trained, high-level technicians. Such personnel are not being trained in Afghanistan at the present time, particularly those required to be supportive to the graduates of the new construction engineering program in the FE of KU. Thus, the proposals are as follow:

--Introduce seven new curricula at the 13th and 14th grade levels, giving the graduates a certificate of "Assistant Engineer." The seven areas are civil engineering aid, electrical engineering aid, mechanical engineering aid, inspection technician, soils technician, survey technician, and site business-management technician. The curricula for these badly needed high-level tachnicians follow.

CIVIL ENGINEERING TECHNICIAN

1st SEM	CR HRS
ENGLISH (EXPOSITORY WRITING)	3
TECH MATH I (INCL. SLIDERULE)	4
ORIENTATION TO ENGR. TECH.	2
TECH DRAWING I	4
MATERIALS & PROCESSES I	5
	18

2nd SEM	CR HRS
TECH REPORT WRITING	3
TECH MATH II	3
TECH DRAWING II	4
PHYSICS W/ APPLICATION I	3
PHYSICS LAB I	1
MATERIALS & PROCESSES II	3
	17

3rd SEM	
CONSTRUCTION MGT.	2
CONSERVATION & NATURAL RES	3
GEOTECHNICS & SOILS	4
ENGR PROJECT PLANNING	3
APPL HYDRAULICS & DRAINAGE	4
STATICS	3
	19

4th SEM	
ELEM SURVEYING	4
DESIGN INSPECTION & PROCEDURES	3
STR OF MATERIALS & LAB	5
CONSTRUCTION OF HIGHWAYS	3
CONCRETE CONSTRUCTION	3
	18

ELECTRICAL ENGINEERING TECHNICIAN

1st SEM	
ORIENTATION TO ENGR TECH	2
CIRCUITS - DIRECT CURRENT	4
CIRCUITS - ALTERNATE CURRENT	4
TECH MATH I (INCL. SLIDE RULE)	4
ENGLISH EXPOS WRITING	3
	17

2nd SEM	
VACUUM TUBE FUNDAMENTALS	4
TRANSISTOR FUNDAMENTALS	4
NETWORK ANALYSIS	3
TECH MATH II	3
PHYSICS W/ APPLICATIONS I	3
PHYSICS LAB I	1
	18

ELECTRICAL ENGINEERING TECHNICIAN (cont'd)

3rd SEM	CR HRS
TRANSISTOR CIRCUITS	4
PULSE & DIGITAL CIRCUITS	4
APPL CALCULUS FOR TECH	3
PHYSICS W/APPLICATIONS II	3
PHYSICS LAB II	1
ELECTRICAL DRAFTING	3
	18

4th SEM	CR HRS
DIGITAL COMPUTER CIRCUIT ANALYSIS	4
TECH REPORT WRITING	3
MOTORS, GENERATORS & TRANSFORMERS	4
ELECTRICAL COMMUNIC SYSTEMS	4
POWER TRANSMISSION & DISTRIBUTION	3
	18

MECHANICAL ENGINEERING TECHNICIAN

1st SEM	
ENGLISH (EXPOSITORY WRITING)	3
TECH MATH I (INCL SLIDE RULE)	4
ORIENTATION TO ENGR TECH	2
TECH DRAWING I	4
MATERIALS & PROCESSES I	5
	18

2nd SEM	
TECH REPORT WRITING	3
TECH MATH II	3
TECH DRAWING II	4
PHYSICS W/ APPLICATION I	3
PHYSICS LAB I	1
MATERIALS & PROCESSES II	3
	17

3rd SEM	
MATERIAL TESTING	5
BASIC MECHANISMS	3
MACHINE DESIGN I	3
STATISTICAL METHODS	3
METALLURGY & HEAT TREATMENT	3
	17

4th SEM	
INSTRUMENTS	3
MACHINE DESIGN II	3
QUALITY CONTROL	3
FLUID POWER	3
INTERNAL COMBUSTION ENGINES	4
	16

INSPECTION TECHNICIAN (EQUIPMENT--MATERIALS)

1st SEM	CR HRS
ORIENTATION TO ENGRG TECH	2
INTRO TO ENVIRONMENTAL ENGINEERING	3
TECH MATH I (INCL SLIDERULE)	4
ENGLISH (EXPOS WRITING)	3
CONSTRUCTION MATERIALS	2
CONSTRUCTION MANAGEMENT	2
	16

2nd SEM	CR HRS
ELEMENTARY SURVEYING	4
TECH REPORT WRITING	3
HYDRAULICS & PNEUMATICS	3
TECH MATH II	3
TECH DRAWING	4
	117

3rd SEM	
FOUNDATION ENGRG	3
STATICS	3
INTERNAL COMB ENGINES	4
MECHANISMS & MECHANICS	5
PERSONNEL RELATIONS	3
	18

4th SEM	
DESIGN INSPECTION & PROCEDURES	3
COMPUTING & ESTIMATING	3
CONCRETE CONSTRUCTION	3
STRENGTH OF MATERIALS	5
ROAD SPECS & MATERIALS	5
	19

SOILS TECHNICIAN

1st SEM	
ORIENTATION TO ENGRG TECH	2
INTRO TO ENVIRONMENTAL ENGINEERING	3
TECH MATH I (INCL SLIDERULE)	4
ENGLISH (EXPOS WRITING)	3
CONSTRUCTION MATERIALS	2
CONSTRUCTION MANAGEMENT	2
	16

2nd SEM	
ELEM SURVEYING	4
TECH REPORT WRITING	3
HYDRAULIC & PNEUMATICS	3
TECH MATH II	3
TECH DRAWING I	4
	17

SOILS TECHNICIAN (Cont'd)

3rd SEM	CR HRS
SOILS CHEMISTRY	4
GEOTECHNICS & SOILS	4
SOILS LAB	4
FOUNDATION ENGR	3
STATICS	3
	18

4th SEM	CR HRS
SOIL PHYSICS	4
DESIGN INSPEC & PROCEDURES	3
COMPUTING & ESTIMATING	3
CONCRETE CONSTRUCTION	3
STR OF MATERIALS & LAB	5
	18

SITE MANAGEMENT TECHNICIAN

1st SEM	
ENGLISH (EXPOS WRITING)	3
TECH MATH I	4
ACCOUNTING I	3
INTROD TO BUSINESS ORGANIZ	3
BUSINESS MACHINES	3
	16

2nd SEM	
BUSINESS LETTER WRITING	3
FUNDAMENTALS OF SPEECH	3
ACCOUNTING II	3
STATISTICS	5
PURCHASING	3
	17

3rd SEM	
SURVEY OF COMPUTER SCIENCE	4
INTRODUCTION TO ECONOMICS	5
PSYCHOLOGY	5
COST ACCOUNTING	3
	17

4th SEM	
HUMAN SIDE OF COMPUTERS	4
INTRODUCTION TO FINANCE	3
STATISTICAL INTERPRETATION	4
BUSINESS LAW	3
INTERMEDIATE ACCOUNTING	3
	17

SURVEYING TECHNICIAN

1st SEM	CR HRS
ORIENTATION TO ENGRG TECHNOLOGY	2
CONSTRUCTION MGT	2
CONSTRUCTION MATERIALS	2
INTROD TO ENVIRON ENGRG	3
ENGLISH (EXPOS WRITING)	3
TECH MATH I (INCL SLIDERULE)	4
TECH DRAW I	4
	20

2nd SEM	CR HRS
ELEMENTARY SURVEYING	4
TECH REPORT WRITING	3
HYDRAULICS & PNEUMATICS	3
TECH DRAWING II	4
TECH MATH II	3
	17

3rd SEM	
CONSERVATION OF NATURAL RESOURCES	3
GEOTECHNICS & SOILS	4
ADVANCED SURVEYING	4
ENGINEERING PROJ PLAN	3
STATISTICAL METHODS	3
	17

4th SEM	
DESIGN & INSPECTION PROCEDURES	3
STATISTICS	3
COMPUTING & ESTIMATING	3
APPLIED HYDRAULICS & DRAINAGE	4
LAND SURVEYING	3
	16

--A full-time advisor for a five-year period is recommended. In addition to getting the seven new two-year programs into operation, he will assist in evaluating courses as they are activated and help, as needed, in the integration of VTE into AIT.

--Four to six short-time consultants will be provided to assist in developing the new courses and/or laboratories for the seven new technician curricula.

--The teachers for the seven new technician programs should hold a B.S. degree, and so eight participantships are provided for spending a maximum of three years each in the United States.

--A few of the laboratories will require minor renovations and some equipment. The new laboratories also will require equipment. Further, the successful operation of all these laboratories and/or shops is dependent on certain minimal U.S dollar funds being available on an annual basis for the purchase of parts and supplies for U.S. built machines and instruments.

--VTE should be transferred from the FE to AIT in order that all curricula requiring shops be grouped together under one jurisdiction. (See the next paragraph for a more complete discussion of the VTE situation)

d. Vocational Technical Education

VTE is a four-year B.S. program in the Faculty of Engineering, even though it is not an engineering program. Its purpose is to train teachers for the vocational high schools, the number of which is to be almost doubled under the current Seven-Year Plan of the GOA. The number of entering students, this year, was increased from 20 to over 200.

To achieve its purpose, VTE must have a variety of shops at its disposal to give the students a wide variety of hands-on shop experiences. There are no such shops in FE, whereas they are available at AIT. The economical use of available facilities indicates that all programs requiring the extensive use of shops be combined into one institution. This, however, presents some difficulties, which are:

--Involvement of two Ministries. AIT is under Education whereas VTE in Kabul University reports to the new Higher Education Ministry.

--Need for additional shops and/or equipment at AIT to accommodate VTE.

--Efficient year-round and all-day use of AIT facilities to maximize capacity and accommodate VTE.

--Housing of students of a wide range of ages.

--Need for funding by the GOA on a continuing and greatly expanded basis for both AIT and VTE.

--The unmet need of VTE for a high school for practice teaching by its students.

--VTE's need for access to KU for the teaching of some of its general education courses.

The TMD team found no agreement among those it consulted regarding what should be done. There seemed to be several possible solutions, and after much deliberation concluded that:

> "VTE be transferred to AIT, that the VTE curriculum be modified to accept with advanced standing students completing the new 13th and 14th grade technician programs, that enrollment in the present AIT 9th through 12th grades be reduced so that they can become a laboratory school for practice teaching by the VTE students, and that the entire combination of activities be transferred to the Ministry of Higher Education, becoming a seprarate faculty of Kabul University."

The above recommendation is a one-package recommendation, for the deletion of any one part seriously weakens the whole. Further, the recommendation is quite similar to that of a totally independent unpublished report the TMD team learned about after the team had reached its own conclusions.

The recommendation and the new high-level two-year technician programs precent a whole new educational program for AIT. It successfully pioneered a challenging

program at its inception, and now it has the opportunity to meet another challenge. To effectively carry out the complete development of the plan recommended, and including the new technician programs, it will be absolutely necessary for the GOA to provide AIT with funds of considerable magnitude on a continuing basis! The funding of the TMD project, unfortunately, can assist VTE only in the following ways:

--Provide consultants.

--Participantships will be provided in order to upgrade the faculty's capability.

--Present shops of AIT will be upgraded.

--The new shops and equipment for the seven new technician programs will provide additional resources.

e. Student Flow and Articulation of Curricula

The diagram on page 49 shows the relationship between the various curricula for engineers and engineering technicians. The flow is based on producing 350 graduates annually in the Faculty of Engineering, the number which had been previously determined by GOA and FE, and 235 engineering technicians or "assistant engineers", to use Afghan terminology. The FE graduates receive the B.S. degrees in five years, just as in the past. The graduates of the technician programs at AIT would receive certificates in the respective areas of study at the end of two years.

The survival factors (top of sheet, second line) are current fugures obtained from the Dean of the Faculty of Engineering. Working backward from the number of graduates gives a new student enrollment of 718 each year. They enter the "common core" along with 137 repeaters, to giva a total of 855 students for the first year and 411 at the end of the two-year core curriculum.

1. CORE CURRICULUM. 718 new students and 137 repeaters (as shown by the dashed line on the chart) enter at the beginning of the first year of study. At the start of the second year, 342 have dropped out, 137 of whom are assumed to re-enter the program the next year; 68 (shown as "X" on the chart) are lost to other Faculties, job opportunities, etc. Actually, they are the ones who probably should not have been in engineering anyway. It is believed that appropriate counseling in the Faculty of Engineering regarding abilities, goals, and job opportunities and the required close cooperation with AIT officials will "salvage" about half of those judged to be capable of continuing with a technical education by giving them a new choice of entering the two-year technician programs at AIT. These transfers would be those of high technical ability but who find the rigorous mathematics and science requirements of the engineering curricula beyond their capability; they would be those who work best with their hands on a "how-to-dow" basis rather than the more rigorous "why" basis of engineering. At the end of the second year of the core program there would be a similar recycling, 49 re-entering the second year of study; 49 going to the technician (Assistant Engineer) programs at some advanced level, and 25 being lost to the technical manpower pool. This salvaging of technical manpower is a new concept in the education of the students at the two institutions involved -- the Faculty of Engineering and AIT. It is recommended that a committee composed of representatives from the two institutions be set up to counsel and advise students in selecting their specific programs of study. It is believed that many engineering students are unaware of the opportunities available in the Engineering Technician fields and will pursue such studies when they are adequately informed

2. ARCHITECTURE. At the end of the first year of the core curriculum thirty students continue in architecture, along with six repeaters (as shown by the dashed line on the chart) for a total of 36 students and the ultimate graduation of 21. At the end of the second year, three architecture students drop out and are lost to the technical education field; on the chart this is indicated by an "X". This is representative of the current situation and the TMD recommendations have no bearing on this currilulum although the teaching load is considerable increased by the new consturction program.

3. ENGINEERING MAJORS. The desired outcome for the selection of curricula by the 411 students entering the third year is 40 percent for construction engineering and 20 percent each for civil electrical, and mechanical engineering. The number of students are 165, 22, 82,and 82, respectively. It is very important for the GOA and the Faculty of Engineering to encourage students to take the construction

engineering curriculum, to stress the national need for engineers in the rural areas and to insure appropriate employment there in their area of expertise upon graduation. To assist in achieving this objective it is recommended that a student counseling office be established and that a counseling and placement consultant be provided to assist designated Afghan personnel to become career guidance counselors. The numbers of civil, electrical, and mechanical engineering graduates is not significantly different from the current plans, but their programs have been altered to include eight hours of Afghan history and economics and eight hours in the general area of management. These same curricula are the ones that will lead to the very limited number of graduates continuing with graduate sutdy abroad and as needed in Afghanistan.

4. ENGINEERING TECHNICIAN OR ASSISTANT ENGINEER. The input for these seven new programs comes from three cources -- 122 newly admitted students, 100 from the end of the first-year core program for engineering, and 21 from the end of the first year of the VTE program, for a total of 243. Normal attrition shouls result in 235 receiving their certificates. It shouls not be assumed that this new program will meet all the high-level engineering technician needs of Afghanistan. Other schools, the German Technical Schools in particular, do provide some 13th and 14th grade training, and many good technicians are developed by on-the-job experience; some organizations also train their own technicians. The unique feature of this program is the cooperative "salvaging" of students, keeping them in the technical manpower pool. Also, the seven new areas of training all are supportive of the construction engineer and thus enhance his capability for working effectively in rural areas.

5. VOCATIONAL TECHNICAL EDUCATION. 157 new students, 21 repeaters, and 37 transfers form the end of the first year of the engineering core program -- a total of 215 -- constitutes the group entering the first year of study. Normal attrition will result in 130 receiving the B.S. degree at the end of four years of study, a number consistant with present plans for the training of teachers for vocational high schools.

f. Requirement for Curriculum Changes

Preface

The engineer-graduate from the Faculty of Engineering, Kabul University, is currently perceived as the best

product available to assist the nation in meeting the construction and operational imperatives of the GOA current seven year plan. However, field investigations by the TMD Team lead to the conclusion that the current graduate is highly skilled in the theoretical aspects of his education but lacks hands-on experience skills, and an understanding of the kind of decision making process required for a project engineer operating in a remote rural setting, or, indeed, in many situations common to the practice of engineering.

USAID and the GOA agree that an important enabling factor to meet their goals of an improved status for the rural poor and improvement in the rural setting. On site visits the team has observed insufficient engineering corrections to site problems quite apparent to the team, even though several GOA engineers were at the site at the same time. The team attributes the lack of correctional orders or suggestions to the lack of practical, hands-on construction experience for the engineers involved. In each case the problems were a result of field conditions, i.e. equipment failures, material shortages, or improper work application. In each case, the "cost" of the project would not have been changed; however, the "value" was substantially diminished

because of an inferior product which leads to a lessened lifetime of the structure or higher maintenance costs.

The team perceives that the conditions at a rural site are such that numerous engineering decisions or alternative work procedures must be instituted on a daily, or even hourly basis. While this would be a requirement of his station, the engineer at the site finds himself standing alone and without any means of communication with other engineers or the project designer. Therefore, the engineer must have a broad knowledge of many facts of engineering, management, human relations, materials, and procedures the resources needed for him to make an intelligent decision. In addition, he should have adequate reference material to look up relationships and perform calculations if required.

While this description of the need of a certain type of engineer is not meant to imply that none exist, the large numebr of rural development tasks such as bridges, jui systems, schools, health centers, etc. now being undertaken requires that large numbers of new engineers be trained and placed to function in the rural areas. If these personnel are increasingly available, the benefits resulting from higher value and more rapid

completion of rural development projects will directly accrue to the rural population.

The team's assessment of the current curriculum indicates that it primarily produces a product designed for a graduate school. It produces a person "vertically" schooled into a specialty, as compared to the need for a "horizontially" schooled person to meet the needs of rural development. The team also believes, however, that the nation does need some persons with skills that are currently being produced. These people can become the Faculty of the future, and also become the disigner of future roads, bridges, buildings, electric power systems, machines, industrial plants, etc. Therefore, the Faculty of Engineering should save that which exists in the amount necessary, but at the same time reorient its talents and resources to produce an additional, different product the construction engineer. Also, minor changes in the other curricula will produce a generally more useful graduate in those fields without sacrifice of the graduate school marketability or the engineer's design capability.

The curriculum recommendations are directed to the creation of a better product - the Constructio Engineer - for directing site work in the rural areas, as well as

improvements in certain abilities in the graduates of the traditional curricula. In addition, the improved curricula should help the performance of each governmental department or industry because the graduates have management training.

Discussion of curriculum Change Recommendations

a. Core Curriculum

The present core curriculum extends the student into levels of mathematics and physics believed not necessary for most of the students at FE. Further, it has some evident redundancies which could be eliminated with more effective teaching, i.e., teach it once, thoroughly rather than twice with insufficient depth. The present core has no social science component. Also, the five semester length plances the degree field choice unnecesarily late in the total curriculum; most U.S. students have three professional study years in a four year curriculum. The current FE core leaves only two and one half years (effectively two years due to the practice semester). It is proposed to modify and strengthen the CORE by the addition of eight credit hours of Afghan History and Economics and the addition of a survey type hands-on laboratory course in Engineering Materials. Modifications in the credit hours awarded for mathematics and Introduction to Engineering, the combination of three physics courses into two, the combination of two English courses into one, and the continuation of some limited commonality in the 5th semester allows room for the new course introduction and permits a start on the professional course sequence to begin in the fifth semester, which will give two and one half years plus practice within the chosen discipline.

b. Construction Engineering Curriculim

A new professional curriculum, to be completed in five years, is suggested to lead to a B.S. in Engineering degree with Construction Engineering as the major topic. it will equip an engineer with a broad background of construction studies to allow the engineer to be a decision maker in isolated rural settings where-in he is unsupported by other engineers and lacks the means to rapidly communicate with other

engineers. After progress thru the modified core curriculum, the construction engineer will take new courses in human relations, water management, construction techniques, sanitation, electrical distribution systems, engineering economics and accounting, mobile power sources, specifications and contracts, and computer programming and application. In addition, through the use of courses now offered the engineer will be given mechanics, strength of materials, shop processess (including hands-on experience), thermodynamics, hydrology, surveying, structures, geology, reinforced concrete, construction management and economics, and transportation. Two technical electives and two non-technical electives are available. The practice semester is continued (See "practice"below.)

-- The TMD team suggests this new curriculum with the full belief that it is as rigorous and demanding as the other programs leading to the B.S. degree. At the same time, because it has a horizontal coverage of many facets of all fields of engineering and companion disciplines, it does not provide for easy continuation into graduate school in one of the traditional fields of engineering. Therefore, Construction Engineering should be considered to be a curriculum leading to a terminal B.S. degree.

c. Other Engineering Curricula

Many engineering graduates will assume important roles in the GOA in later years. The inclusion of management skills and a knowlege of national and world economics will pay huge dividents as these persons graduate and mature. Hopefully, some of the current management deficiencies will be supplanted by more effective mechanisms. Those pursuing the traditional CE, EE, and ME curricula will take the same modified core, ending in four semesters, and begin the professional curricula in the fifth semester. Recommended changes include the addition of computer programming and use (already a requirement but not in the printed catalog) and a course sequence in management related topics. These graduates will become more valuable as engineers because of the additions and changes, and in later life as managers of technical units of the GOA.

d. Practice

A uniform complaint of employers is that the new engineering graduate lacks the judgement which comes from experience. In the United States this is overcome by cooperative programs in which the student gains experience in three or more work periods while in college; other employers start the new graduate into a structured traineeship lasting as long as a year, to overcome his lack of experience. Neither model is appropriate for the current state of development of Afghanistan and its centers of engineering employment.

The current curricula at FE releases the student for a 4-month period of practical experience during his 9th semester (spring). Though loosely organized at present, some students obtain significantly beneficial experience; others do not.

The team believes that the practice semester is beneficial, but should be improved so that every student can gain from it. This requires a coordinated, constructive effort between the faculty and the employers of engineers and a critical evaluation of the work experience. Problems arising from culture (for instance, unwillingness of an engineer share his work responsibilities with a person who may, in the future, challenge his position) and financial reward for the student working in rural areas (no extra stipend for lack of living accomodations, eating facilities, transportation, and health care at the point of employment) must be resolved. It is proposed that the practice semester be awarded normal credit hours for one semester of work, i.e. 17, and be graded pass-fail; that faculty be assigned on a proportionate credit hour-demand basis; that the TMD project supply an experienced consultant to assist the faculty in structuring and evaluating the relations with employers; and that the GOA encourage all areas of employment of engineers to participate in this cooperative program.

In addition to governmental agencies and industries, CECSAR could provide practical work experience for some students. Primarily intended to make available the talent of the faculty of engineering to the GOA and others, CECSAR is at the same time a way in which both faculty and students can obtain valuable practical design and field experience.

(1) Impact of Curriculum Change Recommendations Upon Faculty of Engineering

a. General

The total credit hour burden of the new and revised curricula is virtually the same as the steady state burden of present curricula. However, the recommended curricula will cause increases in student loads for civil engineering and construction engineering curricula. Due to different projected major enrollments, there will be decreases in anticipated loads in mechanical and electrical engineering. (See Faculty Population Section) The new laboratory burden is the three laboratories: mobile power sources, engineering materials, and computer laboratory. Other laboratory burdens can be met by changes in the use of existing laboratories during the teaching week. Reassignment of laboratory hours is needed in only one course. Commodities and limited operational support, in addition to GOA funds, will be needed in the new laboratories and in the existing ones impacted by the new curriculum.

The design team feels quite strongly that the facilities available to the Faculty of Engineering are not utilized near to saturation. For instance, the present day is between 0800 and 1130 (4 periods) and 1300 - 1700 (4 periods). Earlier starting, a flexible lunch hour (not one for 2 hours) with the university dining hall serving from 1130 to 1330, and a later ending could add 4 or more class periods to the schedule day - an increase in "apparent" facilities of at least 50 percent. In addition to these, changes in the school calendar, which now leave the facilities unused 1/4 of each year, could add another 33 percent to the apparent facilities. These two changes in concert would double facility availability. However, it is not necessary to implement these changes in order to meet the laboratory needs of the new and modified curricula. Such changes may be needed to meet other instructional space needs, but no such studies were carried out in this program.

b. Faculty Population

The faculty distribution suggested by the division of students of the various curricula into the areas of instruction is indicated in Table 1. This Table uses credit hour (CH) weighing techniques, i.e. a core course is computed at 1.0 weighted credit hours (WCH) per one registration CH. Advanced courses, above core level, are weighted at 1.5 CH per registration CH. The purpose of this weighting is to equalize the computed faculty load of upper-level courses, smaller in size and requiring intensive preparation and instruction, and the large, lecture-type classes typically used in lower-level instruction. Full faculty teaching loads are based upon a 12-credit hour teaching load for non-laboratory disciplines and 9-credit hours for laboratory disciplines. This means that for a lower-level laboratory discipline with a class size of 25 and a teaching load of 9-credit hours per semester, the total yearly weighed credit hours (WCH) per instructor is 450. For the non-laboratory disciplines the similar figure is 12-credit hours x 30 students x 2 semesters, for a total WCH of 720. For upper-level courses, the "1.5 factor" is accounted for in the third column of Table 1. Since graduate students are not available to assist with homework correction, recitation, and laboratory instruction, these are formidable loads for a faculty member.

The data in Table 1 indicate a desired steady-state faculty population of 172 for the Faculty of Engineering. Additional faculty elsewhere in Kabul University also are needed for teaching Afghan Studies, English, and the non-technical electives. Faculty populations less than those indicated would diminish the quality of instruction! The faculty load factors used are among the higher range of those encountered in the more respected institutions in the U.S.

The data in Table 2 indicate the credit hour loads for instructional areas and degree curricula. The data of Table II are the basis for Table I, using the "Area Credit Hour Load Total," last column, to the nearest 50. Table 1 reveals that all faculties have great growth needs. This is healthy from one point of view -- preventing a "hardening" or early maturity of the entire faculty. However, all areas are faced with the same tremendous expansion problem. Advantages accrue from the selectivity to be applied to new faculty hires and in the advanced degree or other training choices available. However, the growth in civil engineering, probably too large, may be reduced by redefining some existing courses into the construction engineering department. Such choices should be left to the detail decisions preliminary to the faculty acceptance of the recommended curricula.

Caution must be raided, however, about the danger to quality of instruction which could result from too rapid faculty hiring and a lessening of average teaching and practical experience. This concern is expanded upon elsewhere in this report.

TABLE 1

ANNUAL INSTRUCTIONAL LOADS - STEADY STATE (VTE NOT INCLUDED)

Area	Core Credits Wt. 1.0 (1)	Advanced Credits Wt. 1.5	Total Weighted Credit Hrs.	Projected Number of Faculty At 450WCH (2)	Projected Number of Faculty At 720WCH (3)	Total	Current Faculty (4)
Afghan Studies	5,350	-	-	-	7	Not FE	-
English	10,050	350 (1)	10,400	-	13		-
Physics	5,550	550	6,100	14	-	37	4 (4)
Math	8,300	1,300 (1)	10,000	-	13		5 (4)
Chemistry	4,250	-	4,250	10	-		2 (4)
Architecture	-	3,700	3,700	12 (7)	-	135	9
Civil Engineering	2,650	15,350	18,000	40	-		21
Construction Management	3,300	6,750	10,050	22	-		0
Electric Engineering	-	9,950	9,950	22	-		15
Mechanical Engineering	5,150	8,450	13,500	30	-		14
Practice	-	6,300 (1)	6,300	-	9		-
					TOTAL FE 172	70(5)(6)	

(1) No weighting factor applied
(2) 9 credits x 25 students Aug Size x 2 semesters = 450 credit hrs.
(3) 12 credits x 30 students 2 2 semesters = 720 credit hrs.
(4) Plus Peace Corps assistance
(5) Plus 2 administrative positions
(6) On-duty faculty approximately 50; balance on participantships for advanced degree
(7) Architecture = 2/3 (450 hrs) = 300 CH due to Studio Teaching

TABLE 2

ANNUAL CREDIT HOUR LOADS

(BY INSTRUCTIONAL AREA & DEGREE CURRICULUM)

Area	Curriculum Core*	Con-struction	Civil	Mechanical	Electrical	Archi-tecture	Advanced cr. hrs. Subtotal	Area Credit Load Total
Afghan Studies	5,339	-	-	-	-	-	-	5,339
English	10,032	-	-	-	-	190	190	10,222
Physics	5,548	-	-	-	-	288	-	5,836
Math	8,322	-	-	246	492	144	882	9,210
Chemistry	4,256	-	-	-	-	-	-	4,256
Architecture	-	1,120	-	-	-	1,357	-	2,477
Civil Engineering	2,660	3,881	5,112	574	574	787	10,241	12,901
Construction Management	3,306	2,440	390	847	839	-	4,516	7,822
Electric Engineering	-	1,440	574	790	3,828	-	6,632	6,632
Mechanical Engineering	5,130	2,146	246	3,009	246	-	5,647	10,777
Practice	-	2,805	1,156	1,156	1,156	-	-	6,273

* Including one year Architecture students.

c. Student Load Factors

Students are admitted as freshmen to the FE through one of two entry examinations, one for Lycee graduates and one for technical high school graduates (including AIT). Statistics on admissions indicate that only about 5 percent new students enter from the technical high schools. This could point to poor technical high school preparation or an inadvertant bias in the two examinations, or both. Of total KU admissions, FE obtains the second-best "cut". The Medical Faculty receives the first and the Polytechnic the fourth. It is somewhat obscure whether all students really want to be in the FE, or simply get there because of their examination scores and the probability of the "First Choice" benefit of extra score points for making the "first choice" faculty. There does not seem to be any advisory or counselling facilities, nor aptitude tests, available to 11th and 12th grade students.

Once a freshman enters, it is desirable to advise and counsel the person, and to establish tutor systems to minimize adjustment problems and failure. These do not now appear to exist. Also, in the second year of study, it is desirable to establish advisory methods to assist the student's choice between the various curricula. These methods include advising based upon aptitude, ability, and interest, as well as the limitation of opportunities or course offerings in years 3, 4, and 5, all in proportion to the desired degree production in the various disciplines.

Through the evolution of a transition curriculum, students currently in the core program could have the Construction Engineering curriculum available for their choice at the beginning of their 5th semester in March 1979. The transitional curriculum would allow the advanced student to catch up on the Afghan studies and the Engineering Materials course proposed for the new core curriculum.

The graduates of the Construction Engineering curriculum will be given texts, handbooks, and a slide rule upon graduation if they accept a work assignment in a rural area. It is very necessary to have such material available to make intelligent and meaningful decisions in remote areas. This also will enhance the attraction of the curriculum. Indeed, such materials are needed by all practicing engineers!

TABLE 3

LABORATORY UTILIZATION

Course	Semester	Student Load and Source, Semester	Laboratory Length	Students per Session	Sessions per week
Existing:					
Physics I	Fall	855 core	2 hours	21	(2 Rooms) 40 (x-)
Physics II	Spring	532 core	3 hours	24	(2 Rooms) 22 (x)
Manufacturing Practices I	Spring	219 (165 Const. 5th) 54 ME, 7th	4 hours	21	11
Shop/Foundry (Co-Schedule with MFE Prac. II, uses same room)	Fall	165 165	2 hours	14	12
Construction Techniques I (Uses existing Drafting Room & Engineering Materials Lab in Spring Semester)	Spring	246 (140 Const. 7th) 160 CE, 7th	4 hours	23	11
Construction Techniques II (Uses existing Drafting Room)	Fall	(140 Const. 8th)	4 hours	20	7
New:					
Engineering Materials	Fall	532 core	2 hours	24	22
Mobile Power	Fall	140 Construction	2 hours	23	6
Computer	Spring	177 (54 ME, 7th)	2 hours + self study	15	12
	Fall	187 (54 EE, 6th)	2 hours + study	15	12

d. Laboratory Utilization

The loads, desired class size, and weekly session and hour utilization for both current laboratories with increased loads and new laboratories are tabulated in Table 3. The existing school day of 8 periods, plus 4 periods each Thursday, is used as the basis of availability. This allows the following scheduling:

2 hour laboratories- 22 sessions per week per room maximum

3 hour laboratories- 11 sessions per week per room maximum

4 hour laboratories- 11 sessions per week per room maximum

e. Laboratory Improvements Required

The details of the new and improved laboratories required to integrate the new Construction Engineering curriculum and other new courses into existing facilities follow:

1. ENGINEERING MATERIALS LABORATORY. Approximately 50 square meters, with overhead door to outside fenced construction area and material storage yard of approximately 300 square meters. Equipment is to include hand and electric construction carpentry tools, cement mixers, concrete finishing tools and forms, transit/level, and brick laying finishing tools totalling a one-time budget of $ US 10,000 and a GOA supply budget of $ US 2,000 local currency per semester. Students will build substantial test models and construct simple projects for the campus, i.e., sidewalks, anti-erosion gutters, low retaining walls, etc. Structural tests of concrete cylinders, fabricated truses, beams, etc. will utilize the current structures laboratory equipment. This laboratory will be used in the off semester for Construction Techniques I.

2. MOBILE POWER SOURCES LABORATORY. Approximately $100M^2$ with overhead door to outside area of $200M^2$. Equipment is to include small internal combustion engines (demonstration models and take-apart cylinder engines), gear trains (demonstration and functioning), hydraulic systems (demonstration and functioning), scale model hopper-conveyor systems, plus hand tools, gages, etc. A functioning back hoe loader on a medium size tractor chasis is a required teaching aid. A one-time budget of $ US 50,000 and a GOA supply budget of $ 6,000 local currency per semester is needed. Some scrap yard items may be procured essentially free to provide the desired hands-on mechanical malfunction and repair experience.

3. COMPUTER LABORATORY. Approximately $100M^2$, subdivided into 2 or more soundproofed and air conditioned sub-rooms. Peripheral equipment includes 2 card punchers, 2 Teletypes (or CRT equipped keyboards), 1 card reader, and 1 output printer. The commodities list can not be specified at this time for it depends on whether the FE will utilize the computer main frame at the Afghan Computer Institute or purchase/lease one or more dedicated small computers specifically programmed for technical/engineering problems. The anticipated first cost of $ US 150,000 will be similar in each case, and the decision is best left to a computer consultant in concert with the FE. Operating costs are anticipated to be $ US 10,000 per year plus $40,000 GOA local currency for supplies and maintenance.

4. MACHINE SHOP. This shop will be used for eleven 4-hour periods per week (maximum possible) for Manufacturing Processes I each spring. Additional equipment such as four South Bend Lathes and three Bridgeport Mills, all with ancillary tooling; and a number of additional drill presses, hand tools, and supplies will be needed to handle the additional burdens of the Construction Engineering Curriculum. Costs will be $ US 55,000 for large equipment, $ US 5,000 for smaller hand tools, and approximately $ US 4,000 annually for metals and other expendables.

5. SURVEYING II. The impact of the Construction Engineering students taking advanced surveying is largely involved with the number of useable transits, rods, etc. available for use at any given time. Additional equipment for eight complete survey parties (transit, level, tape, rod, etc.) should be purchased at a cost of $ US 1,500 each, giving a total of $ US 12,000. Repairs to present equipment, at the manufacturer, should be allocated an additional $ US 2,000 annually.

6. REINFORCED CONCRETE I. . This laboratory should be allocated $ US 5,000 annually by the GOA for operating supplies because of the increased student load. The materials should be available locally.

f. Faculty Improvement

In order to implement the new curriculum and the other qualitative changes recommended, it will be necessary to strengthen the training of some of the members of the FE staff. The team has surveyed the present membership of the faculty, including those now taking advanced degree work, and found the need to exist. Also, the faculty size must increase to meet the new needs of the curriculum and it must continue to expand, by GOA initiative, to meet the challenges of the seven year Plan. Almost all the new members of the faculty will be at the B.S. (recent or new

TABLE 4

LIST OF PARTICIPANTSHIPS

	Persons	Man Years
FE:	3 teachers of basic science, 3 years (Ph.D.) 1 Physics, Math, Chemistry	9
	4 teachers of Construction Management, 2 years (M.S.)	8
	2 teachers of Practical Experience, 1 year (Internships)	2
	50 teachers of Engineering and Architecture, 2 years (M.S.)	100
	Construction Engineer - 10 Civil Engineer - 16 Mechanical Engineer - 8 Electrical Engineer - 8 Architecture - 4 Discretionary - 4	
TE:	3 teachers, 2 years (M.S.)	6
	3 Administrative staff, 1 year (Internship)	3
	1 Dean 1 Procurement Specialist 1 Dept. Head/Assistant Dean	
	4 Senior Faculty, 3 years (Ph.D.)	12
	1 Construction Engineer 1 Civil Engineer 1 Electrical Engineer 1 Mechanical Engineer	
	11 Lectureships, Engineering Faculty, 1 year each	11
AIT:	8 Engineering Technicians for B.S., 3 years	24
Total:	88 persons (77 FE, 11 AIT)	Total: 175 man years (145 FE, 30 AIT

graduate) level. Therefore, it is felt that major emphasis at this time must be given to persons now holding a B.S. degree, giving them the opportunity to study for the M.S. degree in selected fields. At the same time, the Basic Sciences (Mathematics, Physics, Chemistry) should be improved by the training of one faculty member each to the Ph.D. level; others, of course, should hold a M.S. degree, for the team's experience indicates that a good curriculum in engineering cannot exist in the absence of strength in the basic sciences and mathematics. It is suggested that the participantships to be granted during the five year period of this program be those listed in Table 4.

Since the total of 77 FE participants has an average absence from the University of 2.1 years, the planning of new hires and the timing of participantships is a difficult issue. The current absence exceeds 30 people, and there is a very difficult choice to make between the need for faculty improvement and the number of "stay at home" faculty required to maintain quality of instruction in the existing, as well as the new curricula.

The TMD team recognizes that faculty procedures establish the eligible participants on a pre-ordained basis, which includes as factors years of service, years since last degree, and possibly others. However, it is felt that these criteria cannot be applied arbitrarily to the faculty as a whole and produce the degree level and area of specialization needed for the establishment of the new curricula and the strengthening of faculty quality as a whole. Therefore, the above list presupposes the division of the FE into departments of Architecture; Construction; Civil, Electrical, and Mechanical Engineering; and Basic Sciences and that only within such departments the normal rules of seniority apply. The exact topic and place of study or internship should require the joint approval of the Dean of the FE and the TMD Team Leader on behalf of USAID. The establishment of a U.S. coordinator would be of assistance. Further, the use of third nation institutions should also be integrated into the participant activity.

g. Beneficiaries

The beneficiaries of this project are:

(1) The persons living in the rural areas of Afghanistan will benefit by having facilities such as schools, health centers, roads, bridges and small scale irrigation systems built better and more quickly by the technical manpower developed.

(2) The Faculty of Engineering, and therefore, the students being instructed, will benefit from the advisors, consultants and participantships provided.

(3) The graduates in engineering will benefit from more practical and directly usable training. If the whole project is activated as one "package", including the recommendations for AIT and VTE, additional beneficiaries will be:

(4) Synergistic improvements to the rural poor by having, in addition to practical engineers, the availability of well-trained technicians in construction.

(5) Teacher training for vocational high schools will be greatly improved, to the benefit of such schools all over the country.

(6) The faculties of both AIT and VTE will benefit from the assistance provided by participantships, consultants, and commodities funds.

(7) Ultimately the GOA is benefited, for it can be assumed that it benefits when the people and the country's institutions are strengthened in their ability to achieve laudible objectives.

IV. IMPLEMENTATION PLAN, FE ON VTE*
(IV.B)

The direct purpose of the program at the Faculty of Engineering is to produce a quantity of graduates in Construction Engineering capable of excelling in a rural environment and who will supervise in such a setting the constructional tasks of new schools, bridges, tertiary road systems, small scale irrigation systems, and other projects of direct benefit to the rural poor.

The purpose of the program at the Afghan Institute of Technology is to produce a number of post-secondary school technicians required for working with the construction engineer (in particular) in a rural environment. They will be responsible on-the-job representatives of the engineer, capable of working with a minimum of direction and of seeking engineering guidance when needed.

1. Faculty of Engineering

In addition to the normal approvals of GOA and USAID, the obtaining of a contractor, and the arrival at the site of advisors and consultants, the most important and possibly the most difficult part of the implementation, will be the definition and acceptance of the new Construction Engineering curriculum and related changes on a timely basis. Since the FE has academic authority in such matters, the agreement by the GOA on a "Pro Ag" does not insure curriculum acceptance. While the curricula proposals contained herein have been discussed with many faculty members, and their reactions have been favorable, this does not purport to be prior approval.

The creation and periodic empanelling of an Advisory Group (as defined in the section on Program Assessment) will give the team leader adequate leverage to keep the program

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* Unique VTE events are marked VTE.

on the time track; additionally, the Advisory Group's review could lead to a recommendation of cancellation if the critical enablements are not in place in a timely fashion. A meeting of the Advisory Group is indicated to take place just after curriculum approval is needed, and this is the opportune time to cancel the project if curriculum approval is not obtained.

The first engineers would be ready to enter the construction curriculum as early as the March, 1979 semester. They would work into a transition curriculum because they will have progressed through the unmodified core. The newly modified core also should be operative by March, 1979. In order to accomplish these two activities, it will be necessary to make a running start into the program. Preliminary personnel, consultants in the areas of facilities and computer, should be at KU and working in their restricted areas prior to the arrival of the advisor team. The consultants should finish their reports or other activity in overlap with the Team Leader. Only in this way can the target of March, 1979 curriculum implementation be met.

2. Afghan Institute of Technology

The program, as it applies to AIT, can be divided into two parts, each of which can be implemented independent of the other. The introduction of the seven new 13th and 14th grade technician programs can proceed without delay. It is wanted by everyone -- students, faculty, and the administration -- and needed as a supplement to the construction engineering program. Space to handle this expansion is to be available, probably in 1978. Though AIT administration officials highly favor the idea of two additional years of study, it is not known if the recommended curricula will be approved.

The second aspect of the AIT program is the inclusion of the Vocational Teacher Education Program, the transfer of AIT to the Ministry of Higher Education, its incorporation into Kabul University, and the present 9th through 12th grades (with reduced enrollments) becoming a laboratory school for the practice teaching by VTE students. It is judged that the complications involved in accomplishing the merger are such that approval may have no better than a fifty-fifty chance. Although highly desirable, achievement of this objective has no bearing on the other aspects of the program.

An advisor will be at AIT for about five years, reporting on September, 1978 and remaining until the fourth class has

completed the two-year program. He will be responsible for the orderly development of curricula, etc., and report regularly to the Chief of Party. The first class to be admitted will be in March of 1979. Four consultants will report one to two months after the advisor, and thus there should be adequate time to organize and be prepared for the entering class.

The necessary time relationships and cricital or decision points are given in chronological order in Tables 5 and 6. Table 7 is the Laboratory Improvement Schedule for the Faculty of Engineering, Table 8 is the same thing for AIT, and Table 9 is the Advisor and Consultant Schedule.

3. Government of Afghanistan Support

The TMD project outlines the planning and support to bring into being new curricula and quality improvements at both the FE and AIT. However, this is not the only effort needed to produce capable graduates at either institution.

The students entering the new curriculum -- indeed, all of the students -- need text materials, an adequate up-to-date library, audio-visual materials, and laboratory supplies. An adequate number of qualified faculty so that instructional class sizes are within normal limits for effective teaching also is required. These statements are meant to apply to all courses, because a qualified graduate must receive adequate instruction in all of his courses. The project will support the new curriculum and the impact of students in the new curriculum upon other laboratories. But the Government of Afghanistan must support the balance.

Specifically, it will be necessary for the Government of Afghanistan to regularly spend Afghanis to produce text-books and other supplies. Only the core curriculum materials have been procured at the FE. Text materials of any type are notably absent at AIT. It will be necessary for GOA to expend funds and obtain delivery approximately as given in Tables 6, 7, and 8.

TABLE 5

EARLIEST POSSIBLE PROJECT DEVELOPMENT SCHEDULE
FOR TECHNICAL MANPOWER DEVELOPMENT

10/18/77	-	AE Report in hand
11/12	-	Social and Cost Effective Analyses completed
11/20	-	PP draft for SRC review completed
11/26	-	SRC approval
12/1	-	Finalized PP submitted AID/W
1/20/78	-	Project authorized by AID/W
2/25	-	FY 78 ProAg signed
3/10	-	Contract Bids opened by GOA
5/1 - 6/25	-	Contract negotiations conducted with preferred bidder and Team Leader identified
7/1	-	Contract signed and Team Leader in orientation in U.S.
8/1	-	Team Leader arrives in Afghanistan
9/1	-	Four consultants, two additional advisors arrive in Afghanistan
11/1	-	Curricumum developed and revised
12/20	-	Curriculum revisions approved by Faculty of Enginnering
3/79	-	First students enter revised curriculum

NOTE: This exceedingly tight schedule is dictated by the need to have the Team Leader and consultants "on board" by August-September 1978. If this is not done, the whole 1979 academic year is lost and the implementation of the project delayed one year. This will reduce by one-third the number of graduates produced at FE, and by one-fourth at AIT during the life of the program.

TABLE 6

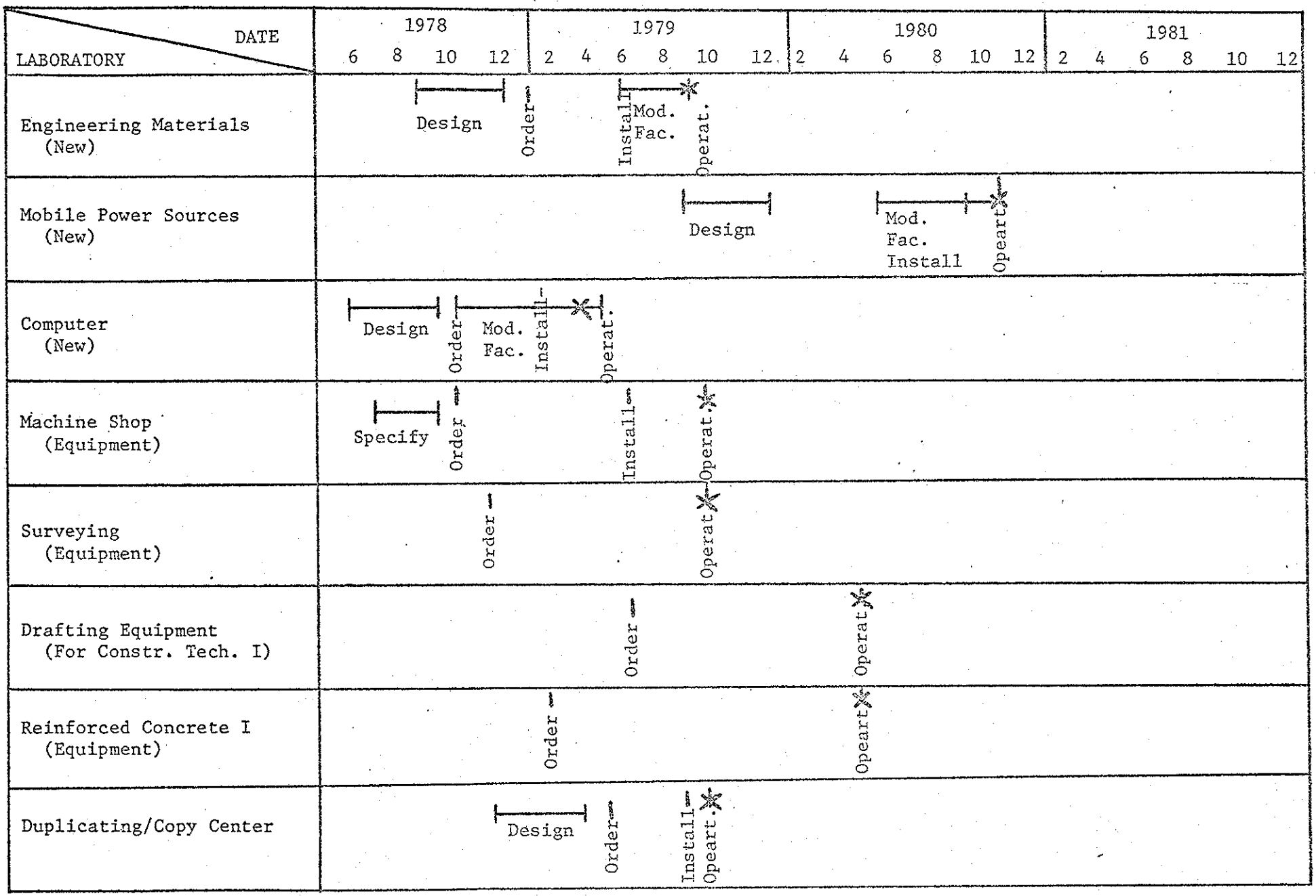
MAJOR BENCHMARK SCHEDULE, FE AND AIT
(Unique AIT events are noted AIT)

Nov. 1977	P.P. completed.
Jan. 1978	P.P. approved.
March 1978	Pro. Ag. signed.
April 1978	Contractor solicitation.
April 1978*	Preliminary Consultants selected.
June 1978	Contractor selected.
June 1978	Preliminary Consultants arrive.
July 1978	Team Leader hired, work in U.S. 1 month to recruit,plan.
Aug. 1978*	Team Leader arrives Afghanistan.
Sept. 1978	Fall semester begins.
Sept. 1978	Advisors for CECSAR and AIT, 4 consultants arrive.
Oct. 1978*	Revised Curriculum submitted to Faculty, CE consultants arrive at AIT.
Nov. 1978	3 Consultants arrive at AIT.
Dec. 1978*	Curriculum approved.
Jan. 1979	Advisory Group Meeting, Washington, D.C.
Feb. 1979	Computer hardware arrives, 7 technician curricula approved at AIT.
March 1979	Spring Semester begins. Core curriculum operational, Construction Curriculum operational (Transition), Other Modified Curricula operational, Practice Semester for seniors, 5th, 6th semester courses ready. At AIT, 7 new programs operational.
Aug. 1979	Advisory Group Meeting, Kabul.
Sept. 1979	Fall Semester begins.
March 1980	Spring Semester begins. First full operation of Const. Engr. curriculum, 7th semester, 8th semester courses ready.
Sept. 1980	Fall semester begins
Dec. 1980	First graduates AIT 14th year program.
March 1981	Spring semester. Program at Steady State at both FE & AIT.
March 1981	Advisory Group Meeting, Washington, D.C.
Sept. 1981	Fall Semester begins
Dec. 1981	Advisory Group Meeting, Kabul (if necessary). First Graduates from Construction Engr. curriculum.
Dec. 1982	Program monitored, minor adjustments made as needed.
Jan. 1983	Advisory Group Meeting, Washington, D.C.
Dec. 1983	Third graduating class in Construction Engr., fourth class graduates from AIT.
Dec. 1983*	Support ends.
Feb. 1984	Final Report, meeting with Advisory Group.

* denotes critical time.

TABLE 7

LABORATORY IMPROVEM[illegible] SCHEDULE,1/ FE

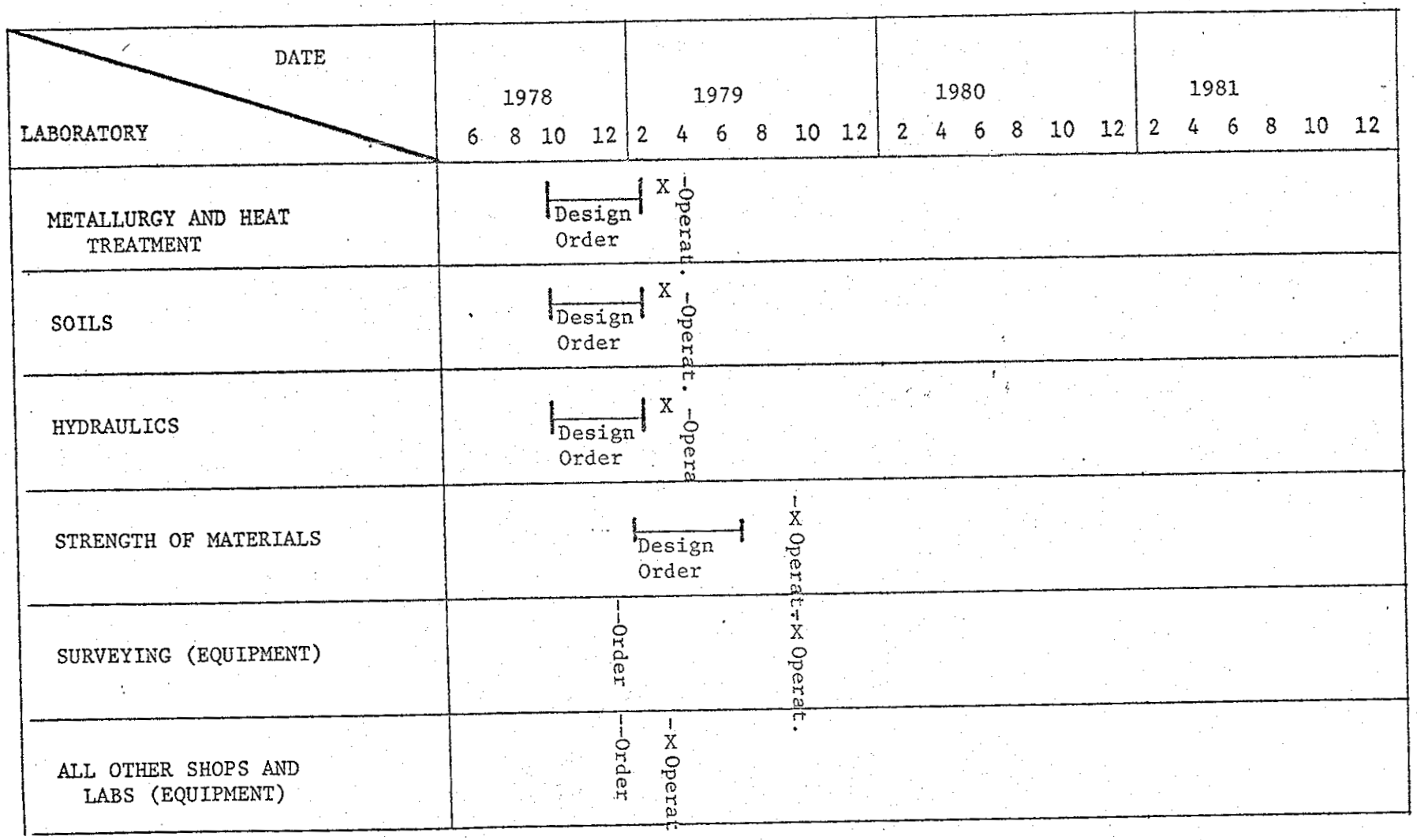


1/ Assumes Construction Curriculum first students March 1979, 5th Semester level.

X First use time requirement.

TABLE 8

LABORATORY IMPROVEMENT SCHEDULE,/1 AIT



/1 Assumes first entry of students March 1979, 13th grade level.

X First use time requirements.

TABLE 9

ADVISORY CONSULTANT SCHEDULE

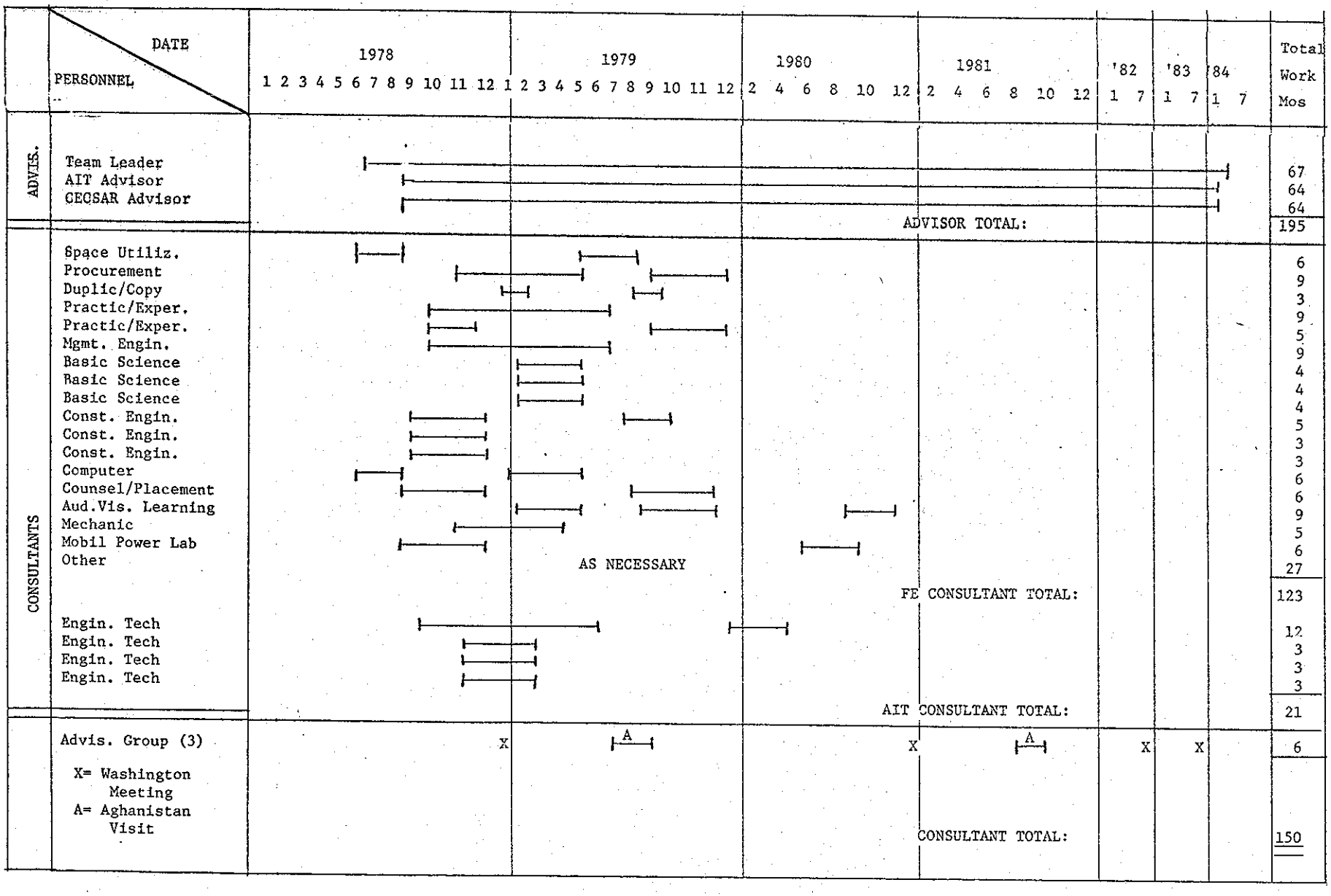


TABLE 10

GOA EXPENDITURES

At Faculty of Enginnering

By March 1979	-	Receive textbooks, etc. for 3rd year class. (except for new courses)*
September 1979	-	Receive textbooks, etc. for new courses of 3rd year.
March 1980	-	Receive textbooks, etc. for 4th year class.
March 1981	-	Receive textbooks, etc. for 5th year class.

At AIT

By September 1979	-	Receive textbooks, etc. for 13th grade curriculum.*
March 1980	-	Receive textbooks, etc. for 14th grade curriculum.

* New courses to be taught in March 1979 will need to operate from duplicated material and instructor's notes because the new courses are scheduled to be approved December 1978, too late for curriculum materials from publishers to be obtained.

TABLE 11

LIST OF COMMODITIES - FACULTY OF ENGINEERING

New Laboratories

Engineering Materials	$US 10,000 (1)
Mobile Power Sources	62,000 (1)
Computer: Initial - 150,000	200,000 (1) (2)
Operating - 50,000, 5 Years	
Duplicating/Copy Center: Initial - 12,000	72,000
Operating - 60,000, 5 Years	

Upgrade - Existing Facilities

Surveying: Initial 12,000 + 10,000, 5 years	22,000
Reinforced Concrete: Oper. 25,000, 5 years	25,000
Machine Shop: 60,000 + 20,000, 5 years	80,000
Drafting Instruments: 140 x $60, 5 years	8,400

Other Costs

Graduation "Survival Kit", 130 Graduates, 1981, 82, 83 (130 x 3 x $200)	78,000
Total-	$557,400
Shipment (Times 1.4)	-$890,000

(1) Additional Costs estimated to total $40,000 for room modifications, electric power supplies, plumbing, and equipment connections. To be supplied by GOA.
(2) Additional costs of local supplies and maintenance contracts, $40,000 per yr. by GOA

TABLE 12

COMMODITIES LIST - AFGHAN INSTITUTE OF TECHNOLOGY

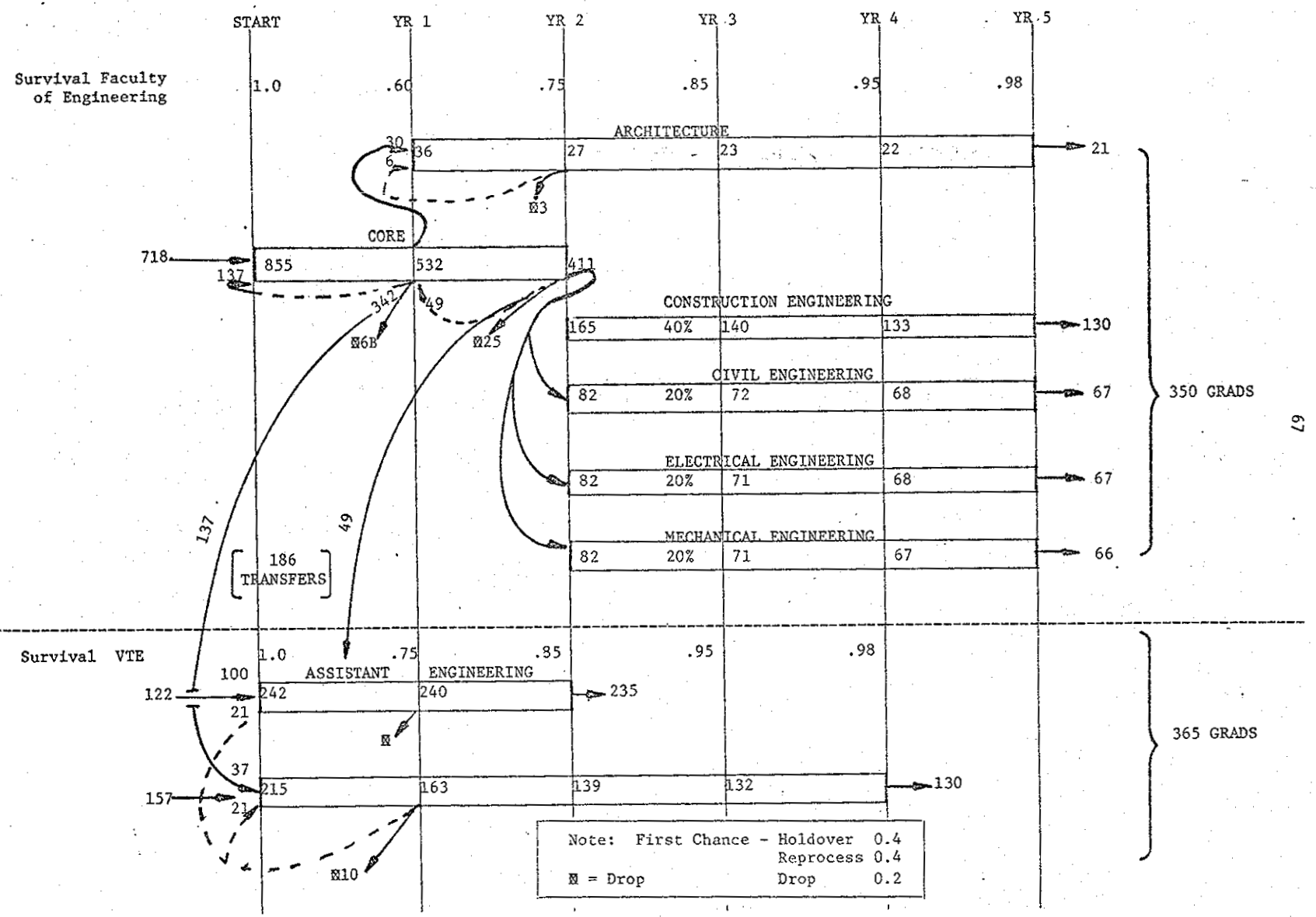
New Laboratories	
Metallurgy and Heat Treatment	$ US 30,000*
Hydraulics	20,000*
Strength of Materials	40,000*
Soils	27,000*
Repair/Upgrade Existing Laboratories	
English (Repair)	800
Physcis (Replacement)	1,000
Chemistry - 3,500 1st Yr + 1,500 x 4 Yrs (Supplies)	6,500
General Science (New)	1,500
Sheet Metal (Supplies)	500
Drafting (New Drafting Sets)	16,000
Surveying (Transits, Rods, Tapes, etc.)	10,800
Elect Laboratory (New Equipment)	2,000
Machine Shop - 20,000 New + 2,000 x 4 Yrs (Supplies)	28,000
Foundry - 9,300 New + 500 x 4 Yrs (Supplies)	11,300
Welding - 8,600 New + 2,000 x 4 Yrs (Supplies	16,600
Total	222,000
Times 1.4 Shipping	310,000

* Costs estimated to total $50,000 for room modifications, electric power supplies, plumbing, and equipment connections to be supplied by GOA.

KABUL UNIVERSITY
FACULTY OF ENGINEERING

AFGHANISTAN
INSTITUTE
OF
TECHNOLOGY

STUDENT FLOW AND ARTICULATION (STEADY STATE)



V. PROGRAM ASSESSMENT AND EVALUATION PLAN (IV.C)

There is a continuing need to monitor the program's effectiveness, as well as its quality and success of implementation, at FE and at AIT. In addition, the predicted numerical output of trained engineers and technicians must be measured against the manpower needs of Afghanistan.

1. Quality

   It is proposed that a three-man advisory committee be appointed in the U.S.A. to continuously monitor the progress of the program. It would serve as a consulting group for the Chief of Party and meet semiannually in the U.S.A. In addition, a revisit to the site at 1 to 1.5 years after program inception (September 1979-March 1980) would allow closer guidance of the actual evolution of the details and facilitate needed changes. Since the TMD team members are not candidates for a continuing role at KU/AIT, they are available to serve in the review and guidance capacity expected of the advisory committee.

2. Manpower Needs

   The figures compiled by the Ministry of Planning and somewhat endorsed by the Revelle study might have incorporated two errors, both of which tend to give an inflated picture of the technical manpower needs during the remainder of the Seven-Year Plan. First, the TMD team's impression is that the program is lagging -- that is, the implementation shows little sign of reaching the pace needed to meet the seven-year goals. There is a technical manpower availability -- accomplishment linkage; the effect of initial engineering, personnel shortages which hamper design and construction will later reduce the need for engineers to operate the systems. Once the total of the pacing elements in the plan are assessed, the technical manpower needs may result in numbers well below original estimates. Second, the team further believes there was confusion between the needs for engineers and technicians of postsecondary school capability. A productive engineer might utilize the talents of five or more technicians or assistant engineers. The currently used manpower needs do not seem to reflect this sort of relationship.

The TMD Team has been asked to design a system for continuously monitoring the nation's manpower needs. Because of the uncertainties of source data, this is essentially impossible. However, the problem can be approached from two directions:

a. Planning

The Chief of Party should stay aware of revised manpower estimates, such as the one now understood to be in process at the Ministry of Planning. In addition, Professor Kazem of the Faculty of Engineering is conducting, and will publish, a survey of current engineering manpower in Afghanistan. Casual discussion with Ministries and their planning officers also could reveal the true pace of the Seven-Year Plan. It is expected that the Chief of Party will have the opportunity to meet most of the ministers during his five years in Afghanistan.

b. Practice Semester Placement

The contacts made with the working groups within the Ministries which employ engineers to give ninth semester students field experience can also provide an idea of work backlogs and job vacancies. Therefore, it is suggested that the FE Practice Semester Director attempt to collect and organize employer information so that it can be compared with the Chief of Party's analysis from (a) above. Then, the Chief of Party could make a judgment of immediate and long-range needs, probably by both type and number of engineers.

c. Consulting

The provision of a short time manpower consultant to work with Professor Kazim and some operating expense funds could yield great dividends if his future work could include some predictive indicators of manpower need.

VI. PROJECT TECHNICAL DETAILS
(Annex B-1)

1. Advisors

Three full-time advisors will be needed for the five-year period, as detailed below.

a. Chief of Party and Advisor for New Construction Engineering Curriculum

He should be a civil engineering graduate with some academic experience teaching in an American university, and extensive experience in construction management. He must fully understand the many problems of small, labor-intensive rural projects found in the construction of country roads, small bridges, irrigation systems, and buildings to house schools and health centers. He should be sympathetic to the need to use local materials and innovative in developing means for their effective utilization. And finally, he should have a genuine liking for young people and an abiding interest in their development into competent construction engineers who will mature into valuable contributors to the developments of maximum value to the population of the rural areas of Afghanistan.

As Chief of Party, this advisor should serve as the point of contact between USAID/A and the Contractor. He should have general oversight of the other advisors and coordinate the efforts of the various consultants. He should also have the authority of co-approval for the degree subject of participantships.

As advisor for the construction engineering program, he should work with the Faculty of Engineering, the Dean, the Student Guidance and Placement Committee, and other formal and informal groups to the end that the goals of this project may be reached.

b. Advisor to the Center for Engineering Consulting Services and Applied Research

He will probably be a director of an engineering experiment station at a U.S. land-grant college. He should have experience in producing or editing research and professional activity bulletins, monographs, or journals. He should be a "self-starter"--a stimulator of ideas, a generator of projects, a grantsman in the best meaning of the terms.

His duties will be to activate and continue on a regular basis the publication of a journal of CECSAR which should report to the professional engineering fraternity on projects and research carried out by the Faculty of Engineering under CECSAR aegis. He should set up an organization to stabilize and promote the professional and research activity of the faculty to the end that a multitude of problems in rural development may be researched and hopefully solved.

c. Advisor for Technician Program

This person should be experienced in directing instruction, developing curricula and faculty in hands-on technology programs for engineering technicians at the U.S. community college level. He may be a graduate engineer, but his interests must be at the sub-engineering educational level.

He will advise the Afghan Institute of Technology on curricula development in the seven proposed areas, each of which will produce technicians of maximum usefulness in expediting construction of small rural developments.

He will also assist AIT in developing faculty to be better qualified for teaching the technician programs in a variety of ways, including selection of faculty to go abroad for additional education, conducting seminars on teaching methods, audio-visual aids, special subject matter fields, and other matters pertinent to the improvement of the technicians' training program.

He will coordinate the efforts of the several consultants on the individual technician programs.

2. Consultants

a. Counseling and Placement Consultant

He should spend two 3-month periods separated by about a year to assist in setting up a student counseling and placement service. It is suggested that two to three members of the faculty be identified as career guidance counselors and placement counselor, each on a half-time assignment. These three should be backed up by a six to seven-man faculty committee on student guidance. A student counseling office should be established. It should have a library of guidance literature and be staffed by a full-time secretary to make appointments for students to confer with one of the faculty counselors concerning the advantages of enrolling in the Construction Engineering curriculum, at times to advise transfer from engineering to technician programs, and at graduation to advise to accept positions in rural development. It is obvious that the faculty members selected for this duty must be sincerely convinced of the advantages of serving the rural development sector if the new Construction Engineering curriculum is to have 40 percent of the engineering graduates.

His office should keep a running file of alumni records which will be useful in evaluting the success of graduates, their placement, etc.

If the consultant is recruited from a college counseling or placement service, he must understand that the activity proposed here is to accomplish a definite aim, i.e., to steer students into construction engineering, or engineering technician programs, and then into placement in the rural development sector.

b. Space Utilization Consultant

He should be employed for two 3-month periods, separated by about a year, to develop a space utilization plan and to check on its implementation. The plan should provide for better utilization of the laboratories and classrooms of the

Faculty of Engineering through space layouts, assignments, and scheduling. This will enable the present available space to be used efficiently, before constructing more. Also, the plan can be used as a basis for the design of the space additions or modifications required to meet the needs of the new Construction Enneering curriculum.

This consultant can be recruited from any one of a large number of the offices of space utilization at American universities.

c. Consultant on Procurement

He should be employed for three 3-month periods to assist in setting up effective procurement procedures for the Faculty of Engineering and the Afghan Institute of Technology. Undoubtedly, this consultant will have to work with not only these two academic units but with business offices of Kabul University and GOA offices. The whole educational enterprise in the above named units depends upon reliable, prompt, and accurate procurement of needed laboratory and classroom supplies and repair parts. Some of these are available locally, but most must be obtained from abroad.

This consultant should probably be recruited from the purchasing office of a large, public American university. He should be familiar with the variety of suppliers of U.S. and foreign laboratory equipment, parts, and supplies. He should be able to translate GOA requirements into American practices and to train Afghan counterparts.

d. Consultant to Design and Establish a Duplication and Copy Center

He should be employed for two 1 1/2-month periods. This reproduction center would be used for printing classnotes, course outlines, bulletins, and other necessary academic materials. It might prove most feabile to locate this facility administratively in the Center for Engineering Consulting Services and Applied Research.

This consultant could be recruited from an institution which has in operation a cost-effective duplicating center; this need not be representative of any of the many systems of reproduction.

e. Consultant on Teaching Methods, Visual and Audio Visual Aids, and Programmed Learning

He should be employed to conduct seminars and short courses for the teaching faculty. This consultant should also set up a room or center for storing, checking in and out, and providing simple maintenance for the various devices used--such as projectors, tape recorders, etc. Unless central control is maintained, this kind of equipment will find its way to a few individuals to the general deprivation of most of the faculty.

The consultant should spend three 3-month periods in Kabul teaching the faculty to make full use of the various teaching aids, as well as conducting seminars on effective teaching. Most of the faculty at FE need this kind of training to supplement the rote learning processess now characteristic throughout KU.

This consultant can be recruited from a good department of audio visual aids, but he should also have training in teacher education. He probably will be a director of teacher training and audio visual aids in a "first rate" institution.

f. Consultants on the Practical Experience Semester

It is suggested that one consultant come from industry or have construction internship experience, and the other from a college of engineering using the cooperative plan; they should be engaged for 14 man-months. They should be experienced in conducting first rate practical experience programs at a U.S. university. They should carefully structure the semester in the FE curricula to provide a useful experience for participating students. On the final visit, they should evaluate the results being formulated during the practice semester and advise the FE whether the program should be continued or dropped.

g. Consultant on Management Engineering Courses

This consultant, who probably should be at KU for the academic year (nine months), will assist in developing the course outline and in teaching the specific courses listed; these include Management of Human Resources (Personnel), Engineering Economy and Accounting, Construction Management and Economics, and Specifications and Contracts.

This consultant will probably be a professor of civil or mechanical engineering, teaching the above courses in a college of engineering. He should not be recruited from a college of business unless he also has management experience on engineering projects.

h. Basic Science Consultants

Three consultants, one each for mathematics, chemistry, and physics, should spend a 4-month period in assisting the FE in improving the courses in these departments, especially the laboratory courses. If these courses are transferred to the cognate departments in KU, these consultants will still be needed to work between the FE and KU departments of mathematics, chemistry, and physics in a liaison capacity to assure that the courses are suitable and desirable for engineering backgrounds. All too often, unless there is adequate liaison between engineering and the basic science departments, the courses given engineers will be in the first course in a sequence planned for a major in that science rather than a comprehensive course underlying the engineering courses to be taught after the core curriculum.

i. New Engineering Course Consultants

Three consultants should be engaged for 3-month periods, followed a year later by a 2-month period for one man. These consultants should outline, develop, and perfect the following new courses in the Construction Engineering curriculum:

--Mobile Power Sources;

--Engineering Materials I and II; and,

--Construction Techniques.

The three consultants should include academicians from Mechanical Engineering, Civil Engineering, and Architecture.

j. Computer Program Consultant

This person should assist in selecting and locating the computer, specifying the controlled environment, and developing a program for the modus operandi of the computer facility. It is estimated that this consultant can be most effective if he spends two 3-month periods, separated by about six months to one year.

k. Consultants for Activating Engineering Technician Program

These four consultants would be utilized to aid faculty at AIT in developing the courses and facilities for the seven new engineering technician programs. It is believed that one consultant will be required for each of the programs for mechanical and engineering technicians, electrical engineering technicians, and site business-management technicians. A broad-gauged construction technician consultant should be able to serve the other four areas, namely, civil engineering technicians, surveying technicians, soils technicians, and inspection technicians.

The first three consultants should be able to complete their work in three months. The fourth consultant should have nine months available for the four programs, plus two months at a later time.

1. Other Consultants

It is assumed that during the five-year period, need for additional consultants will become evident. It is estimated that 38 man-months of consultant time will be adequate for this purpose. Examples of such extra effort could be:

---a consultant-mechanic to assist the procurement specialist in defining the repair and spare parts needed to make existing equipment functional (five man-months); and,

---a consultant to assist the mobile power laboratory (six man-months).

m. Summary of Consultants

Student Counseling Programs	6 man-months
Facilities (FE and AIT)	6 man-months
Procurement	9 man-months
Reproduction Center	3 man-months
Teaching Methods	9 man-months
Practical Experience Semester	14 man-months
Management Courses	9 man-months
Basic Sciences	12 man-months
New Construction Curriculum Courses	11 man-months
Computer Program	6 man-months
Engineering Technicians Program (AIT)	21 man-months
Others	38 man-months
TOTAL	144 man-months

3. Participantships

The following list of participantships will be necessary to strengthen the abilities of members of the staffs of the FE, AID, and VTE.

NUMBER	AREA	MAN-YEARS
3	Teachers of Basic Science 3 years, Ph. D.	9
	One each in physics, chemistry, mathematics	
4	Teachers of Construction Management, 2 years, M.S.	8
2	Directors of Practical Experience, 1 year, internships, no degree	2
3	Administrative Staff Interns, no degree	2
	Dean, 6 months	1/2
	Assistant Dean and 2 Department Heads, 6 months each	1 1/2
2	Procurement Specialists, 6 months each, no degree	1
	One for FE, One for AIT	
4	Senior Faculty, 3 years, Ph.D. One each in Construction Engineering, CE, EE, and ME	12
3	Teachers of Engineering, VTE, 2 years, M.S.	6
	Teachers of Engineering and Architecture, as follows:	100

NUMBER	AREA	MAN-YEARS
10	Construction Engineers	
16	Civil Engineers	
8	Mechanical Engineers	
8	Electrical Engineers	
4	Architectural Enginerrs	
4	Discretionary Engineers	
8	Teachers of Engineering Technology at AIT, 3 years, B.S. One Each in CE, EE, ME, Inspection, Site Business-Management, Soils, and Surveying	24
11	Visiting Lecturers, 1 year, no degree	11
TOTAL		
88 (77 FE)		175

VII. STATEMENT OF WORK FOR CONSULTANTS
(Annex J)

I. AID PROJECT TITLE

Project Development and Support (Technical Manpower Development)

II. OBJECTIVE

The objective of the Work Order is to assist the Government of Afghanistan in the development of a technical manpower project by devising a series of project design recommendations for proposed interventions in the training program of the Kabul University Faculty of Engineering aimed at enhancing the capacity of Kabul University engineering graduates to carry out technical tasks of rural engineering.

III. STATEMENT OF WORK

A. The contractor shall examine a range of on-going and completed rural engineering projects in Afghanistan in order to develop a set of project design recommendations which address proposed interventions in the training program of the Kabul University Faculty of Engineering. These recommendations should have as their central objective the enhancement of the capacity of the graduates of Kabul University Faculty of Engineering to carry out the technical tasks of rural development engineering. Such recommendations will address, but not be limited to:

1. Improvement in the quality of Kabul University engineering graduates flowing into rural-oriented construction and water projects designed to assist the rural poor.

2. Strengthening core courses at Kabul University Faculty of Engineering for all engineering students, with special attention to those student streams moving toward construction and water engineering elements of rural infrastructure development.

3. Establishing on-going research/monitoring concerning the utilization of engineering graduates trained to work on rural-oriented matters and creation of some system for projecting demand.

4. Consideration of division of the Kabul University Faculty of Engineering curriculum into two or more tracks, with the possibility of an applied engineering track producing a more field-oriented, less theoretically skilled engineer/technician for rural development activities.

5. Qualitative changes, deriving from the actual development needs of Afghanistan, rather than quantitative changes.

While it is recognized that any substantial program of assistance to the faculty will have some impact on the magnitude of the institution's capacity, the design should expressly avoid interventions designed primarily to contribute to the expansion of the Kabul University Faculty or its body.

B. 1. The Contractor shall submit the project design recommendation described in III. A above in the format prescribed in AID Handbook III, Project Assignments, of appropriate draft portions of a project paper. Five copies of this recommendation shall be submitted to USAID/Afghanistan, prior to November 1, 1977.

2. The Contractor shall submit a final report outlining completion of the scope of work to the Contracting Officer by January 1, 1978.

IV. PLACE OF WORK ORDER PERFORMANCE

In order to obtain necessary information, the Contractor will conduct research and consult with appropriate officials of AID/Washington, Ministry of Education, and Kabul University.

V. TERM OF WORK ORDER PERFORMANCE

Services to be provided hereunder shall be performed during the period September 8, 1977 through Januaryl, 1978, unless otherwise extended in writing by the Contracting Officer.

VIII. BUDGET

306-0161 TECHNICAL MANPOWER DEVELOPMENT

	Fiscal Year 1978		Fiscal Year 1979		Fiscal Year 1980	
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
I. Field Personnel						
Salary	32,000	35,200	38,720	42,590	46,850	22,115
Differential = 20%						
Pers. Benefits = 20%						
Overhead = 60%	32,000	35,200	38,720	42,590	46,850	22,115
C.O.L.A.	805	805	805	805	805	335
Edu. Allowances - 2 Grants	5,200	5,200	5,200	5,200	5,200	-
Travel - Assignment	12,400					
Home Leave		12,900				12,500
Separation						
R & R		4,000		4,000	4,000	
Emergency	1,000	1,000	1,000	1,000	1,000	-
Storage	600	600	600	600	600	150
Housing	8,000	8,000	8,000	8,000	8,000	3,335
Cost of One Advisor	92,005	102,905	93,045	104,785	113,305	60,550
Cost of Three Advisors	276,015	308,715	279,135	314,135	339,915	181,650
II. U.S Personnel						
Coordinator - 50%	18,000	19,800	21,780	23,960	26,360	14,500
Adm. Assistant - 50%	12,000	13,200	14,520	15,970	17,570	9,664
Secretary - 50%	6,000	6,600	7,260	7,990	8,790	4,832
Pers. Benefits - 20%	7,200	7,920	8,712	9,584	10,544	5,800
Overhead - 60%	21,600	23,760	26,136	28,752	31,632	17,400
U.S. Travel	1,200	1,300	1,400	1,500	1,600	400
Intl. Travel - 2 trips	5,000	5,000	5,500	5,500	6,000	-
Other Direct Costs	8,000	8,000	9,000	9,000	10,000	2,500
Home Office Costs	79,000	85,580	92,308	102,256	110,476	55,096

306-0161. TECHNICAL MANPOWER DEVELOPMENT (Cont.)

	Fiscal Year 1978		Fiscal Year 1979		Fiscal Year 1980	
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
III. Consultants	422,075	583,975	113,250	18,100	9,050	9,050
IV. Local Support Costs	39,000	40,800	43,780	45,960	49,356	26,000
Total	816,090	1,019,070	530,473	480,671	510,817	271,796
Plus 5% Annual Inflation	856,895	1,123,525	614,288	584,496	652,313	364,207

306-0161. TECHNICAL MANPOWER DEVELOPMENT (Cont.)

	Fiscal Year 1978		Fiscal Year 1979		Fiscal Year 1980	
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Consultants*						
2 x 1 Person/Month	-	19,000	-	19,000	-	-
1 x 1	-	-	-	-	9,500	9,500
1 x 1 1/2	13,000	13,000	-	-	-	-
1 x 2	16,500	16,500	-	-	-	-
13 x 3	312,000	-	-	-	-	-
11 x 3	-	264,000	-	-	-	-
5 x 3	-	-	120,000	-	-	-
3 x 4	-	124,000	-	-	-	-
1 x 5	38,500	-	-	-	-	-
1 x 6	-	46,000	-	-	-	-
1 x 9	67,500	-	-	-	-	-
2 x 9	-	135,000	-	-	-	-
1,223,000	447,500	617,500	120,000	19,000	9,500	9,500
150 Person/Months	56.5	74.5	15	2	1	1
Less @ $450 Person/Month	(25,425)	(33,525)	(6,750)	(900)	(450)	(450)
Total	422,075	583,975	113,250	18,100	9,050	9,050

* 1/2 Consultant @ 36,000/Year
1/2 Consultant @ 30,000/Year

306-0161 TECHNICAL MANPOWER DEVELOPMENT (Cont.)

	Fiscal Year 1978		Fiscal Year 1979		Fiscal Year 1980	
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Local Support Costs						
Secretary	6,000					
Adm. Assistant & Typist x 2	8,400					
Drivers x 3	3,600					
	18,000	19,800	21,780	23,960	26,356	14,500
Vehicles x 3	9,000	9,000	9,000	9,000	9,000	4,500
Miscellaneous	12,000	12,000	13,000	13,000	14,000	7,000
Total	39,000	40,800	43,780	45,960	49,356	26,000
Participants						
MS - 2 Yrs. 9	99,900	91,800				
MS - 2 Yrs. 16 x 3		177,600	177,600	177,600		
			163,200	163,200	163,200	
BS - 3 Yrs. 8		88,800	81,600	81,600		
Ph.D 3 Yrs. 7		77,700	71,400	71,400		
OJT 1 Yr. 5	20,100	20,100	20,100	20,100	20,100	
VL 11		30,000	30,000	30,000	20,000	
	120,000	486,000	543,900	543,900	203,300	
+ 7% Inflation	128,400	520,020	581,973	581,973	217,531	
AID/w Costs @ $50 PM	6,000	24,600	28,800	28,800	10,200	
	134,400	544,623	610,773	610,773	227,731	
Total (175 Person/Years) 2,130	135	545	611	611	228	

Summary

Personnel	4,197,000
Participants	2,130,000
Commodities	1,200,000
Total	7,527,000