Universidad de Puerto Rico
Colegio de Agricultura y Artes Mecánicas
SENADO ACADEMICO DE MAYAGUEZ
Mayagüez, Puerto Rico

Certificación Núm. 65-67-9

Yo, Juan Suárez Morales, Secretario del Senado Académico de Mayagüez, CERTIFICO:

Que en reunión celebrada por este organismo el día 11 de febrero de 1966, se acordó aprobar el PROGRAMA DE ESTUDIOS GRADUADOS CONDUCENTE A LA MAESTRIA EN CIENCIAS EN INGENIERIA CIVIL.

Se acompaña copia del Programa hacia la Maestría en Ciencias en Ingeniería Civil.

Y para remitir a las autoridades correspondientes, expido la presente en Mayagüez, Puerto Rico, a 14 de febrero de 1966.

Juan Suárez Morales
Secretario

Anejo

University of Puerto Rico
College of Agriculture and Mechanic Arts
Engineering Faculty
Civil Engineering Department
Mayaguez, P. R.

PROPOSAL FOR THE ESTABLISHMENT OF GRADUATES STUDIES LEADING TO THE DEGREE OF MASTER OF SCIENCE IN CIVIL ENGINEERING

Dr. M. Santiago Meléndez
Chairman

October, 1965

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Proposal for the establishment of graduate studies leading to the degree of Master of Science in Civil Engineering.

INTRODUCTION

The Department of Civil Engineering of the School of Engineering of the University of Puerto Rico hereby proposes the establishment of a Graduate Program in Civil Engineering leading to the Master's degree. The decision to make this proposal is based on the following reasons:

(a) The fast moving technological progress of our society requires a rapidly increasing number of civil engineers trained beyond the baccalaureate degree with capacity to solve new and challenging engineering problems.*

(b) The Civil Engineering Department, because of its own resources and those of related departments of the College of Agriculture and Mechanic Arts, is at present the only educational body in Puerto Rico suited to undertake such a program.

(c) The Civil Engineering Department in its normal development has reached a point where the establishment of graduate studies is the next logical step.

(d) A Graduate Program will offer to the Civil Engineering Faculty an additional opportunity to carry out research activities, excercise creativeness and, in general, improve its quality and strength.

OBJECTIVES

(1) To offer training at an advanced level leading to the degree of Master of Science in Civil Engineering. Thus making available facilities for graduate education to a larger number of Civil Engineers residing in our Island. This M.S. degree will be devoted to training for research, development and / or solving new engineering problems.

*See additional information in page 5.

(2) To provide additional opportunities and facilities for research to our faculty members and, thus, contribute to the advancement of engineering and the strengthening of the faculty.

(3) To help our Government and Industry to solve specific technological problems through sponsored research in our Department.

(4) To participate more fully in the academic and professional activities between universities and research groups throughout the world by means of the exchange of technical literature, professors, and students.

(5) To provide suitable means for studying technical problems related to Civil Engineering and peculiar to our Island.

REGULATIONS

Graduate instruction at the Civil Engineering Department shall be organized in accordance with the Graduate Studies Regulations of the College of Agriculture and Mechanic Arts, University of Puerto Rico, which appear in Appendix VI. In addition to these regulations, the following requirements are mandatory:

A) Admission Requirements:

1) Applications for admission should be submitted at least three months prior to the registration date for the semester or summer session which the applicant plans to attend. Later applications could be accepted depending upon the availability of proper facilities.

2) Students admitted with deficiencies must make up these deficiencies during his first semester or summer sessions of graduate work. His residence requirements will be increased accordingly.

3) For admission on probation a qualifying examination will be required as evidence of scholastic aptitude.

B) Language Requirements:

A working knowledge of Spanish and English is required of candidates for a Master of Science degree in Civil Engineering.

C) Thesis Requirements:

The thesis shall involve the work equivalent to six credit hours. However, in some cases the thesis work can be extended and the candidate could register for additional thesis credits, but these additional credits shall not be applicable to satisfy graduation credit requirements.

The thesis will be graded only once, that is, after its completion.

D) Examination Requirements:

In case of failure in the final examination the candidate may appear for re-examination after a six month period has elapsed.

FACULTY AND FACILITIES TO SUPPORT THIS PROGRAM

A) Faculty

The Civil Engineering Department has at present a Faculty composed of 21 members distributed as follows:

a- Civil Engineering Faculty:

1. Professors	7
2. Associate Professors	7
3. Assistant Professors	6
4. Instructors	1
Total	21

The basic academic preparation of this Faculty can be indicated by the following degrees held by its members:

b- Academic Degrees held by the Faculty:

1. Ph. D.	6
2. M. Sc.	14
3. B. S.	1
Total	21

In addition to the above Faculty, 8 professors of the Engineering Faculty hold advanced degrees in Civil Engineering and, consequently, could colaborate with this Program.

For detailed information on the academic preparation, research being carried out, papers published, teaching and professional experience, etc., of those that will participate in the graduate program, see the corresponding Curriculum Vitae in Appendix I

The above professors have had advanced training at different institutions, thus assuring a well balanced teaching and research background:

c- Advanced degrees in Civil Engineering have been obtained by the preceeding Professors at the following institutions:

1. Rensselaer Polytechnic Institute (1)
2. University of Michigan (2)
3. Northwestern University (1)
4. University of Illinois (2)
5. Texas A. and M. University (2)

In order to devote part of this Faculty to the proposed Graduate Program it will be necessary to obtain additional Faculty members, especially instructors, to assure that the existing undergraduate Programs will no be weakened. Part-time graduate students can be used as instructors to the mutual benefit of the student and the Institution. The number of additional instructors needed is not easy to evaluate at this stage of the Program. However, some suggestions and orientation to this respect are presented in Appendix II.

B) Laboratories

The Engineering Faculty has in operation several research and testing facilities, all of which are available to graduate student and professors. For a complete relation of those facilities, including the main pieces of equipment available, as well as some suggested improvements, see Appendix III. A brief summary of these facilities is presented here:

1. Soil Mechanics Laboratory
2. Materials Testing Laboratory
3. Structural Engineering Laboratory
4. Sanitary Engineering Laboratory
5. Fluid Mechanics Laboratory
6. Experimental Stress Analysis Laboratory
7. Highway Engineering Laboratory
8. Surveying and Photogrammetry Laboratories

In addition, the following facilities at the Mayaguez Campus are also available:

a. Electronic Computing Center
b. Mechanical Engineering Manufacturing Processes Laboratory
c. Nuclear Center

C) Library

A new library building was recently inaugurated in our Campus. This library has an acceptable selection of technical books, journals, magazines, etc. covering most aspects of Civil Engineering. There are among them 2000 books on Civil Engineering topics, and over 200 engineering publications are regularly received, a large percentage of wich are related to Civil Engineering. In addition, being this the Scientific Center of the University, there is a considerable number of scientific publications available. The library has facilities to get books, reprints, micro-films, etc. on a loan basis from libraries in continental United States. Appendixes VII-IX.

All these library facilities seem to be sufficient to iniciate the proposed program. However, it should be pointed out that, in order to further develop this Program, a sistematic improvement of the amount of available books and publications is strongly recommended.

ADDITIONAL INFORMATION

The following information has been gathered and organized in order to support the present proposal, but, because of its character, it is not made a necessary part of it.

A) necessity of Civil Engineers with Master Degree in Puerto Rico.

A survey was made in order to find out the actual demand for Civil Engineers with Master Degrees. As part of this survey a letter explaining its purpose, as well as a questionnaire, were prepared, both being sent to a number of Government Agencies and private firms which ordinarily employ a large number of engineers. Also a personal opinion about our plans was requested. The response was very encouraging, and, in addition, a large number of letters were received, all strongly in favor of this proposal. The answers received were from the firms or agencies wich appear in Appendix IV.

A summary of the answers to the most significant question is as follows:

1. Total number of engineers employed by these firms: 1013
2. Total number of civil engineers employed : 755
3. Total number of civil engineers with advanced degrees working at present in these firms : 36
4. Total number of civil engineers with advanced degrees that these firms would like to employ : 206
5. Most desirable fields of specialization (in order of preference)

   a- Structural Design
   b- Soil Mechanics
   c- City Planning
   d- Mechanical Engineering
   e- Construction
   f- Electrical Engineering
   g- Highways
   h- Hydraulics

6. Firms willing to help its employees financially or otherwise to study toward a Master Degree : 14

From this information it is evident that the necessity of the proposed program is very real and the expected enrollment will be large.

B) Proposed Courses of Instruction:

It is realized that, at least at the beginning, the number of students participating in this program will be small and also that the available teaching facilities and staff will be limited. Consequently, it seems reasonable to offer only a minimum number of graduate courses organized in such a way to cover a well balanced group of topics. Because of the available facilities and possible demands, these courses have been selected in Structures and Soils Mechanics. It is expected that every year new courses will be added and the existing ones will be revised. The descriptions of the proposed initial courses are indicated in Appendix V

C) Funds Needed to Support this Program

In order properly to carry out this proposal and in spite of all the available resources and facilities, some additional funds will be necessary. These funds will be used for the following main purposes :

1. To obtain additional instructors who will take care of some undergraduate courses, so that the present professors with advance training can devote part of their time to the graduate courses.

2. To maintain the necessary number of teaching and research assistanships in order to attract good candidates and support a sound research program.

3. To increase the number of publications in the library.

4. To improve laboratory equipment in quality as well as quantity.

From the preceding considerations the following tentative bugget is proposed :

TENTATIVE BUDGET

a) Two full time instructors $5,400 /year	$10,800.00
b) Three part time research assistants 1,800	5,400.00
c) Three part time teaching assistants 1,800	5,400.00
d) Necessary books for the library	5,400.00
e) Equipment, Supply and Maintenance of Laboratories *	5,000.00
f) One secretary 2,500	2,500.00
g) Miscellaneous (guest lectures, travel, etc.)	4,000.00
	$38,500.00

* This amount should be complemented with funds from grants, sponsored research, etc.

APPENDIX I

Name	Acarón-Ortiz, Flavio
Department	Civil Engineering
Age	35 years
Academic rank	Associate Professor, full-time
Degrees	BSCE, UPR, 1951 MCE, Texas A & M U, 1952 PhD, Texas A & M U, 1964
Service on faculty	13 years
Other teaching experience	Structural Design Courses in the Continuing Education Program, Ponce, PR
Full-time industrial experience	North American Aviation Co, Summer 1956, Design Engineer
Part-time industrial experience	None
States in which registered	Puerto Rico
Consulting work	Consulting work in Structural Eng and development of residential projects
Publications in last five years	"A Study on Column Behavior", Doctoral Dissertation at Texas A & M U, 1964
Membership in scientific and professional societies	ACI, Colegio de Ingenieros de PR
Honors and awards	None
Subjects or course taught this year	First sem: CI EG 531, 3 sect, 3 hrs lect wk, 2 hrs comp wk, day
Other duties perform for regular base sala ry	Faculty committee work

Acarón-Ortiz, Flavio

Other duties performed for extra compensation	None
Recent summer assignment	CI EG 543, 1 sect, 9 hrs lect wk, 6 hrs comp wk, day
Program participated in, to improve competence as teacher	Summer Conference on Plastic Design of Multistory Frames, Lehigh U, 1965

Name	**Beylerian,** Nurel B.
Department	Civil Engineering
Age	28 years
Academic rank	Assistant Professor, full-time
Degrees	BSCE, Robert College, Turkey, 1959 MSCE, Robert College, Turkey, 1960 PhD, Michigan State U, 1965
Service on faculty	First year on faculty
Other teaching experience	Asst Inst, 1960-64, Mich State U, Inst, Summer 1961, Mich State U
Full-time industrial experience	None
Part-time industrial experience	None
States in which registered	None
Consulting work	GFDS Consulting Engineers, California, Summer 1963
Publications in last five years	None
Membership in scientific and professional societies	None
Honors and awards	None
Subjects or courses taught this year	CI Eg 531, 1 sect, 3 hrs lect wk, 2 hrs comp wk, day; CI EG 343, 1 sect, 7 hrs lect wk; SEMINAR, 1 sect, 2 hrs lect wk, day
Other duties performed for regular base salary	None
Other duties performed for extra compensation	None

Beylerian, Nurel B.

Recent summer assignments not shown above	None
Programs participated in, to improve competence as teacher	NSF Summer Institute in Structural Probabilistics, New Mexico, 1965

Name	**Hernández-Concepción,** Gregorio
Department	Civil Engineering
Age	34 years
Academic rank	Professor, full-time
Degrees	CE, Havana U, 1954 MSCE, U of Illinois, 1956 PhD, U of Illinois, 1958
Service on faculty	7 years
Other teaching experience	Tutor, Havana U, summers 1953 and 1954; Professor Continuing Education Program in Engineering , PR, 1962 and 1964; Lecturer, Fallout Shelter Analysis and Protective Const, OCD, PR, 1964
Full-time industrial experience	Havana, 1954, 1954-55 and summer 1956, Structural Design Engineer
Part-time industrial experience	U of illinois, 1957-58, Research Assistant
States in which registered	Puerto Rico
Consulting work	Considerable consulting work in structures in PR as partner of the firm of Hernández and Hernández
Publications in last five years	" Strength of Prestressed Concrete Beams with Web Reinforcement", Structural Research Series No. 153, U of Illinois, 135 pp 1958

Hernández-Concepción, Gregorio

	"Fundamento del Hormigón Pretensado", Journal of "Colegio de Ingenieros, Arquitectos y Agrimensores de PR 1960, Vol. X No. 2 "Gráficas para Calcular el Valor de Z, a usarse en Vigas Curvas", Journal of the "Colegio de Ingenieros, Arquitectos y Agrimensores de PR, 1963, Vol. XIII, No. 1 "La Inspección y la Seguridad Estructural de Edificios Altos en Puerto Rico", Journal "Urbe", Vol. 8 No. 3, 1964
Membership in scientific and professional societies	Colegio de Ingenieros Civiles de Cuba; Colegio de Ingenieros de PR; Sigma Xi; Pi Mu Epsilon; Phi Kappa Phi; ACI; ASCE; Sociedad de Ingenieros Estructurales de PR; ASEE
Honors and awards	None
Subjects or courses taught this year	First sem: CI EG 533, 2 sect, 3 hrs lect wk, 2 hrs comp wk, day; GE Eg 343, 1 sect 3 hrs lect wk, day
Othe duties performed for regular base salary	Chairman, Faculty Committee on Graduate Studies; Member, Institutional Committee on Graduate Studies; Member, Academic Senate; Member, Academic Affairs Senate Committee; Research
Other duties performed for extra compensation	None
Recent summer assignments not shown above	None
Programs participated in, to improve competence as teacher	Summer Institute on Protective Construction, U of California, Summer 1963

Name	Jiménez-Quiñones, Pedro
Department	Civil Engineering
Age	35 years
Academic rank	Professor, full-time
Degrees	BSCE, UPR, 1952 MSCE, U of Illinois, 1957 PhD, U of Illinois, 1963
Service on faculty	12 years
Other teaching experience	Instructor, Mayaguez Vocational High School, on Architectural Drafting for 2 1/2 years during the period of Jan. 1, 1953 to June 30, 1955.
Full-time industrial experience	PR Planning Board, Summer 1952 Junior Eng
Part-time industrial experience	None
States in which registered	Puerto Rico
Consulting work	Considerable consulting work in soil mechanics for private concerns, and Federal and Local Government Agencies; Consultant to the PR Water Resources Authority in earthdams projects
Publications in last five years	"A Survey of Creep Phenomena in Clay Soils", Journal of the "Colegio de Ingenieros de PR", 1960, "Compaction Characteristics of Tropically Weathered Soils", PhD Thesis, Ann Arbor Press, 1963
Membership in scientific and professional societies	ACI, ASCE, ASTM, Colegio de Ingenieros de PR

Jiménez-Quiñones, Pedro

Honors and awards	None
Subjects or courses taught this year	First sem: CI EG 541, 1 sect, 3 hrs lect wk, day, CI EG 543, 2 sect, 3 hrs lab wk, day
Other duties performed for regular base salary	Professor in charge, Soils Mechanics Laboratory
Other duties performed for extra compensation	Consulting work for the Institutional Buildings and Grounds Department; Soil Mechanics
Recent summer assignments not shown above	None
Programs participation in, to improve competence as teacher	Summer 1961, Attendance to the 5th International Congress In Soil Mechanics and Foundation Engineering, Paris, France Summer 1964, Attendance to the ASCE Conference on Control of Settlement for Shallow Foundations; Northwestern U, Evanston, Illinois Fall 1965, Attendance to the International Conference on Expansive Clays; Texas A & M U Fall 1965, Attendance to the Sixth International Congress in Soil Mechanics and Foundation Engineering

Name	Martí-Marini, Humberto
Department	Civil Engineering
Age	54 years
Academic rank	Professor, full-time
Degrees	BSEE, UPR, 1935 BSCE, UPR, 1939 BSME, UPR, 1941 MSCE, Texas A & M U, 1951
Service on faculty	25 years
Other teaching experience	None
Full-time industrial experience	PR Reconstruction Administration, 1935-37, Junior Elect Eng; PR Govt, 1944-45, Structural Eng; Public Housing Research Adm, PR, 1952-53, Civil Engineer-Research
Part-time industrial experience	None
States in which registered	Puerto Rico
Consulting work	Private consulting in structural design
Publications in last five years	None
Membership in scientific and professional societies	ASEE, ASCE, ACI, Association of Military Engineers, Colegio de Ingenieros de PR
Honors and awards	None
Subjects or courses taught this year	First sem: CI EG 435, 1 sect, 2 hrs lect wk, 2 hrs comp wk, day; CI EG 597, 1 sect, 2 hrs lect wk, 2 hrs comp wk, day; GE EG 342, 1 sect, 3 hrs lect wk, day

Martí-Marini, Humberto

Other duties performed for regular base salary	None
Other duties performed for extra compensation	None
Recent summer assignments not shown above	None
Programs participated in, to improve competence as teacher	Three years of advanced studies toward doctor's degree at Michigan State U

Name	Mora-Faría, Luis E.
Department	Civil Engineering
Age	28 years
Academic rank	Assistant Professor, full-time
Degrees	BSCE, Renseelaer, 1959 MCE, Texas A & M U, 1961 PhD, Rensselaer, 1964
Service on faculty	4 years
Other teaching experience	Instructor, PR National Guard, 1955-57 Instructor, part-time, 1960-62, Inter-American University
Full-time industrial experience	None
Part-time industrial experience	None
States in which registered	Puerto Rico
Consulting work	Consulting work with "Construcciones Antongiorgi", San Germán, PR Consulting Firm, Mora & Pérez, Mayaguez
Publications in last five years	PhD Thesis: "A Study of Compatibility of Rotations and Sequence of Plastic Hinge Formation in Reinforced Concrete Ultimate Load Theory", Rensselaer, 1964
Membership in scientific and professional societies	ASCE, ACI, ASEE, Sigma Xi, Chi Epsilon, Colegio de Ingenieros de PR, Asociación de Ingenieros Estructurales de PR
Honors and awards	None
Subjects or courses taught this year	First sem: CI EG 532, 2 sect, 3 hrs lect wk, 2 hrs comp wk, day; GE EG 341, 1 sect, 3 hrs lect wk, day

Mora-Farfa, Luis E.

Other duties performed for regular base salary	Faculty committee work
Other duties performed for extra compensation	None
Recent summer assignments not shown above	Teaching, summer, 1965: CI EG 533, 1 sect, 9 hrs lect wk, 6 hrs comp wk, day
Programs participated in, to improve competence as teacher	ACI Fall Meeting, 1963, Toronto, Canada ACI Fall Meeting, 1964, Miami, Florida Summer conference: Plastic Design of Multi-Story Frames, Lehigh U, 1965

Name	Santiago - Meléndez, Miguel
Department	Civil Engineering
Age	35 years
Academic rank	Professor, full-time, and Chairman of the Civil Engineering Department
Degrees	BSCE, UPR, 1954 MCE, Texas A and M U, 1960 PhD, Texas A and M U, 1962
Service on faculty	11 years
Other teaching experience	None
Full-time industrial experience	None
Part-time industrial experience	None
States in which registered	Puerto Rico
Consulting work	Consultant for the PR Planning Board on low cost housing, multistory building structures, and prefabricated elements, since 1963; general consulting work on structural design
Publications in last five years	Shear Capacity of Reinforced Concrete Beams, Doctoral Dissertation, Texas A&M Library and U. P.R. Library, 1952 Características y Propiedades de los Agragados Ligeros, Revista de la Construcción, pag. 23, Vol. XI, Núm.3, julio, 1963. Propiedades del Hormigón Ligero, Revista de la Construcción, pag.17, Vol. XI, Núm. 4, octubre 1963. Tracción Diagonal y Cortante en Vigas de Hormigón Armado I, Revista de la Construcción, pág. 17, Vol. XII, Núm. 1, enero 1964.

Santiago-Meléndez, Miguel

	Tracción Diagonal y Cortante en Vigas de Hormigón Armado II, Revista de la Construcción, pag. 15, Vol. XII, Núm. 2. Importancia de una Buena Formación Profesional, Revista de la Construcción, pág. 15, Vol. XII, Núm. 4, octubre 1964. Agregados y Hormigón Ligeros, Revista del CIAA, pág. 48, Vol. XV, Núm. 1, enero 1965.
Membership in scientific and professional societies	ASCE, ACI, ASEE, Tau Beta Pi, Phi Kappa Phi, Sociedad de Ingenieros Estructurales de PR, Colegio de Ingenieros de PR
Honors and awards	None
Subjects or courses taught this year	First sem: GE EG 347, 1 sect, 3 hrs lect wk, day
Other duties performed for regular base salary	Chairman of the Civil Engineering Department, Faculty commitees, institutional commitees, Academic Senate
Other duties performed for extra compensation	None
Recent summer assigments not shown above	CI EG 532, 1 sect, 9 hrs lect wk, 6 hrs comp wk, day
Programs participated in, to improve competence as teacher	ASEE Convention

NAME	Santiago Vázquez, Antonio
DEPARTMENT	General Engineering
AGE	32 years
ACADEMIC RANK	Associate Professor
DEGREES (University, year)	BSCE - University of Puerto Rico - 1955, MSCE - University of Minnesota 1959, PH. D. - Northwestern University - 1964
SERVICE ON FACULTY (year)	9 years
OTHER TEACHING EXPERIENCE	None
FULL-TIME INDUSTRIAL EXPERIENCE	None
PART-TIME INDUSTRIAL EXPERIENCE	None
STATES IN WHICH REGISTERED	Puerto RIco
CONSULTING WORK	None
PUBLICATION IN LAST FIVE YEARS	Boundary Layers Caused by Water Waves in a Rectangular Channel, PH D, Thesis, Northwestern University, 1964 Boundary Layer Studies for the Case of Waves moving along a vertical wall presented to the Oceanographic Session of the American Geophysical Union, 1964 -Proceedings AGU, 1964, Environmemtal Engineering in Puerto RicoPaper presented in the Seminar on Urban Planning for Environmetal Health, U.S. Dept. of Health, Education, and Welfare, Mayaguez, 1965.
MEMBERSHIP IN SCIENTIFIC AND PROFESSIONAL SOCIETIES	ASCE, ASEE, American Geophisical Union, American Association for the Advancement of Science, Colegio de Ingenieros, Arquitectos y Agrimensores de Puerto Rico, Sigma Xi

Santiago Vázquez, Antonio

HONORS AND AWARDS	None
SUBJECT OR COURSES TAUGHT THIS YEAR	Ci Eg 523 Hydrology - Three lecture discussion wk. - one sect. day
OTHER DUTIES PERFORMED FOR REGULAR BASE SALARY	Director Institute of Water Resources
OTHER DUTIES PERFORMED FOR EXTRA COMPENSATION	None
RECENT SUMMER ASSIGNMENTS	None
PROGRAMS PARTICIPATION TO IMPROVE COMPETENCE AS A TEACHER	None

APPENDIX II

DISTRIBUTION OF EXISTING FACULTY BETWEEN THE PROPOSED GRADUATE PROGRAM AN THE EXISTING UNDERGRADUATE PROGRAMS (Necessity for additional instructors)

To initiate the proposed program it is recommended that about six graduate courses be offered each semester. Each course should be in charge of a qualified instructor, already available in our Faculty, and no instructor should teach more than one graduate course each semester. In addition, instructors of the graduate program will devote part of their time to direct research, supervise thesis work, and either teach an undergraduate section or supervise the work of teaching assistants.

It is recommended that the most qualified instructors devote about one third of their time to undergraduate teaching and two third to graduate work. This means that if six instructors are partially engaged in graduate teaching each semester, actually only the equivalent of four full time instructors are being taken away from the undergraduate courses. Furthermore, since at present some instructors are devoting some time to research instead of undergraduate instruction and this research can be used for graduate studies purposes, less than four full time instructors need to be taken from the undergraduate. Consequently, it is estimated that what is really needed at present is the equivalent of three to four full time instructors and, thus, it is suggested to obtain two additional full time instructors plus three part time teaching assistants.

However, it should be pointed out that as soon as the graduate enrollment increases over the eight to twelve students expected the first semester the necessity for additional instructors will be unavoidable.

APPENDIX III

Laboratory Facilities

Soil Mechanics Laboratory

1. Existing Physical facilities
   a) 2400 square feet of floor area including working area, store room and office.

   b) Equipment for grain-size analysis, specific gravity, atterberg limit, permeability, compaction, consolidadation, unconfined compression, triaxial compression, direct shear and double ring shear.

   c) Equipment for standard penetration and sampling of of soils, load tests and vane shear.

   d) Equipment for humidity control and others like ovens, shakers, thermometers, sieves, sample extruders, etc.

2. Additional Facilities Required
   a) 500 square feet of floor area for laboratory working space, one office and storage.

   b) Field equipment for drilling in rocks.

   c) Equipment for consolidation tests, direct shear with different strain rates, pore pressure apparatus, strain controlled and electro-kneading compaction device.

3. Research being done at Laboratory
   a) Compaction properties of soils of Puerto Rico - finished

   b) Properties of Residual Soils of the Mayaguez Area - in progress

   c) An experimental study toward the Beneficiation of Low Grade Soils. To be initiated in coordination with the Department of Public Works and the Federal Bureau of Highways

Materials Testing Laboratory

1. Existing Physical Facilities

   This is possibly the best developed and equipped laboratory in the faculty of engineering

   a) 5000 square feet of floor area, a class room, a shop and a store room

   b) Equipment for metal testing, concrete and concrete products testing

   c) Equipment for tension and compression tests for a range from 1/10 of a pound to 400,000 pounds

   d) Equipment for fine and coarse aggregate analysis and testing

   e) Equipment for columns, beams and structural research

2. Additional Facilities Required

   a) 1,000 square feet of floor area for class and demostration rooms

3. Research being done at Laboratory

   a) Steam curing of concrete

   b) Slender concrete columns

   c) Shear and diagonal tension of concrete beams

   d) The effect of sugar in the time of setting of cement.

   e) Bearing values in concrete beams

Structural Engineering Laboratory

1. Existing Physical Facilities

    a) 950 square feet of Floor area for laboratory work
    b) Equipment for strain measurements, demonstration models and training aids

2. Additional Facilities Required

    a) Electric oven for heating plastics
    b) Scales, mechanical gages and strain indicators

3. Research being done at Laboratory

    This laboratory is being organized at present and no significant work has been done in research. All principal structural engineering research is being carried out in the Materials Testing Laboratory.

Sanitary Engineering Laboratory

1. Existing Physical Facilities

   a) 800 square feet of floor area including working area, store room and office

   b) Enough equipment for undergraduate teaching and for initiating graduate work.

2. Additional facilities Required

   a) 400 square feet of floor area for laboratory working space and research facilities.

   b) Equipment for humidity control, gas analysis and a Warburg meter.

3. Research being done at Laboratory

   a) Relation between electrical conductivity of water and its saline content - finished

   b) Curves for oxygen content in a River stream as an index of Water Pollution - in progress

   c) Proposals in the field of Sanitary Engineering have been submitted to the Puerto Rico Acueducts and Sewer Authority and the The Department of Public Health hoping to start in the near future.

Fluid Mechanics Laboratory

1. Existing Physical Facilities

    a) 7300 square feet of floor area including working area, store room and offices.

    b) Ample space and facilities for undergraduate and graduate programs

2. Additional Facilities Required

    a) Hydraulic jacks sensitive to small slope variantions

    b) Longer open channel for the installation of lateral weirs

3. Research being done at Laboratory

    a) Research in Water Resourses - in progress

    b) Desalinization of Sea Water and Artificial rain-fall - to be started in the near future

Electronic Computer Center

1. Existing Physical Facilities

   a) Ample Computing rooms
   b) Offices
   c) Machine and equipment rooms
   d) An IBM 1620 computer with capacity for 60,00 bits
   e) Key punching machines, verifiers, sorting machines, printers, duplicators, tabulators and an IBM 1401 accesory system

2. Additional Facilities Required

   None

3. Research being done at Laboratory

   The Electronic Computer center is being used for research projects in Nuclear Engineering, Mathematics, Physics, Chemestry, Electrical Engineering and Civil Engineering.

Experimental Stress Analysis Laboratory

1. Existing physical facilities
   a) 850 square feet of floor area including working area and office

   b) Equipment for strain measurements and photoelastic studies

   c) Band saw, polishers, mechanical gages, scales and accesories

2. Additional Facilities Required
   a) 200 square feet of floor area for class demonstrations and lecturing

   b) four laboratory working tables

3. Research being done at Laboratory

   a) Reseach being done in Slender Columns and Concrete Beams in the Materials Testing Laboratory requires the use of the equipment available in the Experimental Stress Analysis Laboratory.

APPENDIX IV

LIST OF AGENCIES AND FIRMS WHICH ANSWERED THE QUESTIONNAIRE ON THE NECESSITY OF CIVIL ENGINEERS WITH MASTER DEGREES IN PUERTO RICO.

Autoridad de Edificios Públicos
Administración de Terrenos de Puerto Rico
Autoridad de los Puertos de Puerto Rico
Junta de Planificación de Puerto Rico
Administración de Fomento Económico
Autoridad de Acueductos y Alcantarillados de Puerto Rico
Departamento de Obras Públicas
Corporación de Renovación Urbana y Vivienda de Puerto Rico
Autoridad de las Fuentes Fluviales de Puerto Rico
Engineeering Center
Carlos M. Passalacqua
Hernández y Hernández, Engineers
Guillermety y Ortiz, Inc.
Toro - Ferrer
Raymond Construction Company of Puerto Rico
Henry Klumb
Viñas y López
Metropolitan Builders, Inc.
Sacmag of Puerto Rico
Tippetts - Abbett - Mc Carthy - Stratton
Earl K. Burton, Inc.
Rexach Construction Company

APPENDIX V

PROPOSED COURSE AREAS TO INITIATE GRADUATE STUDIES IN CIVIL ENGINEERING

Ci Eg 631 - Design of Steel Structures : Three credit hours. Three lecture-discussions each week. Prerequisite : Ci Eg 531, Ci Eg 533.

Behavior of structural steel members and connections, the significance of this behavior in terms of design and the interpretation of codes and specifications for bridges and buildings.

Ge Eg 681 - Advanced Mechanics of Materials : Three credit hours. Three lecture-discussions each week. Prerequisite : GE 348.

Basic concepts and brief review of elementary topics; theory of stress and strain at a point; theories of failure; unsymmetrical bending; curved beams; torsion of non-circular sections; energy principles; indeterminate members; beams on elastic supports, introduction to bending of thin plates.

Ci Eg 632 - Plain and Reinforced Concrete : Three credit hours. Three lecture each week. Prerequisite : Ci Eg 438 & Ci Eg 533.

Brief review of the theories used in the design of concrete and the factors affecting the properties and behavior of the material and of the test piece. Behavior of plain concrete under different types of environment and of loading. Critical review of ultimate strength and behavior of reinforced concrete members and relation between results of research and current specifications for design.

Ci Eg 633 - Reinforced Concrete Structures : Three credit hours. Three lecture-discussions each week. Prerequisite : Ci Eg 632.

Continuation of "Plain and Reinforced Concrete". Ultimate strengh and behavior of statically indeterminate reinforced concrete structures; floors slabs; specifications.

Ci Eg 635 - Structural Theory : Three credit hours. Three lecture-discussions each week. Prerequisite : Ci Eg 533.

Advanced structural theory; evaluation of elastic analysis and limit design of structures; frames; multiple-story structures; arches.

Ci Eg 643 - Design of Structures for Dynamic Loads : Three lecture-discussions each week. Prerequisite : GE 591.

Free vibrations, forced vibration and transient response of structures having one or many degrees of freedom; damping and inelastic action; nature of dynamic loading from earthquake and bomb blasts; methods of analysis and criteria for design earthquake-resistant and blast-resitant structures.

Ci Eg 646 - Applied Soil Mechanics : Three credit hours. Three lecture-discussions each week. Prerequisite : Ci Eg 541, Ci Eg 543.

Application of soil mechanics to earth pressure and retaining walls; foundations of buildings; stability of earth slopes; braced cuts; settlement and contact pressure; seepage.

Ci Eg 648 - Foundation Engineering : Three credit hours. Three lecture-discussions each week. Prerequisite : Ci Eg 646 .

Case histories of projects in foundation engineering; design and construction procedures for foundations, embankments and other civil engineering earthworks.

Ci Eg 644 - Advanced Soil Mechanics Laboratory : Two credit hour. Two Three-hour laboratory periods each week. Prerequisite : Ci Eg 541, Ci Eg 543.

Field and laboratory work in soil sampling, identification, and classification of soils, correlation of modern soil mechanics parameters and theories, and their applications to design problems. Experiments include standard penetration, undisturbed sampling, vane shear, strain and stress-controlled unconfined compression, direct shear, double ring shear, triaxial, consolidation and permeability. Emphasis is given to interpretation and limitations of data in practice.

hours. Prere-
Prerequisite:

Advanced design of complex structural projects.

Ci Eg 695 - Special Problems : One to three credit hours. Investigations and special problems in Civil Engineering.

Ci Eg 699 - Master Thesis : One to six credit hours. Research in the field of Civil Engineering and presentation of a thesis.

APPENDIX VI

REGULATIONS OF THE GRADUATE COUNCIL

UNIVERSITY OF PUERTO RICO
Mayaguez, Puerto Rico

Graduate Studies

REGULATIONS

ORGANIZATION

Graduate instructions at the College of Agriculture and Mechanic Arts of the University of Puerto Rico is organized to provide opportunities and facilities for advanced study and research in the fields of Agriculture, Biology, Chemistry, Mathematics, Nuclear Science and Technology, and Radiological Physics. The purpose of these graduate programs is to develop in advanced students a more adequate comprehension of the scope of knowledge in these special fields of learning and an understanding of the requirements and responsabilities essential for independent research investigations. In all graduate programs emphasis is placed on a high level of scholarship rather than on the satisfaction of specific course or credit requirements.

FACILITIES

The full resources of the College of Agriculture and Mechanic Arts, including its academic divisions and departments, the Agricultural Experiment Station, the Nuclear Center, the Research Center, the Institute of Marine Biology, and other dependencies, are available to all graduate students enrolled at this campus. This includes personnel, laboratories, equipment and other facilities needed for laboratory or field research. The high speed IBM computation system of the Computation Center and the X-Ray Diffraction and Spectographic Laboratory are also available for graduate instruction and research.

Library facilities, which include all the library resources of the University of Puerto Rico under a centralized system and a common card catalog currently being prepared, are also available.

ADMISSIONS

The applicant should obtain from the office of Graduate Studies the necessary forms on which to make his application. Transmission of these forms, together with three letters of recommendation from college faculty members who are acquainted with his academic qualifications, character and ability, and three official transcripts of all undergraduate and graduate work, normally completes an application for admission.

All credentials should be submitted to the office of Graduate Studies at least four weeks prior to the registration date for the semester or summer session which the applicant plans to attend. Applicants who have been away from school for several years may submit recommendations from persons acquainted with their work.

Admission to Graduate Studies is granted by the Graduate Council an upon the recommendation of the Department concerned, and is based primarily on the applicant's undergraduate record. Candidates elegible for admission to Graduate Studies will be sent a permit to register, which will state the conditions under which he may enter. Transcripts of applicants who are admitted become a permanent part of the university files and cannot be returned.

Graduates of institutions other than the University of Puerto Rico will submit the credentials listed above and in addition may be asked to take placement examinations in their major field to determine the quality of their previous training and to guide their counselors in determining the courses best suited for their particular program.

Admission to Graduate Studies may be as follows :

A - Full graduate standing

The requirements for admission to this category are :

1. A degree equivalent to the bachelor's degree granted by the University of Puerto Rico in the proposed field of study.

2. A general grade index of 2.5 or better (on the basis of A = 4.00), or of 3.00 in the major field subjects.

B- Admission with deficiencies.

If the applicant possesses a bachelor's degree but does not fully meet requirement A-1 above, he may be considered for admission with deficiencies. Students admitted in this category must make up these deficiencies during the first year of graduate work and may be required to spend more time in residence than that normally required for the degree sought.

C- Admission on probation

In exceptional cases students whose records show an undergraduate greade-point average slightly below 2.5, but who meet all other requirements for admission with full graduate standing, may be admitted on probation provided that other substantial evi-

dence of scholastic aptitude and or professional achievement are presented. A student who is admitted on probation must carry a full graduate program (12 to 15 credits for a normal semester or 3 to 6 credits for a summer session) during the first term of residence and must obtain an overall grade-index of 3.00 or better in order to be permitted to continue graduate studies.

D - Admission on Senior - Graduate basis

Seniors in the College of Agriculture and Mechanic Arts within 12 credits of graduation, who have earned a general grade-index of 3.00 or better and who can otherwise meet all requirements for admission to Graduate Studies with full standing, may be admitted under this category. The student may enroll for one semester in this status and may carry up to 6 credits of graduate work. He will receive graduate credit only if he completes the requirements for the bachelor's degree at the end of the semester during which he is so enrolled.

E - Unclassified

Under this category may be admitted candidates who otherwise qualify for admission but who do not seek a degree at the institution. The credits earned under this classificiation will not be counted toward residence.

GRADUATE GRADING SYSTEM

Unit of Instruction - One graduate credit consists of one hour of lecture discussion or two to four hours of laboratory or one to two hours of seminar or other work of similar nature per week during the semester.

Graduate Grades - The grades in graduate studies are as follows: A-Excellent; B-Good; C-Satisfactory- D-Deficient (carries no graduate credit); F-Failure; W-Withdrawal; I-Incomplete; P-Passed.

Graduate Grade Index - The graduate grade index serves as a basis for measuring and evaluating the academic performance of the student. It is computed by dividing the total number of honor points earned by the total number of credits in graduate subjects in which the student received a final grade including the grade of F but not the grades of W and P. Honor points are assigned to each grade as follows: A:4, B:3, C:2, D:1, F:0.

The graduate grade index is considered satisfactory when it is 3.00 or above, which is equivalent to an average of B.

Graduate Course Numbering System - All graduate courses are designated by a three digit number according to the following system: 551-599 - courses for advanced undergraduate and graduate students; 600 up - courses for graduate students only.

ADMISSION TO CANDIDACY FOR GRADUATE DEGREE

Admission to a graduate program does not constitute or imply admission to candidacy for a graduate degree. Application for admission to candidacy for a graduate degree must be submitted to the Graduate Council after the satisfactory completion of one full semester of graduate study but before the end of the first nine weeks of the last semester in residence. Approval of the application will be based on the quality of the graduate work of the student as certified by the major department.

REQUIREMENTS FOR THE MASTER OF SCIENCE DEGREE

The Master of Science Degree is awarded by the College of Agriculture and Mechanic Arts of the University of Puerto Rico after satisfactory completion of the course work required of the student, demonstration of the ability to read a foreign modern language, completion of a satisfactory thesis, and the passing of a comprehensive final examination. In addition to these requirements, the candidate for the degree is expected to maintain a high level of scholarship. Graduate work is distinguished from undergraduate instruction by its emphasis on research. Training is provided to give the student familiarity with the methods, ideals and goals of independent investigation. The student's program of study is planned with these ideals in mind and the administration of his program is under the supervision of a special advisory committee. His course work and the thesis problem selected mut be approved by this advisory committee and by the Graduate Council. The advisory committee will consist of at least three faculty members, appointed by the Graduate Council upon the recommendation of the Head of the major department. The advisory committee will meet with the student to prepare his program according to the student's graduate objectives. This program must be approved by the Director of the major department and the Graduate Council.

Hours of Credit - A minimum of thirty semester hours of credit in approved graduate courses is required for the Master's degree. Not more than six credit hours of "courses for advanced undergraduates and graduates" will be accepted toward the degree. At least fifteen credit hours shall be earned in the major subject and six credit hours shall be taken in graduate courses in related fields. At least 24 credit hours must be earned in graduate courses at the University of Puerto Rico (Mayaguez Campus). A maximum of six credit hours may be accepted from other graduate schools. Twelve

to fifteen credit hours constitute a full load for graduate students. Under no circumstances shall a graduate student be permitted to carry a higher load.

Residence - Residence at the University of Puerto Rico (Mayaguez Campus) for at least one academic year as a regular graduate student is required for the Master of Science Degree. An academic year of residence is defined as registration for and attendance in graduate courses aggregating not less than twenty four credit hours distributed over a period of not less than two semesters. Three summer sessions of six weeks may be considered the equivalent of one semester.

Grade Index - A minimum grade index of 3.00 must be obtained in all graduate courses taken. Failure to obtain this average in any semester will automatically place the student on probation. No graduate credit will be earned in courses approved with a grade of C in excess of six credits. Courses passed with a grade lower than C carry no graduate credit.

Language Requirements - A reading knowledge of a modern foreign language is required of candidates for a Master of Science degree. The specific language requirements are established by the different departments and programs. Knowledge is determined by the language departments on the basis of a reading examim tion given in cooperation with the student's major department on dates set forth and scheduled by the language departments. Students whose knowledge of the language is not adequate should confer with the directors of the language departments to formulate plans for meeting this requirements for the degree.

THESIS REQUIREMENT

All candidates for the Master of Science degree must present a thesis representing investigation or research. The subject of the thesis must be approved by the director of the student's major department and by the student's advisory committee. Three copies of the thesis in final form and three copies of the abstract must be filed in the office of the Graduate Council at least one week before the final examination. Detailed instructions as to the form and organization of the thesis may be obtained from the academic departments.

Examination Requirements - Requirements for a Master of Science degree are not measured solely in terms of accumulated credits. Each candidate must pass a final oral examination covering the general field of his major study, courses in related fields and his thesis. This examination cannot be held until all requirements are satisfied with the exception of the course work in progress. The examination will be conducted by the student's graduate

advisory committee and a representative from the Graduate Council at a date set forth by them. The date of the examination will be announced publicly, and members of the University faculty may attend. In special cases, a written examination may be substituted for the oral examination. In case of failure the candidate may not appear for re-examination until one semester has elapsed. The result of the second examination is final.

WITHDRAWALS AND DISMISSALS

A student will not be elegible for candidacy for the Master of Science degree and will be permanently suspended from Graduate Studies in the following cases:

1) If he receives a grade of C or lower in ten or more credits of graduate courses in his program of study.

2) If he receives a grade of D in any two graduate courses, or in one course in his major field.

3) If he receives a grade of F in any graduate course in his program of study.

4) If he fails the second time he takes a final examination.

5) If he fails to pass the foreign language proficiency test for the third time.

6) If he fails to fulfill all the requirements for graduation within six calendar years from the date of his admission to the Graduate School.

7) In any other circumstance specifically indicated by the Department in which the student is enrolled.

A graduate student should avoid as much as possible the dropping of courses. Nevertheless, he will be permitted to do so with the approval of his advisor. Except in case of illnes, certified by a competent physician, no student will be allowed to drop courses during the last eight weeks of a regular semester. An unauthorized withdrawal will impose the grade of F. A student who drops all courses will automatically be withdrawn from Graduate Studies. Any student permanently suspended or who has withdrawn from Graduate Studies must apply for readmission if he intends to continue graduate work.

APPENDIX VII

Civil Engineering Journals Available in the Library

1. Acta Polytechica Scandinavica
2. Addison-Wesley Newsletter
3. Alcoa Aluminum News-Letter
4. The American City
5. American Concrete Institute-Journal
6. American Engineer
7. American Highways
8. American Institute of Planners Journal
9. American Water Works Association Journal
10. Applied Mechanics Review
11. The Apraisal Journal
12. Architectural Forum
13. Architectural Record
14. Arkansas Engineer
15. The Australian Surveyor
16. Automotive World en Español
17. Automovil Internacional
18. Aztec Engineer
19. Bollettino Della Societa Italiana Di Fotogrammetria o Topografía
20. Bolletino Di Geodesia o Scienze Affini
21. Boston Society of Civil Engineers Journal
22. Bulletin of The American Association of Petroleum Geologists

23. Canadian Surveyor
24. Chartered Surveyor
25. Civil Engineering
26. Colegio de Ingenieros 1 uerto Rico Revista
27. Concrete and Constructional Engineering
28. Construction
29. Construction Methods and Equipment
30. The Constructor
31. Engineering
32. The Engineering Economist
33. Engineering News Record
34. Geometre
35. House and Home
36. Implement and Tractor
37. Informes de la Construcción
38. Ingeniería y Arquitectura
39. Ingeniería Civil
40. Ingeniería Internacional Construcción
41. El Ingeniero
42. The Institution of Civil Engineering
43. Monografías del Instituto Eduardo Torroja
44. Instruments and Control Systems

45. Instruments and Experimental Techniques
46. International Hydrographic Review
47. Iron Age
48. Japan Institute of Metals
49. Journal of Applied Mechanics
50. Journal of Basic Engineering
51. Journal of Canadian Petroleum Technology
52. Journal of Engineering Education
53. Journal of Engineering For Industry
54. Journal of Engineering Graphics
55. Journal of Metals
56. Journal of the Royal Aeronautical Society
57. Kansas Engineering
58. Landscape Architecture
59. Lead Abstracts
60. Machine Design
61. Materials in Design Engineering
62. Materials Research and Standars
63. Measurement Techniques
64. Military Engineer
65. Missiles and Rockets
66. Model Engineer
67. Oficina Sanitaria Panamericana Boletín

68. Petroleo Interamericano
69. Photogrammetric Engineering
70. Photogrammetric Record
71. Plant Engineering
72. Progressive Architecture
73. Public Works
74. Railway Locomotives and Cars
75. Research Engineer
76. Revista de Obras Públicas
77. Revista de Plásticos Modernos
78. Roads and Streets
79. Southern California Professional Engineer
80. Steelways
81. The Structural Engineer
82. Survey Review
83. The Surveyor
84. Surveying and Mapping
85. Technology Review
86. Traffic Quarterly
87. Wastes Engineer
88. Water and Water Engineering
89. Water Pollution Abstracts
90. Journal Water Pollution Control Federation

91. Water and Sewage Works

92. Water Works Engineering

93. Werkstatt und Betrieb

94. Zinc Abstracts

APPENDIX VIII

Civil Engineering Journals Recommended to be obtained by the Library

1. Highway Research Board Proceedings
   Edited by Herbert F. Orland
   Publication 1024 1962

2. American Society of Civil Engineers, Proceedings
   ASCE
   345 E 47St. , New York

3. American Society for Testing Materials, Proceedings
   ASTM
   1916 Race St., Philadelphia, Pa.

4. Institution of Civil Engineers, Proceedings
   Institution of Civil Engineers
   Great George St.
   Westminster, London

5. Japan Society of Civil Engineers, Transactions
   1. Chome, Yotsuya, Shinkjuku, Tokyo, Japan

6. Building Research Station Digest
   Building Research Station
   Garston, Watford, Herts, England

7. Building Science Abstracts
   Department of Scientific and Industrial Research
   Road Research Laboratory
   England

8. Highway Research Abstracs
   Highway Research Record
   Highway Research News
   Edited by Highway Research Board
   2101 Constitution Avenue
   Washington, D. C.

9. Indian Concrete Journal
   121 Queen's Road
   Bombay 1, India

10. Informes de la Construcción
Instituto Eduardo Torroja de la Construcción y del Cemento
Chamartín de la Rosa
Apartado de Correos No. 19,002
Madrid 16, España

11. Institution of Civil Engineers of Ireland, Transactions
Institution of Civil Engineers
35 Dawson St.
Dublin, Ireland

12. Instituto Técnico de la Construcción y del Cemento, Bulletin
Apartado de Correos No. 2
Costillares, Chamartín, España

13. International Association of Shell Structures, Bulletin
Alfonso XII, 3, Madrid 7, España

14. Magazine of Concrete Research
Cement and Concrete Association
52 Grosvernor Gardens
London, SW 1, England

15. Memorias de la Societe des Ingenieurs Civils de France
19 Rue Blanche
Paris 9, France

16. Memoirs of the Faculty of Engineering, Kyoto University
Kyoto University, Kyoto, Japan

17. National Building Research Institute, Bulletin
South African Council for Scientific and Industrial Research
Pretoria, South Africa

18. RILEM Bulletin
International Association of Testing and Research Laboratories
for Materials and Structures
12 Rue Brancion, Paris 15 e, France

19. Waterways Experimental Station Technical Reports
Waterways Experimental Station
Corps of Engineers
P. O. Box 631, Vicksburg, Miss.

20. Technical Translations
Office of Technical Services
Department of Commerce
Washington, D. C.

APPENDIX IX

SUGGESTED REFERENCES RECOMMENDED TO BE OBTAINED BY THE LIBRARY

A. JOURNALS

1. Applied Mechanics Reviews
   American Society of Mechanical Engineers
   San Antonio, Texas

2. Architectural Science Review
   P.O. Box 292, Broadway
   Sydeney, Australia

3. Bauingeneur, Der
   Heidelberger Platz 3
   Berlin-Wilmersdorf, Germany

4. Bautechnick, Die
   Hohenzollerndamm 169
   Berlin-Wilmersdorf, Germany

5. Beton-und Stahlbetonbau
   Hohenzollerdamm 169
   Berlin-Wilmersdorf, Germany

6. Building Construction
   5 South Wabash Ave.
   Chicago

7. C/M Magazine
   National Concrete Magazine Association
   3121 South St., N.W.
   Washington, D.C.

8. Cement and Concrete
   Sabu Cement Service
   P.N.B. House
   5 Parliament St.
   New Delhi 1, India

9. Civil Engineering and Public Works
   8 Boakingham St.
   London W.C. 2, England

10. Concrete and Reinforced Concrete
    Kalinin St. 3,
    Moscow G-19, Elmbust, Ill.

11. Concrete Construction
Box 444 Elmbu rst, Illi.

12. Concrete Quarterly
Cement and Concrete Association
52 Grosvenor Gardens
London S W 1, England

13. The Engineer
2 Essex St., Strand
London W C 2, England

14. Experimental Mechanics
Society for Experimental Stress Analysis
21 Bridge Square
Wesport, Conn.

15. Le Genie Civil
5 Rue Jules Lefebvre
Paris 9 e, France

16. Ingeniería
Escuela Nacional de Ingeniería
Ciudad Universitaria, Mexico 20
D. F. Mexico

17. Ingeniería Civil
Asociación de Ingenieros Civiles del Perú
Colmena 788, Lima, Perú

18. Modern Concrete
431 S. Deaborn St.
Chicago 5, Illi.

19. Revista IMCVC
Instituto Mexicano del Cemento y Concreto
A. C. Insurgentes Sur 1846
Mexico 20, D. F.

20. Structural Concrete
Reinforced Concrete Association
14 Howick Place
London, S W 1, England

21. The Structural Engineer
Institution of Structural Engineers
11 Upper Belgrave St., London S W 1, England

B. BOOKS :

1. Advances in Geophysics
   H. E. Landsberg and J. Van Mieghem
   Vol. 9, 1962 374 pp. $14.50
   Academic Press, Inc.

2. Building Failures
   Thomas H. Mc-Kaig
   1962 261 pp. $10.75
   McGraw Hill Book Co., Inc.

3. Foundation Design
   Wayne C. Teng
   1962 466 pp. $16.00

4. Modern Piling Practice
   Rolt Hammond
   1962 225 pp. $12.00
   Rolt Hammond Contractors Record Limited

5. Reviews in Engineering Geology
   Thomas Flohr and Robert F. Legget
   1962 286 pp. $6.00
   The Geological Society of America

6. Theory of Ground Water Movements
   P. Ya. Poluvarinova-Kochina
   1962 613 pp. $10.00
   Priceton University Press

7. Worked Examples in Theory of Structures
   N. P. Roberts and P. G. Ridley
   1963 Two volumes 172 and 221 pp. 35S y 40S
   Mac Donald and Company, Limited

8. Foundation of Structures
   Clarence W. Dunham
   1962 722 pp. $12.75
   McGraw Hill Book Company, Inc.

9. Theoretical Geomorphology
   Adrian E. Scheidegger
   1961 333 pp. $13.00
   Prentice Hall

10. Active and Passive Earth Coefficient Tables
Alfreds R. Jumikis
1962 331 pp. $10.00

11. Design of Thin Concrete Shells
Positive Curvature Index
A. M. Haas
1962 128 pp. $7.50

12. Stress : A Users Manual
M. I. T.
51 pp. $2.00

13. Field Testing of Soils
A. S. T. M. $15.00
American Society of Testing Materials

14. Earth Manual
783 pp. $3.75
U. S. Government Printing Office

15. Mechanics of Soils :
Fundamentals for Advanced Study
Alfred R. Jumikis
1964 483 pp. $12.50
D. Van Nostrand Company, Inc.

16. Engineering Conctracts and Specifications
Robert W. Abbett
461 pp. $8.50
John Wiley and Sons

17. International Conference on Soil Mechanics and Foundation Engineering, Proceedings
1963 551 pp. $15.00
Collectors Holding

18. Design of Concrete Structures
George Winter
1964 $10.50
McGraw Hill

19. Reinforced Concrete
E. Sigallow and S. Strongin
1964 393 pp. $12.50
Gordon and Beach Science Publishers

20. Concrete : Plain, Reinforced, Prestressed, Shell
R. H. Evans and C. G. Wilby
260 pp. $8.50
American Elsevier Publishing Company, Inc.

21. Elastic Stability of Post-tensioned Prestressed Concrete Members
C. B. Wilby
54 pp. $4.50
American Elsevier Publishing Company, Inc.

22. Mechanical Properties of Metals
J. C. Tweeddale
$7.50
American Elsevier Publishing Company, Inc.

23. Bitumen in Hydraulic Engineering
Baron W. F. Van Cesbeck
Vol. II 288 pp. $16.00
American Elsevier Publishing Company, Inc.

24. Fluvial Processes in Geomorphology
Leopold, Walman and Miller
W. H. Freeman and Company

25. Ore Deposits
Charles F. Park, Jr. and Ray A. MacDonald
W. H. Freeman and Company

26. Stratigraphy and Sedimentation
Krumbeim and Class
Second Edition 1963 660 pp. $10.50

27. Structural Analysis
Murray I. Mantell and John F. Marron
1962 430 pp. $10.00
Ronald Press Company

28. The Plastic Method of Structural Analysis
B. G. Neal
Second Edition $7.50
John Wiley and Sons

29. Foundation Design and Construction
M. J. Tomlinson
John Wiley and Sons

30. Plastic and Elastic Design of Slabs and Plates
R. H. Wood
1961 344 pp. $12.00

31. Introduction to Structural Dynamics
John M. Biggs
First Edition $11.50
Mc Graw-Hill Book Company, Inc.

32. Theory of Modern Steel Structures
Lindon E. Grinter
Two volumes
The Mc Millan Company

33. Critical Path Methods
Shaffer, Meyer
Mc Graw-Hill Book Company, Inc.

34. Theory of Structures
Timoshenko and Young
Second Edition
Mc Graw-Hill Book Company, Inc.

35. Formulas for Stress and Strain
Raymond J. Roark
Mc Graw-Hill Book Company, Inc.

36. Physical Properties of Soils
R. E. Means and J. V. Parcher
Charles E. Merrill Books, Inc.

37. Foundation of Structures
Clarence W. Dunham
$12.50
Mc Graw-Hill Book Company, Inc.

38. Soil Mechanics Foundation and Earth Structures
G. P. Tschebotarioff
$8.00
Mc Graw-Hill Book Company, Inc.

39. Foundation Design and Practice
J. H. Thornley
$9.00
Columbia University Press.

40. Introductory Soil Mechanics and Foundation
Sowers and Sowers
$9.00
The Mc Millan Company

41. Foundation Engineering
Peck, Hanson, and Thornburn
$10.00
John Wiley and Sons

42. Foundation Engineering
G. A. Leonards
$20.00
Mc Graw-Hill Book Company

43. Substructure Analysis and Design
Paul Andersen
$8.00
Ronald Press Company

44. Theoretical Soil Mechanics
Karl Terzaghi
$12.00
John Wiley and Sons

45. Soil Mechanics in Engineering Practice
Terzaghi and Peck
$10.00
John Wiley and Sons

46. Earth Pressure and Retaining Walls
Whitney Clark Huntington
$15.00
John Wiley and Sons

47. Fundamentals of Soil Mechanics
Donald W. Taylor
$12.00
John Wiley and Sons

48. Operation Research Methods and Problems
Sasieni, Yaspan and Friedman
$9.00
John Wiley and Sons

49. A Policy on Geometric Design of Rural Highways
A A S H O
American Association of State Highway Officials

50. A Policy on Geometric Design of Urban Highways
A A S H O $7.00
American Association of State Highway Officials

51. Portland Cement and Asphalt Concrete
Thomas D. Larson
$7.00
Mc Graw-Hill

52. Highway Engineering Handbook
K. B. Woods
$25.00
Mc Graw-Hill

53. Design and Construction of Asphalt Pavements
J. Rogers Martin and Hugh A. Wallace
$8.00
Mc Graw-Hill

54. Significance of Test and Properties of Concrete and Concrete Aggregat
$5.00
American Society for Testing Materials

55. Principles and Techniques of Predicting Future Demand for Urban Area Transportation
$2.50
Department of Civil Engineering, M.I.T.

56. Future Highways and Urban Grouth
Wilburn and Associates
$4.00
The Automobile Manufacture Association

57. Asphalt and Allied Substances
Herbert Abraham
Vols. I, II, and III $10.75
D. Van Nostrand Company, Inc.

58. Highway Traffic Estimation
Robert E. Schmidt and M. Earl Campbell
The ENO Foundation for Highway Traffic Control

59. Bituminous Materials in Road Construction
$7.00
Road Research Laboratories

60. Road User Benefit Analysis for Highway Improvements
$3.15
American Association of State Highway Officials

61. Statistics in Research
Bernard Ostle
$10.50
Iowa State Press

62. A.S.T.M. Standards on Bituminous Materials for Highways Construction, Waterproofing and Roofing
$5.50
American Society for Testing Materials

63. Simposium on Mineral Aggregate
A.S.T.M. Special Technical Publication No. 83
$2.00
American Society for Testing Materials

64. Thin Shell Concrete Structures
David P. Billington
$13.50
Mc Graw-Hill Book Company

65. Municipal and Rural Sanitation
V. M. Ehlers and E. W. Steel
$9.75
Mc Graw-Hill Book Company

66. Introduction to Structural Dynamics
John M. Biggs
$9.95
Mc Graw-Hill Book Company

67. Theory of Prestressed Concrete
Michael Chi and Frank A. Biberstain
Prentice Hall, Inc.

68. Limit Analysis of Rotationally Synmetric Plates and Shells
Phillip G. Hodge, Jr.
Prentice Hall, Inc.

69. Practical Prestressed Concrete
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