CIVIL ENGINEERING DEPARTMENT

SEOUL NATIONAL UNIVERSITY

A Survey

by

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November 1956

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The writer arrived in Korea on August 6, 1956 for a stay of four months in order to assist the faculty members of the Civil Engineering Department of the Seoul National University in a study of the department's activities and a subsequent formulation of its reorganization, expansion and plans for the future.

This communication covers the first phase of the writer's assignment. Definite proposals for enhancement of the Civil Engineering department's efficiency will be discussed in a separate report.

PHYSICAL PLANT

The Civil Engineering department occupies roughly one-third of the second floor of Building No. 2 (approximately 9,000 square feet) on the Engineering College Campus. In addition to this space rooms in other parts of this building and in Building No. 1 are used daily for classes attended by Civil Engineering students.

All faculty members have office space. There is also floor area available for laboratories and drafting rooms which can be used for instruction as well as for conferences of staff members. The Civil Engineering department shares with other departments the use of the Engineering library which is located in Building No. 1.

The buildings of the Engineering College suffered considerable damage during the recent military conflicts and occupations, but the College is making determined efforts to rehabilitate all buildings. Since the arrival of the writer all rooms and corridors of the Civil Engineering department have received fresh coats of paint on all walls and ceilings, broken window panes have been replaced and electric

light bulbs installed. Floors are washed daily and rooms are aired out every morning before classes begin.

The writer is impressed by the will and determination shown by the department, indeed by the entire College, in improving and maintaining its physical facilities and presenting an attractive appearance of exteriors and interiors of all buildings.

CURRICULUM

The Civil Engineering department offers a four-year curriculum which leads to the degree of Bachelor of Civil Engineering.

The first year of the Civil Engineering course is the same and interchangeable with those of the other departments. As a result the student who has completed his freshman year can choose any of the other ten departments. The first year covers the fundamentals in Mathematics, Physics and Chemistry and, in addition, training in languages and humanities.

The sophomore year covers the advanced Mathematics and Physics and also the intermediate Engineering subjects such as Mechanics, Surveying, Drawing and Geology.

The junior and senior years are devoted exclusively to the professional subjects of structural, sanitary, railroad and highway engineering.

The instruction in English is excellent, but the time allotted for the teaching of this subject is not sufficient. English is assuming increasing importance. Many courses require American textbooks and even those based on Korean and Japanese texts. are built around an English terminology. It is not unusual in a lecture given in Korean to see the entire blackboard filled with English

words [illegible] and very often these two are given their correct pronunciation by the lecturer. There is general accord among all instructors of both English and professional subjects, that the requirements in English should be doubled. Instead of one year, it should be extended to two years.

A study of the professional part of the curriculum reveal two prominent features. The first is the extremely limited amount of laboratory work which is offered. The second is a "spreading out" of subjects, usually taught in one semester, over several. Each of these items will be examined in the following:

Except for Surveying the student receives scant training in applications of principles and theorems set forth in the lectures. The courses in the second, third and fourth year are primarily lecture courses.

It is imperative that prospective Civil Engineers receive training in the actual handling of the problems of design and construction. The laboratory and the practice drafting room constitute an indispensable part of Engineering instruction. The staff members of the Civil Engineering department agree, but point, very frankly, to the personnel problem that has, so far, prevented this from being put into effect.

The problem is, briefly, that in order to conduct laboratory classes the staff members would have to remain on the campus for considerably longer time than they do at present, and thus be prevented from augmenting their University salaries by earnings from other sources.

TABLE

REQUIRED SUBJECTS: JUNIOR YEAR, C. E. STUDENTS

	1st Semester	2nd Semester
Surveying	6 hours	6 hours
Applied Mechanics	4 "	4 "
Hydraulics	3 "	3 "
Materials Testing	2 "	2 "
Execution of Works	3 "	3 "
Concrete Structures	3 "	3 "
Bridge Engineering	2 "	2 "
Highway Engineering	3 "	3 "
Railroad Engineering	2 "	2 "
Harbor Engineering	3 "	3 "
	31 hours	31 hours

The above table lists the courses which must be taken by junior students; it is typical of all semesters. A total of ten courses must be attended, each one having comparatively few meeting hours per week. This dispersion of subjects is characteristic not only of the Civil Engineering curriculum but of all other departments as well. As a comparison, in all American universities six courses are considered the maximum in any given period (semester or quarter) and the optimum is five.

The disadvantages of this scattering of courses are readily conceded by the faculty members, and the reason for the lack of consolidation is the same personnel problem which was cited above:

the staff members must have time to supplement their earnings by additional sources of income. By limiting the number of lectures in any one subject, the instructors can have several full days away from the Campus and still teach enough hours to meet the requirements for full University salaries.

STUDENT ACTIVITIES

The Civil Engineering department has at present 163 students distributed as follows:

Sophomore year	47
Junior year	60
Senior year	56
	163

These students share with others in the various departments of the Engineering College a high degree of competence. Their marked ability is a result of the very rigid entrance examination which screens out the majority of applicants for admission.

Very few students live in close proximity to the College, most of them commute to and from Seoul by either bus or railroad. The time lost in transit by the students is considerable and the result is a very crowded schedule which leaves little time for professional fraternity activities. An important phase of Engineering Education is the encouragement of professional activities such as meetings, discussions and social gatherings.

Afternoon meetings of the student body of the Civil Engineering department are held only infrequently. The writer attended a convocation of Civil Engineering students on September 13 and spoke to

them about "Student Activities in United States". The talk was followed by discussion and refreshments.

FACULTY

The Civil Engineering faculty consists of three professors, Park Sang Cho, Won Tae Sang, and Choi Kyung Yol; three associate professors, Lee Bong In, Lee Kyung Kyong and Shin Young Kee; one lecturer, Chung In Joon and one instructor, Ahn Su Han.

These individuals are extremely capable and conscientious; they command the admiration of the student body and the respect of their colleagues in the other departments. The senior members have established for themselves reputations of originality and ingenuity and are highly regarded by the practicing engineers throughout Korea.

Regular department meetings are not held by the staff and for that reason there is very little exchange of educational ideas, although a great deal of solidarity and mutual respect is evident. The faculty members are very active in the professional organization, Korean Society of Civil Engineers. Professor Choi Kyung Yol is the president of this Society, and the students are urged to attend its technical sessions, which are held regularly on Saturday afternoons at No. 5-5 Myong-Dong, Chung-Ku in Seoul.

CONCLUDING REMARKS

The Civil Engineering department has been successful in attracting competent engineers to its staff and able young men to its student body. It has physical facilities in terms of floor space, testing machines and other equipment which, if properly used and wisely augmented, will enable it to supply the Republic of Korea with civil engineers of high caliber.

The Civil Engineering department of Seoul National University is also, through its staff members, giving leadership to the profession in general. It does not, at this time, by research and writing furnish ideas to the industrial community of Korea. Of this its faculty members are aware. Their most pressing problem is to find a formula which will enable them to devote their full energies to the further development of the Civil Engineering department and the Engineering College.

APPENDIX

Overall aerial oblique view of Seoul National University Engineering College. The Civil Engineering department is on the second floor of three-story building (to the right of building with square tower.) Buildings in the foreground show war damage.

CIVIL ENGINEERING DEPARTMENT

SEOUL NATIONAL UNIVERSITY

Expansion and Reorganization

A Report

by

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November 1956

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In the following are presented proposals for a reorganization and expansion of the activities and physical facilities of the Civil Engineering department of Seoul National University Engineering College at Shinkongtuk. It is proposed to rearrange the curriculum, to make more intensive use of the available floor space and add laboratories that can serve instruction as well as research.

The existing situation has been described in a previous report, in which attention has been called to the circumstances which led to the present plight of the department. It is recommended that the reader make frequent references to the first report.

CURRICULUM

There is at the present time among staff members considerable dissatisfaction with the Civil Engineering curriculum. It is felt that courses which are now taught over as many as four semesters could well be covered in one or two by reducing the number of courses taught per semester and increasing the number of hours for each. In this manner the total number of hours for students and faculty would remain the same. Such arrangement would be especially beneficial to students, because subjects which are natural prerequisites to advanced courses, could be completed before the latter are begun. As an example, the study of sanitary engineering is facilitated if the student is already familiar with basic structural engineering, especially concrete structures.

Objections have also been raised to the lack of laboratory and drawing room work in the present curriculum, as well as to its very one-sided nature; it completely by-passes courses in elementary electrical and mechanical engineering. In his first report the writer has, also, called attention to the inadequacy of the instruction in English.

The curriculum proposed in this communication has been discussed with the senior staff members of the Civil Engineering department and met with their approval. It is believed that the plan of study specified in the table, immediately following this section, corrects the faults and meets the criticism of the present curriculum.

Main features of the proposed curriculum are:

1. Elimination of German as an obligatory subject and an increase in the requirement in English from one to two years.

2. Required laboratory work in surveying, hydraulics, engineering materials, soil mechanics, plain concrete and sanitary engineering.

3. Required drawing room work in bridge, highway and railroad engineering.

4. Required courses during the senior year in elementary electrical and mechanical engineering.

5. Division of senior year students in the last semester into three groups each specializing in structural sanitary or transportation engineering.

Engineering education should afford opportunities for close contacts with practice. In Civil Engineering this can best be accomplished by class inspection trips to large projects either under construction or completed. Seoul National University is very fortunately located in this respect. Large undertakings in the various fields of Civil Engineering are (and will be for many years) in the course of construction in or near Seoul. For the past three years the students under the guidance of the faculty have occasionally visited the construction sites of local projects. These incidental trips should be systematized and their number increased.

The inspection trip should include only the senior year students. An orientation lecture should precede each trip, and the students should be required to submit individual reports on their observations.

PROPOSED CIVIL ENGINEERING CURRICULUM

FRESHMAN YEAR

1st SEMESTER

Subject	Credits	Hours per week	
		Lec.	Lab.
Korean	4	4	
English	4	4	
Algebra and Geometry	4	8	
Chemistry	6	4	6
Descriptive Geometry	2	2	2
History	2	2	
	22	24	8

2nd SEMESTER

Korean	4	4	
English	4	4	
Calculus	4	8	
Physics	6	4	6
Engineering Drawing	2	2	2
Philosophy	2	2	
	22	24	8

SOPHOMORE YEAR

1st SEMESTER

Subject	Credits	Hours per week Lec.	Lab.
English	4	4	
Advanced Calculus	5	9	
Advanced Physics	2	2	
General Surveying I	3	3	3
General Mechanics	4	4	
Outline of Law	4	4	
	22	26	3

2nd SEMESTER

English	4	4	
Applied Mechanics I	5	6	
General Surveying II	2	2	3
Hydraulics I	3	3	3
Engineering Materials	4	2	3
Geology	4	4	
	22	21	9

JUNIOR YEAR

1st SEMESTER

Subject	Credits	Hours per week Lec.	Lab.
Advanced Surveying III	2	2	3
Applied Mechanics II	5	6	
Hydraulics II	3	3	3
Concrete Structures	4	4	
Steel Structures	4	4	
Soil Mechanics	4	2	3
	22	21	9

2nd SEMESTER

Advanced Surveying IV	2	2	3
Statically Indeterminate Structures	5	6	
Foundations	4	4	
Highway Engineering	4	3	3
Railroad Engineering	4	4	
Plain Concrete	3	1	3
	22	20	9

SENIOR YEAR

1st SEMESTER

Subject	Credits	Hours per week Lec.	Lab.
Sanitary Engineering I	5	5	3
Execution of Works	4	4	
Bridge Engineering I	5	5	3
Industrial Economics	4	4	
Water Power Engineering	4	4	
	22	22	6

2nd SEMESTER

Subject	Option								
	Structural			Sanitary			Transportation		
	Cr.	Lec.	Lab.	Cr.	Lec.	Lab.	Cr.	Lec.	Lab.
Elem. Electrical Eng.	3	3		3	3		3	3	
Elem. Mechanical Eng.	3	3		3	3		3	3	
City Planning	3	3		3	3		3	3	
Rivers and Harbors	3	3		3	3		3	3	
Bridge Engineering II	5	5	3						
Building Structures	5	5	3						
Sanitary Engineering II				5	5	3			
Public Health				5	5	3			
Highway Engineering II							5	5	3
Railroad Engineering II							5	5	3
	22	22	6	22	22	6	22	22	6

SPONSORED RESEARCH

Technological research is a necessary function of an engineering college. By engaging in regular research work the faculty members can continue their own development and growth. They will be able to keep abreast of new methods, techniques and inventions and thus bring stimulus and incentive to their students and professional colleagues.

There is a keen realization of this among the staff members of the Civil Engineering department and also a strong desire to include in their future programs research projects which will serve primarily the needs of the Korean economy. For the first time in its existence the department has now available equipment and personnel capable of such undertakings.

As the conduct of engineering research will be a new experience for the staff members, it is proposed that the initial program be of a modest nature and that applied rather than basic research be emphasized.

The following is a list of projects dealing with subjects, with which the staff has had experience. There is at hand evidence that each of these projects can find ready sponsorship.

1. A Building Code for the Republic of Korea.

   There is at present no ordinance which lists loads, stresses and strains that can be allowed on buildings and other structures. An old Japanese code, which is hopelessly out of date, is sometimes followed; but usually bases for design are left to the discretion of the builder. There is considerable dissatisfaction with this state of affairs. The code should regulate the use of concrete, steel, brick, timber and other materials. Possible sponsor: Ministry of Commerce.

2. Utilization of Used Rails for Bridge and Building Construction.

There is annually a large supply of worn railroad rails that have been replaced by new ones. Because of the high price of imported structural steel, these used rails were recently used for all primary and secondary members in a major highway bridge (Over Naktong River, 10 miles west of Taegu, see Appendix No. 1). The proposed project should deal with the systematic utilization of discarded rails for bridge and building construction. Possible sponsor: Ministry of Transportation.

3. Soil Testing for ROK Government Agencies and Private Firms.

There is available now in the Civil Engineering department equipment for making soil tests, upon which to base designs of dams, bridge piers, wharves and numerous other structures. Sponsorship of this project has already been proposed by: Ministry of Agriculture, at a conference on November 6, 1956 (present Kang Chongmu, Director of Land Bureau; Pak Kisung, Chief of Construction Section; Professor Choi Kyung Yol and the writer).

PERSONNEL

A true university is not only a place of learning for its students, it must also be a place of learning for the various faculties. The continued growth and development of its teachers must be one of its main concerns. For this reason the personnel problem facing the Civil Engineering department, and indeed the whole Engineering College, is of extreme importance.

It has become customary in all Korean universities for the instructors and professors to lecture in more than one institution. In this manner they can increase their earnings to levels consistent with the standard of living to which they feel themselves entitled. The result has been an overstaffing of all the higher institutions. The colleges are operated with staff members on part time. As an example: instead of having 100 instructors on full time in each of two institutions, 200 instructors on half time are doing the same work and getting one-half of their pay from each of the two colleges. It is readily admitted that the national economy would be better served if this constant shifting from job to job could be eliminated. Budgets would remain the same for all institutions, everybody would work full time and not twice half-time. The total number of employees would not be reduced, and a tremendous saving in transportation and time lost in transit would result.

This situation, which exists in the Civil Engineering department as well as in all other departments has been critizised by other advisers to Seoul National University. The writer of this

report, however, has arrived at the conclusion that no immediate attempt should be made to change this practice. It is so deeply ingrained at the present time, that it should be accepted and personnel tables of organization should be made accordingly.

Professors and instructors in the Civil Engineering department teach at two other colleges. They are:

1. Han Yang Institute of Technology
2. Korean Military Academy

Both are institutions of excellent reputations, Han Yang is located at Wang-Ship-Ni in Seoul and KMA within walking distance (about one mile) of the Engineering College.

At a recent conference (October 31, 1956) with the American Army officers (Major H. E. Kemp, Col. J. M. O'Brien, both KMAG, US Army) acting as advisers to the Korean Military Academy the writer learned that the Academy is anxious to have the services of staff members of the Engineering College. A shortage exists of competent teachers in subjects such as structural mechanics, bridge engineering, surveying, road building and sanitation, all of which can be taught by personnel from the Civil Engineering department. Due to the close proximity to the Engineering College of KMA this connection should prove of great value. Commuting is no problem. There are not, at KMA the attractions (as there is in Seoul) which will prevent the faculty members from returning to the department where it is planned to have individual office space available (KMA has only

one big room for instructors). Thus it seems to the writer that in sharing of teachers with the Academy, the Engineering College will benefit in achieving its object of keeping the faculty members on the campus outside the lecture hours.

A recommendation of this report is establishment of a close relationship between the Engineering College and KMA for the purpose of making a working arrangement for sharing of instructors. In this connection it is of interest to compare the prevailing rates of compensation at the two colleges. The case is that of Ahn, Chul Ho, instructor in surveying who spends Monday and Wednesday at KMA and Tuesday and Thursday at the Engineering College. His monthly earnings are as follows

ENC	6	hours per week	Hw. 24,300
KMA	7	" " "	" 21,300
			Hw. 45,600

Also of interest in connection with relationships between KMA and the Engineering College is the intention of the Korean Army to send officers (assigned to the Corps of Engineers) immediately after their graduation from KMA to the College to take advanced courses in Civil Engineering.

Han Yang Institute is another place of employment for professors from the department. The Engineering College should make some arrangement with this school which would permit its personnel to lecture there and return immediately.

Finally, the Engineering College should encourage the department to develop research sponsored by outside agencies. The

staff members are permitted to make full use of university laboratory equipment for private activities be they original research or just routine testing. Regulations of the Engineering College require them to make their own financial arrangements with the sponsor and pay to the Korean government a small percentage of the total fee.

UTILIZATION OF FLOOR SPACE

The Civil Engineering department is located on the second floor of Building No. 2. Approximately 9000 sq. ft. are used exclusively by the department. In addition classes are held in rooms on other floors and also in Building No. 1. There is no shortage of floor space but a definite need for re-arrangement, improvements and additional partitions.

The plan, which follows this section, shows a proposed arrangement that meets the immediate and also anticipated needs of the department. The main features of this scheme are:

1. The addition of four new partitions (in red) which will transform the four offices in the south wing into eight, resulting in individual rooms for nine staff members.

2. A new laboratory for instruction and research in concrete in room No. 239.

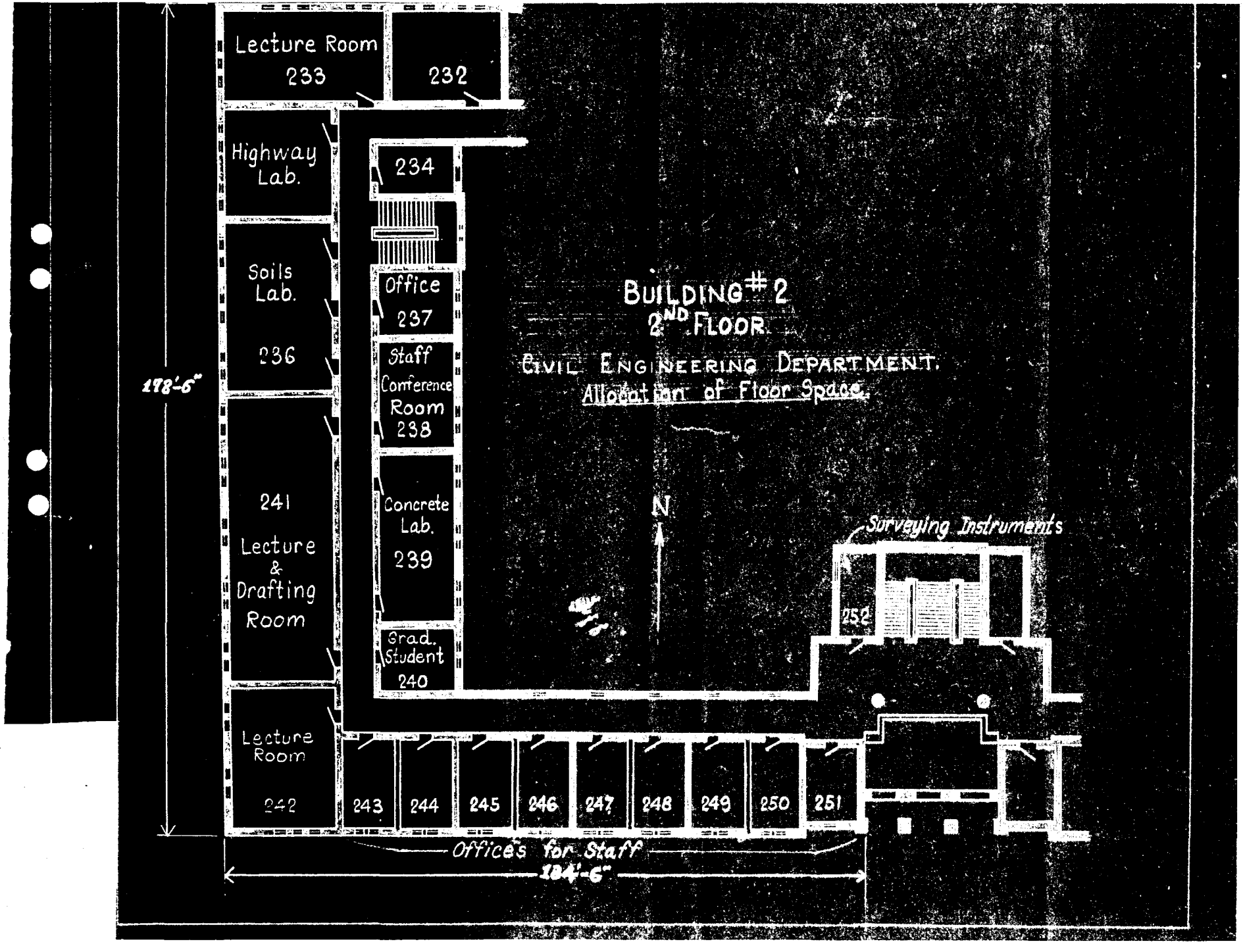
3. A faculty reading and conference room in Room No. 238.

4. A laboratory for instruction and research in highway and soils engineering in Rooms No. 235 and No. 236. This will necessitate the replacement with reinforced concrete of the wood floor in Room No. 235 and the portion of the floor in Room No. 236 shown cross-hatched. The partition between the two rooms may be either completely or partially removed.

5. A combination lecture and drafting room is planned for Room No. 241.

The proposed alterations have been discussed with and approved by the senior members of the departments. They are the results of changes and new emphases in the curriculum. The staff has agreed to the compact curriculum with laboratory work and

supervised design exercises, and has expressed a desire for individual offices and a conference room.


Lecture Room 233
232
Highway Lab.
234
Soils Lab. 236
Office 237
Staff Conference Room 238
178'-6"
BUILDING # 2
2ND FLOOR
CIVIL ENGINEERING DEPARTMENT.
Allotment of Floor Space.
241 Lecture & Drafting Room
Concrete Lab. 239
N
Surveying Instruments
252
Grad. Student 240
Lecture Room 242
243
244
245
246
247
248
249
250
251
Offices for Staff
184'-6"

NEW EQUIPMENT AND LABORATORIES

During the month of October 1956, the Civil Engineering department received additional equipment for laboratory work in meteorology, hydraulics, surveying, soil mechanics and highway engineering. A brief description of the main items in each and the status of these branches follow.

1. Meteorology and Hydraulics.
   Weather recorder (wind pressure, velocity and direction, sunshine); mercury and aneroid barometers; thermometers; anemometer; snow and rain gage; hygro-thermograph; evaporation hook gage; water stage recorder; current velocity meter.

2. Surveying.
   Theodolites (2); transits (5); levels (4); transit levels (2); plane tables (5). Old equipment consisted of: transits (5); levels (3); plane tables (14).

3. Soil Mechanics and Highway Engineering.
   Unconfined compression test apparatus; triaxial compression test apparatus; direct shear test apparatus; permeameter; fixed type consolidometer; platform scale consolidometer; standard liquid limit device; desicator; asphalt penetrometer; asphalt ductility tester; rotary extractor for asphalt; flow trough; humidity cabinet; electric oven; electric furnace; standard sieves with shaker; cement briquette testing machine with molds.

The equipment for meterology and hydraulics is very limited and can only be used for lecture demonstrations. In surveying there are enough instruments for field exercises for the entire class of Civil Engineering students. In soil mechanics and highway engineering there is also sufficient equipment for student laboratory sessions in testing and evaluating soil samples and road building products.

The establishment of a structural laboratory is recommended. The department has decided to reserve floor space for a concrete

and structural laboratory in Room No. 239 and approved of the proposed equipment listed in appendix No. 4. The structural laboratory will initially concentrate on concrete making and testing for classroom exercises and research work for outside agencies. Floor space and equipment will be sufficient for laboratory sections of 20 students.

Eventually a hydraulic and sanitary laboratory should be added to the Civil Engineering department. Because applied hydraulics is also an important subject in other departments especially those of mechanical engineering and naval architecture, it is proposed at some future date to establish a common hydraulic laboratory for civil, mechanical and naval architectural department. This scheme would eliminate duplication and overlapping of personnel and facilities and should receive careful and sympathetic consideration. The three departments are, at present, attemping to coordinate their needs. It is the intention of the writer to review the proposed plans and make definite recommendations at a future date.

CONCLUDING REMARKS

It is impossible to conclude a report on the Civil Engineering department without directing attention to its place in the Engineering College. For this reason the summary, which follows, contains a number of references to the various other units of the college.

1. The writer believes that the proposed curriculum may well serve as a pattern for revisions of other department curricula. In fact, some of the suggestions, which have been made are dependent on similar revisions in other departments. Thus, the completion of the chemistry requirement in the first semester and the physics requirement in the following semester should for efficiency of the College as a whole, be matched by the reverse order of these subjects in some other department. In this manner personnel and equipment of chemistry and physics departments will be able to function continuously at full capacity.

2. Serious consideration should be given to the establishment of a department of theoretical and applied mechanics. The subject of mechanics cuts across all engineering specialties. Unlike drawing and surveying, which are also fundamental, it is constantly growing and invading new fields. Great financial savings and educational advantages could be realized from the creation of a department of mechanics.

3. Sponsored research should be solicited in all departments of the Engineering College. It should be used as a source of prestige and additional earnings for the faculty members. Seoul National University should prevail upon the Korean government to change its decision of not allowing additional compensation for staff members engaged in sponsored research financed by outside support.

4. The Engineering College administration should set up rules for facilitating part time teaching for its faculty members at other educational institutions. These rules should be worked out in conjunction with the other colleges which employ instructors from Seoul National University.

APPENDIX NO. 1

Koryong Bridge over the Naktong River, 10 miles west of Taegu. Discarded railroad rails were used for all primary and secondary members of this structure, which was conceived and designed by Professor Choi, Kyong Yol of the Civil Engineering Department. - Systematic use of the large annual volume of rails is proposed as sponsored research at the Engineering College of Seoul National University.

1. 工事名 高灵橋戰災復旧工事
2. 位置 慶尙北道達城郡·高灵郡境界 洛東江
3. 橋長 241.35m
4. 構造型 古軌條組立2經間連續斗—引鋼構橋/38.45
겔바型 102.90m------------102.90
6. 施行廳 內務部土木局
7. 施行監督 內務部土木局道路課 技仕 金昇燦 〃 沈秉滿
8. 施業者 現代建設株式會社 代表 鄭周永

1. [illegible] Reconstruction of Koryong bridge, war damaged.
2. Location. Between Talsong Gun and Koryong Gun, Kyongsang Pukto province, on Naktong river.
3. Length of bridge. 241.35 M
4. Type of bridge structures.
Two-span Continuous Warren steel trusses (made of old rail) [illegible]
Three hinged steel plate girders .... [illegible]
6. Office of execution. Bureau of Public works, Ministry of Home Affairs,
7. Supervisor & Inspector. Engineers, Kim Sung Chan, Shi Bong Man, Highway section, Bureau of Public works.
8. Contractor concerned. Chong Ju Yong. President, Hyundae construction Co.

APPENDIX NO. 2

Surveying equipment consisting of theodolites, transits, plane tables, drawing instruments, measuring chains and tapes have been delivered to the Civil Engineering department by United States Office of the Economic Coordinator for Korea. Improved instruction and field exercises will be a result of this acquisition.


WILD
WILD

APPENDIX NO. 3

View of laboratory for soil mechanics. The equipment shown has been delivered by United States Office of the Economic Coordinator for Korea. These apparatuses will enable the Civil Engineering department to conduct laboratory classes to students and also to engage in independent and sponsored research.

APPENDIX NO. 4

Proposed Equipment for Structural Laboratory.

The following list of items has been approved for the 1956 budget.

Item No.	Description	Quantity	Unit Cost	Total Cost
1	Laboratory Concrete Mixer; CT-30	1	$165.00	$165.00
2	Slump Test Set; CT-225	4	22.50	90.00
3	Heavy Duty Cylinder Molds CT-35	20	28.50	570.00
4	Curing Cans CT-205	10	35.00	350.00
5	Capping Set CT-56	1	185.00	185.00
6	Cement Measure CT-40	1	10.50	10.50
7	" " CT-41	1	20.00	20.00
8	" " CT-42	1	30.00	30.00
9	Concrete Tester CT-711	1	1050.00	1050.00
10	Flexure Attachment CT-84	1	390.00	390.00
11	Quick Type Beam Form CT-76	1	24.00	24.00
12	" " " " CT-77	1	26.00	26.00
13	" " " " CT-78	1	28.00	28.00
14	" " " " CT-79	1	29.00	29.00
15	" " " " CT-80	1	30.00	30.00
16	" " " " CT-81	1	31.00	31.00
	Total			$3028.50

The above equipment can be purchased from SOILTEST, Inc., 4711 West North Avenue Chicago 39, Illinois.

Proposed Equipment for Structural Laboratory - continued

Item No.	Description	Quantity	Unit Cost	Total Cost
	Total brought forward			$3028.50
17	Gurley Plane Table Outfit No. 582FD complete with Alidade, Tripod, Board and canvas cases. (Gurley Co., Troy, N. Y.)	5	$559.00	2795.00
18	K-Box Strain Recorder, Complete with 4 spare batteries	1	620.00	620.00
19	SR4-electrical resistance gages type A11	170	1.00	170.00
	The last two items can be purchased from Baldwin-Lima-Hamilton Corp. Philadelphia, Pa.			
	Grand Total for Civil Engineering Department			$6613.50