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Civil Engineering

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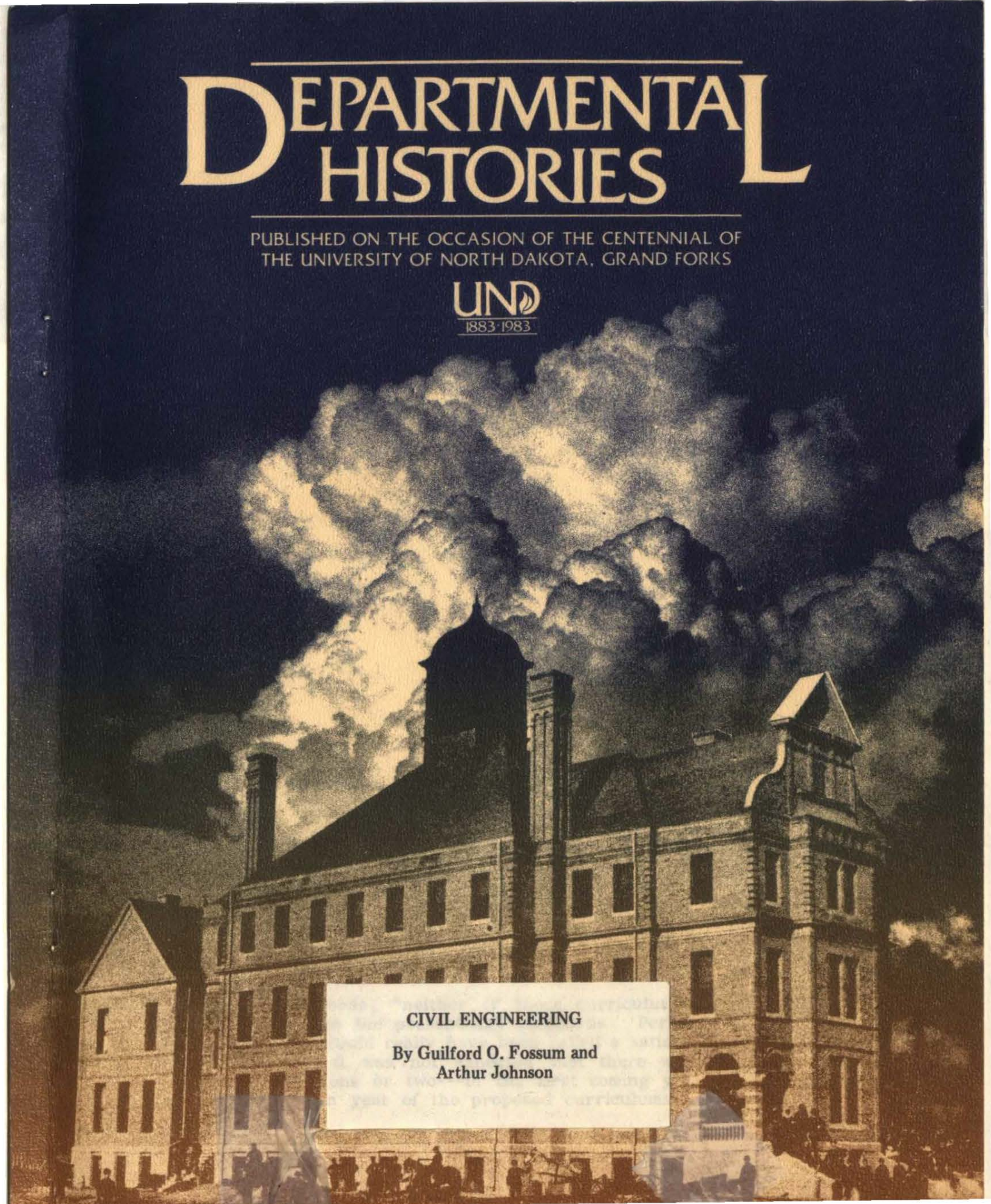

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The charter of the University of North Dakota provided that it should "consist" of the following colleges and then proceeded to enumerate them. The fourth one mentioned was "The School of Mines, the object of which shall be to furnish facilities for the education of such persons as may desire to receive instruction in Chemistry, Metallurgy, Geology, Mining, Milling, and Engineering".

Former Dean Elwyn F. Chandler writes in his papers that Earle J. Babcock, Professor of Chemistry and Geology, was also appointed "State Geologist" around 1894, and by 1898 was also designated as "Director of the School of Mines." In the spring of 1901 Professor E. J. Babcock concluded that the time had come for establishing one or more engineering curriculums because of several favorable factors. One of these was the income each year received by the University from the rent or sale of the School of Mines lands, which Babcock felt should be appropriately spent for support of engineering courses. A second factor was the increasing number of students apparently interested in such work and would likely go to some out-of-state college if it were not provided here. Thirdly, it appeared at this time that increased working space and laboratories would become available with the erection of Science Hall. Actual work on Science Hall was started in the summer of 1901 and it was occupied in February of 1902. At that time Professor Babcock was able to move, with all his laboratories, from the former rooms in the basement of Old Main to the much more spacious quarters in Science Hall. The fourth factor was that Mr. Calvin H. Crouch had been engaged by the University before the opening of the 1901-1902 academic year in response to a popular demand that students should have an opportunity for "manual training". Mr. Crouch was a mechanical engineer graduate with considerable experience who could instruct in mechanical engineering and could also serve any mining engineering students in engineering drawing and machine-shop courses.

Chandler further states that the Catalogue Committee found Professor Babcock's recommendations to be sound. Therefore, with final faculty authorization, they inserted in the catalogue under the heading College of Mining Engineering, the four-year mining engineering curriculum which he had suggested. Also, since Mr. Crouch would be here before the beginning of school and since Science Hall would soon be available for use, the Catalogue Committee decided that it was permissible and advisable to insert in the catalogue a full so-called mechanical engineering four-year curriculum under the new heading "College of Mechanical Engineering."

In Chandler's words, "neither of these curriculums as thus first announced were according to the present-day standards. Perhaps neither, and certainly not the second, could really have been called a satisfactory curriculum even for that day. But it was not expected that there would be any students---or merely a single one or two---in the first coming year above freshman grade, and the freshman year of the proposed curriculums was good enough. Publi-

cation of complete courses, even in this preliminary form, was expected to open the door ready for their subsequent amendment and improvement into really good standard form in following years, before any students reached the upper years of the curriculum. Thus the official start of engineering college instruction under that title was in September, 1901." Thomas Campbell, mechanical engineer, was the first engineering graduate in June, 1904.

On June 29, 1899, ground was broken for a general university power house to contain a central heating plant and generators for the electric lighting system. When Science Hall was put into use in February, 1902, more than half of the basement was occupied for machine or carpenter shop work and drafting room space. Apparently that type of work appealed to many students so funds were obtained for additional quarters which were erected in the summer of 1902 and occupied that fall. This building was about 100 feet by 54 feet and was located to the north of the Power House and known as the Mechanic Arts Building. Shortly thereafter (about 1903) these two buildings were connected by completing the intermediate section. In 1909 a new Power House was constructed at the southern edge of the campus and the old power house was given over to engineering instruction. The now combined old Power House and Mechanic Arts Building were called the Engineering Building, also referred to as Mechanical Engineering. Some small additions to the building were made then, and several larger additions in the period 1936 to 1940.

In the catalogue of May, 1903, the name announced for the prospective degree from the mining course was "Mining Engineer" (the first graduate was in 1905). Also, a curriculum for Bachelor of Electrical Engineering was added. The catalogue of July, 1904, announced two other engineering degrees, "Mechanical Engineer" and "Electrical Engineer." This catalogue also changed the mining degree title to "Engineer of Mines."

A civil engineering curriculum was first listed in the catalogue for the academic year 1907-1908. The following statement preceded the description of the curriculum:

"As the first three years of a Civil Engineering course is embodied in the existing curriculum of the existing engineering colleges, the course in Civil Engineering is under the joint direction of the Colleges of Mechanical and Electrical Engineering. The degree of Civil Engineer (C.E.) is conferred upon those who complete satisfactorily the following curriculum." A footnote stated that the subjects of the senior year would not be offered in 1907-08. Similar statements are found in the catalogues for 1908 and 1909.

The first faculty person in Civil Engineering was Elwyn F. Chandler. The following biographical sketch is taken from the Elwyn F. Chandler papers on file in the Chester Fritz Library of the University.

"Elwyn Francis Chandler was born at Yellow Springs, Ohio, August 29, 1872. He received his education at Ripon preparatory school and college, graduating A.B. in 1894 and A.M. in 1897. He was in the graduate department at the University of Wisconsin (applied mechanics and astronomy) from 1897 to 1899, holding a teaching fellowship the second year.

The University of North Dakota engaged him in 1899 as an instructor in the combined departments of mathematics, physics, astronomy and Scandinavian

languages. When the department was divided in 1903, he was assistant professor in charge of all mathematics, and made professor of mathematics in 1904. He became professor of Civil Engineering in 1914. Professor Chandler was Dean of the College of Engineering from 1924 until 1932 in which year he requested the transfer of those duties because of a neurological condition.

He was active in many off-campus occupations during these years wth the University. He was: State Engineer of North Dakota, 1904-1905; City Engineer of Grand Forks from August, 1918 until September, 1919; hydraulic engineer for the Water Resources branch of the U.S. Geological Survey, 1903-1935; Boy's Working Reserve, 1917-1918; State Director for the U.S. Coast and Geodetic Survey, 1933; Associate Water Consultant for the National Resources Commission, 1936; secretary of the North Dakota Society of Engineers, 1912-1922, and others.

On June 11, 1946 he received an honorary degree as Doctor of Science from the University of North Dakota. He had retired to part-time teaching at the University of North Dakota in 1939 and remained in that status until his death August 13, 1946."

The University Bulletin in 1910 stated that "the Course in Civil Engineering" was in charge of Professor Chandler, at that time Professor of Mathematics. This Bulletin stated that "the Division of Engineering consists of the Colleges of Mining Engineering (School of Mines), the Colleges of Mechanical and Electrical Engineering and the Course in Civil Engineering. The Course in Civil Engineering is supervised by a committee consisting of the President of the University and the deans of the engineering colleges. Professor Elwyn F. Chandler acts as enrolling officer for the students in Civil Engineering.

The distinctive professional lines in which attention is given in the course in Civil Engineering are the following:

1. Surveying and field methods.
2. Mechanics and its application to the design of roofs, bridges and other structures.
3. Plain and reinforced concrete and concrete construction.
4. Railway location, construction and maintenance.
5. Hydraulics, and its application to waterpower, canals and drainage works, and irrigation.
6. Sanitary and municipal engineering, including water supply, sewerage, and roads and pavements.

It is the purpose to give as broad and scientific training in these lines as the length of the course will permit. The study of principles is held to be of prime importance, since the knowledge of these is acquired only with difficulty in the practical work of the Civil Engineer."

As early as 1910 (the first Bachelor of Science Degree in Civil Engineering had not yet been conferred), the General Catalogue of the University included for the first time a curriculum for a fifth year in Civil Engineering leading to the degree of Civil Engineer. Subject requirements for this degree were as follows:

1. Major subjects (not less than 18 nor more than 24 hours)
   Structural design, bridge engineering, and structural engineering.
   Sanitary engineering and the biology and bacteriology of the purification of water and sewage.
   Hydraulic engineering, rivers and canals, irrigation and drainage, and the conservation and development of waterpower.
   Cements, and plain and reinforced concrete structures.

2. Minor subjects (not less than 12 nor more than 18 hours)
   Sewer systems
   Streets, roads and pavements
   Advanced Geodesy
   Railroad engineering
   Law
   Economics
   Geology
   Mechanical Engineering
   Electrical Engineering
   Mining Engineering
   Mathematics
   Physics

The first degrees in Civil Engineering were awarded in 1911. There were 3 recipients; namely, Paul M. Barnes, George T. Challoner and Wesley R. Ruby. Thereafter, only two or three degrees were awarded each year until 1916 when the number jumped to six. One of these six was Esther M. Jack, a native of Williston, North Dakota and the first woman to graduate from the University of North Dakota in Engineering. Sixty years would pass before Rebecca A. Fisher would become the second woman to receive a degree in Civil Engineering. In 1926 the graduating class numbered thirteen, the only time that the roll of graduates would show double-digit numbers until 1937 when there were ten graduates.

The 1910 catalogue, to which extensive reference has already been made, was arranged to show a Division of Engineering consisting of three parts separately described. These were: the College of Mining Engineering with E. J. Babcock as Dean; the College of Electrical and Mechanical Engineering with C. H. Crouch as Dean; and the Course in Civil Engineering administered by E. F. Chandler. The degrees awarded were revised to be of similar form; namely, Bachelor of Science in Mining, Mechanical, Electrical or Civil Engineering at the end of four regular years. At the close of one additional year of resident study the degree of Engineer of Mines, Mechanical Engineer, Electrical Engineer or Civil Engineer could be attained. The 1917 catalogue changed all this to a single College of Engineering (School of Mines) with E. J. Babcock as Dean. The degree designations remained unchanged.

In 1920 the first advanced degree in Civil Engineering was awarded to William F. Keye and records indicate that it was referred to as a Master of Science in Civil Engineering. This is reflected in the 1921 Catalogue which changed the degree designation at the end of the fifth year to Master of Science in the appropriate engineering discipline.

For the 14-year period from 1907 to 1921 Civil Engineering had been the responsibility of one faculty member, E. F. Chandler. In 1921, however, the

faculty was doubled with the addition of Alfred Boyd, a native of Indiana who had received his B.S. degree at Washington University. He began as an Assistant Professor of Civil Engineering in 1921, had attained the rank of Professor by 1923, and remained as part of the faculty until his retirement in March, 1944, due to health problems.

The 1928 catalogue added provision for the possible granting of the professional degree Engineer of Mines, Mechanical Engineer, Electrical Engineer or Civil Engineer, without resident study except for the submission of reports, examinations, or recommendations as the University faculty might deem proper to require, if any. Only graduates of the University of North Dakota College of Engineering were eligible and they were required to have had at least six years of successful practical engineering experience after graduation; at least three of these years were required to be in a position of considerable responsibility. In line with this stipulation, Paul M. Barnes, Clifford Johnson and Elder L. Lium were awarded Civil Engineer degrees in 1944 and Bruce Johnson and Harry Knudsen in 1949.

In 1935, Elder L. Lium joined the faculty as an Assistant Professor. He was a native of Christine, North Dakota, and had received his B.S. degree from the University of North Dakota in 1921. He became Department Head in 1939 and was Dean of the College of Engineering from 1951 to 1963. After retiring from the position of Dean he continued to teach in the Department until he retired from the staff in 1966.

In 1939 the Civil Engineering faculty increased to four with the addition of Loren B. Almy, B.S.C.E., Nebraska, at the rank of Instructor. However, this coincided with the beginning of part-time status for Professor Chandler so that the full-time equivalent staff was less than four. The clouds of World War II were boiling over Europe and were soon to engulf America also. Graduates in Civil Engineering dropped to zero in 1944, one in 1945 and zero again in 1946. With the retirement of Boyd in 1944, the departure of Almy in 1946 and the death of Chandler, also in 1946, the Civil Engineering Department faced the prospect of entering the post-war education boom with only two faculty, Lium and Theodore O. Reyhner, B.S.C.E. Newark College of Engineering, who had joined the staff as Associate Professor in 1945.

From the first graduates in 1911 through 1946, Bachelors degrees had been granted to 203 individuals, including one woman; Masters degrees had been awarded to only two persons.

NOTE: For the reader's convenience, two tables are provided at the end of this manuscript. The first one shows the number of degrees granted for each year from 1911 through 1982. The second table lists all faculty by name for the same time span and shows their starting rank and period of service.

The home of the Civil Engineering Department was in the Engineering Building which contained offices, classrooms and laboratories. On April 26, 1935, as one feature of the regular annual "Engineers Day" it was officially announced that the State Board of Administration had approved a petition received by them from the engineering students. This petition requested that the Engineering Building should be renamed "Chandler Hall" in honor of Elwyn F. Chandler. In addition to his other relationships to engineering in general and civil engineering in particular, it happened to be Chandler who set the construction stakes

for the first work on this building. This had been done on June 29, 1899, and Chandler had supervised most of the work on the building. Thereafter, the Engineering Building was known as Chandler Hall and continued to serve civil engineering students for the better part of four more decades.

When Dean Chandler requested to be released from the duties of the Dean's position in 1932, Louis C. Harrington became acting Dean and, in 1933, Dean of the College of Engineering. Dean Harrington served in this position until his death on February 3, 1951, at which time the duties were assumed by E. L. Lium. Although Dean Harrington was not a member of the Civil Engineering faculty, he did hold a B.S.C.E. degree from Michigan.

Prior to World War II, and immediately after during the post-war boom in higher education enrollments, the Mechanical, Electrical and Civil Engineering Departments were all headquartered in Chandler Hall with space for offices, classrooms and laboratory facilities. It soon became apparent that this space was highly inadequate for post-war needs and plans were made for a new engineering building. The State Board of Higher Education approved the request for a new building in 1948 and in 1949 the Legislature granted its approval. Construction was begun in 1951 and the building was occupied during the 1952-1953 academic year.

The new Building was officially designated as Harrington Hall and it housed the offices and classroom space for the Civil Engineering Department. Civil Engineering laboratories were still located in Chandler Hall and would remain in use for approximately another twenty years, until the completion of Upson I in the Engineering complex. This new building (Harrington) also contained the Dean's office and an engineering library on the second floor. The Civil Engineering offices were scattered on the three floors of the building with the majority of them being on the second floor.

Entering into the post-war era with a shortage of floor space was one major problem that the Civil Engineering Department of that day had to face; even more unenviable was the prospect of beginning the 1946-47 academic year with a faculty of two, E. L. Lium and T. O. Reyhner. This was the situation which existed as late as the early days of September, 1946. Fortunately, today's regulations (1982) on advertising to fill positions did not exist and Guilford O. Fossum, B.S.C.E. University of North Dakota, was engaged on a one-year contract as Assistant Professor of Civil Engineering; today, 37 years later, Professor Fossum is still a full-time member of the Civil Engineering faculty.

In 1947, T. O. Reyhner resigned but Ivan R. Jensen and Stanley S. Johnson were added, bringing the C.E. faculty up to four in number. Jensen received his B.S.C.E. from the University of Minnesota and came with the rank of Associate Professor. He is still an active member of the Civil Engineering faculty and he served as the Department Chairman from 1952 to 1973. Stanley Johnson was a prewar student who completed his work after the war. He joined the staff as an Instructor in 1947 and remained on the staff through the 1958-59 year at which time he left to enter private practice.

The faculty now established remained constant at four persons until the beginning of the 1952-53 academic year, a period of five years. During this time 108 B.S.C.E. and 1 M.S.C.E. degrees were granted. This represents about 13% of the B.S.C.E. degrees that have been given to date. It is quite

apparent from these numbers that the C.E. staff was completely tied up with teaching; research at this time was not part of the picture.

The next staff member in Civil Engineering was Oscar E. Manz who had received a Bachelor of Science from the University of Saskatchewan and was an Assistant Professor of Geology when he joined the C.E. staff in 1953. He remained as a full-time staff member until 1961 at which time he took a leave of absence to pursue Master's Degree work at the University of Minnesota. In 1962 he returned again to the C.E. Department and remained until 1975. At that time he took a second leave of absence to work as a research engineer with a fly ash company. He returned to the University in 1976 and became the Director of the newly-formed Coal By-Products Utilization Institute. Since 1978 he has been primarily engaged with lignite coal research and has been one-eighth time with the Civil Engineering teaching faculty.

Robert J. McFarlin received a Bachelor of Civil Engineering degree from the University of Delaware and was engaged as an Instructor in Engineering Drawing and Descriptive Geometry in 1952. In 1955 he became Instructor in Civil Engineering for the 1955-56 academic year. He left at the end of the school year to go into private practice, thus reducing the faculty from six to five. To partially compensate for this Peter B. Wold, a graduate student, was employed as a one-quarter time teaching assistant for the 1956-57 school term.

The faculty had the largest increase in a single year when three new full-time members were added in 1957 in the persons of Ronald A. Apanian, Rudolf Aschenbrenner and James O. Billey.

Apanian, B.S.C.E., University of North Dakota, was appointed as Instructor in 1957. In 1965 he took a leave of absence to study for the Doctor's degree at Oklahoma State University. He returned to the department at the close of the fall semester in 1966 and by 1974 his rank had moved to that of Professor. In 1973 he became Department Chairman replacing Professor Jensen in that position, and he has continued in that capacity to the present time.

Aschenbrenner received the degree Diploma Ingenieur from Vienna and joined the C.E. faculty with the rank of Assistant Professor. He remained for only two years, leaving at the end of the spring semester in 1959.

Billey was another B.S.C.E. graduate from the University of North Dakota and started as an Instructor in the department. He remained for only one school year and was replaced by William D. Drew, B.S.C.E. Duke University. Drew also remained only one year, serving with the rank of Instructor.

Robert D. Hansen, B.S.C.E., University of Minnesota, also joined the C.E. faculty in the 1958-1959 academic year with the rank of Assistant Professor, He remained for three years until departing in 1961. The addition of Hansen raised the number of full-time Civil Engineering faculty to nine, the maximum number that there has been during the University of North Dakota's first century of existence. This number is slightly misleading since one of the nine was E. L. Lium who was also serving as the Dean of the College of Engineering.

Three of the 1958 faculty did not return for the next year; namely, Aschenbrenner, Drew and Stanley Johnson. This loss was partially offset by the addition of Charles E. Dahlgren and Robert G. Sheldon.

Dahlgren, B.S.C.E. University of Minnesota came with the rank of Associate Professor. He remained in the Department for 12 years until he left at the end of the spring semester in 1971 to go into private engineering work in Minneapolis.

The other addition, Sheldon, received his B.S.C.E. from Ohio Northern University and joined the staff as an Assistant Professor. His stay was for only 3 academic years until 1962.

In 1961, Monte L. Phillips, who had received his B.S.C.E. from the University of North Dakota, was added to the faculty as an Assistant Professor. He held this position for one year before leaving the University. In 1970 he returned to again be part of the Civil Engineering faculty with the rank of Associate Professor. He is still an active member of the C.E. faculty at the present time.

During the period from 1958 to 1962 the number of faculty suffered a serious decline, dropping in count from nine to six. Also, one of the six was still serving as the full-time Dean of the College of Engineering. This number held constant through 1963-1964 but was partially alleviated by Lium relinquishing his duties as Dean and returning to full-time departmental status. Faculty increased to seven in number in 1964 with the addition of Jack H. Emanuel.

Emanuel, B.S. in Architectural Engineering, Iowa State University, was appointed as Assistant Professor and remained on the staff for four years until 1968. At that time he went to the Civil Engineering Department at the University of Missouri, Rolla.

In 1965 Kesavarao Yalamanchili was added as Assistant Professor. This did not increase the faculty count, however, as Apanian left on a leave of absence to work on his doctorate at Oklahoma State...Yalamanchili, B.S.C.E. University of Mysore, India, had received the Ph.D. degree from the University of Minnesota. He remained until 1967.

The year 1966 saw the addition of Arthur Johnson on a one-quarter time basis. He had retired to Grand Forks from the U.S. Geological Survey and was hired by the Civil Engineering Department for his special expertise in Hydrology. He was an early graduate of the University of North Dakota having received his B.S.C.E. in 1924; thus, he was one of the first fifty graduates from this Civil Engineering Department. He remained as a one-quarter time faculty member with the rank of Associate Professor until his second retirement six years later in 1972.

Albert E. Anuta, B.S.M.E., Purdue University, joined the College of Engineering faculty, also in 1966, with a split appointment as Assistant Professor of Mechanical and Civil Engineering. Except for the academic year of 1978-79, at which time he was on a year's leave of absence, he has been engaged one-half time or more in teaching classes in the Civil Engineering Department, particularly in the mechanics area.

The addition of Lee and Walczak in 1967 brought the count of faculty up to ten; however, the true count was somewhat decreased by the part-time arrangements for Johnson ($\frac{1}{4}$) and Anuta ($\frac{1}{2}$).

Charles C. Lee was a national of the Republic of China with a B.S. degree from the National Taiwan University, Taipei, Taiwan, and the M.S. and Ph.D. from the University of Wisconsin who came here with the rank of Assistant Professor. He was a full-time faculty member for seven years until 1974. During 1974-75 he was on leave of absence and chose to remain with industry rather than return to the teaching field.

Jan M. Walczak, B.S.C.E., Polytechnic Institute, Gdansk, Poland, received the M.S.C.E. degree from the University of Colorado. He also was employed as an Assistant Professor for two years, leaving in 1969.

Another faculty member who is still on the staff, Earl S. Mason, was added in 1968. Due to the departure of Emanuel, however, there was no increase in the number of faculty.

Mason, B.S.C.E., University of North Dakota, began with the rank of Associate Professor and full-time status. During the years of 1970-1971, 1971-1972, and 1972-1973 he was on a fractional basis due to his study for a degree from the University of North Dakota Law School, and other assigned duties. Since 1973 he has again been on full-time status.

In 1969 Alan G. Fletcher became the new Dean of the College of Engineering and also Professor of Civil Engineering, positions which he still holds. A native of Canada, he received his B.S. degree from the University of British Columbia, the M.S. from California Institute of Technology, and the Ph.D. from Northwestern University. Although his primary function has been Dean of a growing College of Engineering (now known as the School of Engineering and Mines), he has also engaged in teaching certain classes.

The return of Phillips in 1970 raised the nominal head count of Civil Engineering facutly to eleven, the largest number that there has been to date. It must be noted, however, that the true full time equivalent would be considerably less because these eleven included the Dean of the College and three other faculty members who had part-time assignments of one-fourth, one-third, and one-half. Even this nominal count was to remain at eleven for only the 1970-1971 academic year due to subsequent departures.

Due to internal administrative changes, David Carlson is listed in some records as an Assistant Professor of Civil Engineering for the year 1971-72. However, he was actually involved with the teaching of courses in Engineering Drawing rather than those designated as Civil Engineering courses.

Carlson was replaced by Bjorn Jahnsen, a Norway national, for the academic year of 1972-73. He had received a Bachelor of Science degree from the University of Newcastle upon Tyne, England, and was appointed as Visiting Instructor in Civil Engineering. He remained with the Department for only one year.

Yung-Tse Hung became a member of the faculty in 1974. He was a national of Taiwan with the B.S.C.E. degree from Cheng Kung University, Tainan, Taiwan. He received the Ph.D. degree from the University of Texas at Austin and came to the Department as Assistant Professor. His specialty was in the field of Sanitary Engineering and he had spent some time in the practice of engineering in New Zealand. He left the University of North Dakota after one

year to take a similar position at the University of Texas - Arlington, but returned in 1976 to remain on the faculty until his resignation in 1981 to accept a position at Cleveland State University. While here, his principal activity was in the field of teaching graduate courses and doing research.

The year 1975-1976 brought the addition of one faculty person. Laddie Mills, B.S.C.E. University of New Mexico came as an Associate Professor. He remained for only one year and by 1976-1977 the faculty had decreased in number to eight which inlcuded the Dean and one half-time person.

From 1977 until Hung's resignation in 1981 the Civil Engineering faculty did not undergo any large changes. No full-time teaching faculty left or were hired; the only changes were temporary leaves of absence or rehiring of part-time faculty. Anuta was on leave of absence in 1978-1979 and Manz rejoined the Department on one-eighth time during the same year.

The position vacated by Hung remained open during 1981-1982. In the fall of 1982 this position was filled with the addition of Charles D. Turner, B.S.C.E. University of Nebraska, as Associate Professor. He has also specialized in the environmental area, both teaching and research.

The comparative salaries between industry and education tend to attract engineers away from the academic world. In spite of this, the Civil Engineering faculty has been a rather stable group. From 1908 until the end of the spring semester in 1982 the roster shows only 31 individuals. Of these, five left after only one year of service. The eight faculty listed as part-time or full-time in May, 1982, had an accumulative service record of 175 man-years, for an average of just under 22 years each.

During these first 75 years of Civil Engineering history the curriculum has been constantly subject to change, as it should be. A comparison of the first curriculum put out in 1908 with the one for the present academic year of 1982-1983 catches the attention more by similarities between the two than by wide dissimilarities. Many of the changes are indicative of a change in emphasis. The first curriculum tended to emphasize skills and practical applications; the current curriculum deemphasizes laboratory work in favor of more pure science, theory, and design, as well as a broader education in the non-engineering courses such as humanities and social sciences.

Some courses have appeared in the Civil Engineering curriculum for a while, been deleted, and reappeared again at a later date, perhaps under a slightly different title. The 1912-1913 curriculum, for example, listed the course Contracts and Agency but by 1916-1917 it was deleted. In 1919-1920, however, the curriculum included Business Law for Engineers, apparently for the first time; the 1982-1984 curriculum contains Contracts and Specifications as a Civil Engineering elective.

It is of interest to compare the description and contents of the Course in Civil Engineering - as recorded in the University Bulletin for 1910- with that shown in the undergraduate Catalog for 1982-1984. The 1910 description has been quoted in the early pages of this document; the 1982 description follows:

> "The Civil Engineering curriculum includes a core of chemistry, physics, mathematics, and engineering science, followed by intensive

design-oriented courses in sanitary and water resources engineering, soils and structural engineering, and transportation engineering. This curriculum has the goal of developing the student as a professional engineer capable of systematically solving complex problems of society within the engineering field, while also preparing graduates for continuing professional or graduate education."

In line with this description, practically 100% of the courses designated as "Civil Engineering" are taught by Registered Professional Engineers.

A review of the curriculums from 1907-1908 through 1982-1984 shows a remarkable consistency in the emphasis on mathematics, science and structural design. There have been variations from year to year with changes as the times warranted. For example, Shop Work (both wood and metal) was part of the first year curriculum from 1911 to some time between 1925 and 1929. In retrospect, it would seem that such a course would have been more appropriately part of a vocational course rather than a course in professional engineering.

Railway Engineering (or a similar title) was included from 1907 until 1937. A course in Railway and Highway Engineering was started in 1939 and continued until 1956. This was the first mention of highway engineering. Although not specifically mentioned in the course description, some problems relating to highway location surveys were included in some of the surveying courses during the 1920's.

Matriculation lectures for freshmen were started in 1912 and continued until 1921. In 1915 Foreign Language was added to the sophomore year. However, if two units of a foreign language were offered for entrance, other subjects could be substituted.

A course in Structural Design was included in 1916 and succeeded a course designated as Roofs and Bridges. Metallurgy of Iron and Steel or Engineering Metallurgy was included from 1920 to 1962. Courses in Business and Technical Writing and Fundamentals of Public Speaking were mentioned at various times. Beginning during the 1950's and continuing for several years the curriculum listed an Option in Sanitary Engineering for the fourth year. Transportation Engineering was first mentioned as an elective in 1960. Also in 1962, Computer Programming was first mentioned; this was 42 years after the Civil Engineering Department had tentatively probed into the "Computer Era" by purchasing a Monroe Calculator in 1920.

Early in this paper the six general headings of the curriculum for the Course in Civil Engineering as set forth in 1910 were listed. The following is the Civil Engineering curriculum as it appears in the Undergraduate Bulletin for 1982-1984.

School of Engineering and Mines

B.S. IN CIVIL ENGINEERING

Required 138 hours, including:

I. General Graduation Requirements, see pages 24-27 and pages 77.

II. The following Curriculum

	Freshman Year	First Semester	Second Semester
Chem 105	General Chemistry	(4)	
Chem 106	General Chemistry		(4)
	or		
Biol 101	Introduction to Biology		
Engl 101	Composition I	(3)	
Engr 100	Intro to Engineering	(1)	
Engr 101	Engineering Graphics	(2)	
Engr 102	Descriptive Geometry		(2)
Engr 201	Fund. of Computer Programming		(2)
Math 211, 212	Analytical Geometry & Calculus I & II	(4)	(4)
	Arts & Humanities I (See page 77)	(3)	(2)
Phys 205	General Physics I		(4)
	Sophomore Year		
CE 300	Analytical Mechanics (Statics)	(2)	
CE 301	Mechanics of Materials I		(3)
CE 313	General Surveying	(4)	
CE 314	Route Surveying		(2)
Engl 209	Technical & Business Writing		(2)
Geol 203	General Geology		(3)
Math 213	Analytical Geometry & Calculus III	(4)	
	Arts and Humanities I (See page 77)	(3)	
Math 351	Applied Mathematics		(3)
ME 341	Thermodynamics		(3)
Phys 206	General Physics II	(4)	
	Junior Year		
CE 305	Analytical Mechanics (Dynamics)	(3)	
CE 351	Structural Mechanics I	(3)	
CE 303	Civil Engineering Lab		(3)
CE 352	Structural Mechanics II		(4)
CE 412	Soil Mechanics		(3)
CE 431	Sanitary Engineering I		(3)
Econ 105	Elements of Economics (Social Sciences I)	(3)	
EE 206	Electrical Engr Fundamentals	(3)	
Engr 306	Fluid Mechanics		(3)
Math 352	Applied Mathematics	(3)	
	Social Science II (See page 77)	(3)	
	Senior Year		
CE 413	Soil Mechanics Lab I	(2)	
CE 416	Transportation Engineering		(3)
CE 423	Hydraulic Engineering	(3)	
CE 432	Sanitary Engineering II	(3)	
CE 451	Structural Design I	(3)	
CE 453	Reinforced Concrete		(4)
CE 481	Inspection Trip	(0)	
CE	Elective	(3)	(6)
	Social Sciences II (See page 77)		(3)
Engr 460	Engineering Economy	(3)	
Phil 370	Moral Questions & the Professions (Arts and Humanities II) (See page 77)		(3)

By 1936 there was enough concern with engineering education on a national scale that the Engineers' Council for Professional Development (ECPD) believed that engineering departments in the United States should be evaluated by a united agency to insure the quality of engineering education. In March of that year President West was informed that ECPD would begin such inspections for accreditation the following fall. The Civil Engineering Department was one of those evaluated at that time and in due time received notification that accreditation had been granted. Reevaluations have been carried out periodically and the Civil Engineering program has maintained uninterrupted accreditation to the present day.

Engineering curriculums have always been very time-demanding with their emphasis on mathematics, science, laboratory work, and design. The Civil Engineering curriculum has been no exception. The 1982-1984 catalogue states on page 24 that "A minimum of 125 semester hours of credits is required for a baccalaureate degree." The same catalogue, however, shows that the B.S.C.E. degree requires 138 credit hours. Extra-curricular activities, therefore, become a problem for those seeking to complete their degree requirements in four years.

A survey of old publications shows that the Civil Engineering students have not been hidden in their academic buildings. Their names are found in varsity and intramural athletics, music organizations, student government and the like. Certain functions and organizations have been specifically for engineers. The following illustrations are not intended to be a complete listing of such; neither, with one exception, have they been for civil engineers exclusively, but for engineers in general.

A Mining Engineering Club was organized in 1905. This became known as the Engineering Society about 1907 and reference was made to Civil Engineering students begin eligible for membership. Actually, the membership listing in the 1910 Yearbook indicates that ten of the forty members were Civil Engineers.

The 1916 Yearbook includes a write-up on and a picture of a UND Engineer's Band. A quote from the write-up states "Our prettiest girl and our wittiest girl, in fact, our only girl, is Esther Jack."

An honorary engineering fraternity by the name of Sigma Tau was founded in 1904 at the University of Nebraska. On April 8, 1922, Pi Chapter of Sigma Tau was chartered at the University of North Dakota and during its existence (it was later superseded by Tau Beta Pi) the names of many civil engineers were shown on its membership list. A familiar sight on campus during Sigma Tau initiation was the new initiates in their home-made, pyramid-shaped, cardboard hats, carrying a 12-inch length of rail in their hands. Interested onlookers could watch the initiates carefully cleaning the Sigma Tau pyramid with their toothbrushes. This monument still stands in the open area, midway between Twamley Hall and Babcock Hall.

The student chapter of the American Society of Civil Engineers was the first major organization for Civil Engineers only. Following is a quotation from the 1925 Yearbook, the Dacotah Annual:

> "The American Society of Civil engineers is the oldest of all American Engineering Societies. It was founded in 1854 [1852] for the purpose

of promoting general interest in current engineering enterprises. Chapters are granted only to the Engineering Schools of very high standing. The North Dakota Chapter was installed in 1923."

The first student chapters were authorized by the parent society in 1919; consequently, eight student chapters came into being in 1920, twenty-six in 1921, twelve in 1922 and twelve in 1923. Thus, the UND student chapter was one of the first fifty-eight to be established. Regionally, a student chapter was established at Montana State in 1922, at the University of North Dakota in 1923, at South Dakota School of Mines in 1928, at North Dakota State in 1932 and at South Dakota State in 1933.

The picture in the 1925 Annual listed 27 members with Ray V. Tilly as President, Arthur Johnson as Vice President, Richard B. Black as Secretary-Treasurer and Professor E. F. Chandler as Faculty Advisor. Nearly 60 years later, in 1981, the President was shown as Christi A. Green, the first woman president of the student Chapter.

Civil Engineering students have also had their hand in publications. In 1924 two Civil Engineering students, Fred Jernberg and Arthur Johnson spotted a copy of the Colorado Engineer in Professor Boyd's office. They decided that the Engineering College at the University should have a similar publication and the idea was presented to Dean Babcock. The Dean was enthusiastic about the idea and insisted that a true magazine, not just a few mimeographed pages, should be established. As a result, in May 1925 the North Dakota Engineer was born with the debut of Volume 1, Number 1. The magazine was published four times yearly until its final issue in April of 1976. A break in continuity occurred during the war years from May 1943 until January 1945 when no issues appeared.

No publication was put out during the academic year of 1976-77. In September 1977 the appearance of North Dakota Engineer II marked the resumption of the magazine, which continues to the present time.

A Tau Beta Pi Chapter was chartered at the University of North Dakota on April 24, 1974. The existing members of Sigma Tau were eligible for immediate membership, and this now became the honorary society for all engineers at the University of North Dakota.

Also, in 1974, the growing interest of women in engineering as a career resulted in the chartering of the UND Student Section of the Society of Women Engineers (SWE). The Society of Women Engineers had been founded in 1949-1950 when small groups of women engineers started meeting in several eastern cities and the society was incorporated in 1952. The UND student section now has members from all engineering majors. In 1982 the UND-SWE Section took top honors as the "best student section" in the nation. The section also publishes The SWE Connection which had its first edition in January of 1978.

On May 8, 1976, the Charter Ceremony for the Order of the Engineer was held in Upson II. At that time, thirty-one engineering seniors, seven engineering faculty and five engineering graduates became members of the Order. Of the total of forty three, eight were Civil Engineering seniors and two were Civil Engineering faculty.

It has been previously mentioned that the Civil Engineering offices were moved into Harrington Hall in 1952 but the laboratories had remained in Chandler Hall. This situation was to become greatly improved in the early 1970's with the addition of another engineering building, due largely to funds contributed by Maxwell M. Upson.

Maxwell Mayhew Upson was born in Milwaukee, Wisconsin, in 1876 and he moved to North Dakota at the age of five when his father purchased a 4000-acre wheat farm in Traill County. Upson attended high school in Grand Forks and later enrolled at the University of North Dakota where he received the Bachelor of Arts Degree in 1896. He then entered Cornell University and received the Mechanical Engineering Degree in 1899.

He became a construction manager in New York for Westinghouse, Church, Kerr, and Company where he designed and built the first reinforced concrete industrial building. In 1905 he joined the Hockanum Mills Company of Rockville, Connecticut, as Chief Engineer and Assistant to the President. While there he was responsible for the development of the first all-reinforced concrete textile mill and the first large group of reinforced concrete buildings.

In 1907 Upson accepted the position of General Manager, Chief Engineer and Secretary with the Raymond Concrete Pile Company which was in a state of bankruptcy and desperately needed his technical knowledge. During the next ten years he and his associates established the principles which made the Raymond Company one of the world's largest construction firms. His titles in the company eventually grew to Vice President, President and Chairman of the Board.

The University of North Dakota awarded Maxwell Upson an honorary Doctor of Engineering Degree in 1931. He was also the recipient of the Distinguished Service Citation from the University of North Dakota Alumni Association "for his distinguished achievements as a construction engineer, inventor, administrator and humanitarian."

He was a staunch supporter of educational institutions and interests and through the years he made large contributions to the UND Development Fund thus making possible the construction of the Upson Engineering buidings and other modern campus facilities.

On May 22, 1971, the Upson Engineering Building was officially dedicated. The preceding biographical information on Maxwell M. Upson was obtained from the dedication brochure for this event. At last, laboratory facilities for Civil Engineering (and other departments) could be moved to be near the office and classroom space.

Civil Engineering space in the new building included a concrete laboratory, a soils laboratory, a materials laboratory, a structural laboratory and a fluids laboratory, plus additional facilities such as a walk-in freezer, specimen curing rooms, surveying instrument storage, general storage and the like. Only a small sanitary engineering laboratory remained in Chandler Hall. Its use had been largely discontinued because sanitary engineering research projects, operated jointly by Civil Engineering and Chemical Engineering, had in effect, moved sanitary engineering classwork and research into the Chemical Engineering laboratories on the third floor of Harrington Hall.

Special features are incorporated in some of these laboratories such as the structural laboratory. In this laboratory the floor, which is 30 feet by 60 feet in size, is a loading floor for testing purposes. Beams 50 feet in length and plates 20 feet by 50 feet can be laboratory-tested on a 3-foot loading grid. Columns up to 14 feet in length have been tested. The laboratory is actually patterned after the Portland Cement Association Research Laboratory at Skokie, Illinois.

A second building, the Upson Engineering Center, was formally dedicated on October 11, 1975. This building closed the gap between Harrington Hall and Upson Engineering Building, thus making them all into one engineering complex. This building contains primarily offices, classrooms, the Computer Center and certain laboratories. The Civil Engineering offices were now relocated from Harrington Hall to the second floor of the new building, and the Sanitary Engineering laboratory had new space on third floor, still conveniently located relative to the Chemical Engineering facilities. Because there were two Upson buildings dedicated at different times, they are currently referred to as Upson I for the 1971 unit and Upson II for the 1975 unit.

This manuscript has been an attempt to put into writing a record of the development of Civil Engineering at the University of North Dakota during the University's first 100 years. By no means should it be considered a complete documentation. What will transpire in the future cannot be prejudged; however, the authors of this paper sincerely hope that it will be of some use to future writers, just as the papers of Elwyn F. Chandler were an invaluable source for this documentation.

TABLE 1

Civil Engineering Degrees

Year	B.S.	M.S.	Year	B.S.	M.S.	Year	B.S.	M.S.
1911	3	0	1935	9	0	1959	27	0
1912	3	0	1936	6	0	1960	18	2
1913	2	0	1937	10	0	1961	33	2
1914	2	0	1938	12	0	1962	17	1
1915	4	0	1939	14	1	1963	18	4
1916	6	0	1940	12	0	1964	10	3
1917	3	0	1941	6	0	1965	18	5
1918	5	0	1942	8	0	1966	17	6
1919	1	0	1943	5	0	1967	18	4
1920	4	1	1944	0	0	1968	17	6
1921	6	0	1945	1	0	1969	19	1
1922	1	0	1946	0	0	1970	22	9
1923	5	0	1947	7	0	1971	25	5
1924	4	0	1948	17	0	1972	14	3
1925	4	0	1949	20	0	1973	15	3
1926	13	0	1950	30	1	1974	11	1
1927	6	0	1951	24	0	1975	13	0
1928	7	0	1952	18	(1)*	1976	14	1
1929	3	0	1953	9	1	1977	14	3
1930	9	0	1954	15	1	1978	14	1
1931	6	0	1955	15	2	1979	20	1
1932	9	0	1956	15	3	1980	19	1
1933	9	0	1957	24	5	1981	12	1
1934	8	0	1958	21	1	1982	13	2
					TOTAL		836	82

*Ph.D. degree

Since 1977 advanced degrees are Master of Engineering.

TABLE 2

Chronological List of Civil Engineering Faculty

Name	Starting Rank	Period of Service
Chandler, Elwyn F.	Professor of Mathematics, changed to Professor of Civil Engineering in 1914	1910-1946
Boyd, Alfred	Assistant Professor	1921-1944
Lium, Elder L.	Assistant Professor	1935-1966
Almy, Loren B.	Instructor	1939-1946
Reyhner, Theodore O.	Associate Professor	1945-1947
Fossum, Guilford O.	Assistant Professor	1946-
Jensen, Ivan R.	Associate Professor	1947-
Johnson, Stanley S.	Instructor	1947-1959
Manz, Oscar E.	Assistant Professor of Geology	1953-1961 1962-1975 1978-
McFarlin, Robert J.	Instructor	1955-1956
Apanian, Ronald A.	Instructor	1957-1965 1967-
Aschenbrenner, Rudolf	Assistant Professor	1957-1959
Billey, James O.	Instructor	1957-1958
Drew, William D.	Instructor	1958-1959
Hansen, Robert D.	Assistant Professor	1958-1961
Dahlgren, Charles E.	Associate Professor	1959-1971
Sheldon, Robert G.	Assistant Professor	1959-1962
Phillips, Monte L.	Assistant Professor	1961-1962 1970-
Emanuel, Jack H.	Assistant Professor	1964-1968
Yalamanchili, Kesavarao	Assistant Professor	1965-1967
Johnson, Arthur	Associate Professor	1966-1972
Anuta, Albert E.	Assistant Professor of Mechanical and Civil Engineering	1966-1978 1979-
Lee, Charles C.	Assistant Professor	1967-1974
Walczak, Jan M.	Assistant Professor	1967-1969
Mason, Earl S.	Associate Professor	1968-
Fletcher, Alan G.	Professor of Civil Engineering and Dean of the College of Engineering	1969-
Carlson, David	Assistant Professor	1971-1972
Jahnsen, Bjorn	Visiting Instructor in Civil Engineering	1972-1973
Hung, Yung-Tse	Assistant Professor	1974-1975 1976-1981
Mills, Laddie	Associate Professor	1975-1976
Turner, Charles D.	Associate Professor	1982-