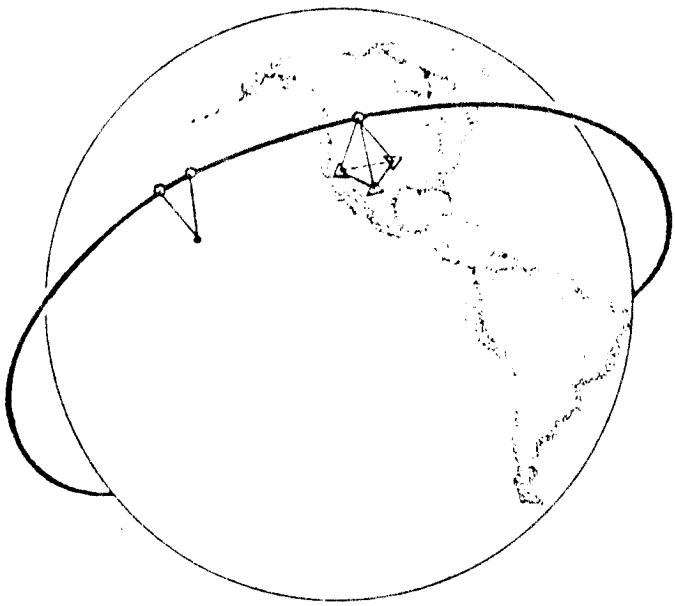

Technical Papers of XIth SURVEYING TEACHERS' CONFERENCE

August 13-16, 1984
FRESNO, CALIFORNIA

Department of Civil & Surveying Engineering
California State University, Fresno
Fresno, California

THE B.S. SURVEYING DEGREE AT OIT

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Biographical Sketch

Earl F. Burkholder joined the OIT faculty September 1980 and teaches upper division surveying classes. Prior work experience includes 5 years with an international engineering firm, summer work with the U.S. Forest Service and several years with a consulting engineering/surveying firm. A civil engineering graduate of Michigan (cum laude) BS '73 and Purdue MS '80, he has been registered as a Land Surveyor in 6 states and as a Professional Engineer in Michigan and Oregon. Active memberships include ASCE, ACSM, PLSO, and MSRLS.

ABSTRACT

In December 1980 OIT President Kenneth F. Light directed the surveying faculty to prepare a proposal and justification to be presented to the Oregon State Board of Higher Education (OSBHE) to change the surveying degree title from "B.S. Civil Engineering Technology" to "B.S. Surveying." A separate proposal to fund curriculum study and modifications incidental to the name change was also prepared and submitted to the National Science Foundation in February 1981.

The NSF proposal was funded, numerous existing surveying programs were reviewed, curriculum modifications were approved and the new title, "B.S. Surveying" became effective April 1983. This paper chronicles the process: highlighting educational philosophies, instructional policies and professional practice criteria which were considered in formulating the existing program.

I. CHRONOLOGY

Oregon Institute of Technology (OIT) started out in 1947 as a vocational rehabilitational school for veterans and has grown into a 2800 student-body institute offering associate and bachelor degrees in engineering, allied health and industrial technologies. Surveying has been prominent at OIT since the

first two-year surveying technology program was implemented in the late 1940s and accredited by the Engineer's Council on Professional Development (ECPD) in 1953.

The baccalaureate degree program, first implemented in 1966, was accredited in 1970 as a Bachelor of Technology degree. In 1978 that degree title was changed to "Bachelor of Science Civil Engineering Technology." Both associate and baccalaureate degrees remain accredited by the Technology Accreditation Commission (TAC) of the Accreditation Board of Engineering & Technology (ABET), successor to ECPD.

Due to increasing recognition of surveying as a professional entity, it became desirable to change the degree title to "B.S. Surveying." That title is more descriptive of the curriculum content and the stigma associated with the word "technology" in the title is avoided.

Options for the program's future were discussed at a departmental long-range planning session in December 1980. At the meeting's end, OIT President Kenneth F. Light gave the surveying faculty a directive to prepare a proposal and justification to be presented to OSBHE to make the degree title change.

The following list chronicles major activities related to the degree title change:

1. In January 1981 a proposal was prepared and submitted to the National Science Foundation to fund curriculum study and modifications incidental to the name change.

2. Spring Term 1981 OIT surveying professor Fred Foulon was on sabbatical and visited numerous surveying programs around the country. Discussions with peers and data collected through visits and correspondence were quite valuable in subsequent evaluation of our surveying program.

3. Summer 1981 OIT surveying professor David Hull and I prepared formal documents requesting the degree title change. We identified changes to be made in the curriculum but did not have time or funding to make them.

4. In August 1981 we were notified of NSF support of the curriculum study and modifications. The bulk of the work was to be done Summer 1982.

5. Fall Term 1981 the OIT Curriculum Planning Commisssion reviewed the title change documents and offered refinements which were incorporated prior to

submission to the Chancellor's Office of OSBHE early 1982.

6. OSBHE didn't act on the request immediately because:

   a. The economy in Oregon was down and budgets were being cut.

   b. A new Chancellor of the State System of Higher Education was scheduled to take office July 1, 1982, and OIT President Light announced his resignation effective in July. An interim President was appointed until a replacement could be found.

   c. The degree name change was categorized a new program request and the new Chancellor declared a moratorium on all new programs.

7. The Chancellor's Office did, however, approve the new course offerings and curriculum modifications to be included in the 1982-83 Catalog. We got everything but the title change.

8. Summer 1982 David Hull and I devoted to development and reorganization of instructional material for many of the 24 surveying courses.

9. Fall Term 1982 transition to the new curriculum was initiated. Although the BS Surveying degree title had not been approved, course changes were put into effect and the Chancellor's Office gave permission for "(Surveying Option)" to be added to the existing degree title.

10. OIT's new President took office in March 1983 and we asked him to champion our cause. We did not have to start over, but we had to sell him on the requested title change.

11. The degree title change was approved at the April 22, 1983, meeting of OSBHE. Surveying graduates since then include:

	BS Surveying	BSCET (Surveying Option)
June 1983	12	12
June 1984	14	6
June 1985	?	?

II. CLARIFICATION OF POSITION

I'd like to clarify OIT's mission and to describe where my personal philosophy fits in. OIT is a polytechnic college offering technical degrees. It does not offer a professional engineering curriculum. The State Legislature has denounced unnecessary duplication of programs within the state and the professional engineering programs are at Oregon State University.

The Surveying Program at OIT grew and flourished as a technical program and enjoys an excellent reputation due to the dedicated efforts of David Hull and Fred Foulon. One reason given for the growth is that the program is not growing in the shadow of an engineering program, competing for the same limited resources. As one of the larger programs on campus it exists on its own merit and does not ride along on the coattails of engineering. That leads to an interesting question: Is the surveying profession really separate from engineering or should it be? I suspect we could discuss that all week and not reach a consensus.

Rather than providing pat answers, I'd like to offer several observations, pose a few questions and do a lot of listening. I am not required to go back to Klamath Falls with a list of answers, but we are still looking for ways to improve our program. I expect to learn a lot from you.

I am a surveyor because I enjoy it. I was out of High School several years before I got into surveying and I was into surveying before attending an engineering school. However, I was given a "big picture" of engineering at the University of Michigan and I remain convinced that surveying is a vital part of it. I also learned there is much to surveying not covered in a classical engineering program and I shudder with many of you at the way some engineers perform surveys. So, where does that leave me? Is surveying a part of engineering or isn't it? Am I to believe, as suggested by some, that the practice of surveying and engineering is mutually exclusive? Or, more to the point, how can we at OIT properly address professional practice topics in a 4 year technical program? Are students at OIT to be told they can not be professionals because OIT is a technology school? More about the school may be in order.

III. INSTITUTIONAL MISSION

The first objective of OIT listed in the 1984-85 catalog is, "to provide students with programs of a technical nature that are based on the sciences and that are intellectually demanding. In a baccalaureate technical college it is of primary importance to teach fundamentals and basic underlying

principles; the mastery of facts and skills is secondary." OIT also has a long-standing commitment to the advantages offered a student by the inverted curriculum. With technical topics included in the first two years, a student can leave OIT with a two-year degree equipped with marketable technical skills. Those desiring the breadth of a baccalaureate degree emphasizing professional practice topics continue for an additional two years.

It is not really my place to question the appropriateness of the 2+2 curriculum. That is given by the system. My question is, "How can we give a student the most for his money while turning out a person properly trained to make a valuable contribution to the surveying profession?" I suspect part of the answer is to insist on technical excellence, but I also suspect much of it is related to the attitude a student acquires toward himself and the profession.

Finally, OIT is a teaching college and not a research organization. I agree research is important, but emphasis at OIT is to facilitate learning and application of existing knowledge. Each student who pays tuition deserves a chance to learn. The old saying goes, "You can lead a horse to water, but you can't make him drink." Better, I think, is the quote by John Gardner in the Fall 1983 issue of THE TRANSIT, "The ultimate goal of the educational system is to shift to the individual the burden of pursuing his own education." If we challenge a student to pursue knowledge and can help him/her feel good about surveying as a career, then we have succeeded.

IV. INSTRUCTIONAL POLICIES

Regardless of whether surveying is really part of engineering, surveying instruction at OIT is conducted within the following guidelines:

1. As a technical institute we do not attract the intellectual cream of available students. Although admissions standards at OIT are lower than a professional engineering school, we are committed to doing the best we can for each one who enrolls. However, lower admission standards have not prevented gifted individuals from taking our surveying program and we are gratified at the number who do.

2. So far as possible, each class is met by a registered professional who has actual experience in the topic being presented. There are no graduate programs at OIT so graduate teaching assistants are not available even if we wanted them. That difference has prompted more than one student to attend OIT.

3. There is a certain amount of overlap built into the presentation of material from course to course. Learning happens at various times and rates and under different circumstances from student to student. Few students grasp the full impact of a new concept when first presented. Repeat learning opportunities are exploited whenever possible.

4. There is an undisputed correlation between doing and learning. The best example I can think of is the computer/word processor being used to type this paper. I read the manual and listened carefully to the expert, but personal productivity took a quantum leap when I sat down to the keyboard and tried it for myself. At OIT we give our students lots of "hands-on" work. Occasionally we hear complaints at all the busy work and some are not without merit. But for the most part, it is those "doing" courses, whether boundary surveying, subdivision design, surveying computations, geodesy or computer applications, which are most popular with the students.

V. CURRICULUM GUIDELINES

Given the institutional mission and instructional policies, the following criteria were considered in formulating our program.

1. All programs offered at OIT must meet the General Education Requirements established by the institution and approved by OSBHE. These requirements contain 39 quarter hours of communication, humanities, and social science in addition to the specific curricular courses.

2. The Oregon State Board of Engineering Examiners publishes a syllabus of topics which should be included in a 4-year surveying curriculum. Although we are not statutorially obligated to their listing, they do have the authority to determine what constitutes an acceptable degree to be counted toward registration. Our goal is for OIT BS Surveying graduates to seek registration in Oregon as well as other states.

3. Numerous OIT surveying alumni support the program in any one of several ways. A very helpful one is curriculum development. On a specific occasion, 15 different surveying alumni signed a letter suggesting additional geodesy and computer applications courses

as well as instruction in modern surveying instrumentation be offered as a part of the curriculum. We were able to use that letter as primary justification for a new course. We have also revised the content of existing courses to reflect specific needs in the profession.

4. ABET accreditation is considered vital to the OIT surveying program. Discussions of a Related Accreditation Commission (RAC) were underway when we were evaluating and modifying our curriculum, so we consulted with ABET, followed development of RAC and tried to anticipate RAC accreditation requirements. Course changes made in 1981 for the 82-83 catalog were modified in late 1983 after the RAC guidelines were adopted by ABET in October. The biggest difference is additional math and science electives.

5. As we evaluated our program, we looked at what is being done at other schools and reviewed surveying eduation papers in the technical literature. Some items were discarded as impractical for our circumstance, others were not harmonious with the institutional "givens" and many were already being addressed within our existing program. It was interesting and challenging though to learn from experiences of others and to incorporate some of your ideas into our program.

6. We had to consider faculty talents and expertise in modifying the program. Any courses added or changes made had to be taught by existing faculty. With five surveying faculty positions, we were gratified that the diversity of the existing staff gave us considerable leeway. With other persons teaching, the outcome would have been different.

VI. ASSIMILATION INTO PROGRAM

Given the above criteria, guidelines and, in some cases, conflicting demands on the outcome of our study, it was a challenge to refine the existing program to meet the needs of students as well as those of the surveying profession. Not that the outcome is perfect, but we;

1. Retained the Freshman year without major changes because most CET students take common core courses.

2. Moved Photogrammetry and Advanced Surveying Computations into the upper division to accommodate transfer students and to exploit higher math skills.

3. Introduced new courses in Land Survey Systems and geometrical computations into the Sophomore year.

4. Designed a new Junior level Control Surveying course and an upper division elective in Modern Surveying Instrumentation.

5. Implemented a Senior level Law II class for analyzing cases involving land surveying legal problems.

6. Reviewed and solidified the content of all other upper division surveying courses.

7. Are still working on the Computer Applications course. The primary question there is language, FORTRAN or BASIC. We recognize value in both languages, but are frustrated at trying to do a good job with both. Do you have any suggestions?

VII. WHERE DO WE GO FROM HERE?

Knock on wood, things have gone quite well for the OIT Surveying Program recently. We have made much progress and our program is healthy. We have, however, suffered a significant drop in enrollment in the last two years and if the trend continues, we are in trouble. We are optimistic though because the economy is picking up and this year there were more surveying jobs, both permanent and temporary, than job seekers.

We are hopeful that our program will be more attractive to associate degree graduates of the many community colleges offering surveying instruction. The block transfer concept enables a student to come in as a Junior conditional on the prerequisites of the surveying courses and the OIT General Education Requirements. Often the block transfer student can complete a 4 year degree in two years. Occasionally an extra term or two is required if many deficiencies must be corrected.

Co-operative education is another part of the OIT Surveying Program to which we remain committed. An entire paper could be written about it but I will keep it to one paragraph. Dave Hull has devoted uncounted hours making our co-op program work for the students. The work experience is valuable for the students and helps us keep in touch with what is really happening in the surveying profession. We are always looking for additional co-op opportunities, but we will work hardest at servicing the ones in hand.

An obvious conclusion to this paper would be to discuss our RAC accreditation visit coming up this Fall. Our program is one of the first ones to be visited by RAC and we have

worked hard to prepare for it. I think RAC can be good for our program and the profession, but I still have a lot of questions on surveying vs engineering before I support RAC to the exclusion of EAC and vice-versa. Included in the Appendix are several definitions of civil engineering, professions and job categories of Civil Engineer, Technologist, and Technician. I hope these items are covered in the following panel discussion on accreditation.

We have a good program at OIT designed to prepare individuals for satisfying career opportunities in surveying. Other programs may be more rigorous or prestigious, but I have yet to see one more committed to its students and to the surveying profession. (Attending this conference will broaden my outlook?) Teaching at OIT is quite enjoyable for me and I am proud to be part of such a good program.

Note: This material is based upon work supported by the National Science Foundation under grant # 8160670. Any opinions, findings, and conclusions or recommendations expressed in this article are those of the author and do not necessarily reflect the views of the National Science Foundation.

OREGON INSTITUTE OF TECHNOLOGY

Bachelor of Science Surveying Curriculum
1984-85

FRESHMAN YEAR

Cr.	Fall
5	CET 131 Fundamentals of Surveying
3	MET 106 Engineering Graphics
4	Mth 104 College Algebra
3	Wr 121 English Composition
1	PE 190 Physical Education
16	

Cr.	Winter
3	CET 103 Plat Drafting
3	CET 132 Surveying Computations
3	EngT 110 Statics
4	Mth 105 Trigonometry
3	Wr 122 English Composition
1	PE 190 Physical Education
17	

Cr.	Spring
3	CET 138 Contract Documents
5	CET 133 Route Surveying
3	EngT 120 Strength of Materials
1	EngT 121 Strength of Materials Lab
5	Mth 106 Anal Geometry & Intro to Calc
1	HE 251 First Aid
18	
51	

SOPHOMORE YEAR

Cr.	Fall
4	CET 233 Instrument Techniques
4	Ph 201 General Physics
4	CST 141 Computer Programming (FORTRAN)
2	HE 250 Personal Health
3	Gen.El. (CET 235 recommended)
17	

Cr.	Winter
3	CET 230 Geometrics
3	CET 240 Survey Law I
4	Ph 202 General Physics
3	Sp 111 Fundamentals of Speech
3	Wr 227 Technical Report Writing
16	

Cr.	Spring
3	CET 210 Fluid Mechanics
1	CET 212 Fluid Mechanics Lab
4	CET 232 Const & Engr Surveying
5	CET 237 Boundary Surveying
3	Elective: SSc or Psy
1	PE 190 Physical Education
17	
50	

JUNIOR YEAR

Cr.	Fall
4	CET 333 Control Surveying
4	Ph 203 General Physics
4	Mth 200 Calculus I
3	BA 310 Principles of Management
3	Economics Elective
18	

Cr.	Winter
5	CET 334 Advanced Survey Computations
4	Mth 201 Calculus II
3	BA 321 Financial Accounting
3	Psy 201 Psychology
3	Hum 300 Humanities
18	

Cr.	Spring
4	CET 338 Subd'n Planning & Platting
3	Mth Elective
3	Mth 411 Statistical Methods
4	Science Elective
3	SP 321 Discussion Processes
17	
53	

SENIOR YEAR

Cr.	Fall
4	CET 434 Geodetic Position Comp
4	CET 324 Photogrammetry
3	Social Science Elective
3	Humanities Elective
3	CET 220 Engineering Geology
17	

Cr.	Winter	
4	CET 432 Computer App to Hyws & Surv	} *
4	CET 433 Advanced Road Design	
3	BA 340 Industrial Economics	
3	Wr 327 Advanced Technical Writing	
3	Humanities Elective	
3	General Elective	
16		

Cr.	Spring	
4	CET 301 Water & Sewer System Design	} *
3	CET 431 Field & Geodetic Astronomy	
3	CET 440 Survey Law II	
3	CET Elective	
3	BA Upper-Div. Business Elective	
13		
46		

*One of the two courses is required. The other one can be used as an elective.

Available CET electives include but are not limited to:

- CET 223 Soil Mechanics
- CET 235 Land Survey Systems
- CET 295 Cadastral Techniques
- CET 303 Hydrology and Design of Drainage Structures
- CET 330 Modern Survey Instrumentation
- CET 340 Fundamentals of Planning
- CET 407 LSIT Review
- CET 435 Adjustment by Least Squares

An Associate Degree in Surveying Technology will be awarded upon completion of the freshman and sophomore years (101 credit hours).

Bachelor of Science--Surveying will be awarded to those students fulfilling the requirements of the 4-year program listed above (200 credit hours).

OREGON INSTITUTE OF TECHNOLOGY
KLAMATH FALLS, OREGON 97601
TELEPHONE (503) 882-6321

Surveying Courses, Credit Hours & Required Texts 1984 - 85

3	CET 103	Plat Drafting	Elementary Surveying 7th Ed.; Brinker & Wolf
3	CET 128	Contract Documents	Legal Aspects of Engineering 3rd Ed.; Richard C. Vaughn
5	CET 131	Fundamentals of Surveying	Elementary Surveying 7th Ed.; Brinker & Wolf
3	CET 132	Surveying Computations	Elementary Surveying 7th Ed.; Brinker & Wolf
5	CET 133	Route Surveying	Elementary Surveying 7th Ed.; Brinker & Wolf
3	CET 230	Geometrics	Surveying: Theory & Practice 6th Ed. Standard Highway Spiral; Or. Highway Div.
4	CET 232	Construction & Engineering Surveying	Surveying: Theory & Practice 6th Ed.; Davis, Foote, Anderson & Mikhail
4	CET 233	Instrument Techniques	Surveying: Theory & Practice 6th Ed.; Davis, Foote, Anderson & Mikhail
3	CET 235	Land Survey Systems	Land Survey Systems; John G. McEntyre
5	CET 237	Boundary Surveying	Manual of Surveying Instructions, 1973; Bureau of Land Management
3	CET 240	Survey Law I	Boundary Control & Legal Principles 2nd Ed. Supplemental Handouts
3	CET 295	Cadastral Techniques	BLM Cadastral Survey Training Booklets
4	CET 324	Photogrammetry	Elements of Photogrammetry Paul R. Wolf
3	CET 330	Modern Surveying Instrumentation	Surveying: Theory & Practice 6th Ed.; Davis, Foote, Anderson & Mikhail
4	CET 333	Control Surveying	Surveying: Theory & Practice 6th Ed.; Davis, Foote, Anderson & Mikhail
5	CET 334	Advanced Surveying Computations	Surveying: Theory & Practice 6th Ed.; Davis, Foote, Anderson & Mikhail
4	CET 338	Subdivision Planning and Platting	Applicable State and County Ordinances
3	CET 407	Seminar (L.S.I.T. Review)	Various Surveying Texts and References
4	CET 431	Field & Geodetic Astronomy	Elements of Astronomy for Surveyors 8th Ed.; J. B. Mackie
4	CET 432	Computer Application to Highways & Surveying	A FORTRAN Reference Manual and a suitable calculator manual
4	CET 433	Advanced Road Design	Road Design Handbook; Lecklider & Lund
4	CET 434	Geodetic Position Computation	Geodesy for Surveyors; Burkholder Supplemental Handouts
4	CET 435	Adjustment by Least Squares	Analysis and Adjustment of Survey Measurements; Mikhail & Gracie
3	CET 440	Survey Law II	Evidence & Procedure for Boundary Location 2nd Ed.; Brown, Robillard & Wilson

OFFICIAL REGISTER 1984

American Society of Civil Engineers
United Engineering Center
345 East 47th St., New York, N.Y. 10017-2398
Telephone: 212-705-7496

DEFINITION OF "CIVIL ENGINEERING"

In October 1961 the ASCE Board of Direction adopted the following definition of Civil Engineering:

"Civil engineering is the profession in which a knowledge of the mathematical and physical sciences gained by study, experience, and practice is applied with judgment to develop ways to utilize, economically, the materials and forces of nature for the progressive well-being of mankind in creating, improving and protecting environment, in providing facilities for community living, industry and transportation, and in providing structures for the use of mankind."

DEFINITION OF "PROFESSION"

The ASCE Board of Direction on May 13–14, 1963, adopted the following definition of the term "profession," and amplification thereof offered by the Society's Task Committee on Society Objectives:

DEFINITION

"A profession is the pursuit of a learned art in a spirit of public service."

AMPLIFICATION

"A profession is a calling in which special knowledge and skill are used in a distinctly intellectual plane in the service of mankind, and in which the successful expression of creative ability and application of professional knowledge are the primary rewards. There is implied the application of the highest standards of excellence in the educational fields prerequisite to the calling, in the performance of services, and in the ethical conduct of its members. Also implied is the conscious recognition of the profession's obligation to society to advance its standards and to prescribe the conduct of its members.".

Vol. XLV. JUNE, 1901.

AMERICAN SOCIETY OF CIVIL ENGINEERS.

INSTITUTED 1852.

TRANSACTIONS.

No. 897.

ADDRESS AT THE ANNUAL CONVENTION AT NIAGARA FALLS, N. Y., JUNE 25TH, 1901.

A CENTURY OF CIVIL ENGINEERING.

By J. James R. Croes, President, Am. Soc. C. E.

The century which has just passed, the nineteenth of the Christian era, is distinguished from any of the preceding hundred-year periods in the world's history by the advances made in the co-operation of investigators in numerous branches of science in the formulation of doctrines regarding the nature and co-ordination of natural phenomena, which stand the test of experiment and calculation, thus leading to a nearer approximation to the understanding of the laws which govern such phenomena and so to the development into a profession of the "Art of directing the great sources of Power in Nature for the use and convenience of Man," which Art is entitled Civil Engineering. This definition is itself one of the most noteworthy products of the Nineteenth Century, and a study of the sequence of events and reasoning which led to its formulation is not without interest.

Ever since man became endowed with consciousness and the power of reasoning, he has been striving to solve the problems of the physical world around him in which he perceived matter in motion, which was

CIVIL ENGINEERING AND LAND SURVEYING ASSOCIATION

OF

OREGON INSTITUTE OF TECHNOLOGY

THE CIVIL ENGINEER, TECHNOLOGIST, AND TECHNICIAN*

CIVIL ENGINEER

The civil engineer, working in his full professional capacity, is a conceptualizer, planner and designer of new and innovative engineering works and systems and/or the operating manager of complex technical systems or business enterprises. In this role, he must utilize technical knowledge of great sophistication and he also must employ his understanding of the interrelationships of the economic, social, political, and environmental issues that are frequently the key matters in decision making today. The civil engineer is expected to make judgments that extend well beyond the technical domain. To prepare a civil engineer for this role requires and educational program of technical depth and finesse--and also of breadth.

Basic programs in civil engineering begin the education of an individual for the role of the professional civil engineer. However, work experience as an engineering technologist during an engineer-in-training period, and advanced study in engineering and/or management, are usually strong contributing factors in an individual's achievement of his full professional capacity as a civil engineer.

CIVIL ENGINEERING TECHNOLOGIST

The civil engineering technologist works in close support of engineers and architects translating conceptual ideas into functioning systems and providing supervisory direction for the implementation of these ideas by technicians and craftsmen. The technologist is principally an implementer of the technical aspects of large projects or systems. This implementation may be manifested in his role in the written and graphical aspects of project documentation, in the design of standardized subsystems, or in the overseeing of manufacturing or construction activities.

The term "civil engineering technologist" is applied to the graduate of four-year bachelor's degree curricula in civil engineering technology, or related curricula such as construction and environmental technology.

Because of his key role as an implementer, the technologist's education must provide him with sufficient technical knowledge and skills to permit him to make independent judgments that will expedite the work without jeopardizing its effectiveness, its safety or its cost.

CIVIL ENGINEERING TECHNICIAN

In the practice of civil engineering, the technician will usually work under the immediate supervision of a civil engineer or a civil engineering technologist. He performs operational tasks of a technical nature following well defined methods and procedures set down by his supervisors or by engineering standards, and he is not expected to make judgments requiring marked deviations from these procedures without consultation. The technician's tasks often include sampling and collection of data, testing, computation, written and graphical presentation of results, field layout of work according to plans, and field inspection.

The term "civil engineering technician" is applied to the graduates of college level associate degree curricula or to persons who have received comparable training through on-the-job experience and/or training programs.

The tasks of the civil engineering technicians require understanding and skills in engineering principles, manual techniques, and communication modes in order for him to communicate with his supervisors and to execute his task effectively.

* Appendix: Policy Statement No. 140, American Society of Civil Engineers