**THE COMMONWEALTH OF MASSACHUSETTS**

BOARD OF HIGHER EDUCATION
One Ashburton Place, Room 1401
Boston, Massachusetts 02108-1696
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Stanley Z. Koplik
Chancellor

James F. Carlin
Chairman

November 18, 1997

Ms. Yvonne Ellison
Corporate Input Section
Office of the Secretary of State
Room 1717, McCormack Building
One Ashburton Place
Boston, MA 02108

Dear Ms. Ellison:

In accordance with M.G.L. c. 89, s. 30, the Massachusetts Board of Higher Education at its meeting today approved the Articles of Amendment filed on September 29, 1997 by F.W. Olin Foundation, Inc. to award the degrees of Bachelor of Science in Engineering, Bachelor of Science in Mechanical Engineering, and Bachelor of Science in Electrical and Computer Engineering; and the honorary degrees of Doctor of Engineering, Doctor of Laws and Doctor of Humane Letters.

Sincerely,

A handwritten signature in black ink, appearing to be 'SK', written over a horizontal line.

Stanley Z. Koplik
Chancellor

cc: Charles M. Cook, Director of the Commission, NEASC/CIHE
Clare M. Cotton, President, AICUM
Jack R. Warner, Vice Chancellor, BHE

SZK:mam

FRANKLIN W. OLIN COLLEGE OF ENGINEERING

Petition to the Board of Higher Education
pursuant to 610 CMR 2.00
(Degree Granting Regulations for
Independent Institutions of Higher education)

October 6, 1997

Lawrence W. Milas, William J. Schmidt, William B. Norden and William B. Horn, as the Incorporators of the proposed Franklin W. Olin College of Engineering (hereinafter "Olin College"), hereby petition the Board of Higher Education to grant degree granting authority to Olin College.

Background

The Incorporators are all of the members of the Board of Directors of the F.W. Olin Foundation (hereinafter the "Foundation"), a not-for-profit corporation established in New York in 1938 by Franklin W. Olin. The Foundation's principal office is at 780 Third Avenue, Suite 3403, New York, NY 10017. The Foundation also maintains an office at 1500 Foshay Tower, 821 Marquette Avenue, Minneapolis, MN 55402-2918.

In addition to serving as Directors of the Foundation, the following Directors also have held the offices shown below since January 1, 1983:

Lawrence W. Milas - President
William J. Schmidt - Treasurer
William B. Norden - Secretary and Counsel

Additionally, William B. Horn served as Vice President of the Foundation for approximately 8 years until his retirement from that office at the end of 1995.

The length of service of each of the Incorporators as a Director of the Foundation is approximately 23 years for Mr. Milas and Mr. Horn, and nine years for Mr. Schmidt and Mr. Norden.

Although the Foundation's corporate charter provides its Board with broad grant making authority, the Board, as it has been constituted from time to time over the last 46 years, has committed substantially all of its grants in support of academic facilities for colleges and universities. When making such grants, the Foundation's policy has been to pay the total cost of each building,

including equipment and furnishings required to support the programs intended to be housed in them. Since its founding, the Foundation has made grants for 72 buildings at 57 institutions across the nation (see Appendix "A").

Institutions in the Commonwealth of Massachusetts which have benefited from building grants from the Foundation include Babson College, Tufts University and Worcester Polytechnic Institute. Other institutions in New England which have received building grants from the Foundation include Bates College, Colby College and Connecticut College.

The large dollar amount of the Foundation's building grants (most recently as much as \$15 million) and the small number of grants which the Foundation makes annually (generally from two to four), as well as the Foundation's demanding selection process, have given its grants the cachet of external confirmation of institutional quality. The Foundation's grants are highly prized and there is usually strong competition from a large number of institutions for these grants.

The Foundation's selection process for its building grants regularly includes more than 100 meetings annually with applicants, almost always with their Presidents, and the review of a broad array of institutional data dealing with strategic goals, faculty and student quality, enrollment and financial strength, fund raising and program and architectural planning. For institutions which advance in the competition, there is a site visit which includes meetings with faculty, administrators and members of Boards of Trustees. These activities have given the Foundation's Directors broad knowledge of higher education issues and institutional management.

Over the last four years the Foundation's Directors have been engaged in long range strategic planning to consider other possible grant opportunities and to address other issues, including their desire to continue to commit substantially all of the Foundation's assets in support of higher education in perpetuity. During this planning the Directors also reviewed Franklin W. Olin's clearly expressed interest in the Foundation supporting the establishment of a new college. The Foundation also has considered the National Science Foundation's recent efforts to reform undergraduate engineering education. All of this has led the Directors to conclude that the establishment of a new engineering college will provide an exceptional opportunity to advance the reform of engineering education and also meet important strategic objectives of the Foundation including the consummation of Mr. Olin's stated wish to establish a new college.

The Foundation's current net worth is approximately \$400 million and consists of a diversified portfolio of marketable securities. A copy of the Foundation's 1996 audited financial statements is attached as Appendix "B".

The Proposed College

The Foundation proposes to organize and fund the Franklin W. Olin College of Engineering. The College will seek to establish a new paradigm for undergraduate engineering education consistent with the reforms proposed by the National Science Foundation, industry leaders, engineering educators and others (see attached Appendices "C-1" thru "C-7"). The academic program will be committed to maintaining a culture of innovation and leading-edge programs which stress interdisciplinary learning. Hands-on learning, supported by strong student research programs with students working in teams will be the norm. Engineering and science teaching will be supplemented by liberal learning with an emphasis on communication skills and cross-cultural studies. The program will expose students to business and marketing concepts which they will need as they enter a variety of engineering related jobs. The number of students per faculty member will be kept quite low.

The College will be located in Needham on land to be purchased from Babson College and contiguous to the Babson College campus. Both Babson College and Olin College will collaborate in a variety of ways. These may range from cost sharing of certain campus services, such as grounds maintenance, campus security, and purchasing, to sharing liberal arts faculty, developing joint programs for both engineering and business students, and maintaining joint facilities such as a library or an arts building. Cross-registration is a goal. Collaboration will be based largely on the Claremont Colleges group model in California and on other examples of college partnerships, including the Five Colleges Group in Massachusetts.

The year 2001 has been targeted for the commencement of the academic program and the matriculation of about 50 to 100 students. Enrollment is expected to grow to a range of 600 to 800 by 2007. The campus will be built as enrollment grows but construction will precede actual needs. It is expected in the first several years that some Babson College facilities will be made available to Olin College so that the construction of certain non-essential spaces can be postponed until justified by actual enrollments.

The Foundation is prepared to invest the full amount of its uncommitted financial resources in the establishment of the college. It fully expects that it will invest upwards of \$200 million for this purpose over the next ten years. This support will be used for campus construction, operating costs and to establish a sufficient endowment to enable Olin College to be tuition free or to charge only a very modest tuition. In the early years, the Foundation intends to underwrite all student costs so that the college can operate tuition free for at least its first seven years. The Foundation's recent announcement that it has indefinitely suspended its regular building grant program will enable the Foundation to meet these financial needs.

Information Required by Sec. 2.07(1) (a) of the Regulations

Foreword to the Petition

Because the Franklin W. Olin College of Engineering is a new college there are not yet any physical facilities, specific employees, precise policies, etc. in place. In the paragraphs that follow, therefore, we will often need to refer to philosophies of operation rather than precise procedures, intentions rather than prior actions, and examples of good practice we intend to emulate rather than historical accounts of our own performance.

The text of documents such as this petition can often get lengthy and cumbersome. We will use appendices when appropriate to provide in-depth background information for the reviewer instead of imbedding extensive explanations, sample documents, etc. in the text.

1. the petition itself, including the certificate of organization and any amendments and foreign corporation certificates.

This document is intended to constitute the petition required by these Regulations. A copy of the certificate of organization ("Articles of Incorporation"), dated September 30, 1997, is annexed hereto as Appendix "D". Olin College has not been incorporated in any other jurisdiction and there are no foreign corporation certificates pertinent to this petition.

2. a list of members of the corporation.

Olin College will not be a membership corporation and therefore it will not have members. Its Board of Trustees will be self-perpetuating. Petitioners intend to elect themselves as the first trustees of the corporation. See the information about Petitioners and their experience with higher education under the earlier section entitled "Background". Also see Appendices "E-1" thru "E-4" for further biographical information about Petitioners.

Other trustees will be added from time to time as plans for the college are implemented and the Foundation's goals for Olin College are achieved and success seems certain.

3. the constitution and by-laws of the corporation.

Olin College's by-laws are annexed hereto as Appendix "F".

4. a statement of mission and educational objectives.

The Vision

We envision a 21st Century in which the industrial and commercial community is truly a global marketplace. Everyday life has already become extensively intertwined with enabling technologies and we foresee that this trend will continue at an accelerated pace. We believe that the leaders of all walks of life in the 21st Century will need a genuine understanding of the "know how," "know why," and "know when" of these enabling technologies. Knowing the essentials of how these technologies work and how to make them work allows one to grasp their potential immediate effects and empowers one to bring those effects to life. Knowing the theory of why these technologies work allows one to make them work better and to develop entirely new technologies to replace the old. Knowing when it is appropriate to employ available or attainable technologies requires the wisdom that comes from genuine understanding of the technologies coupled with an informed appreciation of the cultural and social context within which the technologies would exert their influence.

We believe that modern engineering education provides the optimum basic preparation for the leaders of the future we see. We believe that engineers will continue to be expected to practice their profession in the traditional technical capacities. In addition, however, we believe that engineers will be called upon and must assert their leadership as managers of technology-based commercial ventures and governmental agencies, as senior corporate leaders, entrepreneurs, political leaders, and as specialized professionals in the fields of medicine and law. We believe that engineers will be so important in this future society because their education uniquely provides them with the essential knowledge, skills, processes and perspectives to understand the complex system that modern life has become. Many educational programs provide graduates with either the "know how," the "know why" or the "know when." The Franklin W. Olin College will enable its graduates to develop within themselves the necessary synthesis of these three ingredients to emerge as the effective leaders needed to chart our course through the future.

In short, we see a future in which an undergraduate engineering education becomes the true "Liberal Education," i.e. an education which liberates one to lead a personal and professional life of full citizenship in one's local, national, and global communities. Engineering education has long claimed to prepare its graduates for such lives and has done a good job within its constraints; we believe the creation of the Franklin W. Olin College of Engineering will finally bring that claim to full reality.

Mission Statement

The role played by the Franklin W. Olin College of Engineering in realizing our vision of the future is to educate engineers well versed in science and mathematics and to provide them with a background in the humanities and social sciences to enable them to assume leadership in their fields with a clear understanding of the impact of their work on the rest of society. In particular, we will ensure that our graduates have an extensive understanding of the science and the technologies that undergird modern life and an ability to predict, create and manage the technologies that will shape the future. A complementary mission will be to provide undergraduate students from other colleges majoring in business, the social sciences or the humanities with a basic understanding of engineering by involving them in collaborative work with Olin College students and faculty members.

In the process of accomplishing the mission of the college we believe that the Olin College of Engineering will emerge as a global model of the agile, learning oriented, professional preparation community. We expect to embrace this role and work with our colleagues at other academic institutions, agencies, corporations, etc. to constantly seek and implement the very best practices to support our mission.

Major Strategic Tenets of the Franklin W. Olin College of Engineering

These tenets help define some of the philosophies of operation and strategic approaches that will be followed by the college in carrying out its stated mission. The major tenets of the Franklin W. Olin College of Engineering are:

- The college will focus on degree programs in engineering.
- The college will focus its efforts on the education of undergraduate students.
- The college will be residential in nature with the great preponderance of its students living in residence halls or other facilities governed by the college
- The college will be selective in admissions based upon intellectual ability and achievements.
- The college will maintain tuition charges to students at a very low level relative to other private engineering colleges.

- The college will establish a lifelong relationship between its students and the college community. This relationship includes the following understandings between the college and its graduates. The college will strive to:
 - provide the support necessary for students to successfully complete their undergraduate studies at the college,
 - provide continuing learning opportunities for its graduates on the college campus or at off campus sites that are deemed feasible, and
 - provide career services to its graduates on a lifelong basis.

In return for the college's efforts to provide relatively low cost educational support for a lifetime of professional leadership, graduates of the college will be encouraged to provide continuing financial and in-kind support to the college so that the opportunities afforded to the graduate can be offered to the next generation of students.

- The college will develop and maintain a close relationship between the study and practice of engineering and commercial business and industry.
- An overarching operating principle will be to provide access to resources for members of the college community rather than seek ownership of resources. Whenever practical and appropriate, therefore, the college will establish a partner relationship with other institutions and organizations to share facilities, programs and other resources.
- The college will put in place mechanisms to continuously assess and evaluate all college programs.

Educational Objectives

In addition to the philosophy and general operating principles expressed in the preceding Vision and Mission Statements and in the Major Strategic Tenets of the college, it is appropriate to provide a set of more specific educational objectives for the degree programs of the college. Subject to review by the faculty of the college, Olin College's current set of specific educational objectives are as follows:

The Franklin W. Olin College of Engineering will graduate persons who demonstrate:

- an ability to apply knowledge of mathematics, science, and engineering.
- an ability to design and conduct experiments and analyze and interpret data from those and other experiments.
- an ability to design a system, component, or process to meet desired needs.
- an ability to function on multi-disciplinary teams.
- an ability to identify, formulate, and solve engineering problems.
- an understanding of professional and ethical responsibility.
- an ability to communicate effectively in English both orally and in writing.
- the broad education necessary to understand the impact of engineering solutions in a global societal context.
- a recognition of the need for, and an ability to engage in life-long learning.
- a knowledge of contemporary issues.
- an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice.
- a basic understanding of the financial, marketing, and accounting practices necessary to bring a product, process, or technical service to the commercial marketplace.
- that they have taken the necessary first steps to achieve recognition as a Licensed Professional Engineer in at least one State of the United States of America .
- that they have had a significant work or study experience in a culture other than their native culture.

- that they have a sound understanding of the importance of the interrelationships among the component parts of a system.

5. course descriptions and syllabi for all programs of study.

Listing of Programs of Study

The Franklin W. Olin College of Engineering intends to offer baccalaureate degrees in engineering. The specific degree titles currently envisioned are as follows:

Bachelor of Science in Engineering
Bachelor of Science in Mechanical Engineering
Bachelor of Science in Electrical and Computer Engineering

Course Descriptions and Syllabi

It is essential that the faculty and professional staff of the college be intimately involved in the process of defining the courses and attendant syllabi of the various degree programs. Those faculty and staff members have not yet been selected. In order to provide substance for this petition, however, we will provide our current plans for the overall curricular design. This curricular design plan will be used in recruiting the initial faculty members and will be refined by them as the college comes into full existence.

a. General Curricular Framework

The college will stress with each student the need to characterize the period at the college as one in which the student develops a set of competencies for entry into the chosen profession and not merely a period of meeting stated specific course requirements, spending a set period of time, etc. Indeed, the time that passes between matriculation and graduation may be significantly different for each student. With this general concept in mind, the college's specific degree programs will be developed within the following general curricular framework.

- The initial portion of the student's work at the college will be focused on acquiring a solid foundation in mathematics, the physical sciences, and the life sciences.
- The intermediate portion of a student's work at the college will be focused on acquiring a solid foundation in the engineering sciences and other material that are common to all areas of engineering practice.

- The capstone portion of the student's work at the college will focus on the broadening of the student's understanding of the particular field in which the student is majoring, upon the development of a deeper understanding of one particular aspect of the chosen major field, and upon the development of professional-level skills in the practice of engineering.
- Distributed throughout the entire period of the student's undergraduate program and superimposed on the content-related portions on the student's work will be a coordinated program to assist each student to develop the professional-level process skills to enable each graduate to make a seamless transition into professional practice upon graduation.
- Because we believe that our graduates will practice in a global environment, each student will be encouraged to have and will be afforded the opportunity to have a significant international experience prior to graduation.

b. Exemplars of Specific Curricula, Course Descriptions and Syllabi

As indicated above, it is important to permit Olin College's faculty members to play a strong role in the detailed development of the college's curricula. For purposes of this petition and for purposes of recruiting faculty members, however, it is necessary and appropriate to put some initial definition of the curricula in place. The following paragraphs provide that definition. At this time it is our intent to implement curricula based upon the following exemplars with the understanding that we will need to amend these definitions as faculty members with different perspectives join the team and as we discern better approaches from among our colleagues and sister institutions actively engaged in curricular and pedagogical research.

The Initial Portion

As the model for the initial portion of the program at Olin College we have selected the Integrated First Year Curriculum in Science, Engineering and Mathematics (IFYCSEM) pioneered at Rose-Hulman Institute of Technology and subsequently adapted for use in other member institutions of the NSF sponsored Foundation Coalition. A similar model is the one developed at Drexel University as part of its activities in the NSF sponsored Gateway Coalition. The conceptual bases of these two approaches are quite similar.

Dr. Jeffrey Froyd, Professor of Electrical and Computer Engineering at Rose-Hulman, was one of the initial designers of the IFYCSEM

program, has overseen its evolution at Rose-Hulman and has facilitated its adoption by other colleges. Dr. Froyd provided the specific information imbedded in the following synopsis of the IFYCSEM program.

IFYCSEM has been offered each year since 1990 to approximately one-fourth of the entering class of 375 at Rose-Hulman. IFYCSEM integrates the content of the following courses which traditionally account for approximately 75% of the course work of the first year or year and a half of engineering study, i.e. approximately 27-30 semester credit hours.

Calculus I, Calculus II, Calculus III
Physics I, Physics II
General Chemistry I
General Chemistry II
Engineering Statics
Engineering Graphics
Introduction to Engineering Design
Introduction to Problem Solving and Programming

In addition to coverage of the content suggested by the above list of courses, the pedagogy and process of IFYCSEM emphasizes team activity and cooperative learning for both students and faculty and fosters continuous improvement through feedback, assessment, and joint critique of methods and outcomes. Structured laboratory experiences and group project work are distributed throughout the IFYCSEM class schedule. Examinations cover all material in an integrated manner; students receive a single grade for the entire block of credit hours represented by the IFYCSEM.

Summative assessment data show that students who complete the IFYCSEM program perform significantly better than the students in a matched comparison group both in persistence in engineering and grade point average in upper level courses. As upper class students, those who complete IFYCSEM are rated more highly by faculty than students in the comparison group in their communication skills, ability to integrate the use of technology for problem solving, ability to develop their ideas to appropriate conclusions, and ability to integrate previous knowledge into their current work. On a physics misconceptions test, sophomore students from IFYCSEM showed significantly fewer misconceptions than students who completed the traditional curriculum. Additional details about the IFYCSEM program and the Foundation Coalition are presented in Appendix "G".

The Intermediate Portion

The Intermediate Portion of the Olin College engineering curricula for all majors will be based upon the Foundation Coalition Sophomore Engineering Curriculum (FCSEC) which was developed by the faculties of the

member institutions of the Foundation Coalition. Texas A&M University faculty members did the pioneering work on this program; the program has subsequently been adapted for use at several other institutions.

Dr. Donald Richards, Associate Professor of Mechanical Engineering at Rose-Hulman provided the information for the following summary of the FCSEC as it is expressed at Rose-Hulman. We present this particular curriculum as an example of the type of specific curriculum we will implement at Olin College, subject to the recommendations of the Olin College faculty.

The FCSEC at Rose-Hulman consists of 25 semester credit hours offered in a three-term series of eight courses:

- MA211 Applied Mathematics I (3 Cr. Hr.)
- ES201 Conservation and Accounting Principles (3 Cr. Hr.)
- MA212 Applied Mathematics II (3 Cr. Hr.)
- ES202 Fluid and Thermal Systems (3 Cr. Hr.)
- ES203 Electrical Systems (3 Cr. Hr.)
- ES204 Mechanical Systems (3 Cr. Hr.)
- MA213 Applied Mathematics III (3 Cr. Hr.)
- ES205 Design & Analysis of Engineering Systems (4 Cr.Hr.)

MA211, MA212, and MA213 occasionally substitute laboratory experiences for lecture periods to support various topics, e.g. statistics. ES202, ES203, and ES204 each includes three laboratory experiences substituted for three of the lecture periods. ES205 includes 10 three-hour laboratory periods in addition to the lecture periods.

The eight course sequence outlined above can be considered to "substitute" for the following 21 credit hours of courses traditionally taken by engineering students in nearly all majors during the sophomore and junior years.

- Differential Equations I (3 Cr. Hr.)
- Differential Equations II (3 Cr. Hr.)
- Engineering Statistics (3 Cr. Hr.)
- Dynamics (3 Cr. Hr.)
- Fluid Mechanics (3 Cr. Hr.)
- Thermodynamics I (3 Cr. Hr.)
- Electrical Circuits (3 Cr. Hr.)

The additional 4 credit hours in the FCSEC are provided by the culminating course of the FCSEC sequence, ES205, Design & Analysis of Engineering Systems.

Appendix "H" contains additional detailed information about the specific courses that comprise the FCSEC. This information includes catalog

descriptions and detailed course syllabi for each of the eight courses of the FCSEC. (Note: Rose-Hulman is on a quarter system so the detailed explanations in Appendix "H" are presented in that format. Everything in the body of the text of this application is stated in terms of semester credit hours, however, because that system is more familiar to most readers. Because of this conversion, there may be occasional "rounding errors.")

The Capstone Portion

The capstone portion of the academic program at Olin College will stress broadening to gain appreciation for the many aspects of the chosen major field, permit the student to achieve some depth in the content of one specific area of the major and provide opportunities for the student to polish his or her professional skills before graduation.

One of the college's stated objectives is that each graduate should have a broad feel for the place of his or her particular efforts within the larger context of human endeavor. However, by the time a student reaches the Capstone Portion of the educational experience at Olin, he or she will have chosen a major field of endeavor. Thus begins a beneficial tension between a focus on a fairly narrow disciplinary area and the concurrent need to maintain the system-level view we want to instill in each Olin graduate. These appear to be contradictory or mutually exclusive endeavors; they really are not.

The truly effective professionals we will graduate must engage this apparent dilemma and develop a sense of dynamic equilibrium that enables them to recognize and operate at the appropriate level of generality. Each graduate must gain and maintain a base of expertise so that they can make needed technical contributions to projects. At the same time each one must be able to understand and comprehend the scope of the entire project, the exact place in which their contribution fits into the larger effort and the role played by each other member of the project team. Design by committees of specialists produces the proverbial "camel instead of a racehorse." Design by committees of generalists produces lovely artifacts that don't work very well. Design by teams of competent specialists with a systems-level perspective produce effective solutions to the problems of humankind.

The Initial Portion and the Intermediate Portion of the curricula will be the same for all Olin College engineering majors. The Capstone Portion will differ for each major. The Electrical Engineering curriculum at Rose-Hulman illustrates the sort of capstone program we envision. Programs like this one and the one at Carnegie Mellon will form the starting point for the specific design of the Capstone Portion of the Olin College Electrical and Computer Engineering curriculum.

As indicated above, the Capstone Portion provides the student with a broader view of the chosen major, a deepening of understanding in a specific area of the major, and an opportunity to refine professional practice skills. In the Rose-Hulman program these three objectives are met by three sequences of courses taken over a four-term period.

The broadening component is developed in the following course work:

- Circuits and Systems (3 Cr. Hr.)
- Electronic Device Modeling (3 Cr. Hr.)
- Signals and Systems (3 Cr. Hr.)
- Analog Electronics (3 Cr. Hr.)
- Electromagnetic Fields (3 Cr. Hr.)
- Discrete Time and Control Systems (3 Cr. Hr.)
- Digital Systems (3 Cr. Hr.)
- Machines and Power (3 Cr. Hr.)
- Communications Systems (3 Cr. Hr.)
- Control Systems (3 Cr. Hr.)
- Electromagnetic Waves (3 Cr. Hr.)

The deepening component is accomplished through a series of six three credit hour technical elective courses. The professional practice skills are developed through a series of five design courses and a course in technical communications.

The Capstone Portion of the Olin College curriculum in Electrical and Computer Engineering will use a set of courses, similar to those listed above, to develop breadth in the chosen major. Disciplinary deepening and professional skills development will be accomplished by a combination of some course work like that in the Rose-Hulman curriculum and student participation in the industry-sponsored, vertically integrated projects described in a later section of this application.

A similar approach to that described above for Electrical and Computer Engineering will be taken for the Capstone Portion of the curriculum in Mechanical Engineering. The major difference, of course, is that the broadening course work will reflect a range of possible subspecialties and electives in Mechanical Engineering and related fields. Examples of such courses are:

- Mechatronic Systems
- Advanced Thermodynamics
- Finite Element Analysis
- Vibration Analysis
- Materials Engineering
- Gas Dynamics
- Aerospace Design

Manufacturing Systems Engineering
Etc.

The curriculum for the BS in Engineering degree program will share the same Initial Portion and Intermediate Portion as the degree programs in Electrical and Computer Engineering and Mechanical Engineering. The Capstone Portion of the BS in Engineering curriculum will permit a wider latitude in selection of electives to include course work in management, marketing, and finance as well as sequences of technical courses like those listed above for the other engineering degree programs. The relationship to Babson College will provide ample opportunity for Olin College students to have access to a wide range of excellent business-related courses. Students in this major will also participate in the vertically integrated team projects as part of their graduation requirements.

Appendix "I" contains more detailed descriptions of the Rose-Hulman curricula in Electrical Engineering and Computer Engineering.

c. The "Trans-curriculum"

In a 1997 speech, Dr. Diana Chapman Walsh, President of Wellesley College, spoke of the Silent Curriculum on the Wellesley campus. By that term she referred to the general atmosphere, environment, and surroundings on the campus and the persons with whom students associate during their time at the college. She correctly points out that much of the learning and personal development that occurs during the undergraduate years is a result of this curriculum rather than the one published in the college catalog. Olin College intends to make extensive use of several of these "silent curricula" to achieve some of its objectives.

Different institutions have used different terms to describe these influences: extracurricular activities, co-curricular activities, campus life, etc. We prefer the term trans-curricular to identify these activities because we believe that term more correctly captures the nature and intent of the activities. The term trans-curriculum describes activities and modes of interaction that are intentionally designed to assist the student to create certain outcomes in their personal and professional lives. These activities transcend specific curricular components and produce outcomes that are transferable from one specific area to another.

In addition to pedagogical strategies, these trans-curricular components include interaction with one's classmates, informal interactions with members of the faculty and staff, the physical facilities, the grounds, the decor, the clubs, the athletic teams, the social events, etc. Learning moments do not always happen at the scheduled time and place. A progressive environment like

the one we intend to create at Olin needs to put in place the trans-curriculum in a very purposeful manner.

The Underlying Themes of the Trans-Curriculum

Previous sections have described the general intent of each segment of the formal educational program at Olin College and have provided some definition of specific content to be covered. In this section we will describe some of the underlying themes we believe should pervade the entire experience at Olin, i.e. the underlying themes of the trans-curriculum.

Belonging

The first underlying theme we will describe is belonging. It seems to be an essential human need to belong: belong to a family, a club, a team, a culture, a religion, a circle of friends, etc. If this sense of belonging is well-developed, individuals are able to be honest and open with one another and have the confidence to take the intellectual risks associated with creative ideas. Persistence in difficult times also seems to be enhanced by a sense of kinship and shared mission. Olin College believes that it is beneficial to develop a sense of belonging on a professional level as well as on a more fundamental human level.

One way in which Olin College will assist students to achieve this sense of belonging is by structuring its students' and faculty members' work environment around cohorts of students and faculty. For example, we intend that the Initial Portion of the studies on the campus will occur with students grouped for all of their classes in cohorts of 80 students with eight faculty members associated with that group. The students will take all of their classes in this first portion together and will be team taught by the eight faculty members. There will be a strong message of mutual responsibility for success of each member of the cohort and that the success of the individual is tightly enmeshed with the success of the group. Faculty members will also be required to work for the success of the faculty team and the student cohort as well as working for the success of their own separate component in the overall academic program.

Vertically integrated project work

We believe that it is essential that new engineering students begin to practice engineering as soon as possible after they begin their formal engineering education. It is true that the newest students have the least to offer in terms of technical expertise. They bring with them a certain level of creativity and problem-solving strategies, however, that enable them to participate in teams to work on projects where other team members may possess the specific knowledge necessary for the problem solution. Even the least experienced

member of the team can have a creative new approach that works and it is important that less experienced team members carry out some of the more mundane support tasks that underpin the project. There is a place, therefore, for persons with varying levels of expertise on any team.

The vertically integrated approach is defined here as one in which faculty members, advanced students, intermediate level students and beginning level students all work on the same project. Leadership roles are played by the more experienced members of the team, occasionally even by members of the team who are faculty members or by practicing engineers who are hired for their expertise as project managers. These projects are expected to be long term activities based upon the real needs of the engineering workplace. Requiring that projects fit neatly within the framework of an academic term does not permit the "reality" we want to engender with project work.

We also believe that it is best if the project has a sponsor or customer who is not a member of the campus community. Faculty members often subconsciously tailor projects to fit smoothly within the campus constraints and do not adhere to the constraints of time, money, and performance that a corporate customer will demand. Inexperienced student members of these teams should not be expected to meet the deliverable schedule of such project work; they need to learn in a more protected environment and their work should not be expected to be of professional quality. On the other hand, upper-level students should be expected to produce professional quality work and must be exposed to the sometimes rigid realities of commercial ventures. A 1963 quote from Jack Alford, one of the founders of the Engineering Clinic Program at Harvey Mudd College, sums it up quite nicely: "I gained the idea that engineering was like dancing; you don't learn it in a darkened lecture hall watching slides: you learn it by getting out on the dance floor and having your toes stepped on."

Well selected and well managed team projects can meet many of our educational objectives in these areas. The Engineering Clinic program at Harvey Mudd College as well as many other project based curricular components at other institutions will provide the basis for the detailed design of the Olin College Project Program. Appendix "J" contains more detailed information about the Engineering Clinic Program at Harvey Mudd College.

Pedagogical strategies

In addition to the content of the required course work and the process skills learned in the project work there is a third component to the learning environment that produces valuable outcomes: the pedagogical strategies employed. Olin College will insist that its faculty members are committed to and experienced at fostering cooperative learning approaches, active learning whenever practical, and the development of learning strategies

that will serve Olin graduates well in a lifetime of continued learning. The pedagogical strategies must be learner-centered not teacher-centered. Ownership of the processes and responsibility for learning must rest with the student not with the faculty member. The assumption of responsibility for one's own intellectual development by the student is an important milestone in the overall intellectual development that leads to a successful graduate of Olin College.

The use of appropriate enabling technologies

An essential ingredient in modern technological education is the application of appropriate technologies. These technologies enable engineers and, therefore, engineering students to achieve more and remove the tedium that has historically hindered creativity in engineering. These technologies are power tools in the hands of craftsmen.

Computers are the first such "tools" that come to mind. Each faculty member, staff member and student at Olin College will have his or her own notebook computer. Offices, residence halls, library study areas, etc. will provide power and network connections so that the notebook can become the information spine for the campus and the connection into the global network. At the present time such computers are tethered by the need for power outlets and network connections. By the time Olin College opens its doors to students, technology may have advanced enough to eliminate these encumbrances and create a sound, video, graphics and text interaction interface that is as transparent as the air that separates colleagues engaged in a face-to-face conversation.

Classroom facilities on the campus will also be fully networked to ensure a seamless interface for students and faculty members between their computers and the various servers, printers and other peripherals. Internet and intranet access will also be available from these "learning spaces." The physical design will facilitate group work and the integration of various electronic media into the learning process. Flexibility of design and construction will be stressed so that new technologies can be incorporated as they develop. The DeBartolo Hall at the University of Notre Dame, the Olin Advanced Learning Center at Rose-Hulman, the new engineering facilities at Carnegie Mellon and several other campuses and corporate conference centers around the country serve as the current models of the "state of the art" in regard to such facilities. By the time final building plans are drawn, we are confident that other innovations will have emerged for inclusion into our facilities.

Student and faculty computers will host a suite of software that includes the expected word processors, spreadsheets, Internet search engines, calendars, electronic mail, etc. In addition the college will negotiate site licenses

for many of the specific professional software packages used by practicing engineers and, therefore, appropriate and necessary for engineering students. Examples of this latter class of software include *Mathematica*, *Maple* and the other symbolic manipulation software, *Working Model* engineering mechanics and design software, *AutoCad* drafting and design support software, *Matlab*, *Spice*, etc. In summary, students and faculty will work with the most advanced available tools used by their contemporaries in engineering practice. In some cases we expect that the Olin College community will be significantly ahead of all except the most sophisticated of corporations in adopting new software into engineering practice.

Partner institutions

In an earlier section we indicated that one of the fundamental strategic tenets of operation of Olin College was that we would seek access to resources rather than ownership whenever appropriate. This premise suggests that we will need to establish a range of partnerships with a variety of colleges and other organizations.

Olin College has a special symbiotic relationship with Babson College. The communities of the two institutions share a firm belief that the worlds of engineering, finance, management and marketing are inextricably intertwined. As a result of this relationship there will be many facilities and services shared by the two colleges. Among these shared resources may be library holdings, centralized purchasing offices, residence halls, dining facilities, recreational facilities, etc. Not included in the things shared will be identity, autonomy of operation, and fiscal responsibility.

International experience is an important desirable component of an Olin College education. Olin College will establish relationships with progressive institutions in a variety of other cultures that will provide a conduit of interaction between the communities to facilitate faculty and student exchange, joint project work, and avenues for student work opportunities in the "other" culture. We expect that these relationships would be developed primarily with other countries and cultures that appear to be significant players in the international industrial arena within a 20-year horizon.

Relationships with specific corporations are also necessary to the successful operation of the degree programs we propose. In particular, we will rely upon these corporations to provide us with the project work that comprises a major required portion of our curricula. Various U.S. colleges of engineering have established such relationships. Some have chosen relatively exclusive relationships with one, or a very few, large corporation(s); some have established membership in "clubs" that provide certain *quid pro quo* prerequisites for both the company and the college; some have focused on specific industries.

At this time, Olin College has not defined its specific focus (or lack thereof) for its corporate partnerships. There is no question, however, that extensive relationships of this sort will be necessary.

6. plans for any additional future program offerings necessary to achieve the stated goals of the institution.

One aspect of the vision of the founders is that Olin College would be a leader in curricular development and new academic program implementation. Therefore, while there are no immediate plans to do so, Olin College may eventually want to expand its degree programs to include B.S. or M.S. programs in mathematics, computer science, the physical sciences, the life sciences, or additional engineering fields. The college may also need to establish additional "delivery" mechanisms to meet the evolving needs of its community members as the nature of the group changes from one comprised of on-campus students only, to one that includes new graduates, mid-career professionals, and senior professionals.

One of the special curricular characteristics of Olin College will be the involvement of each student in external customer-based team project work. That portion of the various curricula provides the student with a learning experience that parallels the technical workplace in as many ways as is practical. Such project work also provides faculty and staff members an environment in which to practice their professions as engineers, scientists, etc. in addition to serving as role models and mentors for their students. In an earlier section we discussed the need for an extensive network of industrial partners to provide the substance of these projects. Additional mechanisms that provide similar types of opportunities to our students, faculty and staff members include a graduate program at the Master's level, the establishment of a not-for-profit research institute, and an extensive network of partnerships with existing research and development organizations, universities, etc.

Our strategic approach of seeking access rather than ownership when possible will be important in this area. Massachusetts is already home to many potential partners for these activities and we will always seek to form mutually beneficial relationships with existing organizations in preference to initiating new duplicative ventures.

7. assets and exiting support already in hand and pledged, and support for the development, growth, and maintenance of the institution.

The F.W. Olin Foundation has publicly announced that it is prepared to invest upwards of \$200 million of support over the next ten years for the development, growth, and maintenance of Olin College. The actual level of

the Foundation's support for Olin College over this ten year period could be nearly double this amount. This support is conditional on the successful incorporation and accreditation of the College, the acquisition and successful development of real estate from Babson College, the implementation of a satisfactory agreement with Babson College concerning the on-going relationship between the two Colleges, and the achievement of the Foundation's goals for the College during this ten year period. A financial model of the level of support which the Foundation is prepared to invest, subject to the foregoing conditions, is attached as Appendix "K-5".

In addition, Babson College will support Olin College by collaborating with Olin College with respect to academic programming, administrative services and trans-curricular programming. See Appendix "L" for a Statement of Intent of Babson College and F.W. Olin Foundation, Inc. regarding these matters. The ready availability of this support and these resources will be extremely important to Olin College's early development and success. For example, a liberal arts faculty, library, athletic and recreational facilities, general classrooms, computer center, residential space and dining services are expected to be made available in varying degrees to Olin College students and faculty. Clearly, this will give Olin College students the benefit of a much larger and more mature educational environment than would ordinarily be expected at a new institution. Over the longer term, both Olin College and Babson College will be enabled to offer their students and faculty a critical mass of educational and social opportunities which neither could offer alone. Just the increased diversity of engineering and business students on both campuses will make a marked difference in the experience of all students, both educationally and socially. And, of course, the opportunity to develop new programs which will integrate business and engineering promises to make the Babson-Olin partnership unique.

At an appropriate time it is expected that Olin College will solicit support from other sources. This will include seeking gifts and grants from individuals, corporations, other foundations and government agencies. Prior to undertaking an on-going commitment to this kind of fund raising, it will be necessary for the College to employ a development staff.

Olin College also will consider issuing bonds to the public to fund the construction of facilities. Other possible financing arrangements may also be considered. But assuming that the Foundation provides the full level of support projected by Appendices "K-4" and "K-5", these financing arrangements will not be essential and will be undertaken only if they will support an enhanced financial model for Olin College's longer term development.

8. information regarding tuition fees, and other student charges, as well as plans for student financial aid.

A fundamental goal of the Foundation's planning for Olin College is that the College must be either tuition free or charge tuition which will be quite modest in contrast to tuition at peer institutions. The term "tuition", as used in this petition, includes all student charges, including room and board and other fees. The financial model in Appendix "K-4" demonstrates that the financial support which the Foundation intends to provide will enable Olin College to be fully tuition free and free of all other student charges.

With further study and planning, the College may determine that certain adjustments should be made to a policy of no student charges of any kind. For example, the availability of student aid from government may make it desirable to charge some amount of tuition. The appropriateness of imposing certain student fees also will need to be reviewed. For example, charges for room and board might be excepted from a policy of no student charges.

Because of what will be sufficient funding to endow the payment of all student charges, it is clear that generous financial aid will be available to all students who have need, to the extent there are student charges of any kind.

9. plans for the acquisition of physical plant and equipment.

The Board of Trustees of Babson College has authorized the sale of approximately 80 acres (approximately 60 buildable acres) of undeveloped real estate in Needham for use as a campus for Olin College. The price range authorized by the Babson Board is between \$12 million and \$15 million. See Appendix "M" for a copy of the resolution of the Babson College Board of Trustees. The sale is subject to the following conditions:

- a. That the incorporation of Olin College be approved by the Commonwealth of Massachusetts.
- b. That the required approvals for building the campus be obtained.
- c. That Babson College and Olin College (or the Foundation on behalf of Olin College) enter into a formal agreement defining their relationship.
- d. That the Foundation provide Babson College with an adequate financial plan for the development of Olin College.

The property proposed for sale to Olin College is contiguous to the Babson College campus. Following discussions with representatives of Babson College, and after a preliminary review by an engineering firm, the Foundation has tentatively elected to reduce the size of the parcel to 64.8 acres of which 57.63 are buildable. See Appendices "N-1" and "N-2" for descriptions of the parcel.

The Foundation has obtained a preliminary estimate from Richard Dober of Dober, Lidsky, Craig and Associates, Inc., nationally recognized higher education space planners, of the amount of building space which will be required to support Olin College's programs, assuming a maximum enrollment of 800. That estimate suggests that Olin College will require 163,000 gross square feet of academic space, 210,000 of residential space, and 87,500 for campus life, administrative, physical plant and support and physical fitness. However, this estimate does not consider the space which will be available on the Babson College campus which will reduce the total space required to be built by Olin College. Based on current planning, optimum enrollment will be closer to 600, which also will substantially reduce the total space needed. In any case, the proposed acreage to be sold to Olin College is large enough to support the facilities needed to accommodate the proposed academic and trans-curricular programs.

Based on the funding the Foundation has proposed, it is expected that all of the physical plant and equipment required to support Olin College's programs and student life and other activities of the College will be acquired and provided without financial difficulty.

10. description of current library holdings and plans for future development of library and information resources.

Perhaps our policy of access rather than ownership finds its greatest immediate potential in the area of library holdings. In the past decade there has been an increasing implementation of systems to enable the sharing of books and journals among libraries. Several things have driven this trend: the need for financial efficiency, the availability of rapid document delivery services, the advances in electronic media, etc. It is difficult to imagine that the need for financial efficiency will lessen and the enabling technologies and services continue to show every indication of becoming more effective and less expensive with each iteration.

In more specific terms, the location of Olin College makes the sharing of information resources particularly appropriate and practical. The special relationship of Olin College with Babson College and the fact that the Boston area has such a large concentration of colleges and other knowledge-based organizations makes it possible to implement such an approach because

these organizations already have major historical collections in place. Olin College expects that it will initiate its own circulating van service to facilitate the interlibrary loan process in the Boston area if no such service is already available.

If one speaks of sharing of resources, however, it is necessary that one has something to share not simply to be a constant borrower. Olin College does intend, therefore, to acquire and maintain a collection of approximately 50,000 volumes of hard copy texts, monographs, and reference volumes for the use of the members of the Olin College community and our partners in resource sharing. This collection will be very focused on the current and emerging professional interests of our community members. The following paragraphs provide an outline of the acquisition philosophy that will guide the development of the college's collection along with some specific examples of the types of titles to be purchased.

The development of a balanced collection begins with the belief that titles should reflect the basic areas of science, i.e. biology, chemistry, physics, and mathematics, and a strong representation of the constituent disciplines of engineering that mirror the actual curricula. A selection tool like the *Bibliographic Guide to Technology* (Boston: Hall) and *Guide to Basic Information Sources in Engineering* (New York: Wiley) will direct initial acquisitions. Reference tools, also in electronic, networked format to the extent possible, will begin with dictionaries and encyclopedias, for example *McGraw-Hill Encyclopedia of Science and Technology* (New York: McGraw-Hill) and *Kirk-Othmer Encyclopedia of Technical Technology* (New York: Wiley) and the *Encyclopedia of Materials Science and Engineering* (Pergamon Press). Handbooks, the most basic ready-references, will range from the *CRC Handbook of Chemistry and Physics* (Boca Raton, Fl.: Chemical Rubber) to *Perry's Chemical Engineers' Handbook* (New York: McGraw-Hill), *Merritt's Standard Handbook for Mechanical Engineers* (New York: McGraw-Hill) and *Finks's Standard Handbook for Electrical Engineers* (New York: McGraw-Hill). There are other essential but more specialized handbooks like the various handbooks of the American Society for Metals.

Textual tools that provide an array of tables of data and statistics are important for upper class students and faculty. Titles selected will be based on curricular needs but will include those dealing with solar energy, pollution, ergonomics, natural resources, demographics, etc.

Students and faculty members must be knowledgeable about the rules, techniques, and conditions of state-of-the-art industrial or field practices. American National Standards Institute documents, the *Annual Book of ASTM Standards* (Philadelphia: American Society for Testing and Materials) and similar volumes are essential for this portion of the engineering collection and will be

included in the college's acquisitions. Supporting the core print collection in this area are a variety of online, fee-based databases that may be accessed via dial-in or the Internet. Vendors such as STN and INSPEC deliver a variety of bibliographic, full text, and physical property information; access to such services will be provided for all faculty members and students.

The college will not attempt to establish and maintain a collection of technical journals in hard copy. Whenever practical, the Olin College Information Access Center will subscribe only to technical journals and other periodicals that are available in electronic format. We believe that this is clearly the trend of such publications and we believe that we should invest our resources to facilitate this delivery strategy rather than invest in infrastructure to support the technology of the past. Implicit in the decision to focus our efforts on electronic information access is the need to place the most advanced access, viewing, and printing technologies in the hands of our community members.

The Foundation's vision of the college also recognizes that a place for quiet study and the tactile and visual experience of the printed page are essential components in the learning process for many persons. The Olin College Information Access Center will be a real physical facility, therefore, with study areas and open access "stacks" for our hard copy holdings. The Center will also provide a place for face-to-face interaction with the information specialists who will facilitate information access. The Center will not be a repository for aging printed matter, however, and will be designed and operated to accentuate access and use rather than preservation and storage. These latter functions are important and are being well addressed by others; we will focus on the former.

11. curriculum vitae of all faculty already retained by the institution, including those pledged to the institution effective as of specified dates.

The fact that the faculty members of the Franklin W. Olin College of Engineering have not yet been selected makes it difficult to respond directly to this particular question. We will take the same approach we have used in similar situations in other portions of the application and illustrate the types of credentials we expect our faculty members to possess rather than present the credentials of specific individuals.

We expect that the President of the college will be named in mid-1998 (see section 16 of this petition) and that the process of actively recruiting the other faculty and staff members of the college will begin shortly thereafter. In general we anticipate that nearly all members of the faculty will hold earned doctorates or other terminal degrees in their disciplines. In addition, faculty members will need to demonstrate a willingness and ability to practice their

disciplinary profession. For example, we would typically expect a faculty member in Mechanical Engineering to hold a Ph.D. from a respected university and have also had significant industrial experience or express an intent to gain such experience in the immediate future. Faculty members will be expected to continue to practice their disciplinary professions after appointment to the faculty.

Because of the special place in the curriculum of project work, we may also hire project engineers to serve as the focal persons on some of the more complex projects that require management skills better provided by persons with extensive industrial project management experience in contrast with the more research-oriented credentials of traditionally educated faculty members. These project engineers will also be accorded the usual faculty rank and perquisites commensurate with their experience and performance.

We anticipate that a student to faculty ratio of approximately 10 to 1 will be necessary to enable our students to achieve the outcomes stated as the educational objectives of the college. This would suggest that the college would have a faculty of 60-65 full time equivalent faculty members when the college reaches its desired steady-state enrollment of approximately 600 FTE students. We estimate that this faculty would include approximately 12 electrical and/or computer engineers, 12 mechanical or aerospace engineers, 2 materials engineers, 4 chemists, 6 physicists, 6 computer scientists, 4 life scientists, 6 mathematicians, and 10 to 12 faculty members representing the various disciplines of the humanities and social sciences.

12. enrollment plans including annual anticipated enrollment for the period from initiation of the program(s) until the first degrees are awarded.

Petitioners' plans call for the recruitment of from 50 to 100 students for the 2001-2002 academic year. Some students may be transfers from other institutions and may have earned advanced standing. Ideally, the number of students recruited annually will be in cohorts of 80 to correspond with the curriculum planning described previously. As a practical matter, the actual number of students will probably vary from this optimum number and some minor adjustments will need to be made in class size. Table 1 below attempts to show how enrollments may grow from 2001 through 2005, when the first degrees are likely to be awarded to students who had entered as freshmen in 2001.

Table 1

Estimated Enrollments 2001-2005

Fall Freshmen		2001-2	2002-3	2003-4	2004-5	Retention		
						% of 1st yr to 2nd yr	% of 2nd yr to 3rd yr	% of 3rd yr to 4th yr
2001	100	100	80	75	70	80%	94%	93%
2002	125		125	106	100	85%	94%	
2003	150			150	135	90%		
2004	175				175			
Estimated Enrollments		<u>100</u>	<u>205</u>	<u>331</u>	<u>480</u>			

If senior level transfer students from other institutions are enrolled in 2001, the first degrees may be awarded as early as the spring of 2002. In any case, it is expected that the first degrees will be awarded no later than 2005.

Petitioners do not anticipate any difficulties in attracting the relatively modest numbers of students projected in Table 1. The low cost of attending, the innovative nature of Olin College, the College's location next to Babson and in the Boston area, all will be strong attractions for prospective students. Additionally, current demographic data shows a substantial increase in the number of high school graduates expected over the next ten years, including a 28% projected increase for Massachusetts (see Appendices "O-1" thru "O-3"). Although the number of engineering students declined in recent years, there is widespread belief that this trend is at an end.

13. Proposed operating budget for the period from initiation of the program(s) until the first degrees are awarded.

Any attempt to estimate an operating budget for the period from 2001, when the first students arrive, through 2005, when the first degrees are expected to be awarded, is speculative at best. There are many variables in such an exercise, including enrollments, the extent to which tuition and other charges may be imposed, arrangements with Babson College for services, as well as the number of faculty and the then level of faculty salaries and other costs.

Nevertheless, there are several approaches possible for developing such an estimate. Perhaps the simplest method and one used in our early planning assumes a budget based on an average cost per student of \$30,000. This figure comes from a review of financial statements from a wide variety of colleges and universities and from common knowledge that at this point in time full tuition and room and board charges at the vast majority of higher education institutions are substantially below this total. Most students, because

of financial aid, do not pay full tuition, and therefore the full cost per student can be assumed to be substantially below \$30,000 . Petitioners believe that a total operating budget in 2001 based on \$30,000 per student is a reasonable planning assumption. This exceeds the projected operating cost per student at Rose Hulman for the current fiscal year and also for 2001. Using this amount and increasing it by 3.5% annually for inflation after 2001 would require the annual operating budgets as shown in Table 2 below:

Table 2

Estimated Operating Budget Based on an Average Cost per Student

	<u>Avg. Cost per Student</u>	<u>Enrollment</u>	<u>Total Budget</u>
2001-2	\$30,000	100	\$ 3,000,000
2002-3	\$31,050	205	\$ 6,365,250
2003-4	\$32,137	331	\$10,637,347
2004-5	\$33,262	480	\$15,965,760

Another, more detailed approach appears in Table 5 below (see also Appendices "K-1" thru "K-4"). This provides a budget based on estimated instruction costs. Using the targeted 10 to 1 student faculty ratio it is possible to estimate the number of faculty based on projected enrollments (see Table 3). Assuming that an average faculty salary in 1997 is \$75,000, increasing this annually by 3.5% for inflation will give an assumed average faculty salary for each of the years 2001 through 2005. This has been increased by one-third to reflect employee benefit costs and other associated expenses (See Table 4). Once total instruction costs are known, other costs can be estimated by determining their average percentage relationship to instruction costs from the financial statements of existing institutions. Using data from the financial statements of Harvey Mudd College and Rose-Hulman Institute of Technology provides an especially germane comparison. The estimated annual operating budgets using this approach are shown in Table 5.

Table 3

Estimated Number of Faculty
Based on a 10:1 Student Faculty Ratio and
Projected Enrollments per Table 1

	<u>2001-2</u>	<u>2002-3</u>	<u>2003-4</u>	<u>2004-5</u>
Total Enrollments	100	205	331	480
Faculty @ 1:10	10	21	33	48

Table 4

Estimated Instruction Expense

Average Faculty Salary in 1997 = \$75,000
 Average Annual Increase = 3.5%

		2001-2	2002-3	2003-4	2004-5
1997-8	\$75,000				
1998-9	\$77,625				
1999-0	\$80,342				
2000-1	\$83,154				
2001-2	\$86,064	\$ 860,642			
2002-3	\$89,076		\$1,826,058		
2003-4	\$92,194			\$3,053,926	
2004-5	\$95,421				\$4,580,208
Plus one-third for benefits, etc.		286,881	608,686	1,017,975	1,526,735
Estimated Instruction Expense		<u>\$1,147,523</u>	<u>\$2,434,744</u>	<u>\$4,071,901</u>	<u>\$6,106,943</u>

Table 5

Statement of Estimated Cash Operating Budget:
 2001 - 2005

	2001-2	2002-3	2003-4	2004-5
Operating Revenue				
Gifts/Endowment Income (a)	\$2,726,515	\$5,784,950	\$9,674,839	\$14,510,099
Operating Expenses				
Instruction (b)	\$1,147,523	\$2,434,744	\$4,071,902	\$6,106,944
Academic Support (c)	195,079	413,906	692,223	1,038,180
Student Services (c)	250,160	530,774	887,675	1,331,314
Institutional Support (c)	466,468	989,723	1,655,228	2,482,473
Facilities (c):				
Operation/Maintenance	254,750	540,513	903,962	1,355,742
Auxiliary Enterprises (c)	412,535	875,290	1,463,849	2,195,446
	<u>\$2,726,515</u>	<u>\$5,784,950</u>	<u>\$9,674,839</u>	<u>\$14,510,099</u>
Change in net assets	\$0	\$0	\$0	\$0

Notes:

- (a) Gifts are 100% from the F.W. Olin Foundation, Inc. See Appendix K-4 for Endowment data.
- (b) See Table 4.
- (c) Based on the average percentage of "Instruction" which this expense represents at Harvey Mudd College and Rose-Hulman Institute of Technology. See Appendix K-3.

As the above estimates demonstrate, estimates based on a per student cost, as shown in Table 2, will tend to overstate costs as enrollment increases because per student costs do not consider economies of scale.

Indeed, both budget estimate approaches may overstate costs. Enrollments and student retention have been estimated at a fairly high level (see Table 1 and Appendix K-1) for a new institution with a very narrowly focused academic program. The newness of the College, the small number of students (especially in the early years), the absence of traditions and possible limits on student life, may create some special pressures on recruiting and retaining students. For those students who may decide they do not wish to continue to study engineering, the College will be unable to offer them other programs, making them more likely to transfer to other institutions. The budget projections also do not take into account that the College in its early years will not yet have built up certain ongoing costs which more mature institutions may encounter. Olin College, in terms of its operating budget, will be relatively lean in its early years. Maintenance costs should be modest; deferred maintenance will not be a factor. And there will not be any outdated or marginal programs which need to be carried on from year to year to satisfy certain narrow constituencies.

Petitioners intend to maintain updated budget estimates as development of the College progresses. As faculty members are employed and clearer information concerning the specific academic programs becomes available, budgets based on more concrete data will be possible. Nevertheless, Petitioners believe that the preceding budget estimates provide a fair basis for judging the approximate upper range of operating costs which may be expected during Olin College's first four years. The Foundation is prepared to support the operating budget of Olin College at these levels during the period shown.

14. proposed requirements for admission and graduation.

a. Admission Requirements and Procedures

The Franklin W. Olin College of Engineering seeks to provide a learning environment that supports the intellectual and social development of the leaders of tomorrow's world. Necessary to such a venture are students with the character traits and intellectual potential to achieve such leadership. It is appropriate, therefore, that Olin College will be a very selective institution in terms of the credentials of its entering students. In general terms, the students who are accepted will be in the top few percent of their respective cohorts.

The exact details of the college's admissions standards and procedures are necessarily left to the faculty and staff members eventually charged with those responsibilities. There are traditional standards in some

areas, however, that we can identify *a priori* that will serve to illustrate the kind of students we expect to attract to the college.

Completion of an appropriate secondary program that includes the equivalent of four years of mathematics through trigonometry, a combination of two years of chemistry and/or life science with a laboratory component, and the completion of one year of physics with a laboratory component will be expected of all applicants. From among those who are so qualified, we will recruit students with minimum total SAT scores of 1100 with a minimum of 600 in the quantitative area and a minimum of 500 in the verbal area. We expect that the median scores of our entering classes will be at the 1400 level with 750 quantitative scores and 650 verbal scores. Such minimum scores would only include students who were in the top 50% of the year's college-bound high school graduates who indicate an intent to study engineering; the median scores cited would be those of students in the top 5% of that same group. Comparable scores on the ACT test would be minimums of 20 and 24 and medians of 27 and 29 in the English portion and the Mathematics portion of the ACT, respectively.

Standardized tests do not provide a complete picture of the academic and professional potential of a young person. The level of academic performance in high school, evidence of significant leadership experience, unusual talent and achievement in non-academic pursuits, and recommendations from teachers, counselors, employers, etc. will also influence admissions decisions. Olin College will also make significant efforts to ensure that the student body is representative of the diversity we envision in our view of the future of the world in which our graduates will practice their professions.

A final component in our admissions process is a personal interview of each candidate for admission. If reasonably practical, these interviews will be held in person. If a face-to-face interview is too difficult in the opinion of the college, an interview will be conducted using the best available electronic technology.

b. Graduation Requirements

Graduation requirements will include the completion of approximately 130 to 135 semester credit hours of post-secondary work. Included in this total will be approximately 18 credit hours of mathematics, 18 credit hours of physical and life sciences, 30 credit hours of humanities or social sciences, 30 credit hours of required courses or constrained elective courses in the engineering sciences, 30 credit hours of required courses or constrained elective courses in the major, and 6 to 9 credit hours of free electives. The required course work in the humanities and social sciences, when combined with at least a portion of the mathematics, physical and life science course work will

constitute a "general education" component well in excess of the 36 credit hours required by the guidelines of the Massachusetts Board of Higher Education.

In addition to the credit hour requirements defined in the preceding paragraph, students will be required to have been enrolled at Olin College for a minimum of two years for the receipt of a Bachelor's degree. Exceptions to this requirement may be made in the initial years of operation of the college.

The exact structure of the academic calendar at the college, procedures for demonstrating competence in lieu of attending traditional classes and laboratories, etc. are all issues that will need to be defined and refined as the college materializes. One of the overriding tones of the college is a focus on ensuring the continuing professional competence of its graduates. Implicit in such a concept is the assumption that the graduates will be competent to begin professional practice in engineering upon graduation and/or they will be well-prepared to proceed to the additional education required for the practice of law, medicine or other professions. The principle upon which graduation should be based is competence, therefore, not completion of a certain number of credit hours of work.

15. description of the proposed academic and student services which the institution plans to provide.

The most extensive and important academic services provided to Olin College students by the college are implied in previous sections, i.e. the attention and assistance of a cadre of faculty and staff members. Technical support for the campus computer environment will include personal assistance with computer-related problems for each student as well as for faculty and staff members.

An office of student affairs will provide housing, food services, counseling services, health services and a bookstore facility. The student affairs office will have significant input into many of the activities described as being in the "trans-curriculum." Athletics and recreation, student organizations, student government and social event planning and scheduling will all fall under the purview of student affairs. We expect that our special relationship with Babson College will involve the sharing of some student services; initial conversations with Babson officials indicate that they are enthusiastic about such cooperation.

The college will maintain an office of placement and career services to assist students and graduates with the problems associated with initiating and maintaining a professional career. The office of the registrar will be responsible for the preparation of the academic catalog, the maintenance of the academic rules and procedures established by the faculty, the scheduling of classes, and the maintenance of academic records.

16. other information pertinent to the plans of the Incorporators.

Petitioners recognize that much planning remains to be done and implemented to prepare for the arrival of students. Much of this planning will be assumed by the President of the College for whom Petitioners are about to begin their formal search. They expect to employ a professional search firm to assist in identifying and interviewing qualified individuals. In the meantime, Petitioners will directly communicate with the Presidents and Deans of highly regarded engineering schools, as well as other individuals interested in engineering education. Attached is a letter and Job Description (see Appendix "P") which the Foundation intends to send to request nominations. Present plans call for this letter to be mailed during the week of October 6, 1997 to about 100 individuals.

CONCLUSION

Petitioners believe that the establishment of Franklin W. Olin College will provide an opportunity to achieve substantial improvements in the education of engineers. The ability to implement the latest thinking about engineering education in a totally new college without the restraints of existing programs is a rare event - one that promises to achieve a quantum leap forward in the development of a new paradigm. What Olin College achieves in pursuit of the new paradigm will inure to the benefit of all engineering schools, but the engineering schools in Massachusetts and throughout the Northeast region, because of their proximity to Olin College, stand to gain the most. A competitive edge in technology education must inevitably lead to a competitive edge in industry, bringing with it jobs and economic development.

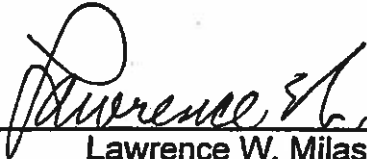
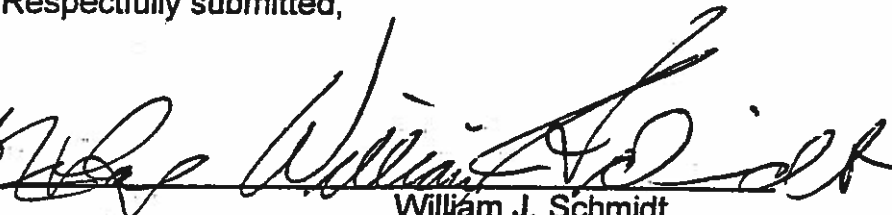


Rare indeed, also, is that such an ambitious and promising plan for the establishment of a new college is sponsored by an organization experienced in higher education and capable of providing enough funding to construct the entire campus and to endow substantially all student costs.

The proposed collaboration of Olin College with Babson College brings some additional benefits to higher education in Massachusetts. Not only will this relationship strengthen the operations of both colleges through administrative efficiencies, but it also offers the opportunity to develop new programs melding engineering and business. To our knowledge there is no similar model like these two institutions anywhere else in the U.S., or perhaps on the globe: two excellent independent and innovative colleges - one specializing in engineering and the other in business - located next to each other and collaborating administratively and programmatically. It is a highly desirable model for higher education in the 21st Century.

We believe that our plans to establish a new kind of engineering college, one with a permanent culture of accommodating change and innovation, can and will succeed.

We request the Board's approval of the incorporation of Franklin W. Olin College of Engineering.

Respectfully submitted,

 _____ Lawrence W. Milas	 _____ William J. Schmidt
 _____ William B. Norden	 _____ William B. Horn

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**THE COMMONWEALTH OF MASSACHUSETTS**

BOARD OF HIGHER EDUCATION
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Stanley Z. Koplik
Chancellor

James F. Carlin
Chairman

November 18, 1997

Mr. Lawrence Milas, President
F.W. Olin Foundation, Inc.
780 Third Avenue
New York, NY 10017-7090

Dear Larry:

It is with great pleasure that I enclose a copy of the notification to the Office of the Secretary of State concerning today's approval by the Board of Higher Education of the Articles of Organization for the F. W. Olin College of Engineering. The approval includes the authority to award the degrees Bachelor of Science in Engineering, Mechanical Engineering, and Electrical and Computer Engineering; and the honorary degrees of Doctor of Engineering, Laws and Humane Letters. The Secretary of State's Office will notify you directly of its approval of the requisite Articles of Amendment.

Once your administration and faculty are on board and prior to enrolling students, the President should advise me on the implementation of plans outlined in the petition in the area of curriculum and faculty. Course descriptions for each program of study as well as curriculum vitae of faculty will fulfill this request.

I am pleased that the Board acted with such speed, support and enthusiasm to respond to the needs of the F.W. Olin Foundation. It was a pleasure to work with you over the past several weeks, Larry, and I look forward to a continued relationship in the future. The F.W. Olin College of Engineering will be an important asset to the Commonwealth and to the higher education community in Massachusetts.

Sincerely,

A handwritten signature in cursive script, appearing to read 'SKoplik'.

Stanley Z. Koplik
Chancellor

Enclosure

SZK:mam