

COLLEGE OF ENGINEERING

**ONE-YEAR AND
FIVE-YEAR BUDGET
PLANNING DOCUMENT**

March 15, 1982



CONTENTS

1. Introduction	1
2. Documentation of the "Engineering Gap"	2
3. Reallocation Plans	6
4. One-Year Budget Plans	8
5. Five-Year Budget Plan	9

1. INTRODUCTION

For over a century the College of Engineering at The University of Michigan has ranked among the leading engineering schools in the world, with claims to unusual strength across the full spectrum of technical interest. Each of the 19 academic programs offered by the College is currently ranked among the top such programs in the nation, whether evaluated with respect to the quality of undergraduate instruction, graduate instruction, or research accomplishment. This degree of both breadth of disciplines and depth of quality is unmatched by any other engineering school in this nation.

It is our belief that the College will play an increasingly critical role during the next decade as the state and the nation become ever more dependent on science and technology and therefore upon engineers. Today our nation faces an engineering manpower crisis of unprecedented proportions that poses the most serious implications for industrial productivity and national security. The strong demand for our engineering graduates is continuing to accelerate along with student demand for admission to the College. There is also an increasing recognition of the importance of the College to industrial and economic development of the State of Michigan.

Yet, despite the importance of its role in the state and the nation, the College of Engineering finds itself today in a struggle for survival. During the past decade, University support of the College has deteriorated to the point where the College has become not only one of the most poorly supported major engineering schools in the United States, but for the past several years it has had the dubious distinction of being the most underfunded unit on this campus. Indeed, a careful analysis of the operating costs of the College indicates that it now receives the lowest level of state support per enrolled student of any academic program in any public institution in the State of Michigan. If major and rapid budget restoration is not achieved, the level of state support received by the College will actually drop to zero during the 1982-83 academic year, and the College will in effect generate a "net profit" for the University --it will have become a "private" institution.

Yet the true costs of this decade of neglect have been very high indeed. The College now finds itself struggling to meet the intense needs of our state and nation for its students and the creative achievements of its faculty in the face of inadequate funding, obsolete laboratories, decaying physical facilities, and a seriously overloaded faculty. It has become painfully apparent that until this situation is corrected, the College will be severely handicapped in its efforts to achieve excellence, to maintain its traditional reputation as a leader in engineering education, to attract and retain outstanding faculty and students, and to respond to the serious needs of the state and the nation for its graduates and its research.

We believe it essential to analyze the five-year budget plans of the College within the context of the devastating deterioration in its General Fund support that has occurred over the past decade, accentuated by the objectives of the College and the opportunities and responsibilities that lie before it. Unless the University acts rapidly to restore a level of support

consistent with our enrollments, our aspirations, and state and national needs for our graduates and research, the College will suffer irreparable harm. If this should occur, the University, the state, and the nation will have lost one of their most valuable resources.

2. DOCUMENTATION OF THE "ENGINEERING GAP"

A series of reductions in the General Fund budget of the College of Engineering was initiated in 1971-72 and continued for almost a decade at an average rate of 2% base budget reduction per year. Although engineering enrollments began to rise in 1974 and since have risen by 44% to an all-time high of 5495 students (3787 FYES), the College continued to suffer budget reductions, further degrading its General Fund support relative to the rest of the University. The degree of erosion in University support of the College during the past decade can be quantified as follows:

- i) Compound growth rates in the College General Fund dollars per Student Credit Hour have averaged only 1.1% for the period 1971-72 to 1981-82 compared to a University average of roughly 7% over this same period. (See Figure 1 and Table 1.)
- ii) College instructional staff fell 11.1% from 302.5 to 268.5 FTEs.
- iii) College support staff fell by 9.1% from 151.9 to 138.1 FTEs.
- iv) College enrollments have increased by 44%; SCH have increased by 35%, and SCH/FTE(Instructional Staff) have increased by 45%. (See Figure 2.)

As a result, the College of Engineering has been constrained to a real growth in General Fund support per SCH (or enrolled student or FYES) that is several times lower than any other unit in the University. When inflation (e.g., through application of the Consumer Price Index for this period) is taken into account, the College has experienced an average loss in General Fund support per SCH over the decade of 7% per year. As a result, by almost any measure (e.g., General Fund dollars per enrolled student, FYES, or SCH), the College has become the most poorly funded unit in the University. This has been particularly devastating because the real costs of engineering education are high due to the extensive laboratory and computing facilities and the design and research experience demanded by quality engineering instruction.

But it is misleading to focus only on the General Fund component when considering University support of an academic unit. Therefore we have attempted to analyze the total operating costs and income of the College of Engineering for two base years, 1980-81 and 1981-82, in an effort to determine the degree of underfunding of the College, the magnitude of the so-called "Engineering Gap". This analysis includes not only direct instructional and research costs, but also indirect costs including instruction imposed on other units, plant maintenance and utilities, library costs, staff benefits, student financial aid, and research administration, as well as both expenditures and income associated with private support.

FIGURE 1

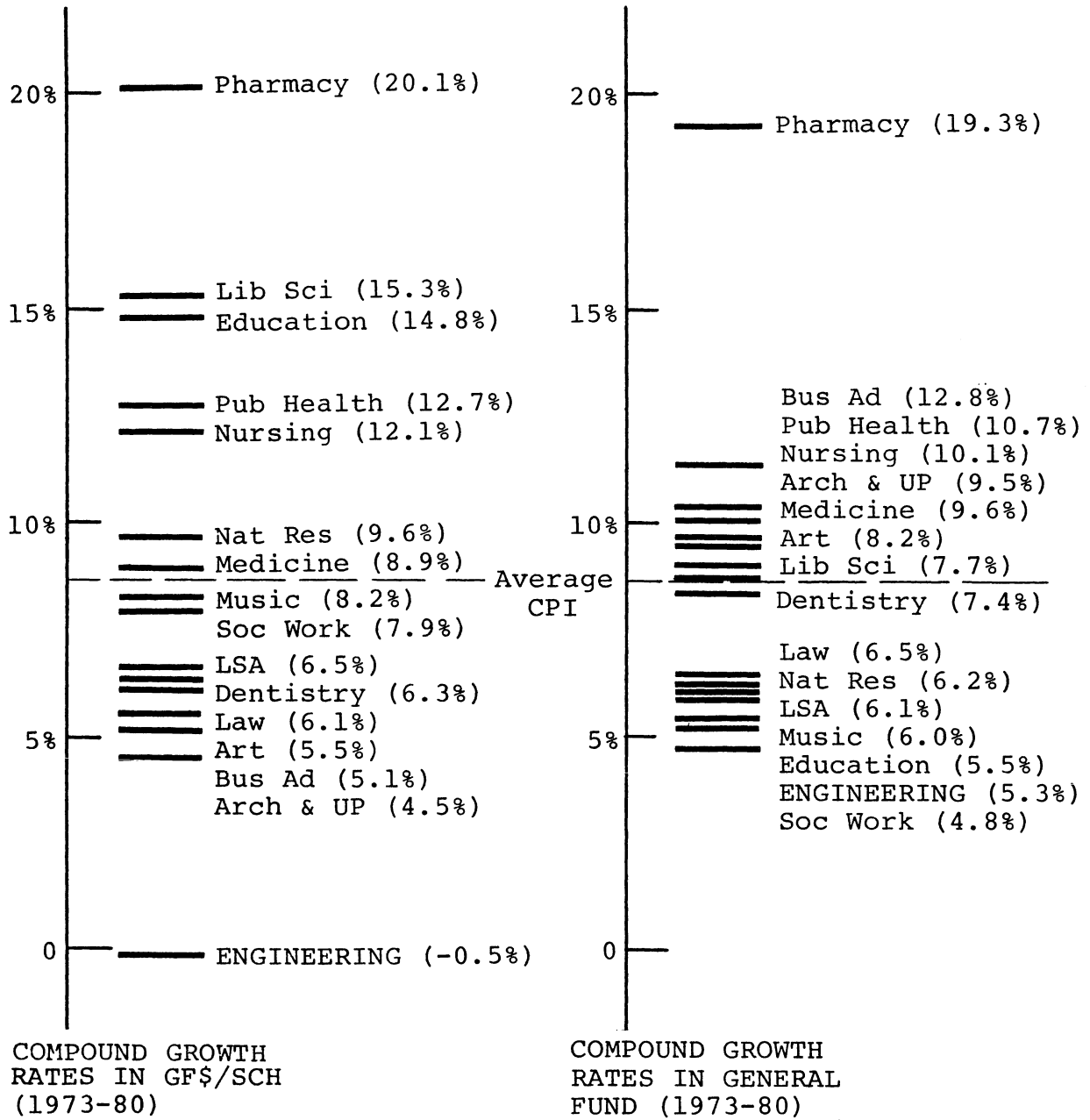


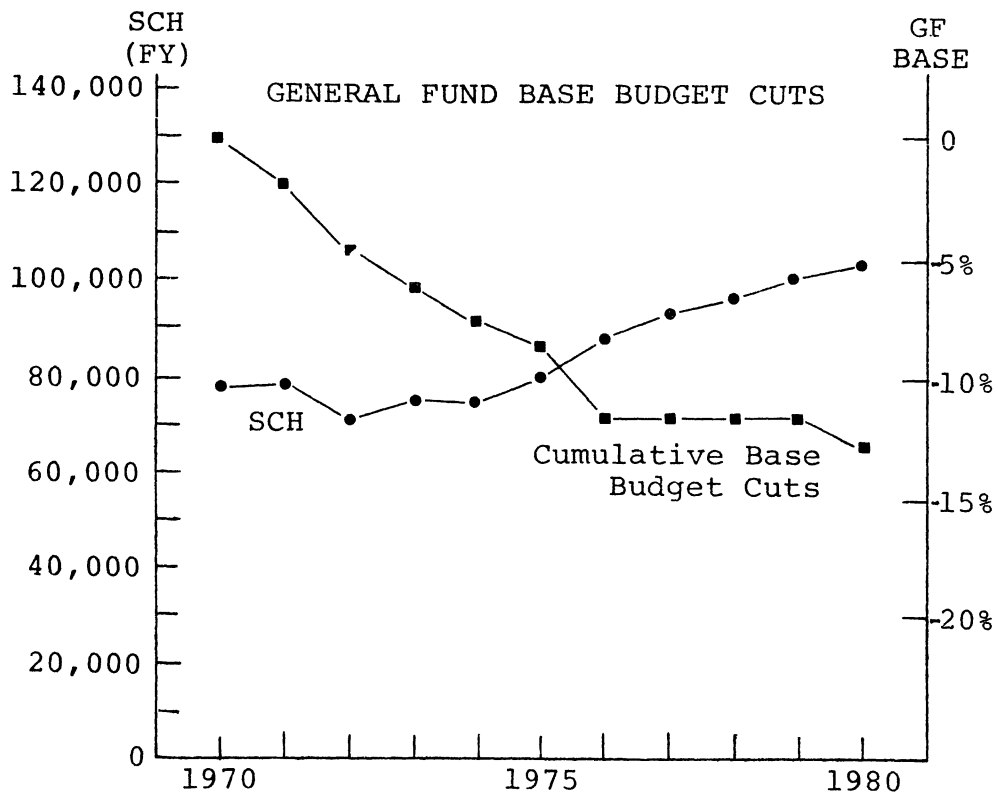
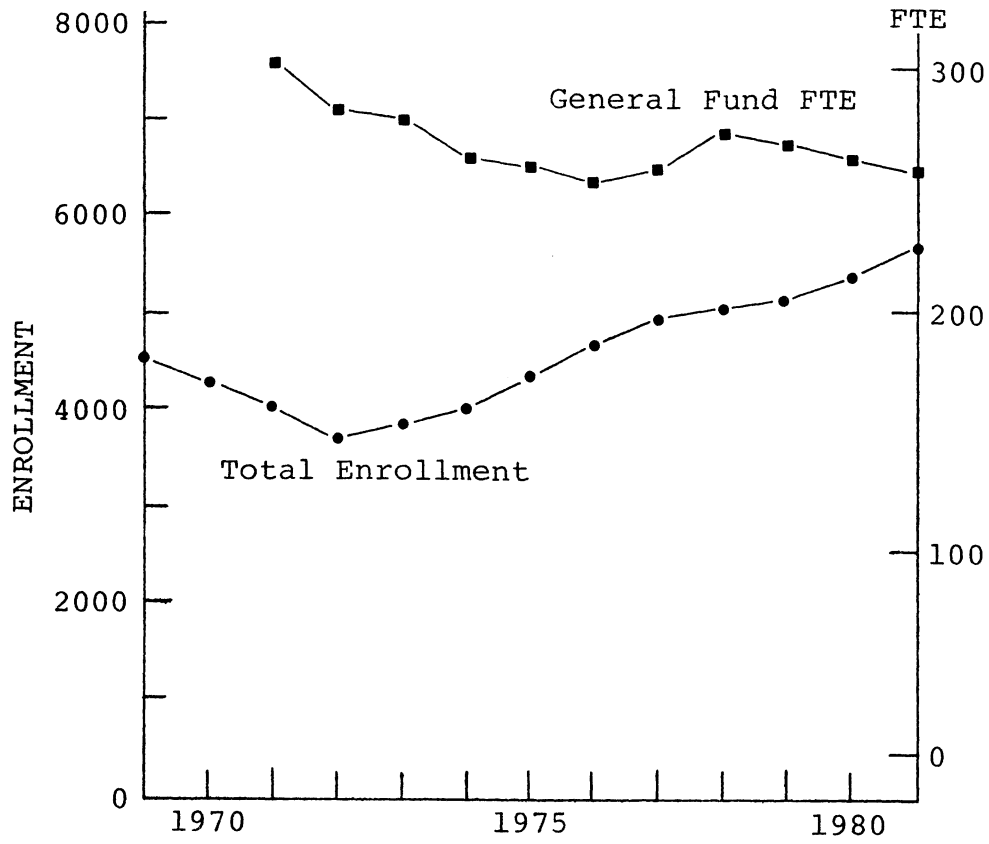
TABLE 1

GENERAL FUND DOLLARS PER ENROLLED STUDENT

	<u>1980-81</u>	<u>1981-82</u>
DENTISTRY	10,696	11,407
MEDICINE	10,452	9,555
PUBLIC HEALTH	5,985	6,530
PHARMACY	4,706	5,684
MUSIC	4,624	5,010
EDUCATION	3,580	3,739
NURSING	3,267	3,825
LAW	3,580	3,739
ARCH & UP	3,216	3,467
LIB SCIENCE	2,659	2,897
BUS ADMIN	2,633	2,698
NAT RESOURCES	2,789	2,692
LSA	2,418	2,499
ART	2,350	2,334
ENGINEERING	2,128	2,277

NOTE: It is generally recognized that the instructional costs in dentistry, medicine, and engineering are higher than those in other disciplines because of the extensive laboratory and practice experience (e.g., clinical, design, and research) required. Yet General Fund support of the instructional programs in the College of Engineering continues to rank lowest among all units in the University.

FIGURE 2



This financial analysis (Table 2) demonstrates the astonishing degree to which University support of the College has deteriorated over the past decade. During the present academic year, our total budgeted expenditures will amount to \$40,186,491. Balanced against this will be income generated from student tuition, sponsored research, and private support amounting to \$39,807,798. Hence the true cost of the instructional, research, and service programs of the College to the University (and therefore to the state of Michigan) amounts to the difference between these operating expenditures and income, \$378,793 --less than 1% of our total budget. In other words, over the past decade, state (and University) support of the College has deteriorated to the point where we are essentially a "breakeven" operation. To place this in perspective, we would note that the average state appropriation per student enrolled during 1981-82 on the Ann Arbor campus is \$3,747. In terms of this simple logic, the degree of underfunding of the College --the "Engineering Gap" --relative to the rest of the University is (5495 enrolled students) x (\$3747 per student) = \$20 million --exactly the magnitude of the total goal for resource reallocation in the University Five-Year Plan!

Of course such a simple-minded analysis does not take into account the true costs of a quality engineering education (roughly estimated from our analysis at \$7314 per enrolled student per year), nor does it account for the College's ability to generate support for its activities from external sources. Of particular importance in this regard is the role of sponsored research support in the College. Indeed, the acceleration in the growth of technical knowledge over the past three decades has demonstrated that a high-quality undergraduate education in engineering simply cannot be separated from strong graduate education and research programs. The responsibility for generating the resources to support graduate education and research has traditionally fallen on the shoulders of the faculty of the College. In particular, their entrepreneurial efforts to attract both public and private support for their research projects and graduate students has always been a critical component of leading engineering programs such as those at Michigan.

However, during the past decade the deterioration in General Fund support of the College has not only required our faculty's sponsored research resources to support our graduate and research programs, but to an increasing degree these resources are now playing a major role in providing the environment necessary for quality undergraduate instruction as well. We now find that research grants and contracts support most of our equipment purchases, graduate student support, travel, and supplies. Beyond this, roughly 22% of our faculty salaries are supported by research grants. This growing dependence of our instructional programs on sponsored research support forced by the serious erosion in the General Fund support of the College is particularly disturbing since it implies that more and more faculty effort is being required to write research proposals and reports, administer research contracts, and carry out all of the other "non-scholarly" activities associated with generating research support --just to maintain the quality of our instructional programs (not to mention our research programs).

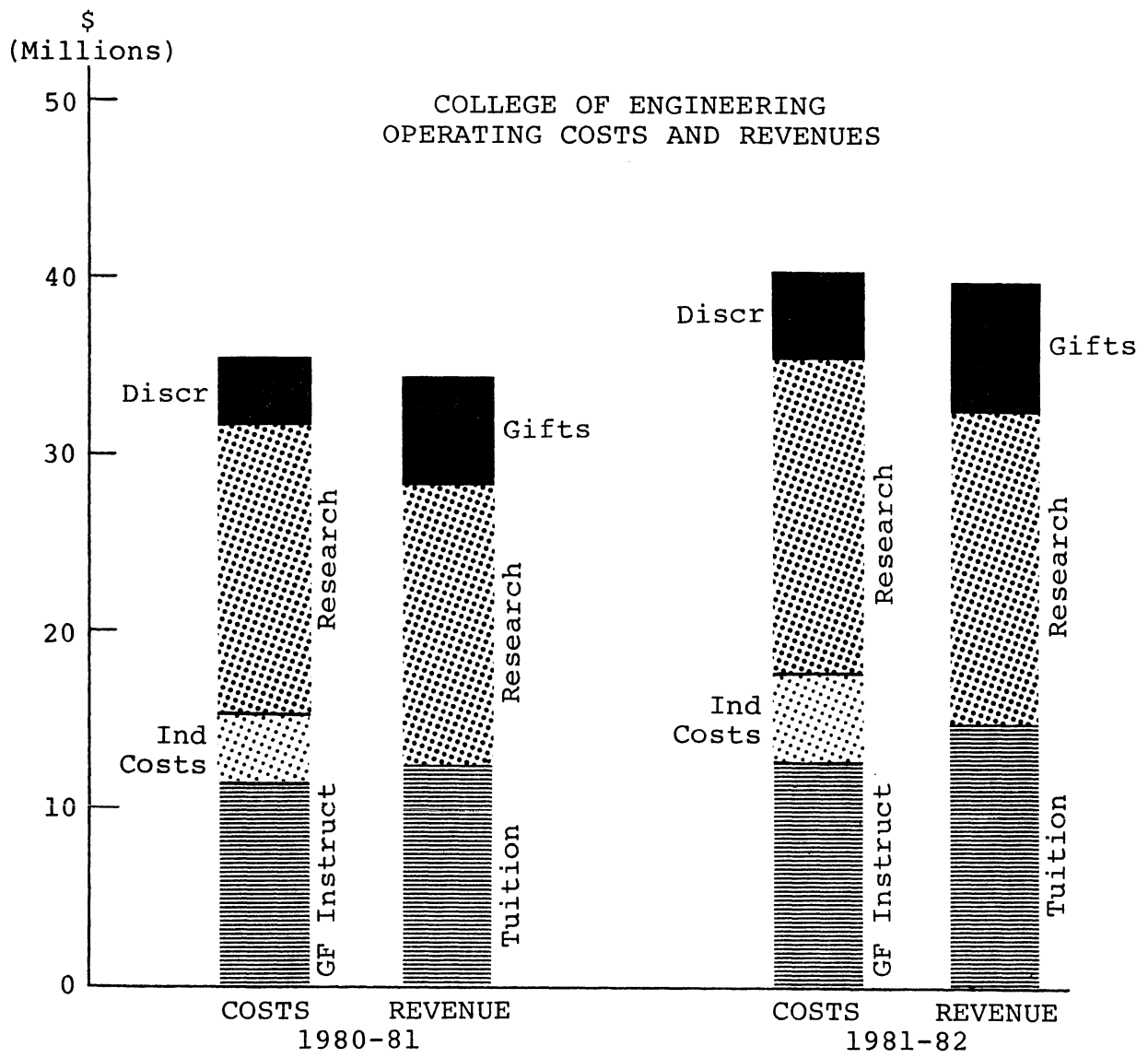
The impact of the past decade of underfunding on the College has been very serious. We have been forced to reduce instructional staffing by 45 FTE positions during a period of substantial enrollment growth (44%) leading to a faculty that is seriously overloaded. There are strong indications that these heavy instructional loads have harmed the research and graduate activities of

TABLE 2

THE COLLEGE OF ENGINEERING
ANALYSIS OF OPERATING COSTS AND REVENUES

BUDGET EXPENDITURES	1980-81	1981-82
Direct Costs		
...Gen Fund budgeted expenditures	\$11,275,105	\$12,513,635
...Sponsored Research (DC)	11,321,570	12,453,727
Indirect Costs		
...Instruction from other units	1,897,580	1,954,507
...Instruction to other units	- 336,655	- 373,687
...Sponsored Research (IC)		
.....Research Administration	1,257,994	1,383,793
.....Equip, Rehab, Overruns	407,000	447,700
.....Cost Sharing	80,000	88,000
...Plant (Utilities & Main)	2,368,896	2,724,230
...Computer Center	498,000	540,000
...Eng/Trans Library	345,000	380,000
...Financial Aid (University sources)	260,000	286,000
...Staff Benefits	1,887,598	1,859,000
Other		
...State PRR		750,000
...Service (Designated Funds)	2,085,331	2,293,864
...Financial Aid (College sources)	705,000	775,500
...Expenditures from College Discretionary Funds	1,690,000	1,859,000
Total Expenditures	\$35,742,419	\$40,186,591
GENERATED INCOME		
Student Tuition and Fees	\$12,245,000	\$14,949,690
Sponsored Research (DC)	11,321,570	12,453,727
Sponsored Research (IC)	4,819,897	5,301,887
Service (Designated Funds)	2,085,331	2,293,864
Private Support		
...Gifts	3,486,800	4,184,160
...Distributed Earnings	567,700	624,470
Total Income	\$34,526,298	\$39,807,798
NET COST OF THE COLLEGE OF ENGINEERING TO THE STATE OF MICHIGAN		
Net Cost of College of Engineering	\$1,216,121	\$ 378,793
Net Cost per Student enrolled in College of Engineering (based on 1981-82 enrollment of 5495)	\$229	\$69
Average state appropriation per student for UM-Ann Arbor campus	\$3,887	\$3,747

FIGURE 3



the College. (Last year, for the first time in its history, the sponsored research volume in the College actually decreased.) Furthermore, these heavy instructional loads in the face of decreasing resources have damaged faculty morale and contributed to the loss of several outstanding faculty.

The erosion in technical support staff, equipment, and other non-salary support has seriously damaged the environment for excellence in teaching and scholarship within the College. This has been aggravated by the University's inability to provide or attract the funds necessary to complete the move of the College to the North Campus (despite the College's successful \$10 million Capital Campaign in support of this effort). It has become increasingly difficult to attract and retain high quality faculty and graduate students with obsolete equipment, inadequate laboratories and support staff, and decaying physical facilities.

During the past eight months the College has been engaged in an intensive strategic planning activity. We have attempted to assess the present status of the College, establish objectives for the next decade that respond to the opportunities and responsibilities that lie before us, and develop plans to achieve these objectives. We have also carefully analyzed the degree of General Fund base-budget restoration necessary to maintain high quality instructional and research programs in view of both enrollment pressures and societal needs. This analysis has formed the basis for this document as well as for several major presentations to the Executive Officers of the University.

This detailed analysis has arrived at a minimum estimate of the degree of underfunding of the College of Engineering (i.e., the "Engineering Gap") at \$6,930,000 in General Fund base budget support. More precisely, we estimate the following minimal funding needs of the College of Engineering:

=====

THE ENGINEERING GAP

- i) Instructional Needs: \$2,650,000 increment in base budget
 (45 new FTE instructional staff and 27 new FTE support staff)
- ii) Research Needs: \$2,430,000 increment in base budget
 (Resources to stimulate, develop, and support College research indexed to some measure of the College's research activity -- estimated roughly at 15% of the College sponsored research volume)
- iii) Other Needs: \$1,850,000 increment in base budget
 (Market salary adjustments, seed funding for equipment and computer acquisition)

TOTAL REQUIRED BASE BUDGET INCREMENT: \$6,930,000

=====

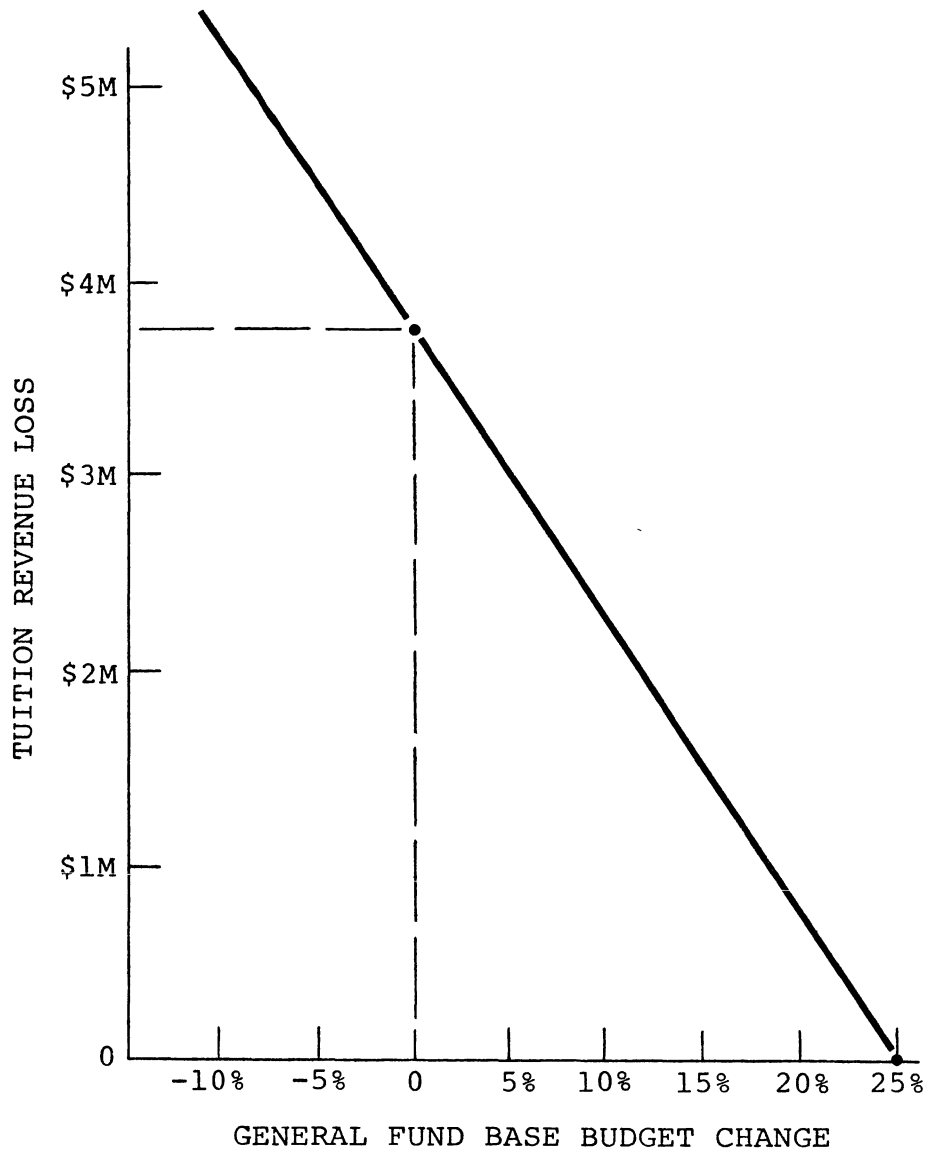
The detailed analysis and proposed schedule for these base budget increments will be presented later in this document. However the significance of these increments should be noted within the context of our earlier analysis of the total expenditures and income attributed to College activities. For example, there is little doubt that if we do not receive a General Fund increment for instructional needs of roughly \$2,650,000, we will be forced to implement enrollment cuts of 25% at the undergraduate level in order to maintain instructional quality. Such an enrollment cut would lead to a loss of tuition revenue (at 1981-82 levels) of \$3,737,422 (see Figure 4).

A similar analysis quantifies the resources necessary to develop and sustain College sponsored research activities. We have noted that the chronic underfunding of the College over the past decade has forced a heavy dependence on sponsored research to support both instructional and research programs (see Figure 5). Yet at the same time, the College continually has been deprived of the resources required to stimulate, develop, or sustain this critical activity. As a consequence, during the past two years the sponsored research volume in the College has leveled off and begun to decline. A further loss in sponsored research volume would require the College to shift faculty back to 100% academic appointments, resulting in a net cost to the University of \$2,546,000.

We would suggest, therefore, that failure to reallocate these resources to the College --to rapidly close the "Engineering Gap" --will actually impose major costs upon the University over the next five years (estimated at roughly \$6 million in annual income loss). Indeed, it would appear that the present degree of underfunding of the College of Engineering will require a University reallocation of roughly this magnitude (\$6 to \$7 million in base budget over five years) regardless of the particular decision made concerning the College's needs at this point. The past decade of gross underfunding of the College of Engineering has confronted the University with a difficult dilemma. The University can either respond in a positive manner to meet the serious General Fund needs of the College, or it can choose not to respond to these needs, thereby forcing the College to reduce enrollments and curtail sponsored research activity. Whatever course of action the University chooses will require major and comparable levels of resource reallocation --in one case to sustain high quality programs that address serious state and national needs and in the other case to compensate for lost tuition revenue and sponsored research support that would result from failure to address the College's urgent needs.

However the most important reasons for addressing these needs are of a quite different character. It is our belief that the College of Engineering occupies a unique position within the University at this point in its history. Never before has the demand for our graduates been higher. Similarly the quality and quantity of students applying for admission to the College are at an all-time peak. It has become apparent that the College is expected to play a major role in supporting state initiatives to strengthen and diversify the Michigan economy. There is a clearly perceived national crisis in the education of advanced-degree engineers, and the College is in a unique position to become a leader in graduate education. The creative efforts of our faculty and students in research are needed to provide the seeds for technological innovation to revitalize industry both in this state and

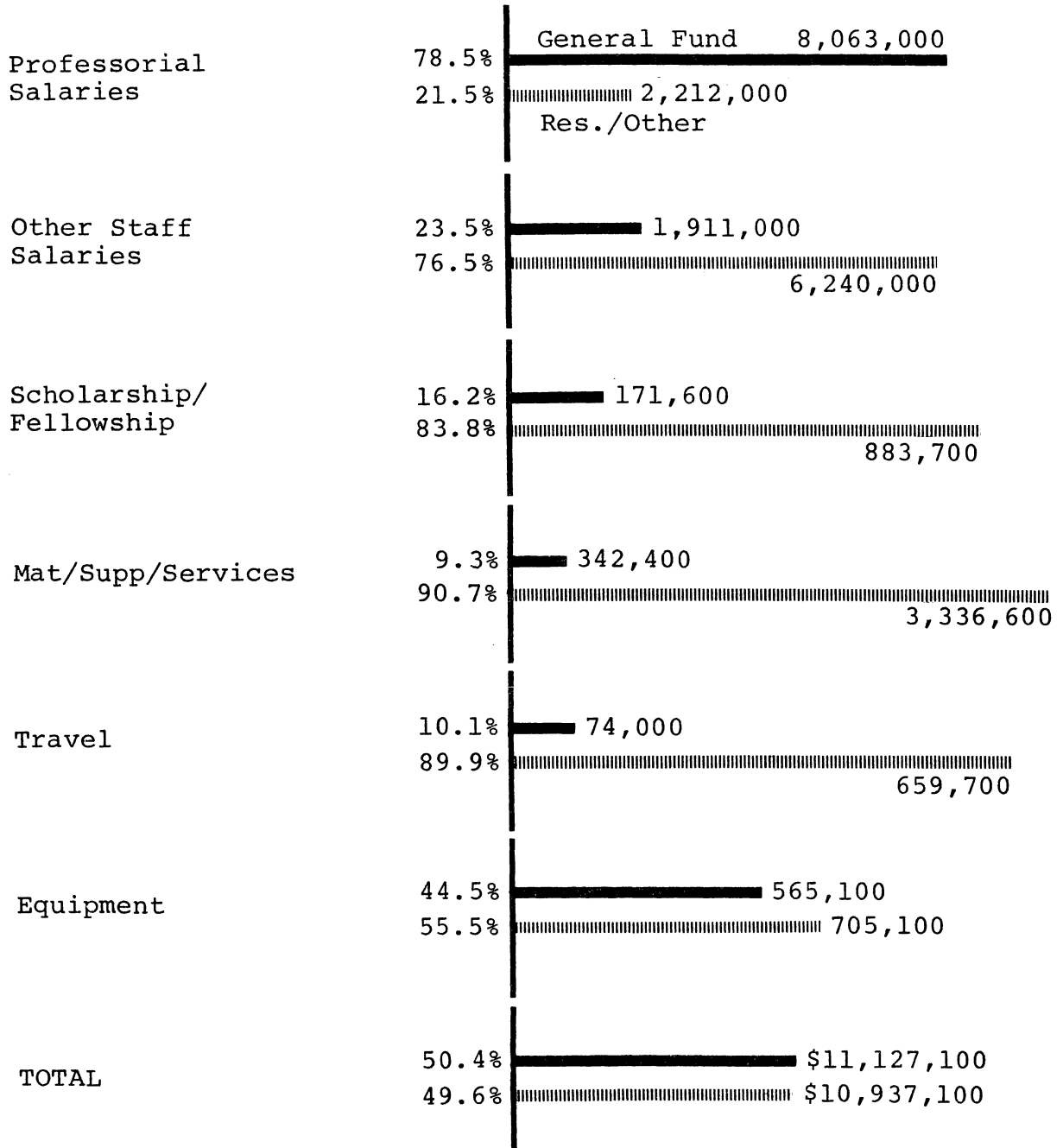
FIGURE 4



(See detailed analysis on page 9)

FIGURE 5

1980-81 EXPENDITURE ELEMENTS



throughout the nation. We believe the College to be within striking distance of having the leading engineering programs in the nation in several key areas of major importance to Michigan.

Yet for the College of Engineering to achieve these objectives, to respond to the opportunities and to meet the responsibilities that lie before it over the next decade, it is essential that the University respond rapidly and effectively to alleviate the College's serious degree of underfunding, to eliminate the "Engineering Gap". For it to fail to do so not only would be a tragedy for this University, but a tragedy as well for the State of Michigan and the nation.

3. REALLOCATION PLANS

The College of Engineering firmly believes it essential to achieve and maintain the flexibility to respond to changing needs and priorities. It acknowledges and accepts a major responsibility to participate fully in the University's effort in resource reallocation. The College has the will and determination to shift resources internally. It is now developing administrative structures and policies to facilitate reviews and resource reallocation so that programs that fail to meet the tests of centrality, quality, and cost-effectiveness can be reduced or eliminated to provided the resources necessary to strengthen existing programs or to initiate new programs.

In developing specific courses of action, we have kept in mind three important guidelines:

- i) It is essential that the College keep as its primary objective the achievement of excellence in its instructional and research programs.
- ii) It must strive to maintain the flexibility to respond to changing needs and priorities.
- iii) It must be prepared to shift resources when necessary, possibly reducing or even eliminating some programs and activities in order to improve or initiate others. In such decisions, it must keep in mind the important criteria of quality, centrality, and cost-effectiveness.

We have set as a goal the internal reallocation of roughly 25% of our General Fund resources over the next five years. The working groups involved in developing resource allocation policies and procedures include the Executive Committee of the College, the Deans of the College and their staffs, and an advisory committee consisting of all department chairs. At appropriate points the governing faculty of the College will become involved in the reallocation process.

The resource reallocation will proceed along several fronts. We are developing criteria for resource allocations within the College (including General Fund resources, new faculty positions ("hunting licenses"), and facilities). To assist in this activity, we have developed a comprehensive (computer-supported) data base for all units of the College which contains

information concerning staffing, enrollments, instructional and research productivity, faculty and student quality, quality of scholarship, reputation, and so on. We are now in the process of working with department chairs to develop an effective set of criteria to assist in resource allocation. To assist in this activity, we are incorporating a long range planning activity at the department level as an important component of budgeting and staffing procedures in the College. We have, of course, already developed a comprehensive long range plan for the College as a whole.

Over the course of the next two years, essentially all academic, service, and administrative units of the College will be reviewed. We have already conducted reviews of several programs and activities including the Department of Naval Architecture and Marine Engineering, the Department of Humanities, the Department of Mechanical Engineering and Applied Mechanics, and several administrative units. Units currently under review include the Department of Chemical Engineering, the Computer, Information, and Control Engineering Program, the Office for Studies on Automotive Transportation, the College Instructional Television System, and the Chrysler Center for Continuing Engineering Education.

During the past year we estimate that through normal budget and staffing processes, we have managed to reallocate roughly 7% of our General Fund budget to high priority areas. We would anticipate internal reallocations at roughly this level for the next several years.

It is important to recognize that, while we believe that internal resource reallocations are necessary if we are to fund high priority or innovative programs, we are also making the explicit assumption that no major reallocation of resources away from the College is justified at this time. Indeed, we have already demonstrated quite convincingly that the University must respond quite rapidly to reallocate resources to the College if we are to maintain our present enrollments and research activities without a serious deterioration in the level of quality. Our specific proposals for the one-year and five-year budget plans are made from this perspective.

4. ONE-YEAR BUDGET PLAN

As noted in earlier sections, it is our intent to reallocate internally roughly 5% annually of our base budget through General Fund allocation and staffing decisions coupled with selective program reduction. However it should be recognized that our capacity to reduce the total base budget of the College is severely limited at this point. A decade of erosion in University support, coupled with last year's action to cannibalize \$250,000 of FTE positions to fund our market adjustment salary program, leave us with little flexibility. Indeed, our detailed budget models for the College (see table) indicate that a 1%, 3%, and 5% reduction in General Fund expenditures would place the College of Engineering in the interesting position of generating a "profit" for the University during its FY1982-83 operations of \$0.9 million, \$1.2 million, and \$1.5 million, respectively (see Table 3).

Our detailed budget analysis has convinced us that the present instructional loads in the College are far too high to tolerate further general budget reductions of our academic units. Therefore we have ruled out any across-the-board actions and focussed only on highly selective program reduction and discontinuance options.

Budget reduction/reallocation options are listed in Table 4 in order of increasing severity. We have broken the College's response to the request for a one-year budget plan into two categories: actual base budget reductions ("external" resource reallocation to other areas of the University) and internal reallocations within the College.

TABLE 3

ANALYSIS OF OPERATING COSTS AND REVENUES
(1982-83 GENERAL FUND BUDGET REDUCTION MODELS)

BUDGET EXPENDITURES	-1%	-3%	-5%
Direct Costs			
...Gen Fund budgeted expenditures	\$13,379,579	\$13,109,284	\$12,838,990
...Sponsored Research (DC)	13,699,100	13,699,100	13,699,100
Indirect Costs			
...Instruction from other units	2,110,868	2,110,868	2,110,868
...Instruction to other units	- 418,529	- 418,529	- 418,529
...Sponsored Research (IC)			
.....Research Administration	1,522,173	1,522,173	1,522,173
.....Equip, Rehab, Overruns	492,470	492,470	492,470
.....Cost Sharing	96,800	96,800	96,800
...Plant (Utilities & Main)	2,996,653	2,996,653	2,996,653
...Computer Center	583,200	583,200	583,200
...Eng/Trans Library	410,450	410,450	410,450
...Financial Aid (University sources)	320,320	320,320	320,320
...Staff Benefits	2,279,147	2,279,147	2,279,147
Other			
...State PRR	250,000	250,000	250,000
...Service (Designated Funds)	2,523,251	2,523,251	2,523,251
...Financial Aid (College sources)	868,560	868,560	868,560
...Expenditures from College Discretionary Funds	2,044,900	2,044,900	2,044,960
Total Expenditures	\$43,158,890	\$42,888,595	\$42,618,301
GENERATED INCOME			
Student Tuition and Fees	\$16,743,653	\$16,743,653	\$16,743,653
Sponsored Research (DC)	13,699,100	13,699,100	13,699,100
Sponsored Research (IC)	5,832,075	5,832,075	5,832,075
Service (Designated Funds)	2,523,251	2,523,251	2,523,251
Private Support			
...Gifts	4,602,576	4,602,576	4,602,576
...Distributed Earnings	686,917	686,917	686,917
Total Income	\$44,087,572	\$44,087,572	\$44,087,572
NET COST OF THE COLLEGE OF ENGINEERING TO THE STATE OF MICHIGAN			
Net Cost of College of Engineering	-\$ 928,682	-\$1,198,976	-\$1,469,271
Net Cost per Student (based on 5495 students enrolled in the College of Engineering)	NONE	NONE	NONE
Average state appropriation per student for UM-Ann Arbor campus	\$3,887	\$3,887	\$3,887

TABLE 4

=====

COLLEGE OF ENGINEERING ONE-YEAR PLAN

=====

REQUESTED GOALS:

<u>† 81-82 Base Budget</u>	<u>1% Reduction</u>	<u>3% Reduction</u>	<u>5% Reduction</u>
\$13,265,135	\$132,651	\$397,954	\$663,257

BASE BUDGET REDUCTIONS (listed in order of increasingly severity):

<u>Reduction</u>	<u>Amount</u>	<u>Source</u>
0.60%	80,000	Reduction/transfer of Student Records Office
0.66%	88,000	Initial phase of academic program reduction/redirection (phased over a three-year period (3 FTE in 82/83, 15 FTE over a 3 year period)
† 0.94%	125,000	Planned drop in state PRR support for equipment (if second year PRR is funded)
† 2.65%	500,000	Drop in state PRR support for equipment (if second year PRR is not funded)
* 1.88%	250,000	Failure to restore FTE base budget reduction implemented in 1981-82 market salary adjustment program (8 FTE)
* 0.90%	120,000	FTE reduction from not replacing faculty retiring during 1982-83 academic year (4 FTE)
* 2.26%	300,000	Immediate retraction of outstanding hunting licenses (12 FTE)

INTERNAL RESOURCE REALLOCATIONS (Preferred alternatives)

0.60%	80,000	Reduction/transfer of Student Records Office
0.66%	88,000	First phase of academic program reduction/redirection
5.00%	600,000	Reallocation during normal budget process (new hires, flexible staff, salary program)

†PRR Items included in base budget goals.

*Serious actions that would eventually require enrollment reductions.

5. FIVE YEAR BUDGET PLAN

As we have indicated in earlier sections of this document, the College has set an objective of achieving an internal reallocation of its General Fund resources averaging 5% each year over the next five years. However we are convinced that any absolute reduction in the College's General Fund budget during this period could only be accommodated with major enrollment reductions. Indeed, if budget restoration is not achieved during this period, the College will be forced to implement an enrollment reduction of 25% even without further General Fund budget reductions. Since our General Fund budget for instruction is \$10,725,454 for FY81-82 (when state PRR items and research administration are subtracted), we will assume a model in which each 1% in base budget reduction will be accompanied by a 1.24% decrease in enrollment:

 IMPACT OF GENERAL FUND BUDGET REDUCTIONS ON COLLEGE ENROLLMENT

<u>Base Budget Change</u>	<u>Enrollment Reduction</u>	<u>Lost Tuition Revenue</u>
+25%	0	0
0	25%	\$3,737,422
-1%	25.2%	3,922,798
-2%	26.4%	4,108,175
-3%	28.6%	4,275,611
-5%	30.6%	4,577,595
-7%	33.7%	5,035,056
-10%	37.4%	5,591,184

Assumptions used in this model include:

- i) All budget and tuition data are taken for the base year FY81-82.
- ii) A 25% enrollment reduction will be necessary if the College does not receive an increase in its instructional staff base of \$2,650,000 over the next three years.
- iii) Further reductions in base instructional support will require corresponding reductions in enrollment.

 We do not consider this plan to be an advisable course of action either for the University or for the College. It would lead to a loss in tuition revenue that would far exceed the resources released for reallocation to other needs of the University, thereby defeating the major purpose of the University's Five-Year Plan. Furthermore, enrollment reductions at this time would run counter to the serious needs of this state and the nation in view of the intense engineering manpower shortage that is anticipated to persist at least through this decade.

We will therefore present an alternative Five-Year Plan which responds directly to serious funding needs of the College of Engineering and allows it to maintain current enrollment levels while achieving its objectives of excellence in instruction and research. This Five-Year Plan has been summarized in the Tables below, both in terms of Annual Increments and Cumulative Increments to the General Fund base budget of the College. Detailed explanations for each of the components of the plan are presented on following pages (see also Table 5).

=====

PROPOSED ANNUAL INCREMENTS TO BASE BUDGET

	<u>FY82-83</u>	<u>FY83-84</u>	<u>FY84-85</u>	<u>FY85-86</u>	<u>FY86-87</u>
Research Needs (Seed funding pool for research development and support needs)	\$0.81 M*	0.81*	0.81*	*	*
Instructional Needs (45 FTE inst staff 27 FTE support staff)	1.15	0.75	0.75	-	-
Other Needs (Market salary and equipment)	0.25	0.70	0.55	0.35	-
	-----	-----	-----	-----	-----
Total Annual Increments	\$2.21 M	2.26	2.11	0.35*	*

CUMULATIVE INCREMENTS TO BASE BUDGET

	<u>FY82-83</u>	<u>FY83-84</u>	<u>FY84-85</u>	<u>FY85-86</u>	<u>FY86-87</u>
Research Needs	\$0.81*	1.62*	2.43*	2.43*	2.43*
Instructional Needs	1.15	1.90	2.65	2.65	2.65
Other Needs	0.25	.95	1.50	1.85	1.85
	-----	-----	-----	-----	-----
Total Cumulative Increment	\$2.21 M	4.47	6.63	6.93*	6.93*

=====

*For the purposes of this model, these increments have been based on 15% of the College annual sponsored research volume for the previous year. Initial startup period assumes 5% for FY82-83, 10% for FY83-84, and 15% for 5 years thereafter. We anticipate that a less rigid model eventually would be used to relate research support to the level of research activity in the College.

BASIC ASSUMPTIONS IN FIVE-YEAR PLAN:

1. The College of Engineering will adhere to the basic premise of the University Five-Year Plan (and respond to state and national needs) by maintaining its enrollments (and tuition revenue) at the present level of 5500 students, although the mix of these students will shift somewhat toward the graduate level.

2. The University will restore the instructional and support staff positions lost during the past decade of budget deterioration in the College (during a period that saw enrollments in the College surge by 44% to their present level). This will correspond to the addition of 45 FTE instructional staff and 27 support staff over the next three years (as detailed in the State PRR submitted in Fall Of 1981). The total General Fund budget growth required to support this program is \$2,650,000. (We would note that projected estimates of 54 to 90 retirements of senior faculty before 1990 will provide the flexibility to reduce the instructional staff size in the College should enrollments decrease later this decade.)

3. In recognition of unusual importance of sponsored research activities in the College in providing both the intellectual climate as well as the resources necessary for high quality instruction, the University will provide the College with the resources necessary to meet its urgent needs for funding to stimulate, develop, and support research activities. These resources will be a component of the General Fund support of the College and will be related in some appropriate manner to the level of research activity in the College. More specifically these funds will provide:

- i) facilities and staff to enhance research productivity
- ii) leverage to acquire and maintain key items of equipment needed to maintain or obtain leadership in designated research areas and to obtain top-quality graduate students through the PhD
- iii) technical leadership and incentives required to develop and manage large coordinated research projects (the increasing preferred mode of engineering research sponsors)
- iv) seed funds to foster the meaningful cooperation between the College and industry required to meet our responsibility in improving industrial productivity
- v) incentives to build research projects which contribute directly to increased PhD production and thus to alleviating the growing crisis in graduate education in certain fields of engineering.

Innovative allocation as well as useful analysis of the impact of these funds will be the responsibility of the Associate Dean for Research and Graduate Studies. This newly established office of the College is a major component of our commitment to improved excellence in the tightly-coupled dimensions of scholarly research and graduate student education. A careful analysis of needs based on our present level of research activity implies a buildup in General Fund support of \$2,430,000 over the next three years for this research development and support pool.

4. The University will restore the FTE budget positions that were shifted to discretionary College funds (\$250,000) to allow the 1981-82 market adjustment salary program in the College. (It should be noted that this restoration will not give rise to any true FTE growth in the College but rather restore General Fund support of these positions.)

5. The University will provide a General Fund budget growth of \$500,000 over the next five years to meet anticipated market pressures on the College salary program.

6. The University will provide a General fund budget growth of \$1,100,000 over the next five years to provide the seed funds necessary to stimulate and attract federal and industrial equipment grants (expected to build to \$2,000,000 per year) necessary to rebuild the College's laboratories.

7. The College will develop the capacity to reallocate internally 5% of its base General Fund budget each year. Included in this reallocation process will be selective program reduction and closure as well as normal faculty and staff attrition.

We have analyzed the impact of this General Fund increment on our total operating budget for the five-year period, making reasonable assumptions concerning growth in budget components (salary, utilities, tuition, sponsored research, private support, etc.). (See Table 6.) Even with this plan, the General Fund will continue to support only one-third of the College's operating costs during this period. The College's General Fund support per enrolled student will continue to be one of the lowest in the University, while the actual level of state support per enrolled student will continue to be only a fraction of that characterizing the University at large.

The total (cumulative) increment to the College's General Fund base budget over the five-year period will amount to \$6,930,000. We believe this to be the minimum support program necessary to enable the College of Engineering to remain among the leading engineering programs in the nation and respond to the major opportunities and responsibilities that lie before it. Without such a prompt and substantial increase in General Fund support, it is almost certain that the College will be unable to maintain its national reputation and meet its serious obligations to provide the engineering graduates and technological innovation so desperately needed by this state and the nation. If this should occur, the University and the State of Michigan will have lost one of their most valuable assets —indeed, they would lose that particular asset which may well prove to be the most critical element in attracting new industry to Michigan while strengthening and rebuilding existing industry and the Michigan economy.

The College of Engineering has been forced to a critical point in its history by a decade of neglect. It will require the immediate and significant support of the University if it is to overcome its present challenges and meet the opportunities and responsibilities that lie before it during the decade ahead.

TABLE 5
COLLEGE OF ENGINEERING FIVE-YEAR PLAN

	1982-83	1983-84	1984-85	1985-86	1986-87	
MAJOR CHANGES IN GENERAL FUND BUDGET BASE (Cumulative Increments to Annual Budget)						TOTAL INCREMENTS
(Exclusive of University-wide salary (merit) and nonsalary adjustments)						TO GENERAL FUND
=====						
New FTE Positions						
...Inst Staff	20	15	10			
...Support Staff	12	5	10			
...Salaries	1043200	778800	721100			
...Staff Benefits	187800	140200	130000			
...Non-salary	127000	15000	68900			

Total for New FTEs						
...Net GF Allocat	1150000	750000	750000			2650000
...Unit Matching	208000	184000	170000			

Restoration of funds used in 80-81 salary prog	250000					250000

Market Salary Adj		200000	200000	100000		500000

Special Equipment						
...Instr Equipment		250000	250000	250000		750000
...Computer Equip		250000	100000			350000
...Unit Matching	850000	1000000	1200000	1500000	2000000	

Research Pool	810000	810000	810000	0	0	2430000
=====						
ANNUAL GENERAL FUND INCREMENT	2210000	2260000	2110000	350000	0	6930000

CUMULATIVE GENERAL FUND INCREMENT	2210000	4470000	6580000	6930000	6930000	6930000

TOTAL GENERAL FUND BASE (excludes merit salary program)	14723635	16983635	19093635	19443635	19443635	

GENERAL FUND SUPPORT PER HC	2679	3091	3475	3538	3538	

PERCENTAGE FUND BASE INCREASE (excludes merit salary program)	17.66	15.35	12.42	1.83	0.00	47.27
=====						

TABLE 6

ANALYSIS OF OPERATING COSTS FOR THE COLLEGE OF ENGINEERING

RUDGET EXPENDITURES	1980-81	1981-82	1982-83	1983-84	1984-85	1985-86	1986-87
Direct Costs							
...Gen Fund budgeted exp	11275105	12513635	13514726	16982704	20782120	24723490	28829628
...Research (DC)	11321570	12453727	14321786	16470054	18940562	21781646	25048893
Indirect Costs (to Univ)							
...Inst from Other Units	1897580	1954507	2110868	2279737	2462116	2659086	2871813
...Inst to Other Units	-336655	-373687	-418529	-468753	-525003	-568004	-658564
...Research (IC)							
.....Research admin	1272453	1399698	1609653	1851101	2128766	2448081	2815293
.....Equip, Rehab, Over	404871	445358	512162	588987	677335	778935	895775
.....Cost sharing	60000	88000	101200	116380	133836	153912	176999
...Plant (Util & Main)	2368896	2724230	3269076	3922892	4707470	5648964	6778757
...Computer	496000	540000	563200	629856	680244	734664	793437
...Eng/Trans Library	345000	380000	410400	443232	478691	516986	558345
...Financial Aid (Univ)	260000	286000	314600	339768	366949	396305	428010
...Staff Benefits	1867598	2110321	2321353	2553488	2808637	3089721	3398693
Other							
...State FRR		750000	650000	0	0	0	0
...Service (Desig Funds)	2085331	2293864	2523251	2775576	3053133	3358446	3694291
...Financial Aid (Coll)	705000	775500	853050	921294	994998	1074597	1160565
...Expenditures from Discretionary Funds	1690000	1859000	2044900	2249390	2474329	2721762	2993938
Base budget increments							
...Instructional staff			1150000	750000	750000	0	0
...Research needs			810000	810000	810000	1620610	607592
...Other needs			250000	700000	550000	350000	0
Total Expenditures	35754749	40200154	46931695	53915705	62274384	71469202	80393464
RECOVERED INCOME							
Student Fees	12245000	14949690	16594156	17921689	19355424	20903858	22576166
Research (DC)	11321570	12453727	14321786	16470054	18940562	21781646	25048893
Research (IC)	4819897	5301887	6097170	7011745	8063507	9273033	10663988
Service (Desig Funds)	2085331	2293864	2523251	2775576	3053133	3358446	3694291
Private Support							
...Gifts	3486800	4184160	4602576	5062834	5569117	6126029	6738632
...Interest	567700	624470	686917	755609	831170	914287	1005715
Total Income	34526298	39807798	44825855	49997506	55812912	62357299	69727685
NET COST TO UNIVERSITY	1226451	392356	2105840	3918199	6461471	9111903	10665779
...Net Cost % of Tot Bgt							
...Net Cost/Student	3.44	0.98	4.49	7.27	10.38	12.75	13.27
...UM State Appr/Student	231	71	383	713	1176	1658	1941
...College BFA/Student	3887	3747	4046	4370	4720	5097	5505
...College I BFA/Tot Exp	2052	2277	2459	3091	3782	4499	5247
...College I BFA/Tot Exp	31.53	31.13	28.80	31.50	33.37	34.59	35.86

TABLE 7

A CAPSULE HISTORY OF THE COLLEGE OF ENGINEERING
FOR THE DECADE OF THE 1970s

GOOD NEWS

Enrollment has increased
by 44% (1550 students).

SCH taught by the College have
increased by 45%.

Applications for admission have
increased by 60%.

Visits by industrial recruiters
have increased by 57%.

Tuition revenue generated by
College has increased by 165%.

Indirect cost recovered by the
College has increased by 126%.

The College has been identified
as the cornerstone in the State's
initiatives to attract new high
technology industry to Michigan.

BAD NEWS

The College General Fund base
budget was cut by 15%.

Compound growth rate in GF\$
per SCH was 1.1% per year--
-- the lowest in the University
over this period.

Instructional staff has fallen
by 15% (302 - 261 = 42 FTE)

Support staff fell by 10%
(152 - 138 = 15)

1981-82 College operating budget
will be "breakeven" with total
expenditures (both direct and
indirect costs) being covered
by tuition, research, and private
support revenue.

The State has not fulfilled its
commitment to match private
contributions to complete the
move to the North Campus.

The College General Fund support per
enrolled student is now the lowest
in the University.

THE UNIVERSITY OF MICHIGAN

ANN ARBOR

48109

Office of the Vice-President
for Academic Affairs

BILLY E. FRYE
Vice President

RECEIVED

February 24, 1982

Dean James Duderstadt
College of Engineering
255 W. Eng

MAR 1 1982

OFFICE OF THE DEAN
COLLEGE OF ENGINEERING

Dear Jim:

The 1982-83 fiscal year will be the first budgetary period of the Five Year Plan. As described in my letter, our recent experience and economic forecasts force us to conclude that the University's revenue for 1982-83 will be less than adequate to meet our minimal salary increase and other needs. Hence, it is again necessary for us to rely on internal reallocation as the source of funds to meet our highest priority needs.

I am, therefore, requesting that you submit a plan which indicates how your unit would adjust to budget reductions of 1% (\$132,651), 3% (\$397,954), and 5% (\$663,257), to become effective July 1, 1982. The objective is to have \$4 million available for reallocation in 1982-83 and this will require, on the average, a reduction level of approximately 2.7%. In order for decisions on the precise level of reduction to be made on a timely basis, may I request that you submit your plan to me no later than Friday, April 9. It is my intention to inform you of the actual reduction level prior to June 1.

Please assume in your planning that current enrollments and service course offerings will be maintained at present levels unless we agree otherwise, since it is imperative that tuition revenue be sustained during the coming year.

In planning the necessary adjustments, it is requested that you protect current and equipment accounts to the fullest extent possible. It is expected that the reduction will be achieved primarily through reduction in force. In this regard, I ask that each school and college include with its budget reduction plan a statement indicating what negative effect the reduction might have on instructional quality, and what steps it might take to effectively offset this.

Thank you for your continuing cooperation during these stressful times.

Sincerely,



Bill Frye

1
2
3
4
5
6
7
8
9
10
11
12
13
14
15
16
17
18
19
20
21
22
23
24
25