

Background of the Study

On January 28, 1975 a class action suit was initiated that has led to the charge of this committee. The committee's charge is given in *The Ayers Decision Memorandum Opinion and Remedial Decree* as laid down by Judge Neal Biggers, Jr. of the United States District Court for the Northern District of Mississippi and recorded in the report prepared by the Board of Trustees of State Institutions of Higher Learning dated March 7, 1995. On page 177 of this report it states that the Board shall evaluate "...the feasibility and educational soundness of establishing an engineering school....under the direction and control of JSU." Our charge also included, "The nature and extent of duplication with other institutions in the system will be addressed ... in the context of determining whether meaningful programmatic uniqueness may be gained which would bring about significant white enrollment through elimination and/or transfer of existing programs as other institutions and the feasibility/educational soundness of such elimination and/or transfer.

The committee over the course of the past several months has conducted visits and interviews at the University of Mississippi, Mississippi State University, and Jackson State University. It has interviewed numerous business, civic, and other professional and educational leaders in the Jackson metropolitan area (JMA). Numerous documents were reviewed and studied which contained demographics information about the JMA and Mississippi, statewide information pertaining to graduation rate, ACT scores, white and minority enrollments, market demand, job projections, and university enrollment preferences. Also studied were documents containing detailed information about the engineering programs at the University of Mississippi and Mississippi State University. We reviewed general information about Jackson State University (JSU), and in particular, information about its mathematics and science departments. Also, personnel from the Mississippi Society of Professional Engineers were interviewed.

Procedure

Following an initial briefing at the offices of the Mississippi Institutions of Higher Learning, which included a statement of the problem, the charge to the committee, and a view of the issues as presented by the president and members of his administrative cabinet at Jackson State University, the Engineering Sub-Committee (ESC) drafted a preliminary outline to guide its work. It became clear to the committee members that information gathered from multiple sources would be both critical and essential. It was considered desirable that the information be presented in a variety of formats, including reports, surveys, site visits, and individual and group interviews. It was felt that interviews would be absolutely essential if we were to get a proper appreciation of the

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problem. The purpose of the interviews was two-fold: (1) to serve as a method for gathering and verifying facts, and (2) to serve as a means of sampling the range of opinions surrounding the issue under study. The sub-committee is appreciative of the efforts of Dr. Phil Pepper in arranging these interviews, and providing whatever statistical information we requested.

Persons Interviewed

Higher Education

1. Jackson State University

Dr. James Lyons, President, and members of his administrative cabinet.

Dr. Dora Washington, Vice-President for Academic Affairs

Dr. William White, Associate Dean, School of Science & Technology

Chairs of the departments of chemistry, computer science, mathematics, and physics

2. University of Mississippi

Dr. Allie Smith, Dean, School of Engineering

Dr. James Vaughn, Associate Dean

Dr. Bill Blair, Director, Jackson Engineering Graduate Program

Engineering department chairs

3. Mississippi State University

Dr. Glenn Steele, Interim Dean, School of Engineering

Dr. William Smyer, Associate Dean

Administrators and faculty

Employers

1. Stennis Space Center

Dr. Jim W. Meredith, Board Chairman, Mississippi Enterprise

2. Mobile Telecommunication and Technologies Corp (MTel)

Dr. John Colonias, Chief Scientist

3. Institute for Technology Development (ITD)

Mr. Lynn Vernamonti, President

Economic /Professional Development

1. Mississippi Science and Technology Commission

Dr. John Colonias, Chairman

Mr. Lynn Vernamonti

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HENRY DENARD AYERS, DR. IVORY PHILLIPS, DR. VERNON ARCHER
2. Mississippi Department of Economic and Community Development

Mr. Bill McGinnis, Deputy Executive Director

3. Hinds County Development Commission

Mr. Sonny McDonald, Manager

4. Mississippi Engineering Society

Dr. David Arnold

Mr. Gus Hilderbrand, President

Mr. Terrell W. Temple, Vice President

5. Mississippi Society of Professional Engineers

Ms. Rosemary Brister, Executive Director

Site visits were made to ITD, the Hinds County Development Commission, the University of Mississippi, Mississippi State University, and Jackson State University.

Engineering Opportunities in Central Mississippi

Central Mississippi, Jackson Metropolitan Area (JMA) is one of the few metropolitan regions of over 400,000 population in the United States with a strong, growing business and governmental base without an engineering degree program available to the citizens of the region. None of these areas are also the state capital.

Many studies have linked the business/industry future of a region to its ability to attract a well-educated work force, especially in technology-related areas like engineering. A state's economic well being is often measured by the number of science and engineering degrees produced by its universities. The attraction of high tech businesses more often than not depends upon available technical personnel and opportunities to consult with university personnel. Companies prefer to locate in areas where strong educational opportunities exist for their personnel and family members. An engineering degree program is integral to a region's ability to retain and attract the desirable businesses that provide high paying jobs and create economic growth. A state or region is unwise to expect new business to first create the demand for an engineering program before it invests in one.

With growth of industry and service needs in the central Mississippi region in fields like the telecommunications industry, governmental services, and environmental cleanup, the need for an engineering program is clear. The JMA engineering jobs are expected to increase by 26% between 1992 and 2005, and when considering other engineering related job opportunities like engineering managers, industrial production managers, construction managers,

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communications, transportation, utilities, and computer systems analysis, the growth is more nearly 35% (Mississippi Statewide and Selected Sub-State Areas; Employment and Job Openings, 1992-2005; Mississippi Employment Security Commission, 1994). Interviews with economic and development personnel confirm the confidence in engineering job growth (Mississippi Science and Technology Commission, Mississippi Department of Economic and Community Development, Hinds County Development Commission).

U.S. Bureau of Census data show that Mississippi is seventh among eight Southeastern states in practicing engineers per 100,000 population. It is seventh among these states in annual production of B.S. engineering degrees. Economic development studies show the symbiotic relationship of a state's engineering degree production and its business/manufacturing/service growth. Of course, some engineering job needs in Central Mississippi will always be met by the two existing engineering programs in the state, and by migration of engineering graduates from other states. However, there is a unique, place-bound demand in the JMA. Also, the agility of business, manufacturing, and governmental organizations to interact with an engineering program and its faculty is a unique characteristic for an urban engineering program. The place-bound student and this corporate/governmental agility are unmet needs for the JMA.

The potential demand in the JMA for engineering degree programs is further evident from the ACT Enrollment Information Service, Market Analysis for High School Graduating Class of 1995. Considering only the data for the 11 counties around Jackson, 364 college-bound ACT-tested students listed engineering as their preference. Of these, 93 (26%) indicated their plans to commute to college. More white than black students plan to commute— 36% versus 23%. Asked to list their first six choices of colleges, 183 responses were given for colleges within the 11 county area. We confidently expect that an engineering school, particularly oriented to the needs of the place-bound student and offering engineering degree programs consistent with the needs of business and industry in the JMA, would achieve an enrollment of 400 students in five years. This would be in addition to students enrolled in the more traditional computer science programs.

Recommendations

The situation regarding engineering education at Jackson State University and the Jackson metropolitan area has two distinct but interrelated aspects:

- 1) The need for place-bound and non-traditional students in the Jackson area to have an opportunity to study engineering at the undergraduate level.

2). The need for enhanced opportunity for working engineers in the Jackson area to advance their knowledge and skills through masters level study and appropriate continuing education. A 1991 survey by the Jackson Chamber of Commerce showed that electrical/electronic engineers in the JMA were not satisfied with the opportunities for further study in the area. In discussions with representatives from business and industry during the present study this view was expressed frequently.

The first aspect addresses the long-range economic future of the Jackson region. The case for an undergraduate engineering program in the central Mississippi region is made in the preceding section of this report. Jackson State University is the only institution of higher education in central Mississippi capable of assuming this role. Moreover, the committee does not consider it feasible or beneficial to transfer parts or all of the engineering programs at the University of Mississippi or Mississippi State University to the Jackson area. These engineering programs serve vital roles within their institutions, and effectively serve the engineering education needs of many citizens of the state of Mississippi. Moreover, there is no way to economically transfer the specialized facilities necessary for their function, but most importantly, they are not designed to address the special needs for engineering education in the JMA.

The second aspect was not strictly a charge to the Institutions of Higher Learning by the US. Circuit Court. It is, however, an essential condition for maintaining and growing the economic base of high-tech companies in the Jackson area.

An engineering school at Jackson State University should focus on place-bound and non-traditional students, who will often be commuting students, often working students, and often older students. The Deans of Engineering at the University of Mississippi and Mississippi State did not envision such a school as a threat to their enrollments, although they were naturally concerned about what such a school would do to their resources. We cannot deny that a new engineering school will require additional resources. However, we feel that the plan outlined here is conservative, and one which will return benefit many fold to the citizens of the state.

The school that we envision and propose is not a conventional engineering school. It will squarely address the needs of prospective students in the Jackson area. It will work in curriculum areas that, in the main, do not duplicate offerings at the two existing engineering schools. It will be built with intimate cooperation and planning, and support, of Jackson businesses. It will build on the demonstrated strength at Jackson State University in the supporting departments of mathematics, chemistry, physics, biology and computer science. It will be built from the start with quality in mind and with the expectation that

accreditation of each curriculum will be achieved with the Accreditation Board for Engineering and Technology (ABET) or the Computer Science Accreditation Board (CSAB) with the first graduates of the program. As a further assurance of quality we strongly suggest that a Corporate Board of Visitors be established at the founding of the school to assist in the development of curricula, the establishment of private support, and the assessment of progress.

→ *Recommendation: Create a School of Engineering and Information Sciences, at Jackson State University.* A free standing engineering school is almost a *sine qua non* for successful ABET accreditation. This school should be built around the existing Computer Science Department, which should be transferred from the School of Science and Technology to the new engineering school. The School of Engineering and Information Sciences would consist initially of three departments: Computer Science and Engineering; Civil Engineering, and Telecommunications Engineering. Success of the new school will depend upon the leadership of its dean, who should be hired as a first critical step. Ideally, the dean will have had experience building a quality engineering program.

→ *Recommendation: Start with Curricula in Civil Engineering, Computer Engineering, and Telecommunications Engineering.* The justification for these selections follows. Jackson, as the state capital, has a good job market in environmental and transportation engineering, both major sub fields of civil engineering. Computer engineers nationally are in high demand, and is a natural outgrowth from computer science. Since there is a concentration of telecommunications businesses in Jackson, a BS program in telecommunications engineering would be unique and natural addition. Future curriculum additions could be systems engineering (to address the technical needs of the financial community in Jackson), and biomedical engineering (since Jackson is the medical center of the state). Neither of these programs currently exist in the state. The sequence in which new programs would be initiated most likely would be computer engineering, civil engineering, and telecommunications engineering. We view this as a five year initial phase-in period, after which the success of the program would be evaluated before planning for any additional programs. Criteria for evaluating the success of the programs would include quality of the program, as measured by acceptance of the graduates in the job market and graduate schools, the enrollment, and the degree of interaction of the faculty with industry in the JMA.

Recommendation: Focus the Engineering School Entirely on the Needs of the Place-Bound Student: The new engineering school must meet the needs of all students in the Jackson area who for whatever reason do not choose to leave the area for their engineering education.

A program of cooperative education in which students alternate study with highly selected work experiences is highly desirable for all full-time students because it provides relevance, motivation, and financial

assistance, as well as providing important benefits to cooperating employers. However, the resource requirements imposed by a co-op program(the need for multiple sections and year-round operation) may not make this possible. A definitive study of the feasibility of implementing co-op programs in engineering and computer science should be made. At a minimum, an extensive program of summer internships must be developed.

Likewise, the resource issues of providing engineering programs for both full-time and part-time students should be studied for possible economical solutions. Possible factors to explore include late afternoon scheduling of engineering courses, utilization of modern developments in distance learning and multi-media instruction, and closer integration with local community colleges for the first two years of instruction. Whatever the solutions, a path toward the BS degree in engineering must be provided for students who work full time.

Finally, recognizing that a significant fraction of the engineering students will be older returning students, or students who have not received adequate mathematics training, in high school, there must be effective placement tests and remedial math courses in place and functioning at a high order. JSU has been know for commitment in this area in the past. It must be continued.

- *Recommendation: Plans and Commitment for an Engineering Building Must be Made at the Start of an Engineering School..* Commitment to build an engineering building with appropriate well-equipped laboratories
- on the JSU campus is necessary to attract faculty and students to the new engineering programs. During the interim, space for faculty offices and laboratories must be found at JSU. This space must be renovated and equipped appropriately.

There are three parties to building this new engineering school. Each will contribute in a different and significant way. The Jackson State administration and faculty will contribute by creating a necessary reorganization and finding space for laboratory and faculty office facilities, possibly a painful process. Jackson businesses will contribute support in curriculum planning, pledging co-op jobs and summer internships, and contributing scholarship support. The state legislature will contribute new funds for additional faculty positions, laboratory equipment, and an engineering building, without detracting from the excellent progress being made in the engineering programs at the University of Mississippi and Mississippi State University.

- *Recommendation: Improve the Opportunity for Working Engineers in the JMA to Obtain Further Education.* The state should commit to a renewed program for obtaining a master's degree in high-demand engineering disciplines through part-time study in the Jackson Metropolitan Area.
- Courses should be offered by a consortium of universities, including

development. Actual funding for the building might be dependent on a successful five-year review, but construction must start by the end of the sixth year. It is difficult to gage the size and cost of this building, but based on experience at Morgan State University, and using 1996 construction costs, it appears that a 60,000 net assignable square foot building costing about 10 million dollars would be required. Much of the present equipment will transfer to the new building; however, there will still be an additional new equipment cost of from \$3 million to \$5 million.