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**A STUDY TO DETERMINE THE PERCEPTIONS
OF COLLEGE STUDENTS AND FACULTY
TOWARD EMPLOYMENT WITH THE
ALABAMA HIGHWAY DEPARTMENT**

AND

**AN ASSESSMENT OF JOB
SATISFACTION WITH EXISTING
HIGHWAY DEPARTMENT EMPLOYEES**

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July 1991

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EXECUTIVE SUMMARY

Introduction

The Alabama Highway Department (AHD) is concerned about the declining ability of state highway departments to attract qualified personnel, particularly civil engineering graduates. In order to improve their ability to attract and develop qualified personnel, the AHD, along with Auburn University's Highway Research Center, requested this investigation of perceptions and attitudes of civil engineering students and faculty as related to employment in the AHD and of job satisfaction and other job-related perceptions and attitudes of AHD employees.

The objectives of this research were (a) to determine reasons for graduates' apparent lack of interest in employment with the AHD, (b) to identify factors which attract and retain AHD personnel, and (c) to recommend actions the AHD can take to increase attraction and retention of qualified personnel.

The AHD management identified the following factors contributing to their problems: (a) many engineers at the upper levels retiring or near retirement, (b) opportunity for early retirement, (c) no active recruiting in recent years, (d) low salaries, (e) negative perception of the AHD, (f) slow advancement, (g) few rewards for good performance, (h) no career planning, and (i) personnel practices restricted by the State Personnel Board.

An additional factor contributing to the difficulty nationwide in attracting qualified personnel is the shrinking number of new entrants to the U.S. workforce. A smaller proportion of the young workers entering the overall workforce will be well-educated. The new workers will be mostly females, nonwhites, and immigrants, with only 15% white males (Johnston & Packer, 1987). Yet, in the past, a large majority of civil engineering

graduates have been white males (Transportation Research Board [TRB], 1985).

Furthermore, the engineering workforce is also shrinking. In the last few years, fewer Bachelor's degrees in civil engineering have been awarded. There was an 11.4% decline in the number of Bachelor's degrees in civil engineering in the 3-year period from the 1985-1986 academic year to the 1988-1989 academic year (Ellis, 1990; Department of Labor, Bureau of Labor Statistics [DOL], 1988).

Contributing further to the difficulty in attracting qualified personnel to state highway departments, including the AHD, is the increase in demand for civil engineers. The demand for civil engineers is projected to increase 25.2% between 1986 and 2000 (DOL, 1988). In state highway agencies, the demand for civil engineers is projected to increase 4.9% per year (TRB, 1985).

The decreasing supply of new civil engineers combined with the increasing demand for civil engineers will result in a serious, long-term shortage affecting state highway agencies nationwide. The AHD's problems are not unique. State highway agencies and other organizations that employ civil engineers will be in competition for the short supply of civil engineering graduates.

This research was designed to assess perceptions of students, faculty and AHD employees toward employment with the AHD. This was accomplished through interviews and questionnaires. The results of the student and faculty research are included in the Recruiting Study along with a review of salaries in comparable jobs for civil engineering graduates and an analysis of turnover in engineering-related jobs in the AHD. The results of the AHD employee research are included in the Job Perceptions Study. The Conclusions and Recommendations section summarizes the overall findings and provides specific recommendations.

Recruiting Study

This research included students and faculty at the six state universities in Alabama with civil engineering programs. These were Alabama A&M University, Auburn University, the University of Alabama-Birmingham, the University of Alabama-Huntsville, the University of Alabama-Tuscaloosa, and the University of South Alabama.

In the interviews the students' major negative perceptions of the AHD were that salaries are low and that the AHD is bureaucratic. Positive perceptions were that the AHD offers good benefits, job security, less pressure, more predictable hours, and the opportunity to work on large-scale projects. For the students who want to stay in Alabama, the location is desirable. What the students want in a job are interesting and challenging work, good pay, an employer with a good reputation, opportunity for advancement, and an opportunity to become licensed. The students said that they knew little about the AHD and that the AHD should advertise its opportunities.

Some negative perceptions expressed by the faculty members in interviews were that salaries are low and that much of the work is contracted out. Other concerns were the red tape in getting hired, the politicized nature of the organization, and the stigma of government work. Positive perceptions were a more normal work schedule, good benefits, and job security. Some felt that the AHD is more progressive than people realize and that there are good opportunities for advancement. The faculty members recommended that the AHD be more visible on campus. They said that what are important to the students are location, a good training program, and the opportunity to get licensed.

Results from the student questionnaires indicated the following as aspects of employment in which the AHD would not meet their needs and desires: (a) a very high salary, (b) opportunities to be creative and imaginative, (c) high salary and good fringe

benefits, (d) opportunities for personal growth and development, (e) chances to exercise independent thought and action, (f) quick promotions, (g) high respect and fair treatment from my supervisor, (h) having control over your project, (i) stimulating and challenging work, (j) opportunity for advancement, (k) variety in work assignments, (l) a sense of worthwhile accomplishment, (m) enough pay to be secure, (n) rewards for good work, and (o) fair company policies.

The students indicated that the AHD meets or surpasses their needs and desires in the following aspects of employment: (a) opportunity to become licensed, (b) time with your family, (c) becoming an expert in what you do, (d) feeling that what you do is important, (e) expert supervision, (f) good fringe benefits, (g) time for leisure activities, (h) chance to exercise leadership, (i) working in the field, (j) high level of responsibility, (k) your family's satisfaction with your job, (l) living in your desired geographic location, (m) opportunity to do design work, and (n) opportunity to pursue a master's degree.

There were some additional findings from the student questionnaire. Only 11.6% of the students chose a state department of transportation as the type of organization for which they would most like to work. However, 46.2% of the students preferred staying in Alabama after graduation.

When the faculty rated their perceptions of opportunity in the AHD and their perceptions of what is important to students, the following were indicated as aspects of employment in which the AHD would not meet the needs and desires of students: (a) a very high salary, (b) high salary and good fringe benefits, (c) prestige of the employer, (d) rewards for good work, (e) enough pay to be secure, (f) opportunities to be creative and imaginative, (g) stimulating and challenging work, (h) a sense of worthwhile accomplishment, (i) quick promotions, (j) being seen as successful, (k) opportunities for

personal growth and development, and (l) feeling that what he/she does is important.

The faculty viewed the following aspects of employment with the AHD as meeting or surpassing students' needs and desires: (a) good fringe benefits, (b) time for leisure activities, (c) opportunity to become licensed, (d) living in his/her desired geographic location, (e) opportunities to learn new things from his/her work, (f) opportunity to do design work, (g) variety in work assignments, (h) chance to exercise leadership, and (i) becoming an expert in what he/she does.

The salary review revealed that starting salaries in civil engineering are lower than those in other areas of engineering (College Placement Council, 1990). The AHD's starting salary is not competitive with the nationwide average, the average for Auburn University civil engineering graduates, or state highway departments/departments of transportation in some neighboring states. According to the students' answers on the questionnaire, most students expect a higher starting salary than what the AHD offers.

A turnover analysis of the engineering-related jobs in the AHD showed that the only unusually high turnover rates were due to retirements at the higher levels. The other turnover rates were not unusual. However, it would be beneficial to reduce turnover.

Job Perceptions Study

This research included AHD employees in the engineering-related jobs. These were Engineering Assistant I - III, Civil Engineer I - VII, Professional Civil Engineer Trainee, Graduate Civil Engineer, and Professional Civil Engineer I - IV.

Positive aspects of employment with the AHD mentioned by the employees in interviews were good benefits, job security, good work environment, interesting and challenging work, and continuing education. Negative comments were about red tape, personnel procedures, and slow advancement. Several employees mentioned the conflict

between older non-graduates and younger graduates. Some suggestions for improving recruitment were a stronger training program for Graduate Civil Engineers, career planning, and informing students about the training program for college students.

The employee questionnaire included the Job Diagnostic Survey (Hackman & Oldham, 1980), a standardized measure of the characteristics of jobs and employee's feelings about their jobs. Results from the AHD were compared to national norms.

Individual growth need strength (the need for personal development and accomplishment) was lower than the norm for Engineering Assistants I, II and III, for Civil Engineers I, II, III and V, and for Professional Civil Engineer Trainees. Autonomy was lower than the norm for Engineering Assistants I, Professional Civil Engineer Trainees, Graduate Civil Engineers, and Professional Civil Engineers I. This indicates that these jobs provide little discretion in planning and completing work. Additionally, Professional Civil Engineers I were lower than the norm on skill variety, task identity, task significance, autonomy, feedback from the job, the Motivating Potential Score (indicates the potential of a job to motivate the employee), experienced meaningfulness of the work, experienced responsibility for work outcomes, and internal work motivation.

Some AHD results were higher than the norm. Civil Engineers V were above the norm in general satisfaction, job security satisfaction, and compensation satisfaction. Civil Engineers VI were above the norm in task significance, dealing with others, the Motivating Potential Score, experienced meaningfulness of the work, general satisfaction, and job security satisfaction. Professional Civil Engineers II were above the norm in job security satisfaction. Professional Civil Engineers III were above the norm in skill variety, general satisfaction, and compensation satisfaction.

General job satisfaction was above the norm in almost all of the AHD job

categories studied and was quite high for Civil Engineers V and VI and Professional Civil Engineers III. Satisfaction with specific aspects of the job, such as job security and compensation, tended to be higher for the upper-level job categories.

Additional findings were that a large proportion of the employees had thought of quitting their jobs or looked for another job, but few planned to quit within the next year. Particularly interesting is that more than half (53.8%) of the employees have family members who have worked for the AHD.

Open-ended comments by the employees were both positive and negative. The most frequently mentioned positive aspects of employment with the AHD were job security, good benefits, and interesting and challenging work. Negative comments often related to low pay, slow promotions, politics, favoritism, negative public opinion of state workers, and problems with personnel policies and procedures.

Conclusions and Recommendations

The AHD's major problems can be summarized as follows:

- The AHD is addressing these problems after they occurred. A program of human resource planning--forecasting of labor supply and demand, turnover analysis, and succession planning--prepares organizations for future changes, and the AHD has been weak in this area.
- The AHD needs to attract civil engineering graduates, but there is a worsening labor shortage in this field.
- In the past the AHD had no program of active recruiting, and its ties to universities had been weak. They hired a recruiter within the past year and are in the process of remedying this problem.
- The AHD may be limited in its ability to attract civil engineering graduates

because of deficiencies or perceived deficiencies in pay, challenge, and career development opportunities.

- Any program to attract civil engineering graduates to the AHD must be implemented in such a way that the severe conflicts between degreed and non-degreed employees are not increased.
- The AHD is unattractive to many people as an employer due to perceptions of political influence, favoritism, unfair personnel practices, and outdated, authoritarian management styles.

The AHD has been addressing these problems and has made a number of changes.

In addition to actions already taken, the following actions are recommended for the AHD to improve recruitment and retention of qualified personnel:

- Continue and expand human resource planning, including formal exit interviews and succession planning.
- Continue to strengthen ties with universities through presentations on campus, joint projects with faculty and students, and publicizing the student training (PCET) program.
- Advertise the AHD's strengths as an employer, such as good benefits, job security, living in Alabama, and the opportunity to work on large-scale projects.
- Request that the State Personnel Department allow offers for employment to be made before graduation by making them contingent on graduation.
- Make employment with the AHD more attractive with higher pay, a strong training program, mentoring, a formal career development program, and a desirable work climate.

- Attract minorities and women by creating a more appealing work environment through mentoring programs and training for managerial personnel in managing a diverse workforce.
- Expand recruitment activities to include those in the over 30 age group.
- Become involved in developing the workforce through ties with schools and universities and making it easier for AHD employees to further their education.
- Continue to modernize the management style in the AHD by providing training to develop management skills.
- Encourage supervisors and managers to adhere to established personnel procedures through participative problem-solving processes.
- Promote establishment of a joint program between a two-year college and a university in order to produce technologists prepared for highway work and also prepared to pursue a Bachelor's degree.

I. INTRODUCTION

Background

The Alabama Highway Department (AHD) and Auburn University's Highway Research Center identified a critical need related to the difficulty attracting qualified personnel, particularly civil engineering graduates, to work for state highway departments. The AHD is concerned about this declining ability to recruit college graduates. This problem is exacerbated by the rapidly accelerating median age of employees which is resulting in a large number of retirements and projected retirements.

The AHD management requested a study to determine why these problems are occurring and what actions can be taken to address them. Their purpose in undertaking this study was to assess perceptions and attitudes of civil engineering students and faculty as they relate to employment in the AHD and to assess job satisfaction and other job-related perceptions and attitudes of AHD employees.

Specific objectives of this research were as follows:

- To determine reasons for graduates' apparent lack of interest in employment with the AHD.
- To identify factors which attract and retain AHD personnel.
- To recommend actions the AHD can take to increase attraction and retention of qualified personnel.

The AHD plans to use the results of this research to develop innovative policies and practices to improve attraction and retention of qualified personnel.

Key Problems Identified by Management

The AHD management, in several meetings prior to the study, expressed concern about attracting qualified personnel. They expressed a desire to implement programs for improved recruitment and development of high quality employees. Their greatest concern was regarding recruitment and retention of civil engineering graduates.

Concern was precipitated by a large number of retirements, particularly at the upper level and in key positions. Many people were hired in the 1950s and 1960s when the Interstate system was being built, and those people are at the top levels of management now. As people have been promoted upward to fill vacancies due to retirements, a gap is occurring in the middle levels. Not enough lower level people have the ability and experience to move into middle level positions due to decreased hiring in recent years. This trend has accelerated due to the opportunity for early retirement now available to employees.

Furthermore, the AHD management identified a number of factors which seem to limit their ability to recruit qualified personnel. Low salaries and a negative perception of the AHD are the strongest of these. Other restricting factors are slow advancement, few rewards for good performance, and a lack of career planning. Personnel practices are controlled by the State Personnel Board; therefore, the AHD management operates under certain restrictions in hiring and promoting. Thus, the AHD management identified the following factors contributing to their problems:

- Many engineers at the upper levels retiring or near retirement.
- Opportunity for early retirement.
- No active recruiting in recent years.
- Low salaries.
- Negative perception of the AHD.

- Slow advancement.
- Few rewards for good performance.
- No career planning.
- Personnel practices restricted by the State Personnel Board.

Workforce Demographics

These problems are especially compelling considering national workforce projections for the next decade. Consider the following U.S. trends between 1985 and 2000 as projected in *Workforce 2000* (Johnston & Packer, 1987).

- The pool of young workers entering the workforce will decrease, not just proportionately but in absolute numbers.
- The small overall growth of the workforce will be dominated by women, non-whites, and immigrants. These are the projections for new entrants to the labor force, 1985-2000:

U.S. born white males	15%
U.S. born white females	42%
U.S. born nonwhite males	7%
U.S. born nonwhite females	13%
Immigrant males	13%
Immigrant females	10%

- Fewer technically-educated workers will be available, probably resulting in an increase in their pay due to the increasing demand for them. The labor market will be increasingly comprised of disadvantaged minorities who tend to have less education. There is a continually widening gap between the low education and skills of new workers entering the workforce and the increasing skill requirements of jobs.

- The average age of the workforce will rise, with a dramatic increase in the number of middle-aged workers. Retraining may be necessary to maintain the productivity of these workers.

These trends will have a dramatic impact on organizations, such as the AHD, that depend on a constant supply of educated workers. Organizations in the forefront of human resource planning are acting now to insure a supply of qualified personnel in the coming years.

Civil Engineering Workforce

The trends for the engineering workforce parallel those for the general workforce. Each year since 1986, the number of Bachelor's degrees in engineering awarded in the U.S. has decreased. There was a 12.0% decline over the 3-year period (Ellis, 1990).

The decline in the number of degrees awarded also applied to civil engineering. In the 1985-1986 academic year, 8,679 Bachelor's degrees in civil engineering were awarded, and 7,688 were awarded in 1988-1989, an 11.4% decline over the 3-year period. Master's and Doctoral degrees have not yet begun to decline but are expected to beginning in 1990-1991 (Ellis, 1990; U.S. Department of Labor, Bureau of Labor Statistics [DOL], 1988).

In addition to the decrease in absolute numbers, civil engineering graduates also are an increasingly smaller share of the total number of engineering graduates. In 1976, 20.3% of the engineering graduates were in civil engineering. By 1982, this percentage decreased to 15.7%, to 12.8% in 1984, and to 11.2% in 1989 (Ellis, 1990; Transportation Research Board [TRB], 1985).

Although white males comprise a small proportion (15%) of those entering the workforce between 1985 and 2000, a large majority of engineering graduates are white

males. In the 1988-1989 academic year, only 15.3% of all engineering Bachelor's degrees were awarded to women, 3.1% to blacks, 2.9% to Hispanics, 0.3% to Native Americans, 8.5% to Asian Americans (the only minority group not underrepresented), and 8.3% to foreign nationals (Ellis, 1990). About half of the foreign students immigrate to the U.S. after graduation. Women and blacks are under-represented in civil engineering as well. In 1984, 13.1% of Bachelor's degrees in civil engineering were awarded to women, and 2% were awarded to blacks (TRB, 1985).

The previous section described how, with the changing demographics of the U.S. workforce, women, minorities, and immigrants will constitute the largest share of new entrants to the workforce. Yet women and minorities seem to be the groups least interested in entering the civil engineering profession. Furthermore, foreign students may return to their native country and be unavailable for employment in the U.S.

Along with the decline in the number of new civil engineers entering the workforce, there is an increase in the demand for civil engineers. In 1986, 199,000 civil engineers were employed in the U.S. By the year 2000, this number is projected to be 249,000, an increase of 25.2% (DOL, 1988).

About 17% of civil engineers work in state highway agencies. The increase in demand for civil engineers will be even more pronounced in state highway agencies. A large number of engineers were hired in the 1950s and 1960s to work on the interstate system, and many of these are now retiring or near retirement. In 1985, almost 25% of engineers in management positions in state highway agencies were 56 years of age or older. The need for new engineers in state highway agencies is projected to increase 4.9% per year (TRB, 1985).

This mismatch between supply and demand will likely result in a serious shortage

of civil engineers in state highway agencies, and the shortage is projected to increase in the coming years. Improved job opportunities for civil engineering graduates may attract more students to the field (TRB, 1985) but will not have an effect soon enough to thwart a crisis. Other actions will be necessary.

It should be clear from these statistics that the problems the Alabama Highway Department is experiencing are not unique. These are nationwide phenomena and will require intense and sustained action on the part of state highway agencies to correct the shortage of engineers. The AHD will have severe competition from other state highway departments or departments of transportation for the short supply of civil engineers.

Research Approach

The missing link in understanding the trends that have been described is an investigation of the perceptions of the individuals involved. Francis B. Francois of the American Association of State Highway and Transportation Officials, discussing the issues reported here, stated, "Yet no one, to our knowledge, has bothered to ask the students what they think. There is simply no research on this." (Hoel, Francois, & Lloyd, 1989). Understanding why students are not attracted to state highway departments would be most helpful in improving recruitment and stabilizing the supply/demand problem cited.

Additionally, investigation of the perceptions of state highway department employees would help identify the positive and negative factors associated with employment. Thus, the AHD could publicize the positive factors to potential applicants and begin to change the negative factors.

This research evaluated the perceptions of students and faculty through interviews and surveys. Initial interviews with a small number of students and faculty plus a few other individuals identified the important issues which needed to be addressed in the more

comprehensive surveys. Civil engineering students and faculty at the six state universities in Alabama which have civil engineering programs were included in the research: Alabama A&M University, Auburn University, the University of Alabama-Birmingham, the University of Alabama-Huntsville, the University of Alabama-Tuscaloosa, and the University of South Alabama. In addition, students and faculty in civil engineering technology at Alabama A&M University and the University of Alabama-Tuscaloosa participated.

A salary review focused on starting salaries for civil engineering graduates. This was to determine how competitive the AHD's pay is compared to other opportunities available to civil engineering graduates. Information was obtained from secondary sources and directly from highway or transportation departments in other states.

The AHD provided data necessary to perform a turnover analysis on the job classifications of interest in this research. This was necessary to evaluate the extent of the turnover due to retirements as well as to determine whether other types of turnover have been a problem.

This study also evaluated perceptions of AHD personnel through interviews and surveys. As with the students and faculty, initial interviews with a small number of employees identified the important issues to be addressed in the more comprehensive surveys. Individuals in all of the engineering job classifications participated in the research. These job classifications were Engineering Assistant I (EAI), Engineering Assistant II (EAI), Engineering Assistant III (EAI), Civil Engineer I (CEI), Civil Engineer II (CEII), Civil Engineer III (CEIII), Civil Engineer IV (CEIV), Civil Engineer V (CEV), Civil Engineer VI (CEVI), Civil Engineer VII (CEVII), Professional Civil Engineer Trainee (PCET), Graduate Civil Engineer (GCE), Professional Civil Engineer I

(PCEI), Professional Civil Engineer II (PCEII), Professional Civil Engineer III (PCEIII), and Professional Civil Engineer IV (PCEIV).

Engineering Assistants have at least a high school diploma and, with enough experience, may be promoted to Civil Engineer. Professional Civil Engineer Trainees are college students in civil engineering who work part-time or during the summer. Graduate Civil Engineer is the classification for graduates with a civil engineering or civil engineering technology degree who have passed the Fundamentals of Engineering (EIT) examination but are not yet licensed. Professional Civil Engineers possess a Professional Engineer's (PE) license.

Organization of This Report

The results of this research are reported in two major sections. The Recruiting Study reports the results of the investigation of student and faculty perceptions of employment with the AHD. In addition, it includes the review of comparative entry-level salaries for civil engineering graduates and the analysis of turnover in the AHD. The Job Perceptions Study reports the results of the investigation of perceptions of AHD personnel toward employment with the AHD. The final section summarizes the findings of the two studies, provides overall conclusions, and outlines specific recommendations.

II. RECRUITING STUDY

Research to investigate the Alabama Highway Department's recruiting problems included a study of the perceptions of students and faculty, a salary review, and a turnover analysis. This section of the report describes the recruiting study.

PERCEPTIONS OF STUDENTS AND FACULTY

Interviews

Student Interviews

Procedure. Open-ended interviews were conducted with 32 students: 5 at Alabama A&M University, 4 at Auburn University, 4 at the University of Alabama-Birmingham, 9 at the University of Alabama-Huntsville, 5 at the University of Alabama-Tuscaloosa, and 5 at the University of South Alabama. All of these students were undergraduates, and all were civil engineering majors except for one civil engineering technology major.

The purpose of the interviews was to become familiar with the universities and students and to identify some of the important issues for study. Therefore, the students were not systematically chosen and the interviews were not structured. Some interviews were conducted individually and some in groups. Faculty members were present in some of the group interviews. A majority of the students were most interested in structural engineering. Many were interested in transportation engineering, and several other specialties of interest were mentioned by the students.

Findings. Students at all the universities said that they did not know much about employment with the AHD and would like more information. Students at one university commented that they did not know where to go to apply for a position. However, they did explain that the AHD has an image problem and that large private firms are more prestigious.

Most students showed considerable interest in the AHD and wanted more contact with them. They suggested that the AHD provide speakers for ASCE (American Society of Civil Engineers) meetings and increase summer employment for students. They noted that students in the training program often stayed with the AHD after graduation. They felt that the AHD could attract more graduates if they better advertised their opportunity and diversity. The students noted that some graduates have had difficulty finding jobs.

The students' strongest negative perception was that salaries were lower at the AHD. They also viewed the AHD as bureaucratic and hampered by numerous constraints. A number of the students had heard that the AHD was contracting out its design work and feared that they would not have the opportunity to do any design work if employed there.

The students' strongest positive perception was that the AHD offered good benefits. Other positive perceptions were that there would be more job security, less pressure, more predictable hours, and the opportunity to be involved in large-scale projects. Those who wanted to stay in Alabama viewed the location as positive.

The students had several conflicting perceptions. Some viewed the AHD as a place for good experience and an opportunity to learn, and others viewed it as having limited experience and lacking in good training. Also, some students believed that work at the AHD would be varied, while others thought it would be routine.

The major concerns expressed by the students were that a job provide interesting, challenging work in which they could apply their civil engineering knowledge and that the pay be good. They also were concerned with the reputation of the employer, opportunity for advancement, and opportunity to get their Professional Engineer's (PE) license. Most did not want to get stuck behind a desk and valued the opportunity to work in the field. Some strongly wanted to stay in Alabama.

Faculty Interviews

Procedure. Open-ended interviews were conducted with 17 faculty members: 3 at Alabama A&M University, 3 at Auburn University, 2 at the University of Alabama-Birmingham, 3 at the University of Alabama-Huntsville, 4 at the University of Alabama-Tuscaloosa, and 2 at the University of South Alabama. All were in civil engineering departments except for one at Alabama A&M University and one at the University of Alabama-Tuscaloosa who were in engineering technology departments. Some interviews were conducted individually and some in groups. In some of the group interviews, students were present and were interviewed at the same time.

Findings. The most positive perceptions of the AHD seemed to be held by the faculty members who were in the transportation or highway specialty and were more familiar with the AHD. They said that things have changed and the negative image is incorrect, but the message has not gotten out. Also, they commented that opportunity for advancement is great and the work is "high tech" and more progressive than most people realize. In contrast, faculty members less familiar with the AHD said that advancement is slow and the work is not challenging.

The faculty members' strongest negative perception was that salaries are low, although most recognized that salaries had improved recently and are better than most people think. Some felt that after working for the AHD it would be hard to move to another job later. Many felt that it was a problem that much of the work was contracted out. Other concerns were the red tape in getting hired, the politicized nature of the organization, and the stigma of government work. Some people see government employees as deadwood.

Positive perceptions of the AHD were that it provides a better lifestyle and more normal work schedule, good benefits, and job security. They felt that engineers in the

AHD do more technical work than those in consulting firms. Another advantage is that those who want to stay in Alabama can.

The faculty members made some other relevant comments. They said that graduates who go to work at the AHD tend to stay. Some faculty members commented that the Florida Department of Transportation is a more attractive employer, offering higher salaries and an extensive training program. It also has an aggressive recruiting program, making it a strong competitor with the AHD for Alabama's civil engineering graduates. The faculty members also said that some graduates have had difficulty finding jobs.

Most faculty members recommended that the AHD be more visible on campus. Some suggestions to increase interaction between students and faculty and the AHD were for the AHD to provide literature and give presentations and for students and faculty to have the opportunity to work on AHD projects. There was a perception that the AHD has closer ties to Auburn than to the other universities.

One particularly interesting suggestion was from Dr. Joseph M. Olsen, Professor and Chairman of the Department of Civil Engineering at the University of South Alabama. He had previously worked for a state highway department in another state and observed that the most positive features of employment with a state highway department (job security, good benefits, more regular hours, etc.) were most valued by people in their 30s. The other state highway department tried to attract people in their 30s from the private sector, because these people were often fed up with the long hours, wanted more time with their families, and needed the security of a stable job with good benefits.

The faculty members said that the most important factors to students in looking for a job are location (chance to stay in Alabama for many), a good training program, and the opportunity to get their Professional Engineer license.

Additional Interviews

Procedure. In addition to the 17 faculty members, 3 other individuals at the universities were interviewed--Professor Paul C. Brandt, the Head of the Department of Building Science at Auburn University; Dr. Joseph R. Jenkins, the Dean of the School of Engineering and Technology at Alabama A&M University; and Mr. George Crook, the Director of Engineering Placement at the University of Alabama-Tuscaloosa. Additionally, the recruiter for the Florida Department of Transportation, Mr. Gordon Burleson, was interviewed by telephone. These individuals provided some additional information.

Findings. Professor Brandt, the Head of the Department of Building Science at Auburn University, was interviewed to determine if their graduates were candidates for employment with the AHD. Since Building Science graduates are more interested in the construction of buildings and because they are unable to be licensed as engineers, the conclusion was that the Building Science program was not a good source for attracting job applicants to the AHD.

Dr. Jenkins, the Dean of the School of Engineering and Technology at Alabama A&M University, felt that students would find the AHD a desirable employer. He said that he would like to know what knowledge and skills the AHD wants graduates to have so that Alabama A&M could incorporate that training into their program. Alabama A&M is working toward accreditation, and Dr. Jenkins would like the AHD to be represented on the advisory committee.

Mr. Crook, the Director of Engineering Placement at the University of Alabama-Tuscaloosa, said that students' decisions about jobs are made mostly on the basis of job content. They want meaningful work, and benefits influence their decisions only if absent.

He felt that consistency helps in recruiting. The most successful organizations are those whose recruiter comes to the campus every year with jobs to offer and forms relationships with faculty members.

Mr. Burleson, the recruiter for the Florida Department of Transportation, reported that they hired at least one Auburn University civil engineering graduate every six months. They regularly recruit at 8 different universities in the southeastern U.S. They maintain close contact with the faculty and provide speakers to the schools.

The Florida Department of Transportation offers an intensive four-year training program with guaranteed incremental raises. Starting salary is \$26,338 for civil engineering graduates, and it is possible with a license to reach a salary of around \$40,000 in 4½ years. They found that when they added more incentives they were able to hire more top graduates. In recent years they have dramatically increased the number hired, and the number in training has increased from 8 to 60. They are losing many experienced people through retirement. Mr. Burleson noted that the graduating classes are getting smaller and that recruiting is getting more difficult. He interviews most who graduate at the universities he visits.

Mr. Burleson made three suggestions for improved recruiting of civil engineering graduates: (a) Have a civil engineer as the recruiter, (b) maintain face-to-face contact with the universities, and (c) provide a strong training program for new graduates.

Surveys

Student Survey

Sample. There were 98 students who responded to the survey. The graduate students were eliminated from the sample, leaving 91 student surveys to analyze. Approximately 12% of the sample of 91 were female, approximately 4.5% were U.S.-born

blacks, and approximately 4.5% were foreign-born (1 Asian, 3 African). They ranged in age from 18 to 37, with a median age of 22. Approximately 92% were civil engineering majors, and the rest were civil engineering technology majors. Approximately 80% were juniors and seniors, and the rest were freshmen and sophomores. The six universities were represented by the following percentages of the student sample:

Alabama A&M University	4.4%
Auburn University	36.3%
University of Alabama-Birmingham	9.9%
University of Alabama-Huntsville	11.0%
University of Alabama-Tuscaloosa	34.1%
University of South Alabama	4.4%

Questionnaire. The student questionnaire used in this survey was developed specifically for this research. It was composed of several major sections. Part I contained 19 questions about the student's personal background, academic participation, and career plans. Part II asked students to rate the degree to which they expected to find each of 39 characteristics if they were employed with the AHD. Part III listed the same 39 characteristics as Part II and asked the students to rate the importance to himself/herself of each one. Part IV contained 12 questions on which the student was asked to choose between two jobs on a 5-point scale. Part V contained eight questions about the student's perceptions of opportunities with the AHD and other types of organizations. Part VI allowed space for the student to make any additional comments.

Many of the items in Parts II and III were adapted from previous research (Davis, Giles, & Feild, 1985; Dunnette, Arvy, & Banas, 1973; Hackman & Oldham, 1980; Hall & Wessel, 1988; Lawler, Kuleck, Rhode, & Sorensen, 1975; Parker & Dyer, 1976; Vroom,

1966; Vroom & Deci, 1971). Some questions from Part III and all of Part IV comprise a widely used measure of individual growth need strength, which is the need for personal accomplishment, learning, and developing oneself. People with strong growth needs are expected to develop high internal motivation in challenging and complex jobs (Hackman & Oldham, 1980).

Procedure. The questionnaires were distributed differently at the different universities. Alabama A&M University and the University of South Alabama distributed the questionnaires in classes and/or meetings. Auburn University distributed the questionnaires during the registration process. The questionnaires were mailed individually to graduating seniors at Auburn University and to students at the University of Alabama-Birmingham, the University of Alabama-Huntsville, and the University of Alabama-Tuscaloosa. The questionnaires were returned by mail, except for Auburn University students, who turned in their questionnaires to the Department of Civil Engineering.

Findings. The students rated the 39 items in Part II according to the extent to which they would expect each one in a job with the AHD. Most items were rated on a scale from 1 to 6, and the other items were mathematically converted to a 6-point scale. The average (mean) rating of each item is displayed in Table 1, ranked in descending order.

In Part III the same 39 items were rated by the students according to how important each one is to them. Again, those ratings not already on a 6-point scale were converted mathematically. The mean ratings of importance are shown in Table 2, ranked in descending order.

Reviewing the two lists reveals some matches and some discrepancies between

what students want and what they believe the AHD has to offer. To make a more specific comparison, the difference between the mean expectation and the mean importance for each item was calculated. These differences are listed in Table 3 in order from greatest negative difference to greatest positive difference. Higher negative values mean that what the students expect from the AHD falls short of how important it is to them. Higher positive values mean that what the students expect from the AHD exceeds their rating of importance. The most extreme values at both ends are the most meaningful.

Statistical tests of significance (t tests) were performed for each item comparing ratings of expectation and importance. Those items which were significantly different ($p < .05$) are designated in Table 3 with asterisks. These are ones with a large enough difference to suggest that students perceive the AHD to be deficient or more than adequate in these areas.

The aspects of employment with the AHD which seem to be deficient to the students, according to these results, are those related to compensation, advancement, challenge and responsibility in their work, and their treatment by management. They include the following:

- A very high salary
- Opportunities to be creative and imaginative in my work
- High salary and good fringe benefits
- Opportunities for personal growth and development in my job
- Chances to exercise independent thought and action in my job
- Quick promotions
- High respect and fair treatment from my supervisor

- Having control over your project
- Stimulating and challenging work
- Opportunity for advancement
- Variety in work assignments
- A sense of worthwhile accomplishment in my work
- Enough pay to be secure
- Rewards for good work
- Fair company policies

All of these were rated at least moderately important to the students. Therefore, to attract graduates, the AHD may improve these areas where necessary or better communicate positive aspects of the AHD where perceptions are inaccurate.

Potential selling points for employment with the AHD are areas the students rated as at least moderately important (See Table 2) in which the AHD meets or surpasses rated importance (See Table 3). These can be considered the AHD's strong points as viewed by students and include the following:

- Opportunity to become licensed
- Time with your family
- Becoming an expert in what you do
- Feeling that what you do is important
- Expert supervision
- Good fringe benefits
- Time for leisure activities
- Chance to exercise leadership
- Working in the field

- High level of responsibility
- Your family's satisfaction with your job
- Living in your desired geographic location
- Opportunity to do design work
- Opportunity to pursue a master's degree

These are areas the AHD can emphasize in its recruiting in order to attract graduates.

The calculation of individual growth need strength allowed a comparison with AHD employees and national norms. The average (mean) individual growth need strength for the students was 4.9. This is about the same as the overall national norm of 5.0 but is lower than the national norm of 5.6 for professional/technical workers (Hackman & Oldham, 1980). The mean individual growth need strength for all of the AHD respondents was 4.9 and for the Graduate Civil Engineers was 5.4. It is unclear whether the higher level of growth needs as compared to students for the GCEs is related to maturity and experience. (More information on the AHD employees' growth needs is provided in the Job Perceptions Study.)

Some other findings from the questionnaire provide some indications of students' attitudes toward state departments of transportation compared to other types of organizations. The desirability of several types of organizations was ranked according to the students' ratings (see Table 4). State departments of transportation were ranked 5 out of 10. The ranks based on faculty ratings of opportunity are also indicated and differed little from the students' ranking. Overall, state departments of transportation appear to have a moderate level of desirability.

When asked their first choice in type of organization, the students responded as follows: specialty consulting firm (environmental, structural, etc.), 30.2%; construction

company, 22.1%; federal government agency (Corps of Engineers, EPA, NASA, FAA, FHWA, etc.), 15.1%; general engineering consulting firm, 11.6%; state department of transportation, 11.6%; petroleum company, 3.5%; aerospace company, 2.3%; county engineering department, 2.3%; materials or equipment producer (as a technical sales representative), 1.2%; city engineering department, 0.0%; other, 0.0%.

Another finding of potential interest to the AHD is that 46.2% of the students responded that they preferred staying in Alabama after graduation. Only 8.8% preferred leaving Alabama, with the other 45.1% responding that they would take the best offer without regard for whether or not it is in Alabama. Thus, another strong selling point for the AHD may be the opportunity to stay in Alabama.

Numerous other analyses of the numerical data were performed, but there were no additional findings that were meaningful and relevant.

Additional information came from open-ended questions on the student questionnaire, including reasons students would and would not want to work for the AHD and any additional comments. The most frequently mentioned positive perceptions of employment with the AHD were job security, good benefits, and a chance to live in Alabama. A number of students commented that the pay was reasonable, fair, or good. Other positive factors mentioned by several students were outdoor work, opportunity for training and experience, interesting and challenging work, and the opportunity to do important work which serves the public. Several mentioned that they wanted to work in transportation/highway engineering.

The most frequent negative perception, mentioned by about half the students, was that starting salaries are low and pay increases are small. Also frequently mentioned were slow advancement and a ceiling on advancement. A number of students felt that the work

would not be challenging, would offer limited experience, and would not allow them to fully use their skills. Other negative factors mentioned by several students were political influence on decisions, bureaucracy, and a "good old boy" network. Several students said that they planned to work in a different specialty so were not interested in highway work anyway.

Faculty Survey

Sample. There were 21 faculty members who responded to the survey, of which approximately 9.5% were female, none were U.S.-born blacks, and approximately 9.5% were foreign-born (Asian). Approximately 90% were in civil engineering departments, and the rest were in engineering technology departments. Only 1 faculty member was part-time, and the others were full-time. The approximate percentages in each rank were 30% Professor, 35% Associate Professor, 30% Assistant Professor, and 5% Instructor. The six universities were represented by the following percentages of the total faculty sample:

Alabama A&M University	15.0%
Auburn University	45.0%
University of Alabama-Birmingham	5.0%
University of Alabama-Huntsville	10.0%
University of Alabama-Tuscaloosa	20.0%
University of South Alabama	5.0%

Questionnaire. The faculty questionnaire used in this survey was developed specifically for this research. Parts of the faculty questionnaire parallel the student questionnaire.

Part I contains 17 questions about the faculty members' background and career.

Part II asked faculty members to rate their perception of opportunities in the AHD for 39 characteristics of a job. Part II parallels Part II of the student questionnaire. Part III listed the same 39 characteristics and asked the faculty members to rate how important each one is to students. Part III parallels Part III of the student questionnaire. Part IV contained 6 questions about the faculty members' perceptions of opportunities with the AHD and other types of organizations. Part V contained 4 questions about the faculty members' perceptions of student preferences. Part VI allowed space for the faculty member to make any additional comments.

Procedure. The questionnaires were mailed to all the faculty members except at Auburn University, where the questionnaires were placed directly in the faculty members' mailboxes. The questionnaires were returned by mail or, in the case of Auburn University faculty, campus mail.

Findings. The faculty members rated the 39 items in Part II according to the extent to which they would expect each one for a student who took a job with the AHD. Most items were rated on a scale from 1 to 6, and the other items were mathematically converted to a 6-point scale. The average (mean) rating of each item is displayed in Table 5, ranked in descending order.

In Part III the same 39 items were rated by the faculty members according to how important they think each one is to their students. Again, those ratings not already on a 6-point scale were converted mathematically. The mean ratings of perceived importance are shown in Table 6, ranked in descending order.

As with the student data, a more specific comparison was made by calculating the difference between the faculty's mean perception of opportunity in the AHD and the faculty's mean perception of the importance to students for each item. These differences

are displayed in Table 7 in order from greatest negative difference to greatest positive difference. These values are interpreted similarly to the student differences in Table 3. Higher negative values mean that the faculty members perceive that the AHD is lacking in opportunity in comparison to how important they think that factor is to students. Higher positive values mean that the faculty members perceive the AHD as having greater opportunity than what they think the students desire on that factor.

Statistical tests of significance (t tests) were performed for each item comparing faculty ratings of opportunity and faculty perception of importance to students. The items which were significantly different ($p < .05$) are designated in Table 7 with asterisks. These are items with a large enough difference to suggest that faculty members perceive the AHD to be deficient or more than adequate in relation to how important they think each one is to students. These perceptions probably influence the advice that faculty give students and, thus, influence the students' perceptions.

The aspects of employment with the AHD which the faculty viewed as deficient were related largely to compensation, challenge and responsibility in the work, and others' perceptions of them. They include the following:

- A very high salary
- High salary and good fringe benefits
- Prestige of the employer
- Rewards for good work
- Enough pay to be secure
- Opportunities to be creative and imaginative
- Stimulating and challenging work
- A sense of worthwhile accomplishment

- Quick promotions
- Being seen as successful
- Opportunities for personal growth and development
- Feeling that what he/she does is important

Most of these were perceived by the faculty as at least moderately important to students as well as being rated at least moderately important by the students themselves.

Improvement in these areas or better communication where perceptions are inaccurate may help in attracting graduates. These items overlap to a large extent with items identified by students as deficient. This may indicate that students' perceptions are influenced by faculty perceptions. If so, efforts to make faculty members aware of positive aspects of employment with the AHD would be beneficial.

The items perceived by the faculty as meeting or exceeding their importance to students (See Table 7) and perceived by the faculty as at least moderately important to students (See Table 6) may be considered the AHD's strong points as viewed by faculty. They include the following:

- Good fringe benefits
- Time for leisure activities
- Opportunity to become licensed
- Living in his/her desired geographic location
- Opportunities to learn new things from his/her work
- Opportunity to do design work
- Variety in work assignments
- Chance to exercise leadership
- Becoming an expert in what he/she does

The AHD may want to emphasize these areas in order to attract graduates.

Additional analyses of the numerical data produced no other results that were particularly meaningful and relevant. The faculty questionnaires contained some open-ended questions, including reasons a recent graduate would and would not want to work for the AHD and any additional comments.

Frequently mentioned positive perceptions were that employment with the AHD offered the opportunity to stay in Alabama (which many students want to do), job security, good benefits, lack of pressure, and more regular hours. The most frequent negative perception, mentioned by a majority of the faculty members, was that the pay is low. Other frequently mentioned negative perceptions were that the AHD lacks prestige and is "low tech" and not progressive. Additional comments by several faculty members were that advancement is slow, the work is boring, and there is no opportunity to be creative.

Some suggestions by faculty members to improve recruiting were to raise pay to attract well qualified civil engineers, offer better training and other opportunities for professional growth, and offer opportunities to advance in responsibility and pay. Some noted the slow process of applying for a state job. The AHD is at a disadvantage because it cannot offer a job until after graduation. Some faculty members felt that the AHD offers some good opportunities but that most students are not aware of them.

SALARY REVIEW

Although starting salaries for engineers are higher than starting salaries in other fields, civil engineering has the lowest average starting salary of the various branches of engineering. The most recent salary survey of the College Placement Council, reporting from college placement offices on offers made to graduating students, shows that graduates receiving a Bachelor's degree in civil engineering receive an average annual

salary offer of \$28,040. This is the lowest average salary of the 18 branches of engineering for which figures are reported. Offers in other branches were: petroleum, \$35,448; chemical, \$35,084; textile, \$33,669; metallurgical, \$32,412; mechanical, \$32,166; electrical, \$31,817; computer, \$31,212; nuclear, \$30,863; industrial, \$30,608; bioengineering and biomedical, \$30,515; aerospace and aeronautical, \$30,465; agricultural, \$30,090; mining, \$29,483; architectural, \$29,143; engineering technology, \$28,905; environmental, \$28,822; industrial technology, \$28,543. These data were collected between September 1989 and June 1990 (College Placement Council [CPC], 1990).

For Auburn University graduates, civil engineering is also the lowest paid branch of engineering. The Auburn University Placement Service reported that from Fall 1988 through Summer 1989 the average salary for civil engineering graduates who were placed through the Placement Service was \$25,822. Average annual salary in other engineering branches ranged from \$27,645 (industrial) to \$33,166 (chemical). Complete data are not available for the 1989-1990 academic year, but a review of salaries for civil engineering graduates reported so far range from \$25,000 to \$34,700, with most salaries between \$25,000 and \$30,000.

Comparing the results of the CPC nationwide salary survey and the Auburn University salary survey shows that salaries for Auburn University graduates are somewhat lower than the national figures. This is probably due to regional differences. Even so, starting pay for civil engineering graduates at the AHD (\$24,523) is still low compared to salaries for Auburn University graduates.

The most recent salary survey of the state highway departments or departments of transportation and the Federal Highway Administration (FHWA) was in July 1988. With 34 states (Alabama not included) and the FHWA reporting, the average (mean) annual

salary for graduate civil engineers was \$24,312 (Huxford & Humphrey, 1988). Although these older data are not directly comparable to current data, they do indicate that the AHD's salaries are only now catching up to pay levels from two years ago in other states and the federal government.

The starting salary at the AHD compares less negatively to starting salaries in the state highway departments/departments of transportation of Alabama's neighboring states. The annual starting salaries for civil engineering graduates in state highway departments/departments of transportation in these states--Florida, Georgia, Mississippi, and Tennessee--were obtained by telephone calls to them. These states' and Alabama's salaries were as follows:

Georgia	\$27,060
Florida	26,338
Alabama	24,523
Mississippi	22,583
Tennessee	21,372

The AHD falls in the middle of these figures. However, they do indicate that the AHD still is not competing with Georgia and Florida in terms of salary.

The student questionnaire included a question asking what they expected their starting salary to be. The students responded as follows: less than \$20,000, 0.0%; \$20,000-25,000, 15.7%; \$25,000-30,000, 59.6%; \$30,000-35,000, 22.5%; \$35,000-40,000, 1.1%; \$40,000-45,000, 0.0%; more than \$45,000, 1.1%. Most of the students appeared to be realistic about their salary expectations. However, comparing their expectations to the starting salary at the AHD indicates that a small percentage (15.7%) expect a salary in the range in which AHD's salary falls. Most expect a higher salary.

EMPLOYEE TURNOVER ANALYSIS

Employee turnover can be costly to organizations. An organization invests in an employee by providing training and experience. If that employee leaves, the organization has lost that investment and, in addition, must pay the costs to recruit and train someone else. The problem is compounded when, as in the case of civil engineers, there is a shortage of qualified labor, and there is increased competition among organizations for the qualified individuals.

Recruitment needs in organizations often are tied to turnover problems. However, the AHD management felt that turnover, other than the large number of retirements, was not a problem for them. An analysis of turnover over the past two years (August 1987-July 1988 and August 1988-July 1989) verified the impressions of AHD management. (See Tables 8 and 9 for these results.)

At the higher levels, most turnover was due to retirements. Other types of turnover, mostly resignations, were not at an unusually high rate and were almost entirely at lower levels. Other than retirements, the highest rate of turnover was for Engineering Assistant I (EAI)--8.4% in 1987-1988 and 9.5% in 1988-1989.

The turnover rate for Graduate Civil Engineer (GCE) and Professional Civil Engineer I (PCEI) is of particular interest in the context of this study. Turnover rates for PCEIs is important because the AHD would be concerned if, after providing new civil engineering graduates with training and supervision to obtain their Professional Engineer's (PE) license, a large proportion leave. However, this does not seem to be the case. The turnover rates for GCEs were 5.9% in 1987-1988 and 6.5% in 1988-1989, which are not unusual for recent graduates of professional programs. Rates for resignation of PCEIs were 2.3% in 1987-1988 and 4.2% in 1988-1989. Additionally, in those two years, there

was no turnover other than retirements for PCEs at the higher levels. It is a positive sign that turnover rates are so low in the AHD, indicating that once employed, most want to stay.

III. JOB PERCEPTIONS STUDY

Employee Interviews

Procedure. Open-ended interviews were conducted with 12 employees of the AHD in job classifications included in this research. These classifications and the number of interviewees in each were: Engineering Assistant II, 2; Civil Engineer I, 1; Civil Engineer IV, 1; Civil Engineer VII, 1; Graduate Civil Engineer, 2; Professional Civil Engineer I, 2; Professional Civil Engineer II, 1; Professional Civil Engineer III, 2. All were white, and 2 were female, 10 male. Tenure ranged from 4 to 37 years, with a median of 11.75 years. Most (10) were assigned to the general office, with 1 from a district office and 1 from a division office. One of those assigned to the general office worked exclusively in the field.

Findings. Many of the employees had family or friends who had worked for the AHD. This seems to be a common way for people to become interested in employment there. Another factor which seems to often draw people to the AHD is the desire for Montgomery, Alabama, natives to want to stay or return.

The employees discussed several things they liked about their jobs. Most mentioned the good benefits, particularly the retirement system, as a positive feature. Although most considered the pay too low, they felt that the good benefits compensated for the lower pay. Some said that they had turned down job offers which paid more because they felt that other factors are more important than pay.

There were several other positive perceptions that these employees had about their jobs. They saw their job as stable and secure. Most perceived it as a good work environment with good co-workers. A number of comments were made about the work itself, that it is interesting and challenging and has a variety of specialties available. Several employees mentioned the opportunity to learn, particularly the continuing

education that is offered.

The employees also discussed several things they disliked about their jobs. Many comments were related to the red tape and other restrictions imposed by state personnel procedures. The process to get hired is lengthy, and promotions are difficult and slow. The younger employees were particularly concerned about slow advancement. Decisions about hiring, promoting, rewarding, and firing are all restricted by state personnel procedures. Additionally, some were dissatisfied with the new performance appraisal system and adjusted pay scale.

An issue frequently mentioned was the resentment that long-term, non-degreed employees feel toward younger employees with degrees. This issue was mentioned by both older and younger employees. They perceived greater opportunities for college graduates and diminishing opportunities for those without degrees. This seems to be creating a great deal of conflict among employees.

The employees made some suggestions for improving recruitment. Many felt that a stronger training program for GCEs would make the AHD more appealing to recent graduates. Some said that training tended to be too specialized and that the engineers should be moved around for more variety of experience. Some commented on the lack of career planning. They said that younger employees need to see their future opportunities. Some felt that the training program for college students was successful in attracting college graduates, but many students do not know about it. They felt that if the program were advertised better and the students were informed of the procedure for applying, the AHD could attract more students.

Employee Survey

Sample. There were 921 AHD employees who responded to the survey and chose to complete the questionnaire. The percentages of the sample in the job categories studied were: Engineering Assistant I (EAI), 13.2%; Engineering Assistant II (EAI), 17.8%; Engineering Assistant III (EAI), 19.5%; Civil Engineer I (CEI), 13.0%; Civil Engineer II (CEII), 8.7%; Civil Engineer III (CEIII), 5.7%; Civil Engineer IV (CEIV), 4.0%; Civil Engineer V (CEV), 2.9%; Civil Engineer VI (CEVI), 1.2%; Civil Engineer VII (CEVII), 0.2%; Professional Civil Engineer Trainee (PCET), 1.9%; Graduate Civil Engineer (GCE), 3.2%; Professional Civil Engineer I (PCEI), 3.7%; Professional Civil Engineer II (PCEII), 2.7%; Professional Civil Engineer III (PCEIII), 2.1%; Professional Civil Engineer IV (PCEIV), 0.2%. Approximately 10% of the sample were female, approximately 5.3% were U.S.-born blacks, and approximately 0.2% were foreign-born. They ranged in age from 19 to 69, with a median age of 40. The number of years with the AHD ranged from 0 to 46, with a median of 17.

Questionnaire. The questionnaire administered to AHD employees included questions regarding personal and career background information, the Job Diagnostic Survey (JDS; Hackman & Oldham, 1980), questions regarding reactions to completing the questionnaire, and questions about attitudes toward the AHD. Part I contained 23 background questions and 2 questions about what the employees like and dislike about the AHD. Part II, Sections One through Seven comprised the JDS. Part II, Section Eight contained the reaction items. Part III allowed space for additional comments.

The JDS was developed to measure the variables in Hackman and Oldham's job characteristics model (1980). According to this model, core job characteristics produce critical psychological states which result in certain outcomes for the individual employee

and for the organization.

The five core job characteristics and their definitions are as follows:

1. Skill variety is the degree to which a job requires the employee to do a number of activities using various skills.
2. Task identity is the degree to which a job requires the employee to do a whole piece of work from beginning to end with a visible outcome.
3. Task significance is the degree to which a job has an impact on others, both within and outside the organization.
4. Autonomy is the degree to which a job gives the employee discretion in planning and completing the work.
5. Feedback is the degree to which a job provides the employee with information about the effectiveness of his or her performance.

According to the theory, these job characteristics combine to determine the potential of a job to motivate the employee. A Motivating Potential Score is calculated from these five variables.

The JDS also measures two additional job characteristics: (a) Feedback from agents is the degree to which supervisors and co-workers provide the employee with information about the effectiveness of his or her performance. (b) Dealing with others is the degree to which the employee must work closely with other people, both inside and outside the organization.

High levels of the job characteristics contribute to high levels of three psychological states: (a) experienced meaningfulness of the work, (b) experienced responsibility for outcomes of the work, and (c) knowledge of the results of the work. High levels of these psychological states contribute to four individual and organizational

outcomes: (a) high internal work motivation, (b) high growth satisfaction, (c) high general job satisfaction, and (d) high work effectiveness.

Additionally, the job characteristics model proposes that individuals respond differently to job characteristics according to three variables: (a) knowledge and skill, (b) growth need strength, and (c) context satisfactions (satisfaction with pay, job security, co-workers, and supervisors). As noted in the Recruiting Study, growth need strength is the individual's need for personal development and accomplishment.

The JDS contains scales for all variables in the model except work effectiveness and individual knowledge and skill. In this research the JDS was used to study the job characteristics and individuals' feelings about their jobs.

Procedure. The questionnaires were distributed by the AHD to all EAI, EAIIs, EAIIs, CEIs, CEIs, CEIs, CEIVs, CEVs, CEVs, CEVs, PCETs, GCEs, PCEIs, PCEIs, PCEIs, and PCEIVs. A total of 1740 questionnaires were distributed. The respondents signed a consent form indicating their choice whether or not to participate and enclosed the consent form and questionnaire in a sealed envelope. The envelopes were either turned in to their supervisor or mailed directly in.

Findings. The average (mean) scale score for the total AHD employee sample on each of the JDS scales is shown in Table 10. For comparison the overall national norms and the national norms for professional/technical workers (Oldham, Hackman, & Stepina, 1979) are also shown in Table 10. To provide a meaningful comparison, the difference (D) between the mean scores for AHD employees and the professional/technical norms in standard deviation units is also shown. Negative values mean that the mean score for AHD employees is lower than the norm; positive values mean it is higher. If the AHD mean score is one or more standard deviations above or below the norm, it is especially

meaningful (Hackman & Oldham, 1980).

The only mean score more than one standard deviation from the norm is individual growth need strength ($D = -1.23$). However, this lower level of growth need strength is due to results from EAs, CEs, and PCETs, as will be described in more detail. These results indicate that AHD employees in certain job categories have a lower need for personal development and accomplishment than most professional or technical workers.

Differences from the norm are more meaningful when the AHD employee sample is broken down by job categories. Table 11 displays the mean scores for EAI, EAII, and EAIII and shows the difference (D) between each one and the professional/technical norm in standard deviation units. As in the overall sample, individual growth need strength is lower than the norm in each of the three job categories (EAI, $D = -1.40$; EAII, $D = -1.23$; EAIII, $D = -1.40$). Also, autonomy is lower than the norm for EAI ($D = -1.10$). This should not be surprising. Since EAI is the lowest level job studied, EAI would be expected to have little discretion in planning and completing their work.

Table 12 shows the mean scores for CEI, CEII, CEIII, CEIV, CEV, and CEVI and the difference (D) between each one and the professional/technical norm in standard deviation units. There were too few CEVII to be able to analyze those results. Individual growth need strength is lower than the norm for CEI ($D = -1.23$), CEII ($D = -1.23$), CEIII ($D = -1.58$), and CEV ($D = -1.05$). Several mean scores were higher than the norm for CEV and CEVI. CEV were above the norm in general satisfaction ($D = 1.11$), job security satisfaction ($D = 1.00$), and compensation satisfaction ($D = 1.00$). CEVI were above the norm in task significance ($D = 1.05$), dealing with others ($D = 1.15$), Motivating Potential Score (overall potential of job to motivate) ($D = 1.07$), experienced meaningfulness of the work ($D = 1.03$), general satisfaction ($D = 1.01$), and

job security satisfaction ($D = 1.08$).

The PCETs, GCEs, and PCEs are of particular interest in this research due to the concern about being able to attract civil engineering graduates. Table 13 shows the mean scores for these job categories and the difference (D) between each one and the professional/technical norm in standard deviation units. (There were too few PCEIVs to analyze.) Individual growth need strength is lower than the norm only for PCETs ($D = -1.05$). (The mean score of 5.0 for PCETs is approximately the same as the mean score of 4.9 for the student sample.) It should be expected that graduates have a higher need for personal accomplishment because they have pursued higher educational levels and higher levels in their careers.

PCETs are lower than the norm on skill variety ($D = -1.40$), task identity ($D = -1.25$), task significance ($D = -1.26$), autonomy ($D = -1.50$), feedback from the job ($D = -1.00$), Motivating Potential Score ($D = -1.53$), experienced meaningfulness of the work ($D = -1.03$), experienced responsibility for work outcomes ($D = -1.53$), and internal work motivation ($D = -1.54$). These low scores are not surprising since PCETs are students working part-time or on a temporary basis, are inexperienced, and are at a low level of responsibility. Nevertheless, since PCET jobs seem to have a low potential to motivate, the PCET program may not attract the more ambitious students to the AHD.

In addition to PCETs, autonomy is lower than the norm for GCEs ($D = -1.20$) and PCEIs ($D = -1.00$). Like EAI, GCE is an entry-level job which may not be expected to provide a great deal of autonomy. However, since PCEIs also report a lower level of autonomy, this is likely an important characteristic of these jobs. This may be an indication that these employees are not given enough discretion in planning and completing their work.

Some scores were higher than the norm for PCEIIIs and PCEIIIs. PCEIIIs were above the norm in job security satisfaction ($D = 1.00$). PCEIIIs were above the norm in skill variety ($D = 1.00$), general satisfaction ($D = 1.11$), and compensation satisfaction ($D = 1.13$).

Some other findings from the employee questionnaire are of interest to the AHD. As would be expected in many organizations, a fairly large percentage of the employees reported having thought of quitting their jobs (62.4%) or having looked for another job (45.2%). However, it is interesting that about half (50.1%) reported that they had turned down jobs that paid more. Only 5.8% said that they planned to quit their jobs within the next year, and this included some who were retiring.

A particularly interesting finding is that 53.8% of the employee sample have family members who have worked for the AHD. This indicates that family relationships have probably been a large recruiting source in the past. This not only suggests limitations in recruiting practices but also may cause resentment and perceptions of favoritism from the other employees (See following sections on responses to open-ended questions).

The employee questionnaires contained the following open-ended questions:

- Give the 3 major reasons you like working for the Alabama Highway Department.
- Give the 3 major reasons you dislike working for the Alabama Highway Department.
- Use the space below to make any additional comments about how you feel about working for the Alabama Highway Department.

A review of the employee's responses to these questions reveals some conflicting perceptions of the AHD and numerous consistent perceptions. Both positive and negative

views were expressed, and many respondents left some or all of the open-ended questions blank. Of the EAs and CEs, 98.1% answered the questions about likes and dislikes, but only 35.8% gave answers in the space for additional comments. Response rates for PCETs, GCEs, and PCEs were much the same, with 96.0% giving answers about likes and dislikes and 36.5% providing additional comments.

Since many respondents did not respond to the open-ended questions, it is important to remember that the responses are not necessarily representative of all employees. Often, people with negative perceptions are more likely to respond to open-ended questions. Nevertheless, the responses can be quite revealing of employees' feelings.

Some responses are quoted in this report so that the issues can be described in the employees' own words. They are representative of many similar responses. Some are excerpts from longer statements, and any potentially identifying information has been removed. Otherwise, the quotes are preserved in their exact form, including errors in grammar, punctuation, and spelling.

In this section of the report, 79.2% of the quotes are from non-degreed employees (EAs, CEs) and 20.8% of the quotes are from PCETs and degreed employees (GCEs, PCEs). The quotes will be identified as being from degreed or non-degreed employees since the two groups may have different perspectives. Since PCETs are more logically grouped with GCEs and PCEs, they will be identified as degreed, although this is not literally true.

The respondents most frequently mentioned job security, good benefits, and the type of work as reasons they like working for the AHD. Many see their work as interesting and challenging, enjoy the chance to work outdoors, and experience pride and

satisfaction in applying their skills and seeing the results of their work. Other frequently mentioned positive aspects of their jobs were the opportunity to learn, reasonable hours, and good co-workers. A number of employees said that the pay is good or adequate or that there is good opportunity for advancement, although a much larger number said the opposite.

The following are some of the general positive comments about employment with the AHD, all from non-degreed employees:

1. *I feel content with the Hwy. Dept. and I like my job and the people I work with.*
2. *Since beginning work in [year], the Highway Department has fed, clothed, partly paid for a house, provided insurance, and other benefits, and has only expected me to fulfill my obligation of employment, honestly.*

I am a loyal member of the Highway Department who appreciates the job opportunity I was given and who enjoys coming to work nearly [number] years later.

3. *It is a great place to work!*

Many respondents mixed their praise with complaints. These people felt that they had a good job overall but, also, that there were problems in the AHD. The following are some examples of these comments, numbers 1-5 from non-degreed employees and number 6 from a degreed employee:

1. *I have enjoyed working with the Department. I have a personal sense of accomplishment and of a job well 'well done', despite, poor pay, and shortcomings in benefits, over the years.*
2. *I feel that even though the A.H.D. is a fine place to work, there is too much favoritism in promotions & job assignments.*
3. *I feel this could be a good job if the people treated each other with more respect.*
4. *The Alabama Highway Department as been very challenging and rewarding to me so far. I think the pay should be upgraded, but the benefits are exceptional.*
5. *The highway dept. could be a great place to work if they would improve promotion oportunities and salary for their personnel.*

6. *Even though the Highway Department does have some faults from a professional development and promotion standpoint, I do feel that it is a great place to work, an excellent Department and the best state department. As more of the older managers retire many of the problems are leaving with them unfortunately with a lot of experience leaving also. The department now has the opportunity (with these retirements) to change managerial style from the "good ol' boy" style to one of fair play and professionalism. Based on some of the recent promotions (in the upper level positions it appears that the same style is continuing. I think that we must change professional style and recruit professional degreed engineers to meet the increasing transportation demands by developing other ways to solve transportation problems.*

The most frequent dislikes of the employees were low pay, slow promotions, politics, favoritism, negative public opinion of state workers, and problems with personnel policies and procedures. Many felt that performance appraisals, tests, and promotions are unfair. Other frequent negative responses related to bureaucracy, nepotism, transfers, treatment of workers by supervisors, and inadequate equipment and out-of-date technology.

A number of employees complained about the high cost of dependent coverage on the insurance and having to travel too far to work sites at their own expense. There were complaints about discrimination against minorities and women as well as perceptions that minorities and women receive undeserved promotions. A number of respondents noted that the AHD is often stifled by employees' resistance to new ideas or change. Some commented that training for graduates is inadequate. Some responses reflected much distrust and concern that the survey was not truly confidential. Others expressed a strong belief that the survey would do no good and that the AHD would not change as a result of it.

The following are some of the most negative comments about employment with the AHD, all from non-degreed employees:

1. *What's to like--utter chaos!*

2. *Backwards thinking everywhere.*
3. *At this point, and under present conditions, I would not recommend anyone consider employment with the State of Alabama Highway Department.*

There were many comments about a broad array of negative factors. One respondent summed up some common complaints in his/her three major dislikes: "1. Politics--too much. 2. Nepotism--too much. 3. Racism." Three separate respondents gave their three major dislikes as: "1. Politics. 2. Politics. 3. Politics." Numerous respondents gave politics as one or two of their major dislikes.

Many comments were related to favoritism and political influences. Concerns were about politics within the AHD and also in relation to contractors and political administrations. These are some examples, numbers 1-3 from degreed employees and numbers 4-7 from non-degreed employees:

1. *Crass political decisions overriding good engineering.*
2. *The political appointment of less than qualified people to high positions.*
3. *Favortism and Buddy System in promotions.*
4. *If you are in the "circle" you advance rapidly. If not you are ignored.*
5. *Working for the Alabama Highway Department can be a very frustrating experience. This would not be so if performance appraisal guidelines and merit system rules were consistently adhered to by management. Cronyism and nepotism are so prevalent that objective appraisals and merited promotions and appointments are rare. Proper guidelines and rules are apparently developed by the Personnel Department, and then little or no effort is made to ensure that they are followed.*
6. *To be able to recruit and keep better qualified people the Highway Dept. needs to get rid of the good buddie network that allows supervisors to "take care of buddies" such as better job ass't. and higher evalation grades....This one thing has been and is widespread and is a big reson many qualified leave the Highway Dept.*
7. *I resent very much being politicians whipping boy. I am sick and tired of hearing how sorry we are. State employees are decent hard working people.*

A frequent complaint was about unfairness: often regarding tests for promotion, treatment of women and minorities, and differences between the Main Office and the Divisions. The following are selected examples of these responses, all from non-degreed employees:

1. *I feel the tests that I have taken for promotion have nothing to do with the skills I need to do my job.*
2. *As an Engineer Assistant II the Department requires job task knowledge about traffic control, construction signs, traffic stripe, concrete inspection, asphalt plant mix, use of nuclear density gauge to check compaction on soil and plant mix. Also correct documentation of all inspected items as well as knowledge on the use of project plans - Construction Manual and Testing Manual. These are just a few of the job tasks one should know to be an Engineer Assistant. Yet, when I took the EA-II and EA-III test (for promotion) not one single question about the before mentioned job knowledge was on the test. If the Department has these requirements and one needs to know them to be a Engineer Assistant then why aren't we tested on them?...People are being promoted because of high scores but this does not mean they have job task knowledge.*
3. *Some of the best employees do not do very well on examinations, which sometimes eliminates them from promotions.*
4. *Those qualified blacks that apply for jobs are turned down for the simple reason that Equal Employment Opportunity is written in paper but not practiced.*
5. *Women are still given little credit for job abilities. Training is usually limited to areas of work already being performed instead of increasing knowledge in all areas....Attitudes are changing but slowly. I doubt I will ever be placed in supervisory capacity over men workers even though qualified.*
6. *Having worked in both the Central Office and at the Division level, I have noticed many differences....The working conditions, opportunities for promotions, and supervisor/employee relationships were much better at the Central Office than at the Division level....I also feel that the Divisions, containing many long-term (20-30 year) employees, often are closed-minded to new ideas, change, modernization, and the advancement of younger employees entering the Highway Department to begin a career.*

A closely related concern is a lack of supervisory skill and leadership. A large number of comments were complaints of poor management. These are some examples, numbers 1-3 from degreed employees and 4-14 from non-degreed employees:

1. *There is no direct indication of how well you are doing. It is hard for person who works hard and is energetic to keep his motivation when there is no shortterm tangible evidence that his supervisors recognize his good work and ambition.*
2. *I'm never told how my work is. Good or bad, I never know.*
3. *This administrator is always looking for something wrong instead of the things which you do that are good.*
4. *Things have to be done "the way we've always done it."*
5. *Seems no one cares if you do a good job.*
6. *When a job is done well there is no recognition what so ever, no words of praise or no pat on the back.*
7. *The Project Engineers could treat you like you're somebody, instead of a knot on a log. On my job my Project Engineer doesn't trust anyone doing anything. He sometimes thinks, (I believe), he's the God Almighty. He treats people like children instead of grown men.*
8. *I would love to have a supervisor who is understanding if you do wrong would correct you in a nice not one like we have if you make a mistake he will curse you call you all kind of names we have reported him to [3 higher level managers] but they won't do anything about the matter if you can do anything I wish you would he makes a good job to where you don't want to come to work this is not only me but for most of the personnel....*
9. *I feel that all project engineers, and above should be required to attend a supervisor course to include leadership. Also, that more adherence to policy and procedures of the Highway Dep't should be followed by all employees.*
10. *Since working with the Highway Dept. I have found out that most of your middle management personnell are lacking in training of how to deal with problems and people.*
11. *Management likes to run the [unit] like boot camp in military.*
12. *Not enough input is allowed, on many things, from those it effects.*
13. *I feel my efforts and work are not appreciated or awarded.*
14. *The two face back stabbing supervisors.*

Some other comments were complaints of poor work performance and poor attitudes among the workers. The following are some examples, number 1 from a non-

degreed employee and numbers 2-3 from degreed employees:

1. *Over the years, since the beginning of my employment ([year]) to present, the personnel, their work ethics, attitudes, self-discipline, responsibility, and their desire to do a good job has deteriorated to an alarming stage.*
2. *I think the AHD has done a very poor job of recruiting qualified personnel. Our new grads seem at times to be people for that others have weeded out or are the way down the line choice of others. I say lets get the pay up where we can get quality grads.*
3. *I do not think the average employee is as concerned about his job performance as they use to be. I don't believe many AHD employees know what would be expected of them in private business.*

I am a college graduate...and I know how important education is-but we (AHD) do not stress the values of good work habits, dependability, pride in your work and none of the aforementioned qualities have a damn thing to do with education.

Many responses reflected the ongoing conflict between graduates and non-graduates. Many non-graduates are resentful that their pay and opportunities for advancement are limited and that young, inexperienced graduates seem to be getting the rewards. On the other hand, some graduates feel that they do not get the respect and responsibility they have earned. The following are some of these responses, number 1 from a degreed employee and numbers 2-6 from non-degreed employees:

1. *People without a degree are referred to as "engineers"*
Attitude of engineering assistants & "civil engineers" towards graduates & professional engineers
2. *I have enjoy working for the Highway Dept. these years but I feel that the one's that are out there doing the work dont get the promotion's that they deserve. That the college graduate who have little or no practical experience get the promotion's and the raises whether they deserve it or not and we the experienced worker we have to teach them how to do the job.*
3. *The college grad gets the big bucks & knows very little about the work construction.*
4. *I am deeply concerned about the current trend of utilizing Graduates in lieu of experience in numerous key jobs in the Hwy Dept.*

I am not "putting down" education. I just believe experience is also necessary. Education is wonderful and necessary, but I feel that graduates should have more hands-on experience before given a highly responsible job.

I believe that a more in depth training program for graduate engineers would be a valuable asset to the future of the Highway Department.

5. *I feel like a master sergeant that's been in the military for twenty years and being supervised by a first year arrogant Lieutenant.*
6. *The policy that a project engineer (who is not learned) simply because he has worked for 15 to 20 yrs and has a god-father should be considered to head a project is wrong to my own perception....Personnel with college education should be given more responsible positions. A lot of Civil Engineer graduates are hardly given responsible positions since they are meant only to be seen and not heard.*

Additional quotes regarding these and other topics are in the Appendix.

IV. CONCLUSIONS AND RECOMMENDATIONS

Major Findings From This Research

Some key problems in attracting and retaining qualified personnel were identified by the AHD management, and these problems were verified in this research. These include the following:

- Many engineers at the upper levels retiring or near retirement.
- Opportunity for early retirement.
- No active recruiting in recent years.
- Low salaries.
- Negative perception of the AHD.
- Slow advancement.
- Few rewards for good performance.
- No career planning.
- Personnel practices restricted by the State Personnel Board.

The following workforce trends will have a long-term impact on the AHD's ability to attract qualified personnel:

- Decreasing number of new workers entering the workforce.
- Decreasing number of civil engineering graduates.
- Increasing demand for civil engineers.
- Most of the new workers will be women, nonwhites, or immigrants.
- Small proportion of degrees in civil engineering are awarded to women, nonwhites, or immigrants.

This research provided some additional information related to these and other issues. The overall findings from the surveys of perceptions and attitudes of civil

engineering students and faculty and of AHD employees, as well as reviews of salaries and turnover, can be summarized as follows:

- The students viewed the AHD as being deficient in areas related to compensation, opportunities for advancement, opportunities for challenge and responsibility in the work, and treatment by management.
- The students viewed the AHD as being strong in areas related to family and other nonwork considerations, benefits, and a variety of career opportunities (for example, becoming licensed, working in the field, and development of expertise).
- The students ranked state departments of transportation 5 out of 10 in desirability of employment.
- Almost half (46.2%) of the students wanted to remain in Alabama after graduation, and 45.1% said they would take the best offer regardless of whether it was in the state or outside the state.
- The faculty viewed the AHD as being deficient in areas related to compensation, opportunities for challenge and responsibility in the work, and perceptions of others.
- The faculty viewed the AHD as being strong in areas related to family and other nonwork considerations, benefits, and a variety of career opportunities (for example, becoming licensed and development of expertise).
- General job satisfaction was above the national average for professional/technical jobs in almost all of the AHD job categories studied, and was quite high for Civil Engineers V and VI and Professional Civil Engineers III.
- Satisfaction with specific aspects of the job, such as job security and

compensation, tended to be higher for the upper-level job categories.

- Individual growth need strength (the need for personal development and accomplishment) was low in most job categories studied, particularly Engineering Assistants and lower-level Civil Engineers.
- The Professional Civil Engineer Trainee job seems to have a low potential to motivate.
- Professional Civil Engineer Trainees, Graduate Civil Engineers, and Professional Civil Engineers I perceive little autonomy in their jobs.
- About half (50.1%) of the AHD employees reported that they had turned down jobs that paid more, and very few said that they planned to quit their jobs within the next year.
- More than half (53.8%) of the AHD employees have family members who have worked for the AHD.
- The open-ended questions elicited positive responses most often relating to job security, benefits, and enjoying the work.
- Negative responses elicited by the open-ended questions most often related to low pay, slow promotions, politics, favoritism, negative public opinion of state workers, and problems with personnel policies and procedures.
- Salary information indicates that starting pay for civil engineering graduates at the AHD falls somewhat below national averages, slightly below the average for civil engineering graduates at Auburn University, and slightly below expectations of students included in this survey.
- The AHD's turnover rate was very low. Retirements accounted for a very large portion of the turnover, and all resignations were at lower levels.

Reviewing the available information leads to the identification of the following major problems:

- The AHD is addressing these problems after they occurred. A program of human resource planning--forecasting of labor supply and demand, turnover analysis, and succession planning--prepares organizations for future changes, and the AHD had been weak in this area in the past.
- The AHD needs to attract civil engineering graduates, but there is a worsening labor shortage in this field.
- In the past the AHD had no program of active recruiting, and its ties to universities had been weak.
- The AHD may be limited in its ability to attract civil engineering graduates because of deficiencies or perceived deficiencies in pay, challenge, and career development opportunities.
- Any program to attract civil engineering graduates to the AHD must be implemented in such a way that the severe conflicts between degreed and non-degreed employees are not increased.
- The AHD is unattractive to many people as an employer due to perceptions of political influence, favoritism, unfair personnel practices, and outdated, authoritarian management styles.

Actions Taken By the AHD

The AHD has been concerned about these problems and is in an on-going process of developing and improving programs to remedy the problems. A number of changes were made before and during this research. Thus, this study provides a snapshot of an evolving organization in which we see the old organization it has been as well as the new

organization toward which it is moving.

The following are some of the actions taken by the AHD to address the problems discussed in this report:

- Shortly before this study began, the AHD hired a Director of Training and Recruitment to lead and coordinate many of these activities.
- In the area of human resource planning, the AHD is gathering workforce demographic information to determine needed workforce levels, to determine rates of separations, and to project employment needs by classification based on attrition rates.
- The AHD has recently put a new emphasis on recruiting by directing attention to its existing Engineering Education and Training Program (through which students are employed by the AHD), by visiting student chapters of the American Society of Civil Engineers (ASCE), by participating in career days and job fairs, and by conducting personal interviews with university students. The Engineering Education and Training Program has been strengthened by the establishment of an Engineering Student Aide position for students who have just graduated from high school. Additionally, the AHD plans to begin outreach visits to high schools and junior high schools to encourage early interests in civil engineering and in the AHD.
- The AHD has had some programs to develop management skills for all levels of supervisors, and some management development programs have been provided for upper-level managers. Programs for training mid-level managers are being developed. Thus, the AHD will be providing training for all levels of management. The training is provided through various sources--the State

Personnel Department, Continuing Education Programs at colleges, the Alabama Certified Public Manager Program, the Highway Users Federation with the American Association of State Highway and Transportation Officials, and independent training organizations.

- The AHD, with the support of the State Personnel Department, has made the following changes to increase the attractiveness of employment with the AHD:
 - (a) a six-months rather than twelve-months probationary period for Graduate Civil Engineers with eligibility for a salary increase at six months and (b) the flexibility to offer an entrance salary above the minimum for Graduate Civil Engineers based on grade point average and experience. Requests for additional changes are pending, including (a) recognizing a Master's degree in civil engineering in determining entrance salary and (b) establishing salary advancement for Professional Civil Engineer Trainees based on scholastic work and work experience.

Recommended Actions

The top management of the AHD has a strong desire to continue these kinds of positive changes. In addition to steps already taken, continual improvement in the following areas is recommended.

Human resource planning. The AHD needs to continue efforts to forecast labor supply and demand in order to estimate future hiring needs. This would include projections of human resource needs in the AHD to determine the number and types of individuals needed each year and analysis of turnover (resignations and retirements) to determine the future internal supply of personnel. Although management usually discusses reasons for resignation with those who resign, establishing formal exit interviews

would provide a record to be systematically reviewed. Some organizations have an exit form to be filled out by terminating employees.

Succession planning (planning for possible replacements for a position if the incumbent leaves or retires) would be quite beneficial to the AHD. The plan includes, for every position, the names of potential replacements and their preparedness to perform that job. If no one is prepared, the necessary training can be provided. Thus, for any vacancy there is a replacement prepared to perform the job.

Attraction strategies. There are three major types of attraction strategies: (a) improving recruitment practices, (b) improving employee inducements, and (c) expanding the applicant pool (Rynes & Barber, 1990). The AHD has used each of these to some degree but may benefit from seeking additional attraction strategies.

To increase applicant attraction, several aspects of recruiting activities may be altered, including the person or persons who represent the organization (the recruiter), the message conveyed to the prospective applicants, the sources used to locate applicants, and the timing of recruitment activities (reducing time between stages or making an offer before other employers). In recent years the AHD had put little effort into recruiting, but they have recently taken steps in this area by hiring a recruiter. The AHD is in the process of strengthening ties with universities, and may want to also consider giving presentations on campus, participating in joint projects with faculty and students, and publicizing the student training (PCET) program. The AHD has a number of strengths (such as good benefits, job security, and the opportunity to work on large-scale projects) that should be publicized in its recruiting messages. The AHD is at a disadvantage because it cannot offer a job until the student has graduated. It would probably help in recruitment if the State Personnel Department would allow offers to be made contingent

on graduation.

Although typically low in cost, improving recruitment strategies usually has a limited impact on attraction. However, in the case of the AHD, a larger impact would be expected because recent efforts in recruiting have been dramatically improved.

Employment inducements are any changes in job attributes designed to make the job more attractive. These may include increases in pay, better benefits, better working conditions, career paths within the organization, flexible hours, child- or elder-care, or any other change that potential applicants would find desirable.

Several changes have already been made by the AHD (as described in the previous section). Some additional inducements which may be of help to the AHD include higher pay and better career planning. Currently, career planning is an informal process at the AHD. It may be helpful to develop formal career ladders and to formally provide career information and advice to employees. A mentoring program may be particularly effective in promoting the career development of young professionals. Mentoring is a program in which an older, more experienced person is paired with a younger person to provide advice, encouragement, and other help to advance the younger person's career. Sometimes this occurs informally in the AHD, but setting up a formal program and involving more people in the process would maximize the benefits.

The AHD provides a one-year training program for new graduates. Training programs contribute to career development and also allow for more early career responsibility. To serve as an inducement to employment, the training program needs to be strong, and information about the training should be communicated to prospective applicants. For example, the Florida Department of Transportation provides a strong two-year training program for civil engineering graduates which attracts a large number of

good applicants.

The AHD may be able to make the workplace more attractive by creating a more desirable work climate (that is, a work environment free of political influence, favoritism, unfair personnel practices, and authoritarian management styles).

Inducement strategies are often high in cost. However, there is considerable evidence that inducements are particularly effective in increasing applications and acceptances. Moreover, high levels of inducements seem to attract the better applicants.

Applicant pools can be expanded by targeting individuals who are less marketable. Although this strategy can include considering people with lower qualifications, this is not necessarily the case. There may be potential applicants who are qualified, but because they are not in the group who traditionally enter that occupation, they are often overlooked. These nontraditional individuals may be minorities, women, older people, or immigrants. Changes in workforce demographics will make it necessary to target nontraditional workers. The AHD has traditionally recruited recent college graduates, but the stability, benefits, and other advantages of a state job may appeal to those in the over 30 age group. To attract minorities and women, it may be necessary to make the work environment more appealing. Providing training in managing a diverse workforce and implementing mentoring programs are some ways to facilitate the transition from a white male-dominated environment to a diverse environment.

As with employment inducements, this strategy is likely to greatly improve attraction. The costs may be low or high, depending on which methods are used to target a particular group.

The three attraction strategies, recruiting, inducements, and attraction, may be used in combination. Designing inducements to attract a particular pool may be a cost-

effective strategy. Some examples would be offering education benefits and flexible hours to attract people interested in furthering their educations (a strategy which also usually benefits the organization) or offering part-time work or flexible hours to attract women with children. Recruitment practices may be changed to attract particular applicant pools--changing recruitment sources, using recruiters similar to targeted groups (female recruiter to attract women, black recruiter to attract blacks), and/or changing recruitment messages.

Developing the workforce. If conditions are so extreme that attraction strategies are still not enough to meet labor needs, the organization should develop and implement human resource programs or make broad strategic decisions in response to the labor shortage (e.g., redesigning jobs so they can be performed by people with lower qualifications, retraining current employees, or canceling a proposed project). One powerful technique is to become involved in developing the workforce.

The AHD could have a long-term influence on the labor supply by becoming involved in producing qualified personnel. Close ties with universities help attract students to civil engineering. High school students and even younger children can be educated about opportunities in the field of civil engineering. If these students are encouraged early to take math and science courses, they may be more likely to pursue a civil engineering degree. The AHD plans to have outreach visits to high schools and junior high schools to encourage early interests in civil engineering and the AHD. Additionally, many current AHD employees may be interested in seeking a civil engineering degree if assistance is provided (flexible or part-time hours, assistance with expenses, classes taught on-site, etc.).

Cooperative programs with two-year colleges may make a college education more feasible for people with limited financial resources. Some two-year colleges have set up

joint programs with universities which give a technology degree at the end of the two-year program which qualifies the individual for work as a technologist. All of the credits from the two-year college then transfer to the university and can be applied toward a Bachelor's degree. This type of program could help the AHD (a) by helping educate people who otherwise could not afford college, thereby ensuring a supply of qualified employees and (b) by producing technologists who have the potential to advance to Graduate Civil Engineer and Professional Civil Engineer. Furthermore, such a program would support, supplement, and possibly replace some of the in-house training currently provided.

Modernize management style. The AHD is faced with the need to adapt to many changes, and these changes will probably continue at an accelerating rate. The old authoritarian management style which has been traditional in most bureaucratic organizations is unsuitable for these conditions. Furthermore, younger employees tend to be more dissatisfied in this type of organization. The AHD is in the process of modernizing its management style and, as previously described, has been providing training to develop management skills. It is important for these changes to continue, and the AHD should focus attention on some management issues which seem to be of particular concern.

The first issue of concern is that many, both within and outside the organization, view the AHD as a "good old boy" system plagued with favoritism and politics. There does not seem to be a lack of objective personnel procedures but, instead, situations where existing personnel procedures are not followed. For the AHD to have a consistent and objective personnel system, all supervisors and managers must support and adhere to the system. The change in attitude necessary to make this occur usually is accomplished better through employee participation at all levels. Management can ask for help and set

up a participative problem-solving process (for example, a task force composed of representatives from various levels and sections within the organization). This process may be used both for developing ideas for changes and for implementing the changes. When members of an organization participate in changes, they are more likely to be committed to making them work and also more likely to have a consistent vision of how things should be done.

If the AHD needs assistance in developing participatory processes, an organizational development consultant may be helpful. Organizational development professionals consult with organizations about how they operate in terms of leadership, decision making, communication, and other process-oriented aspects of management (that is, how things are done rather than what is done). The consultants facilitate change in such a way that the resistance to change is reduced. Although an organizational development intervention may be helpful, it would be costly and lengthy and would require a commitment from all levels of management, particularly top management.

The second management issue on which the AHD needs to focus is the ongoing conflict between degreed and non-degreed employees. Any proposed changes must be sensitive to this issue and be implemented in such a way that the conflict is not exacerbated. Furthermore, actions to diffuse the conflict should be considered. Perhaps the most effective approach to diffuse the conflict in the long term is to provide opportunities for non-degreed employees to further their education. This could be accomplished through a joint program between a two-year college and a university, as described in the previous section.

The two-year program would produce technologists prepared for highway work. The AHD would need to develop a job classification for technologists which could

eventually replace non-degreed civil engineers. This type of change would need to be gradual, with current employees grandfathered in according to the old system so that no one would experience a loss of status or feel like they have worked toward something which has been taken away from them.

The two-year technologist degree would be helpful in several ways: (a) The program would provide some of the training now conducted in-house by the AHD. (b) The technologists would come to the job better prepared than high school graduates. (c) The job of technologist would provide an identity for non-degreed employees without putting them in direct competition with degreed civil engineers.

In a joint program between a two-year college and a university, all credits would automatically transfer to the university. Thus, the two-year technology degree not only prepares the individual for work but also prepares him/her to pursue a Bachelor's degree. Then, the technology job classification would offer the opportunity for continued advancement. The AHD could facilitate employees' pursuit of a Bachelor's degree by providing tuition assistance and flexible hours and by coordinating with the university to provide instruction at the worksite.

One caveat regarding the implementation of this type of educational program is that it must tie closely into the human resource planning system to guard against producing too many civil engineering graduates. Also, if it becomes necessary to limit access to the program, the basis of selection should be fair and also be perceived as fair by the AHD employees.

In summary, the recommended actions for the AHD to improve recruitment and retention of qualified personnel include the following:

- Continue and expand human resource planning, including formal exit interviews and succession planning.
- Continue to strengthen ties with universities through presentations on campus, joint projects with faculty and students, and publicizing the student training (PCET) program.
- Advertise the AHD's strengths as an employer, such as good benefits, job security, living in Alabama, and the opportunity to work on large-scale projects.
- Request that the State Personnel Department allow offers for employment be made before graduation by making them contingent on graduation.
- Make employment with the AHD more attractive with higher pay, a strong training program, mentoring, a formal career development program, and a desirable work climate.
- Attract minorities and women by creating a more appealing work environment through mentoring programs and training for managerial personnel in managing a diverse workforce.
- Expand recruitment activities to include those in the over 30 age group.
- Become involved in developing the workforce through ties with schools and universities and making it easier for AHD employees to further their education.
- Continue to modernize the management style in the AHD by providing training to develop management skills.
- Encourage supervisors and managers to adhere to established personnel procedures through participative problem-solving processes.

- Promote establishment of a joint program between a two-year college and a university in order to produce technologists prepared for highway work and also prepared to pursue a Bachelor's degree.

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APPENDIX

This appendix contains some additional quotes from AHD employees responding to open-ended questions on the questionnaire (see Job Perceptions Study). In this appendix, 67.9% of the quotes are from non-degreed employees (EAs, CEs) and 32.1% are from PCETs and degreed employees (GCEs, PCEs). Again, PCETs are grouped with degreed employees.

As noted before, these responses are not representative of all employees. Open-ended questions often produce responses which are biased toward the negative. However, quoting the employees allows them to express themselves in their own words. Some of these quotes are excerpts from longer statements, and any potentially identifying information has been removed. Otherwise, the quotes are preserved in their exact form, including errors in grammar, punctuation, and spelling.

These are comments from non-degreed employees:

1. *Working for the Alabama Highway Dept. has been most enjoyable and rewarding. I know of no other profession that I would rather have done.*

I consider it an honor to have had the privilege of working and making a career with the Alabama Highway Department. I am very grateful to the State of Alabama for giving me the opportunity.

2. *When people ask where I work, I'm proud to say that I work for the Alabama Highway Dept. I have worked here [number] years and hope to be able to retire here.*

Of all the state agencies where my friends or family work, I feel like the Highway Dept. is the very best of all state agencies.

I have had many different supervisors in my [number] years, and I have loved and respected them all. I feel like my co-workers and supervisors are part of my family.

I have a nice comfortable office to work in; pleasant people to work with; receive respect, guidance, and praise from my supervisors; the latest up-to-date equipment to work with; freedom in my job to use my own initiative; and excellent fringe benefits and a good salary for a female. What else could you ask for in a job!

3. *I thank God each morning for my job. I like the work, I like the different phases, different locations, (to a certain extent) & different people I work with on different projects. I take pride in working for the State of Alabama. I am thankful God has blessed me with a job where I don't have to worry if I'm going to have a job tomorrow, or be broke & laid off.*

However, it bothers me to see (some) people work thier tail off, and never even get a pat on the head; and then to look around and see someone, (some of whom have never done any work except always be in the spotlight) to have positions made available to them & have them carried right on up the ladder with promotions and/or 6 month raises, not from the result of earning it, but by having friends in the right places.

Also, there is too much differences in the same positions, etc., state wide. -Some places pay overtime, routinely, while some places will not. Some departments get per diem, routinely, while others do not (if you are working out of your home district).

With all things considered, it's a great place to work, but hard work, ability, & dependability, and a good work attitude isn't necessarily what you need for advancement. There are politics in the system, no matter what administration is in office.

4. Well if the mert system was fair, there is no problem with the A.H.D. But instade of the mert system we have the buddy-buddy system, or who you know, and I guest I don't know no body. So I just work my ass off and forget about it I guess, because I don't think this system will never change. It was hear whind I was born and it will be there when I die. Also I talk with a lot of people with the A.H.D. and I am not the only one feel like that. People would be shock at the things go on.----Well maybe not.
5. I feel that there is entirely too much favoritism shown to a few select people. I feel this so strongly that I think the Department needs a new classification entitled Professional Ass Kisser--how else would you categorize an individual that gives his [boss] free [gift], invites him over for [dinner] from time to time, and takes him [recreational activities].
6. I have enjoyed working for the Alabama Highway Department for the past [number] years. However, in all fairness to the black race, I would like to see a real increase in employment especially in the offices and design bureaus. Also, I would like to see greater fairness in the promotions and responsibilities of these employees.
7. Project Engineer does not think females should be Inspectors on project. He has problem believing a good job outside could be handled by a woman. He thinks I should be inside even when my work is caught up.
8. Remove the unfairness: the unconcern for employee welfare; and the large amount of stereotyping that goes on within the Highway Department then it will become a really good place to work....

There is a great deal of unfairness in applying Policies.

9. *Supervisor tells you something to do, and then don't back you up.*
Supervisor does not have respect enough to tell your mistake in private.
Supervisor likes to use profanity to you in front of co-workers.
10. *Generally, working for the Highway Dept. is a very good job. However, my department supervisor plays "favoritism" in recognition, in overtime work, in promotions and in "2" sets of rules for his employees. He is very "bad" about making "on the spot" policy for his employees.*
He claims to have an "open-door" to his office, yet he will not listen to suggestions, or believe his employees. Its either his way or else.
When we complain about overtime, (which we do not receive overtime pay or comp. time) he gets very indignant and threatens us with "other" alternatives.
I have been on the promotion list for over 2 years, & have been passed over for promotion to [job classification]. I feel that If I can pass the test, I should be promoted, or at least given the opportunity to decline the job.
11. *Public sentiment-(The public thinks we're bums)*
12. *I may be just a "damm old state employee, but by God my wife and children I try to feed and clothe are real people!*
13. *I wish the State had a system to pay for education to advance. For example: Paid tuition and books for those interested in attending Civil Engineering at Auburn University. Private companies do this to help their employees to advance and in turn, helps their companies.*
The Highway Dept. is good about working students part-time or alternating quarters (co-op), but what about employees with families that want to advance but can't afford the tuition and books due to financial responsibilities? A contract between the State Highway Department and an employee would guarantee payment of college expenses and continuing the employee's employment with the State, (in other words the employee would be obligated to continue working for the State after graduation or partial college work for a predetermined amount of time.)
14. *I would like to advance much further with the Department, however, I am limited in the amount of education I have logged. I do not possess a colledge degree although I would like the opportunity to acquire one. I feel the Department could help in this instance by sponsoring some type of a work/schooling program in conjunction with Alabama's colledges where the employee could continue to support a family while attending school. Maybe the Department could help put employees through colledge and in return the*

employee pledges to work for the Department for five, seven or even ten years after graduation....Odds are that after these years of service the employee would continue until retirement age.

15. *Eliminate some of the politics, find a fair system to evaluate employee, too many personal feelings are involved the grading system, this should be base on performance only. I see that minorities are treated unfairly when it come to transfers, promotions, and it would be nice to see more minorities in supervisory positions.*

16. *The inability to apply current rules, policies and specifications uniformly due to politicians and friends influence with my Supervisors.*

The broad scope of responsibility and liability compared to the very limited authority.

The inability to hire the best qualified applicant and the time consuming, almost impossible task of terminating someone, no matter how useless they may be.

17. *There are a few things that I think can be improved and they are as follows:*

1. Formal Training - This is something that I think should take top priority, but there appears to be a lack of it for all employees. If training is done it is done as an after thought or at least it appears to be that way.

2. Management - Engineers are taught trigonometry, hydraulics, soils, physics, chemistry, engineering economics, but not management. The engineer is not taught how to relate to people, how to motivate people and keep them motivated. How to pat a man on the back for a job well done, or how to get the most out of people. A raise is not always the answer to make a man work harder at his job. Dealing with people is a skill taught and learned over a period of time. Management skills need to be taught to people, both graduate and non-graduate, and they need to be introduced to these people before they are placed in a supervisory position.

3. College Graduates - College recruiting is not the sole answer for the department's future. The people who train college graduates and others who come to work for the department, are the people who do the day to day chores. When a position comes open with a lot of responsibility the non-graduates are very seldom considered even though, the position may be set up for either non-graduate or graduate. This appears to becoming the rule rather than the exception. If the career employees were to rebel and refuse to train anymore college graduates, where would be department be in the future. I'm speaking of equal consideration for promotions and responsible positions only, where the man is qualified.

18. *I think too much emphasis is put on college degrees. I think experience and a mans intelligence and abilities should be of utmost consideration. I think a person should be paid according to his abilities and responsibilities.*

19. *Also this survey will do no good whatsoever! It will probably end up in a file somewhere in the basement. Thanks anyway!*

These are comments from degreed employees:

20. *It may seem that most of my answers are very negative toward the Alabama Highway Department, and they are, but there are some positive things about my job. Funny, right now I can't think of them.*

21. *The inability to reward, dismiss, or stimulate those most deserving.*

22. *Non-professional working environment.*

Hand picking of persons for promotion - not based on experience and education.

Lack of professional job development.

23. *I don't like the idea of my success being determined by my political or afterwork relationships. There is too many "good ol boy" decisions made here (i.e. someone getting promoted more on if the person is from the bosses hometown)....I haven't been here long but I can see that the promotions in the upper ranks depend on [outside work activities with the boss].*

24. *The Alabama Highway Department has a way of taking a hard working, energetic person and turning them into a very indifferent person....They operate under a double standard practice. (What they break their backs to do for some, they will not even make an effort for others.)*

The supervisors are not trained in dealing with employees under them. They still live under the idea that they must keep their people down in order to look good themselves or to keep others from moving over and above them....

The Highway Department system must make changes and adopt a new and different way of doing things if it is to improve recruitment of qualified people and retain those individuals that are already employed here.

25. *I think that the hiring & promotion system needs a lot of improvements and am glad to see this survey.*

In the short [time] that I have been with the State Highway Department, I have seen, and worked with several people that I feel are not qualified to hold the job they hold.

Engineering is a math oriented profession. There are people being hired who cannot do basic "8th grade" math. This tells me that (1) Our schools are not teaching the students what they need. (2) The tests that are used are

hiring & promoting are too easy.

I understand that in recent years, these tests have been made easier. Why?!

Have we as a society lowered our standards to accept the sub-standard? Or are we going to go back to rewarding the people who can meet the standards or exceed the standards?

26. *Many times supervisors have no hands-on experience in the work they are supervising.*

There is a tendency by the department to place professional & graduate engineers into deadend and menial jobs while placing people with lesser education into positions of responsibility. Also some employees are worked out of classification which is detrimental to morale.

The department has been lax in training its personnel and has failed to adequately modernize and computerize its operations. Many procedures used today are the same used in the 1950's.

27. *As a premise to the following statements, I wish to state that I am a college graduate and have benefited from the situation described below, but feel that it is wrong and steps should be taken to change it.*

The emphasis of the State and the personnel office in the past few years seems to have been to recruit and advance college graduates and ignore the current non-graduate career personnel who have given many years collectively to service to the State of Alabama. Too many of the people are being passed over for promotions which are given to "young" graduates who, in many cases, were trained by the person being passed over. This attitude creates a situation where career employees have little chance for advancement above a certain level and have little hope for additional compensation, monetary or otherwise. These career people and their replacements are necessary for state government to function as few graduates are, and rightly so, willing to perform "menial" tasks or physical labor on a continual basis. If the current employees are not satisfied with their jobs, I question their ability to attract and motivate competent people as replacements.

I do not have a solution to the above situation, but some provision should be made for career employees who have been at the top of their pay scale for several years to have their position upgraded. This should not be automatic, but should be tied to the initiative of the employee in obtaining the necessary training and taking the tests necessary to be available for promotion. Another possibility would be to advance his pay scale above the normal for his position periodically.

28. *If the Highway Department is serious about recruiting more qualified personnel, then the jobs should be made more challenging and financially rewarding....My previous job was far more challenging and I had great responsibilities. I took pride in my work and felt that people appreciated and respected my efforts. I can not say that about my current position.*

Table 1

Students' Expectations About Employment with the AHD

M

Opportunity to become licensed	5.34
Working in the field	5.26
Time with your family	5.11
Becoming an expert in what you do	4.99
Fair company policies	4.98
Chance to use your education and abilities	4.98
Opportunity for advancement	4.96
Feeling that what you do is important	4.95
Good fringe benefits	4.93
Great job security	4.80
Opportunities to learn new things from my work	4.79
A sense of worthwhile accomplishment in my work	4.74
Enough pay to be secure	4.74
Expert supervision	4.71
Time for leisure activities	4.68
Opportunity to do design work	4.60
Your family's satisfaction with your job	4.58
Chance to exercise leadership	4.50
Opportunity to use state-of-the-art technology	4.46
Variety in work assignments	4.46
High level of responsibility	4.44
Very friendly co-workers	4.42
High respect and fair treatment from my supervisor	4.41
Opportunity to pursue a master's degree	4.41
Rewards for good work	4.39
Living in your desired geographic location	4.34
Stimulating and challenging work	4.22
Being seen as successful	4.21
Opportunities for personal growth and development in my job	4.14

Table 1 (continued)

M

Chances to exercise independent thought and action in my job	4.04
Prestige of the employer	4.00
Having control over your project	3.99
Lack of pressure in your job	3.87
Opportunities to be creative and imaginative in my work	3.84
High salary and good fringe benefits	3.72
No requirement to transfer to a new location	3.69
Quick promotions	3.33
Not having to travel on the job	3.29
A very high salary	3.15

M = Mean rating on a scale from 1 to 6

Table 2

Importance of Job Characteristics to Students

	<i>M</i>
Opportunity for advancement	5.41
Enough pay to be secure	5.26
Fair company policies	5.23
Chance to use your education and abilities	5.14
A sense of worthwhile accomplishment in my work	5.09
Opportunity to become licensed	5.10
Time with your family	4.99
Becoming an expert in what you do	4.98
High respect and fair treatment from my supervisor	4.97
Great job security	4.96
Feeling that what you do is important	4.96
Opportunities to learn new things from my work	4.93
Opportunities for personal growth and development in my job	4.87
Variety in work assignments	4.84
Expert supervision	4.73
Stimulating and challenging work	4.73
Good fringe benefits	4.72
Rewards for good work	4.71
Chances to exercise independent thought and action in my job	4.68
Opportunities to be creative and imaginative in my work	4.65
Time for leisure activities	4.64
Opportunity to use state-of-the-art technology	4.59
Chance to exercise leadership	4.54
Very friendly co-workers	4.54
Having control over your project	4.51
Working in the field	4.50
High salary and good fringe benefits	4.49
High level of responsibility	4.44
Your family's satisfaction with your job	4.41
Living in your desired geographic location	4.26

Table 2 (continued)

	<i>M</i>
Opportunity to do design work	4.20
Opportunity to pursue a master's degree	4.09
Prestige of the employer	4.08
A very high salary	3.99
Quick promotions	3.95
Being seen as successful	3.88
No requirement to transfer to a new location	3.49
Lack of pressure in your job	3.17
Not having to travel on the job	2.83

M = Mean rating on a scale from 1 to 6

Table 3

Difference Between Students' Expectations About the AHD and Their Ratings of Importance

D

A very high salary	-0.84*
Opportunities to be creative and imaginative in my work	-0.81*
High salary and good fringe benefits	-0.77*
Opportunities for personal growth and development in my job	-0.73*
Chances to exercise independent thought and action in my job	-0.64*
Quick promotions	-0.62*
High respect and fair treatment from my supervisor	-0.56*
Having control over your project	-0.52*
Stimulating and challenging work	-0.51*
Opportunity for advancement	-0.45*
Variety in work assignments	-0.38*
A sense of worthwhile accomplishment in my work	-0.35*
Enough pay to be secure	-0.35*
Rewards for good work	-0.32*
Fair company policies	-0.25*
Chance to use your education and abilities	-0.16
Great job security	-0.16
Opportunities to learn new things from my work	-0.14
Opportunities to use state-of-the-art technology	-0.13
Very friendly co-workers	-0.12
Prestige of the employer	-0.08
Chance to exercise leadership	-0.04
Expert supervision	-0.02
Feeling that what you do is important	-0.01
High level of responsibility	0.00
Becoming an expert in what you do	0.01
Time for leisure activities	0.04
Living in your desired geographic location	0.08
Time with your family	0.12
Your family's satisfaction with your job	0.17

Table 3 (continued)

	<i>D</i>
No requirement to transfer to a new location	0.20
Good fringe benefits	0.21
Opportunity to become licensed	0.24*
Opportunity to pursue a master's degree	0.32*
Being seen as successful	0.33*
Opportunity to do design work	0.40*
Not having to travel on the job	0.46*
Lack of pressure in your job	0.70*
Working in the field	0.76*

D = Difference (Expectations - Importance)

* Statistically significant difference, $p < .05$

Table 4

**Students' Ranking of the Desirability of Types of
Organizations (Faculty Ranking of Opportunity in Parentheses)**

1. Specialty consulting firm (environmental, structural, etc.)	(1)
2. Construction company	(2)
3. General engineering consulting firm	(3)
4. Federal government agency (Corps of Engineers, EPA, NASA, FAA, FHWA, etc.)	(4)
5. State department of transportation	(5)
6. City engineering department	(9)
7. County engineering department	(10)
8. Aerospace company	(7)
9. Petroleum company	(6)
10. Materials or equipment producer (as a technical sales representative)	(8)

Table 5

Faculty Perceptions of Opportunities in the AHD

	<i>M</i>
Opportunity to become licensed	5.24
Great job security	5.23
Time with his/her family	5.19
Time for leisure activities	4.91
Opportunity for advancement	4.85
Working in the field	4.76
Good fringe benefits	4.75
Living in his/her desired geographic location	4.71
Very friendly co-workers	4.63
Fair company policies	4.40
Chance to use his/her education and abilities	4.33
Opportunity to do design work	4.30
Opportunities to learn new things from his/her work	4.16
High respect and fair treatment from his/her supervisor	4.11
His/her family's satisfaction with the job	4.10
Becoming an expert in what he/she does	4.10
Variety in work assignments	4.10
Enough pay to be secure	4.05
Feeling that what he/she does is important	4.05
Lack of pressure in his/her job	4.05
Chance to exercise leadership	4.00
Expert supervision	3.90
Rewards for good work	3.81
A sense of worthwhile accomplishment in his/her work	3.77
No requirement to transfer to a new location	3.71
Having control over his/her project	3.70
High level of responsibility	3.68
Being seen as successful	3.68
Opportunity to pursue a master's degree	3.65
Opportunities for personal growth and development in his/her job	3.64

Table 5 (continued)

	<i>M</i>
Opportunity to use state-of-the-art technology	3.57
Stimulating and challenging work	3.30
Chances to exercise independent thought and action in his/her job	3.30
Not having to travel on the job	3.14
Quick promotions	3.00
Prestige of the employer	2.95
Opportunities to be creative and imaginative in his/her work	2.74
High salary and good fringe benefits	2.57
A very high salary	1.81

M = Mean rating on a scale from 1 to 6

Table 6

Faculty Perceptions of the Importance of Job Characteristics to Students

	<i>M</i>
Enough pay to be secure	5.05
Rewards for good work	5.05
Opportunity for advancement	5.00
Fair company policies	4.67
Chance to use his/her education and abilities	4.67
Opportunity to become licensed	4.67
Feeling that what he/she does is important	4.67
High salary and good fringe benefits	4.61
High respect and fair treatment from his/her supervisor	4.57
A sense of worthwhile accomplishment in his/her work	4.57
Being seen as successful	4.43
Expert supervision	4.33
Time for leisure activities	4.33
Opportunities for personal growth and development in his/her job	4.33
Living in his/her desired geographic location	4.29
His/her family's satisfaction with the job	4.29
Prestige of the employer	4.24
Opportunity to do design work	4.20
Becoming an expert in what he/she does	4.19
Stimulating and challenging work	4.16
Good fringe benefits	4.14
Opportunity to use state-of-the-art technology	4.10
A very high salary	4.10
Variety in work assignments	4.05
Chance to exercise leadership	4.05
High level of responsibility	4.00
Opportunities to learn new things from his/her work	4.00
Time with his/her family	3.91
Having control over his/her project	3.91

Table 6 (continued)

M

Opportunity to pursue a master's degree	3.80
Great job security	3.80
Quick promotions	3.76
Opportunities to be creative and imaginative in his/her work	3.67
Chance to exercise independent thought and action in his/her job	3.59
Working in the field	3.45
Very friendly co-workers	3.35
No requirement to transfer to a new location	3.20
Lack of pressure in his/her job	3.19
Not having to travel on the job	2.85

M = Mean rating on a scale from 1 to 6

Table 7

**Difference Between Faculty Perceptions of Opportunities In
the AHD and Their Ratings of Importance to Students**

D

A very high salary	-5.29*
High salary and good fringe benefits	-2.04*
Prestige of the employer	-1.29*
Rewards for good work	-1.24*
Enough pay to be secure	-1.00*
Opportunities to be creative and imaginative in his/her work	-0.93*
Stimulating and challenging work	-0.86*
A sense of worthwhile accomplishment in his/her work	-0.80*
Quick promotions	-0.76*
Being seen as successful	-0.75*
Opportunities for personal growth and development in his/her job	-0.69*
Feeling that what he/she does is important	-0.62*
Opportunity to use state-of-the-art-technology	-0.53
High respect and fair treatment from his/her supervisor	-0.46
Expert supervision	-0.43
Chance to use his/her education and abilities	-0.34
High level of responsibility	-0.30
Chances to exercise independent thought and action in his/her job	-0.20
Fair company policies	-0.27
Having control over his/her project	-0.21
His/her family's satisfaction with the job	-0.19
Opportunity for advancement	-0.15
Opportunity to pursue a master's degree	-0.15
Becoming an expert in what he/she does	-0.09
Chance to exercise leadership	-0.05
Variety in work assignments	0.05
Opportunity to do design work	0.10
Opportunities to learn new things from his/her work	0.16
Not having to travel on the job	0.29

Table 7 (continued)

D

Living in his her desire geographic location	0.42
No requirement to transfer to a new location	0.51
Opportunity to become licensed	0.57
Time for leisure activities	0.58*
Good fringe benefits	0.61*
Lack of pressure in his/her job	0.86*
Time with his/her family	1.28*
Very friendly co-workers	1.28*
Working in the field	1.31*
Great job security	1.43

D = Difference (Opportunities - Importance)

* Statistically significant difference, $p < .05$

Table 8

AHD Turnover Rates 1987-1988

Job Category	Number of Employees Beginning of 8/87	Terminations 8/87 - 7/88	Turnover Rate %
GCE	51	3 (resigned)	5.9%
PCE I	43	2 (1 resigned) (1 retired)	4.7
PCE II	40	0	0
PCE III	19	0	0
PCE IV	2	0	0
GCEs & all PCEs	155	5	3.2
EA I	239	21 (20 resigned) (1 retired)	8.8
EA II	291	10 (3 resigned) (4 retired) (2 died) (1 failure to return LWOP)	3.4
EA III	339	20 (1 resigned) (17 retired) (2 died)	5.9
All EAs	869	51	5.9
CE I	195	15 (1 resigned) (13 retired) (1 died)	7.7
CE II	156	11 (retired)	7.1
CE III	118	8 (retired)	6.8
CE IV	84	7 (retired)	8.3
CE V	20	3 (retired)	15.0
CE VI	17	0	0
CE VII	4	2 (retired)	50.0
All CEs	594	46	7.7
TOTAL	1,618	102	6.3

Table 9

AHD Turnover Rates 1988-1989

Job Category	Number of Employees Beginning of 8/88	Terminations 8/88 - 7/89	Turnover Rate %
GCE	46	3 (resigned)	6.5%
PCE I	48	4 (2 resigned) (1 retired) (1 died)	8.3
PCE II	39	1 (retired)	2.6
PCE III	23	4 (retired)	17.4
PCE IV	3	2 (retired)	66.7
GCEs & all PCEs	159	14	8.8
EA I	304	29 (21 resigned) (5 dismissed) (3 failure to return LWOP)	9.5
EA II	275	7 (2 resigned) (2 retired) (1 dismissed) (2 failure to return LWOP)	2.5
EA III	306	19 (retired)	6.2
All EAs	885	55	6.2
CE I	215	13 (retired)	6.0
CE II	136	12 (retired)	8.8
CE III	122	6 (retired)	4.9
CE IV	84	4 (retired)	4.8
CE V	16	1 (retired)	6.3
CE VI	18	2 (retired)	11.1
CE VII	2	0	0
All CEs	593	38	6.4
TOTAL	1,637	107	6.5

Table 10

JDS Scale Scores - AHD Compared to Norms

Variable	National Norms Overall	National Norms Professional/ Technical		A H D All respondents	
	<i>M</i>	<i>M</i>	<i>S</i>	<i>M</i>	<i>D</i>
Skill variety	4.7	5.4	1.0	5.3	-0.10
Task identity	4.7	5.1	1.2	4.8	-0.25
Task significance	5.5	5.6	.95	5.8	0.21
Autonomy	4.9	5.4	1.0	4.9	-0.50
Feedback from job	4.9	5.1	1.1	5.2	0.09
Feedback from agents	4.1	4.2	1.4	4.4	0.14
Dealing with others	5.6	5.8	.96	6.1	0.31
Motivating Potential Score	128.0	154.0	55	143.3	-0.19
Experienced meaningfulness of the work	5.2	5.4	.87	5.5	0.11
Experienced responsibility for work outcomes	5.5	5.8	.72	5.6	-0.28
Knowledge of results	5.0	5.0	.99	5.3	0.30
General satisfaction	4.7	4.9	.99	5.3	0.40
Growth satisfaction	4.8	5.1	1.1	5.3	0.18
Internal work motivation	5.6	5.8	.65	5.6	-0.31
Job security satisfaction	4.9	5.0	1.2	5.7	0.58
Compensation satisfaction	4.3	4.4	1.5	4.6	0.13
Satisfaction with co-workers	5.4	5.5	.85	5.7	0.24
Satisfaction with supervision	4.9	4.9	1.3	5.3	0.31
Individual growth need strength	5.0	5.6	.57	4.9	-1.23

M = Mean rating on a scale from 1 to 7

S = Standard deviation

D = difference from professional/technical norm, in standard deviation units

Table 11

JDS Scale Scores - AHD EAs Compared to National Norms for Professional/Technical Workers

Job Category

Variable	EAI		EAI		EAI	
	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>
Skill variety	4.6	-0.80	5.0	-0.40	5.3	-0.10
Task identity	4.4	-0.58	4.6	-0.42	4.8	-0.25
Task significance	5.5	-0.11	5.5	-0.11	5.6	0.00
Autonomy	4.3	-1.10	4.5	-0.90	4.8	-0.60
Feedback from job	4.8	-0.27	4.9	-0.18	5.0	-0.09
Feedback from agents	4.3	0.07	4.5	0.21	4.1	-0.07
Dealing with others	5.9	0.10	5.9	0.10	5.9	0.10
Motivating Potential Score	109.2	-0.81	119.5	-0.63	133.4	-0.37
Experienced meaningfulness of the work	5.3	-0.11	5.2	-0.23	5.3	-0.11
Experienced responsibility for work outcomes	5.2	-0.83	5.3	-0.69	5.4	-0.56
Knowledge of results	5.1	0.10	5.1	0.10	5.2	0.20
General satisfaction	5.0	0.10	5.1	0.20	5.1	0.20
Growth satisfaction	5.0	-0.09	5.1	0.00	5.3	0.18
Internal work motivation	5.6	-0.31	5.4	-0.62	5.5	-0.46
Job security satisfaction	5.5	0.42	5.4	0.33	5.7	0.58
Compensation satisfaction	3.9	-0.33	4.0	-0.27	4.4	0.00
Satisfaction with co-workers	5.5	0.00	5.5	0.00	5.6	0.12
Satisfaction with supervision	5.2	0.23	5.3	0.31	5.1	0.15
Individual growth need strength	4.8	-1.40	4.9	-1.23	4.8	-1.40

M = Mean rating on a scale from 1 to 7

D = Difference from professional/technical norm, in standard deviation units

Table 12

**JDS Scale Scores - AHD CEs Compared to National Norms
for Professional/Technical Workers**

Job Category

Variable	CE I		CE II		CE III		CE IV		CE V		CE VI	
	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>
Skill variety	5.6	0.20	5.6	0.20	5.8	0.40	6.0	0.60	6.0	0.60	6.3	0.90
Task identity	5.1	0.00	5.2	0.08	5.2	0.08	5.0	-0.08	4.9	-0.17	5.5	0.33
Task significance	5.8	0.21	6.0	0.42	6.1	0.53	6.1	0.53	6.3	0.74	6.6	1.05
Autonomy	5.2	-0.20	5.3	-0.10	5.0	-0.40	5.8	0.40	5.9	0.50	6.0	0.60
Feedback from job	5.4	0.27	5.7	0.55	5.3	0.18	5.5	0.36	5.7	0.55	5.6	0.45
Feedback from agents	4.6	0.29	4.6	0.29	4.5	0.21	4.9	0.50	5.0	0.57	4.6	0.29
Dealing with others	6.3	0.52	6.3	0.52	6.4	0.63	6.5	0.73	6.7	0.94	6.9	1.15
Motivating potential score	158.1	0.07	177.2	0.42	159.7	0.10	186.1	0.58	194.0	0.73	213.1	1.07
Experienced meaningfulness of the work	5.6	0.23	5.8	0.46	6.0	0.69	6.0	0.69	6.1	0.80	6.3	1.03
Experienced responsibility for work outcomes	5.7	-0.14	5.9	0.14	5.9	0.14	6.0	0.28	6.1	0.42	6.0	0.28
Knowledge of results	5.5	0.51	5.5	0.51	5.8	0.81	5.7	0.71	5.9	0.91	5.8	0.81
General satisfaction	5.3	0.40	5.5	0.61	5.6	0.71	5.8	0.91	6.0	1.11	5.9	1.01
Growth satisfaction	5.5	0.36	5.6	0.45	5.5	0.36	5.8	0.64	6.1	0.91	5.9	0.73
Internal work motivation	5.8	0.00	5.8	0.00	6.0	0.31	5.8	0.00	6.1	0.46	6.1	0.46

Table 12 (continued)

	CE I		CE II		CE III		CE IV		CE V		CE VI	
	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>
Job security satisfaction	5.7	0.58	5.9	0.75	6.1	0.92	6.0	0.83	6.2	1.00	6.3	1.08
Compensation satisfaction	4.8	0.27	4.7	0.20	5.0	0.40	5.3	0.60	5.9	1.00	5.4	0.67
Satisfaction with co-workers	5.8	0.35	5.8	0.35	5.9	0.47	5.8	0.35	6.0	0.59	6.1	0.71
Satisfaction with supervision	5.4	0.38	5.4	0.38	5.4	0.38	5.7	0.62	6.0	0.85	5.7	0.62
Individual growth need strength	4.9	-1.23	4.9	-1.23	4.7	-1.58	5.1	-0.88	5.0	-1.05	5.4	-0.35

M = Mean rating on a scale from 1 to 7

D = difference from professional/technical norm, in standard deviation units

Table 13

**JDS Scale Scores - AHD PCETs , GCEs, and PCEs Compared to National Norms
for Professional/Technical Workers**

Job Category

Variable	PCET		GCE		PCE I		PCE II		PCE III	
	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>
Skill variety	4.0	-1.40	4.7	-0.70	5.6	0.20	6.1	0.70	6.4	1.00
Task identity	3.6	-1.25	4.1	-0.83	4.7	-0.33	4.8	-0.25	4.9	-0.17
Task significance	4.4	-1.26	5.5	-0.11	6.1	0.53	6.2	0.63	6.4	0.84
Autonomy	3.9	-1.50	4.2	-1.20	5.3	-1.00	5.6	0.20	6.0	0.60
Feedback from job	4.0	-1.00	4.7	-0.36	5.2	0.09	5.4	0.27	5.6	0.45
Feedback from agents	4.0	-0.14	3.7	-0.36	4.7	0.36	4.0	-0.14	4.5	0.21
Dealing with others	5.5	-0.31	5.7	-0.10	6.2	0.42	6.7	0.94	6.6	0.83
Motivating potential score	69.9	-1.53	107.0	-0.85	161.0	0.13	174.5	0.37	202.8	0.89
Experienced meaningfulness of the work	4.5	-1.03	4.9	-0.57	5.8	0.46	6.0	0.69	6.2	0.92
Experienced responsibility for work outcomes	4.7	-1.53	5.2	-0.83	5.8	0.00	6.0	0.28	6.2	0.56
Knowledge of results	4.1	-0.91	4.6	-0.40	5.5	0.51	5.5	0.51	5.8	0.81
General satisfaction	5.0	0.10	4.7	-0.20	5.6	0.71	5.5	0.61	6.0	1.11
Growth satisfaction	4.6	-0.45	4.6	-0.45	5.6	0.45	5.7	0.55	6.1	0.91
Internal work motivation	4.8	-1.54	5.2	-0.92	5.7	-0.15	6.0	0.31	6.0	0.31

Table 13 (continued)

	Job Category									
	PCET		GCE		PCE I		PCE II		PCE III	
	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>	<i>M</i>	<i>D</i>
Job security satisfaction	5.7	0.58	5.8	0.67	6.1	0.92	6.2	1.00	6.1	0.92
Compensation satisfaction	4.7	0.20	3.9	-0.33	5.4	0.67	5.0	0.40	6.1	1.13
Satisfaction with co-workers	5.3	-0.24	5.2	-0.35	5.8	0.35	5.8	0.35	6.1	0.71
Satisfaction with supervision	5.4	0.38	4.7	-0.15	5.7	0.62	5.0	0.08	5.5	0.46
Individual growth need strength	5.0	-1.05	5.4	-0.35	5.1	-0.88	5.4	-0.35	5.5	-0.18

M = Mean rating on a scale from 1 to 7

D = difference from profession/technical norm, in standard deviation units