INTERN EXPERIENCE AT
WALTON & ASSOCIATES/CONSULTING ENGINEERS, INC.

AN INTERNSHIP REPORT
by
Joseph David Blaschke

Submitted to the College of Engineering
of Texas A&M University
in partial fulfillment of the requirements for the degree of
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Major Subject: Civil Engineering
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[Signatures of审批人]

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ABSTRACT

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Walton & Associates/Consulting Engineers, Inc.
Joseph David Blaschke, B.S.C.E., M. Engr., Texas A&M University
Chairman of Advisory Committee: Dr. Neilon J. Rowan, P.E.

This internship report describes the author's one-year internship at Walton & Associates/Consulting Engineers, Inc., (WACE) in Bryan, Texas, which occurred during calendar year 1982. His primary internship objectives were to apply his knowledge and training to solve engineering problems and to develop administrative and managerial skills necessary to contribute to the successful operation of a small consulting engineering firm.

Prior to beginning his internship, the author was Vice-President of WACE and Head of the Transportation Engineering and Civil Engineering Divisions of the firm. In the middle of 1982, he was appointed as the Chief Operating Officer of WACE. The author was responsible for twenty (20) different engineering projects during the internship period. Thirteen (13) of the projects were completed during 1982, and the remaining seven (7) were carried into 1983 to completion. Nine (9) of the projects were categorized as Traffic Engineering projects while the remaining eleven (11) were general Civil Engineering projects. Additionally, the author wrote or co-authored four (4) project proposals, which ranged from a roadway optimization program for the City of Houston to the nationwide study of roadway edgeline widths for the Federal Highway Administration, and assisted in analyzing material
for expert witness testimony in highway traffic accident-related tort claim lawsuits.

The author's internship proved to be very beneficial. It allowed him to expand his engineering skills into various engineering disciplines, to become more involved in the day-to-day operation of a small engineering consulting firm, and to experience the difficulties inherent with the development of a young engineering firm. The author found that the internship fulfilled the specific objectives of the internship requirements, as established by himself, his academic committee, and his internship supervisor.
ACKNOWLEDGEMENTS

The author wishes to express his gratitude to everyone who provided assistance to him in the preparation of this report and in the completion of the Doctor of Engineering Program. Special thanks must be given to Dr. Neilon J. Rowan, Chairman of the author's academic committee, and to the other committee members: Dr. Donald L. Woods, Dr. Donald A. Maxwell, Dr. Newton C. Ellis, and Dr. J. V. Perry. Ms. Kathy Shearer, Administrative Assistant to the Dean of Engineering, deserves praise for her constant help and willingness to serve all Doctor of Engineering Students.

The entire staff at Walton & Associates/Consulting Engineers, Inc., are acknowledged for their support throughout the internship period, particularly Dr. Ned Walton whose continued encouragement and support was deeply appreciated.

Mrs. Joy Ramsey deserves special recognition for typing this report and for her exceptional service as the firm's secretary.

Finally, my wife Dawn and my sons Byron and David are recognized and appreciated for their patience, understanding, support, encouragement, and love that they provided during the past three years.
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CHAPTER I
INTRODUCTION

This report describes Joseph D. Blaschke's Doctor of Engineering internship experience at Walton & Associates/Consulting Engineers, Inc., (WACE) in Bryan, Texas, which occurred from January 1, 1982 to December 31, 1982. The author has been a Registered Professional Engineer in the State of Texas since 1977, and was employed by WACE prior to January, 1982. Hence, the author's internship may not be considered typical of other Doctor of Engineering internships. Nevertheless, the author's internship experience allowed him to apply his knowledge and training to solve engineering problems, to function in a non-academic environment, and to deal with the everyday problems of a small engineering consulting firm.

INTERNSHIP CONDITIONS

The author joined WACE in May, 1980, as a principal with the firm, and was named Vice-President of the firm in 1981. His position in the firm did not change significantly during the internship period. However, in June, 1982, an additional responsibility was added when he was appointed as the Chief Operating Officer of the firm. Dr. Ned E. Walton, President and Chief Executive Officer of WACE, served as the author's supervisor during the internship period.

GOALS AND OBJECTIVES OF THE INTERNSHIP

The goals and objectives of all Doctor of Engineering internships include: (1) the application of engineering skills and knowledge gained
from academic courses to solve "real-world" problems, and (2) learning to function in a professional business environment. The author's goals and objectives included these two items plus documentation of the development of a small engineering consulting firm from its inception to an established and financially solvent business organization. (1)

TYPES OF PROJECTS AND RESPONSIBILITIES

The author was responsible for twenty (20) different engineering projects during the internship period. Thirteen (13) of the projects were completed during 1982, and the remaining seven (7) were carried to completion in 1983. Nine (9) of the projects were categorized as traffic engineering projects while the remaining eleven (11) were general civil engineering projects. Additionally, the author wrote or co-authored four (4) project proposals which ranged from a Roadway Optimization Program for the City of Houston to the nationwide study of roadway edgeline widths for the Federal Highway Administration.

The author assisted Dr. Ned Walton in reviewing material for expert witness testimony in highway traffic accident-related tort claim lawsuits evolving from highway traffic accidents. Many of the traffic accident sites were visited as part of this activity. The author was involved in approximately 18 of these cases.

During the internship period, the author was the Vice-President, a Principal, and the Chief Operating Officer of WACE. He served as the Head of the Transportation Engineering and the Civil Engineering Divisions of the firm. In addition, his responsibilities included general supervision of the firm's drafting section (three individuals) and
a part-time technician.

REPORT FORMAT

The remainder of this report contains five (5) chapters which discuss the work experience gained by the author during the internship period. Chapter II describes the organization of WACE and its goals and standards. Chapter III includes a narrative of the development of WACE as a young and aggressive engineering consulting firm. Chapter IV provides detailed explanations of representative projects for which the author was responsible.

Chapter V discusses the applicability of the Doctor of Engineering Program to the author's internship experience. The report is summarized in Chapter VI. Appendix A contains a listing and brief description of the projects in which the author participated either as a supervisor or a project officer. Appendices B and C contain additional information relative to the author's professional experience prior to the internship period and correspondence pertinent to the administrative requirements of the internship.
WALTON & ASSOCIATES/CONSULTING ENGINEERS, INC.

HISTORY

Walton & Associates/Consulting Engineers, Inc., (WACE) was founded in February, 1980, by Dr. Ned E. Walton in Bryan, Texas. The firm initially specialized in high technology and transportation engineering consulting services. In May, 1980, WACE broadened its operations to provide general civil engineering consulting services. In April, 1981, WACE began its rapid growth by adding electrical/mechanical consulting services to its operation. The firm continued its expansion activities in June, 1981, when it began to offer structural engineering consulting services. WACE again extended its broad-base services in July, 1982, when its professional services included construction management activities.

WACE has grown in three short years to a staff of five (5) registered Professional Engineers, three (3) Engineers-in-Training, and six (6) support personnel. Currently, it has the largest professional staff of any engineering consulting firm in the Bryan-College Station area, and it is the only multi-disciplined engineering consulting firm in the community.

In the Fall of 1982, WACE became associated with URS Engineers of Dallas, Texas. URS Engineers is an international engineering consulting company with offices throughout the United States and the world. The association allows both firms to generate joint venture projects which are mutually beneficial. Although no projects were initiated by the
joint venture team of URS/WALTON during the internship period, several projects appear to be feasible for 1983 and in future years. The primary benefit of this association from WACE's viewpoint is the capability of expanding its operations throughout the State of Texas and the acceptance of major projects which could not be accomplished without the resources of a large consulting firm.

STANDARDS AND GOALS

According to the firm's brochure, "WACE is committed to the principles of professionalism and public service in the practice of Engineering". (2) The firm takes pride in its integrity, strict adherence to the Engineering Code of Ethics, professional service to clients, and desire to serve the public.

WACE is also proud of its progressive attitude, dedication to accuracy and detail in design, and willingness to research and develop new and innovative technologies. The average length of experience of its engineers is eleven (11) years. The staff is also highly educated, considering the fact that virtually all of its engineers hold a Masters degree or higher.

PROJECT PERFORMANCE

Despite the relatively short period of its existence, WACE has been involved in many projects which involved clients of various backgrounds and geographic locations. (The listing of WACE clients shown in Table I provides some insight to the variety of clients served by the firm.) WACE has provided engineering services to public schools,
churches, newspaper plants, and banks. WACE has designed subdivisions, water and sewer systems, streets, highways, and traffic signal systems. Within its high technology operations, WACE has conducted research for the State of Texas, the Federal government, and private industry, taught short courses in several engineering areas, and developed computer control and data acquisition systems for the aerospace industry.

INTERNAL ORGANIZATION

A formal organizational chart for WACE is shown in Figure 1. The chart illustrates the need within small engineering firms for certain individuals to "wear many hats". The author was given multiple responsibilities within the firm; specifically, Chief of the Transportation Engineering Division, Chief of the Civil Engineering Division, and Chief Operating Officer. Although the organizational chart indicates structure within the firm, the general philosophy of the employees is that they work "with" one another and not "for" someone else. This philosophy has been highly successful. The staff at WACE is highly motivated, enthusiastic, and disciplined. More importantly, the attitudes of the staff clearly indicate that the staff sincerely cares for each other, not only as engineering associates, but as individuals. The working atmosphere at WACE during the internship period was unique and extremely enjoyable.
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**Federal Government**
- Federal Highway Administration
- United States Air Force, School of Aerospace Medicine

**State Governments**
- Arizona Department of Transportation
- Arkansas Highway Commission
- Louisiana Department of Transportation and Development
- Texas Forest Service
- Texas State Department of Highways and Public Transportation

**County Governments**
- Bexar County, Texas
- Harris County, Texas
- Lafayette Parish, Louisiana
- Maricopa County, Arizona
- Pima County, Arizona
- Riverside County, California
- Yavapai County, Arizona

**Municipalities**
- City of Bellaire, Texas
- City of Bryan, Texas
- City of Caldwell, Texas
- City of College Station, Texas
- City of Houston, Texas
- City of Phoenix, Arizona
- City of Prairie View, Texas
- City of San Marcos, Texas
- City of Tucson, Arizona

**Universities and Research Organizations**
- Southwest Research Institute, San Antonio, Texas
- Southwest Texas State University, San Marcos, Texas
- Texas A&M Research Foundation
- Texas A&M University
- Texas Transportation Institute
TABLE I (continued)

PARTIAL LISTING OF WACE CLIENTS

Private Sector

- Brown & Root, Inc., Houston, Texas
- Datapoint Corporation, San Antonio, Texas
- First City National Bank, Bryan, Texas
- Gulf Western Company, Eagle Signal Division, Austin, Texas
- Kansas City Southern Railroad Company
- Missouri Pacific Railroad Company
- ROMEC, Inc., Bryan, Texas
- Southern Pacific Railroad Company

Developers/Architects (Bryan-College Station, Texas)

- Broadmoor Office Park
- Building Crafts, Inc.
- Copperfield Development, Ltd.
- George Green, Inc.
- George and Robertson, Inc.
- Jack Cumpton and Associates, Inc.
- James Connor Smith & Associates, Inc.
- Matthews, Callan and Associates
- McClure Engineering, Inc.
- M. O. Lawrence, Jr., Inc.
ORGANIZATIONAL CHART
CHAPTER III
DEVELOPMENT OF AN ENGINEERING CONSULTING FIRM

The establishment of an engineering consulting firm requires a great deal of financial risk. For every successful firm, there are probably one or two that have failed. Usually, success does not occur overnight; five to seven years of substantial effort is considered to be an acceptable time frame required from the establishment of a firm to its economic stability.

Walton & Associates/Consulting Engineers, Inc., (WACE) is one of those firms that is still striving for success. Its future appears bright but it still suffers from growing pains. The author joined the firm when it was only three months old and has remained with the firm through its developmental years. The author's internship period took place primarily during the firm's third year of operation. Consequently, two of the primary educational experiences of the internship were learning to deal with the problems associated with establishing a new business and recognizing the pitfalls which plague young engineering consulting firms.

This chapter is devoted to addressing those problems and pitfalls. Special emphasis has been given to this subject since its importance cannot be overestimated, and the information discussed may prove beneficial to young engineers who have not experienced the difficulties involved with starting a new engineering firm, or have not considered the problems associated with a non-established consulting firm.

These difficulties and problems are identified and discussed in the following four categories: Personnel, Administration, Job Opportunities,
PERSONNEL

Small engineering consulting firms cannot support a large staff; consequently, employees within those firms are required to "wear several hats". The Chief Engineer of the Civil Engineering Department may handle payroll and insurance claims, and also be responsible for hiring new employees. It is important, therefore, that professional engineers within a small firm have multiple skills and the ability to apply those skills.

The need for these two attributes generally requires the employment of engineers who have either considerable well-rounded experience or a strong educational background. Since well-experienced engineers demand salaries in excess of what is affordable by small engineering firms, young but highly-educated engineers are usually acquired.

In order to encourage these highly-educated, young engineers to remain with a small firm, particularly when salary levels are below that which are offered by larger established companies, small consulting firms must demonstrate the potential of long-range benefits. It is important to the small firm's success that young engineers who recognize that short-term benefits will be far outweighed by future, long-term benefits after financial stability occurs.

Experienced engineers usually have developed "short-cut" or quick methods of performing engineering analyses. This capability allows them to complete more engineering projects within a time period than less experienced engineers. On the other hand, young, inexperienced
engineers are much more deliberate. What they lack in experience and expedition, however, they make up in attention to detail and youthful energy. More importantly, strict attention to details contribute to top quality engineering design.

Additional efforts necessary to pay attention to details require time. Consequently, project income per hours worked rates are lowered when relatively inexperienced engineers are involved in design preparations. Profits are maximized when operating costs are minimized. Operating costs are reduced when design time assigned to a project is minimized. It appears, therefore, that when relatively inexperienced engineers are involved, profits from projects are reduced but the quality of the engineering design does not diminish.

WACE is staffed by young professional engineers who continue to expand their capabilities and who are more deliberate in their work activities. Consequently, potential profits from projects have been minimized. However, the staff is dedicated to producing quality engineering work and their continued efforts will eventually result in more efficient productivity and higher profit levels.

ADMINISTRATION

Regardless of the size of an engineering consulting firm, the administrative efforts of the firm always seem monumental. Reports to the Federal and State governments and to the Internal Revenue Service seem incessant. Insurance claims require almost constant attention. Filing systems must be maintained to function efficiently. Company policies and procedures must be developed, modified, argued, and eventually
enforced. Records of time charges, travel reimbursements, vacation leave, sick leave, and other similar information must be kept up-to-date. Bill payments, bills to be paid, accounts paid, accounts receivable, and countless other accounting items must be posted and balanced. All these records are important when the firm is audited for State or Federal projects.

Small firms usually cannot afford to hire an officer to handle these administrative duties. Quite often one of the engineers within the firm takes the responsibility for these administration procedures. Consequently, the time required is considered dead time for engineering projects and must be considered an overhead expense. Engineers usually are not trained to perform these functions and most prefer to perform engineer-related tasks. Administrative tasks become a necessary evil.

Administrative tasks within WACE are shared by the Chief Executive Officer and the Chief Operating Officer.

JOB OPPORTUNITIES

Young engineering consulting firms are caught in the age-old problem of not being awarded jobs because they have no experience and not being able to obtain that experience since they cannot find jobs. These firms have identity problems and have to establish reputations for good work. Strong public relations (or salesmanship) is usually the answer. The belief that "all I have to do is hang out my professional engineer shingle and people will break down my door" is not realistic. Generating work for a new business is not as easy as it appears in the minds of engineering students in colleges and universities.
Interaction with clients is frustrating. Clients are simply people, and every person wants to obtain as much as he can for as little as possible. Engineering fees are expensive and many clients believe that they are simply not getting adequate value for their money. The reason for these feelings are obvious - the client simply does not understand the effort required for an engineering project to be conceived, designed, and constructed.

Young engineering firms are often forced to serve the most difficult clients. When jobs are very difficult to find, the desire to accept virtually any job is tempting. More selective engineering firms refuse certain clients who are exceedingly uncooperative or who have a tendency to ignore billings. Young engineering firms tend to gamble on these clients and they usually lose.

WACE has been attracting new clients gradually and has had many repeat clients, which is a clear indication of the type of service that establishes a firm's long-term stability. The firm has been selective, and although it has refused many projects for several reasons, the refusal was usually based on the firm's adherence to ethical standards. WACE has made the mistake of gambling on a poor-risk client and has suffered some financial loss as a result.

OPERATIONS

A typical comment from managers of small engineering consulting firms could be: "The three most significant problems that I have is cash flow, cash flow, and cash flow." (This same comment is true for any new business!) Engineering services are usually paid for by the
"pay upon completion" method as opposed to "having advanced payments". Consequently, engineering firms have to help finance their client's projects. A small percentage of these clients take advantage of these conditions and refuse to pay for services even after they have been rendered.

Projects for public entities usually do not result in non-payment; however, there is often considerable delay in payment due to governmental "red tape". Because of this delay and the consistent demands to minimize public spending, little profit can be made from small (less than $100,000) publicly-sponsored projects. WACE has worked on many small projects for states, counties, and cities, and the firm is only close to "breaking even" on these projects. Desirable profits can be obtained only from large projects, particularly those funded by private concerns. All consulting firms, including WACE, strongly prefer to work on large projects but continue to accept smaller projects to keep employees busy between the large projects.

Operational costs always tend to be greater than expected. Costs for lease space, telephones, office supplies, utilities, reproduction, and similar items consistently dilute gross income. Small engineering firms are significantly affected by these costs and try to minimize them, even though those efforts are difficult. All engineers desire sophisticated equipment to aid in performing engineering analyses; unfortunately, costs for sophisticated equipment is quite often beyond the reach of most young firms. WACE is fortunate to have commercial access to the computer system at Texas A&M University. This access has provided the firm with exceptional computer capabilities at a reasonable
cost. But even though the cost is reasonable, it comes at a considerable expense to a young engineering firm.

Operational costs are very difficult to cover month after month, especially for a consulting firm without a strong capital base. Outside investors are often the only solution to financial difficulties; however, engineering firms usually attempt to avoid this option for fear of losing control of the firm's operation and direction. WACE has considered this option but has avoided it. If the need for capitalization becomes critical, the firm may resort to outside investment, but it will be extremely selective in choosing those investors.

SUMMARY

The author has learned from his internship experience that the operation of a small engineering consulting firm can be an economic nightmare. Cash flow is a continuous problem and large projects are absolutely necessary to provide profits for survival. The most important comment that the author can make to all engineering students is that running a professional engineering consulting business is not as easy as it appears to be. On the contrary, it is extremely risky!
CHAPTER IV
INTERNSHIP EXPERIENCE

As previously mentioned, the author had been employed by Walton & Associates/Consulting Engineers, Inc., (WACE) for approximately nineteen (19) months prior to beginning the internship period in January, 1982. As a Vice-President and stockholder in the firm, the author was a vital part of the firm before and during the internship period. WACE experienced a significant growth of activity during 1982 and the author was required to become involved in a unique mixture of engineering projects and to accept a greater amount of responsibility in administering the activities of the firm. These engineering activities may be listed in four major categories:

1. Civil Engineering
2. Transportation Engineering
3. Legal
4. Proposal Preparation

CIVIL ENGINEERING

The author was responsible for a broad range of general civil engineering projects which included residential subdivision planning, a feasibility study of an industrial park, drainage studies, sanitary sewer designs, water distribution system designs, parking lot designs, and a feasibility study for a commercial site. Discussion of specific projects follow.

Woodway West Subdivision. The author was responsible for the complete engineering design of Woodway West, a 32.289-acre subdivision
in College Station, Texas. Located between Wellborn Road and F.M. 2818 and adjacent to the extension of Holleman Drive, the subdivision was planned for townhome and multi-family housing which will cater to students and faculty at Texas A&M University. (See Figure 2). This project was a joint venture with McClure Engineering, Inc., of Bryan, Texas, a much-respected general civil engineering firm. The author's objectives in this $500,000 project was to prepare the necessary plats and construction drawings that would result in a cost-effective, functional, and attractive development. Plans for streets, drainage, sanitary sewers, water distribution, and street lighting were prepared.

A major problem developed in the preliminary design stages. The property was bowl-shaped and drained to one particular location. A sanitary sewer line located adjacent to the west side of the property, which the development would utilize, was very shallow. Efforts to provide a gravity flow sanitary sewer system and an effective drainage system without major fill areas became a monumental challenge. Using various combinations of sanitary sewer line sizes and locations, a cost-effective and efficient subdivision plan finally materialized. The design required drainage detention areas to control and minimize runoff, and the use of larger sanitary sewer pipe that could be laid at flatter slopes, thereby minimizing the need for topographic relief.

As of March, 1983, groundbreaking for construction of the project had not occurred, although plans were to start construction soon. The City of College Station will not allow additional residential construction west of Wellborn Road until the extension of Holleman Drive from Wellborn Road westward to existing Holleman Drive is completed.
This extension will require a crossing of the existing Southern Pacific Railroad tracks immediately west of Wellborn Road. The developer of the Woodway West property and the City of College Station have been trying to work out an agreement with the Railroad for over two years but all efforts have proven unsuccessful. The future of the subdivision remains in doubt although the City of College Station eventually will gain approval of the Holleman Drive crossing, since that roadway has been identified as a major collector on the City's Major Thoroughfare Plan.

The most important lesson that the author learned from this project was the need to be totally aware of activities and circumstances that may not be located adjacent to the site of the development for which he is responsible. These activities and circumstances may play a vital role in determining the success or failure of a development. The railroad crossing played and continues to play a significant role in the development of Woodway West. Other developments may be affected by traffic flow or patterns, up-stream drainage, other types of development, political decisions like zoning, or the capacities of sewer treatment plants. It is very important that all developments are properly planned and that all potential areas of conflicts are fully researched.

Industrial Park Feasibility Study. The City of Bryan, Texas, has only one industrial park, the Brazos County Industrial Park, that provides rail access and it is almost completely utilized. In fact, only one tract of land was available by January, 1983. Many industries have expressed a desire to locate in the Bryan area but require rail access to ship their products. Developers in the area realized the potential
success of an Industrial Park having rail access and began to investigate feasible sites. One site, located immediately west of the Brazos County Industrial Park, contained over 700 acres. (See Figure 3).

WACE was requested by the owner of the property to perform a feasibility study of the site and to determine the various types of development and related costs per acre amenable to the site. The author was assigned the responsibility of preparing that report. Dr. Ned Walton developed the methodology to be used for conducting the study and provided much assistance in determining various developmental concepts. These concepts (six in all) included various combinations of rail-served industrial tracts, non-rail-served industrial tracts, and residential development.

Three major areas of concern were immediately identified:

1. The 100-year flood plain associated with Cottonwood Creek extended across the entire length of the property and consumed approximately 25 percent of available acreage.

2. The property drained away from the closest City of Bryan Sewage Treatment Plant necessitating the construction of a treatment plant on-site. (A lift station was another alternative but its construction cost coupled with the cost of off-site sewer line was cost prohibitive.)

3. The cost of providing rail service was estimated at $120 per foot of rail which amounted to a considerable cost.

Each of the six different concepts was designed giving these concerns foremost importance. Two of the concepts were considered to be cost-effective. (The estimated cost of development for the 700-plus acres ranged from $4.5 - $9.0 Million.) The owner has attempted to sell his property with the use of these conceptual designs but has not been successful as of April, 1983, although he has confidence that he will find an interested buyer in the future.
PROPOSED INDUSTRIAL PARK
Brazos County, Texas

FIGURE 3
PROPOSED INDUSTRIAL PARK

LEGEND

--- EXISTING ROADWAY
---+ PROPOSED ROADWAY
+---+ EXISTING RAILROAD TRACK
+---+ PROPOSED RAILROAD TRACK
---+ NATURAL DRAINAGE CHANNEL
---+ 100-YEAR FLOODPLAIN
---+ PROPERTY BOUNDARY

Not To Scale
The most important lessons that the author learned in the conduct of this project was the importance of properly planning large-scale projects to insure payback of large investments, and the unique design considerations required for railroad lines.

**Southern Centre.** The Southern Centre is a three-story office building (plus basement) in Bryan, Texas, scheduled for completion in the Summer of 1983. (See Figure 4). In another joint venture project with McClure Engineering, Inc., the author was responsible for designing drainage facilities and the parking layout for the complex. The preliminary design for the parking lot did not provide adequate space for parking and circulation. The author redesigned the lot to eliminate those previous deficiencies.

The development of the Southern Centre utilizes virtually all of the available land for either the office building or parking area. Consequently, storm water runoff from the site will increase significantly. The City of Bryan has ordinances which require engineers to provide drainage design for commercial developments so that storm water runoff rates after development do not exceed storm water runoff rates before development. Drainage design for the Southern Centre required underground storm sewers and a detention basin to satisfy City ordinances. The author was responsible for the design of the storm sewers and the basin and this was his first experience with detention basin design. Consequently, this project was an excellent learning experience.

**The Christmas Store.** The Christmas Store is a seasonal gift shop in College Station, Texas, that caters, obviously, to Christmas decorations and gifts. The store was constructed in the Fall of 1982,
just in time to take advantage of the 1982 Christmas buying season. Design and construction of the store was done in a very short time period. WACE was requested to prepare construction plans for water and sanitary sewer lines to serve the facility and the author was given the responsible charge of the project.

The most unusual aspect of this project involved the sanitary sewer service. One sanitary sewer line exists adjacent to the Christmas Store and within the Harvey Road right-of-way. (See Figure 5). A second sanitary sewer line was located directly below the proposed Christmas Store building. The property owner desired to plug the sanitary sewer line running across his property, abandon the sewer right-of-way, and redirect this sanitary sewer to the existing sewer line along Harvey Road. The City of College Station knew that the sewer to be abandoned did not carry much sewage (and never would) and agreed to the owner's request. A major consideration was whether the sewer line could be redirected and gravity flow to the Harvey Road line. (A lift station would simply be too expensive for such a small development.) The author had to make that decision after the store was already under construction.

Utilizing sanitary sewer construction plans on file with the City of College Station, the author determined that a 0.11-foot drop existed in the 120-foot distance from the to-be-abandoned sewer line to the Harvey Road sewer line. Although a 0.50-foot drop was considered minimum, the City approved the connection. (After construction, the drop was actually 0.08 feet.)

The author learned two valuable lessons from this project. One,
THE CHRISTMAS STORE
College Station, Texas

FIGURE 5

THE CHRISTMAS STORE
the need for accurate drawings of "as-built" construction plans is
critical to planning future improvements. And, two, engineering design
considerations should be made prior to construction. If a drop between
the two sewer lines did not exist in the right direction, the Christmas
Store might not have been constructed.

Montgomery County Water Distribution System. WACE was requested to
provide a rural water distribution system for three adjacent sub-
divisions in Montgomery County, Armadillo Woods, Pinion Creek, and
Magnolia Oaks. The system would utilize four wells to be drilled within
the subdivisions. The author was given the responsible charge of this
project.

Although the design of the system was not completed during the
internship period, the author learned many valuable lessons. Rural
standards for water systems are much different from urban standards.
The most apparent difference is the absence of fire hydrants in rural
designs. The State of Texas, through the Texas Department of Water
Resources, requires strict adherence to State standards. Governmental
regulations require specific testing for water quality and proof that
the design of the water system provides adequate pressure for each
service. (3) The process of approval through both the County and
State agencies insures that the water system is both safe and
functional.

The design of a rural water system was a new and unique experience
for the author. Not only did it give him added education in the design
of pump and pump stations, it gave him the assurance that the State
of Texas is determined to provide its citizens with safe drinking water.
TRANSPORTATION ENGINEERING

During the internship period, the author was involved in a wide range of transportation engineering projects in Bryan and Harris County, Texas. These projects primarily involved design of traffic signal systems but also included transportation planning and traffic operational studies. Discussion of three (3) specific projects follow.

**Bryan Traffic Engineering Study.** WACE entered into an agreement with the City of Bryan, Texas, in 1982 to provide traffic engineering consulting services on an "as-needed" basis. Successful completion of the $18,000 contract was the responsibility of the author.

The most significant aspect of the project was the preparation of construction plans and specifications for the Villa Maria Road Signal System. The system consisted of the modernization of five (5) existing traffic signal installations and the construction of one new installation on a two-mile section of one of the City's major thoroughfares. (See Figure 6). Another requirement of the project was the installation of hard-wire interconnect cable and timing sequences to provide vehicular progression. (4)

This signal project required the author to make maximum utilization of existing signal equipment that was either in current use or in storage. This special requirement necessitated some non-standardized design detail and development of unique specifications. The $100,000 signal system was completed in early 1983 except for the operation of signal progression timings.

Another major aspect of the Bryan Traffic Engineering Study was the modification of the Bryan Central Business District (CBD) Signal...
System. (See Figure 7). Existing signal phasings and signal timings at five signalized intersections along the two-mile stretch of Texas Avenue were extremely inefficient. Protected left-turn movements were being provided at all five intersections but only two locations warranted such phasing. Although a hard-wire interconnect system linked the signals, the system had been inoperative for many months. A significant amount of vehicular delay was experienced and a rash of accidents from impatient motorists had occurred.

The author redesigned signal faces along the system, developed new signal phasings and cycle lengths, and, with the help of PASSER computer programs, devised new timing sequences to provide progression. The revised system cost less than $5,000 and resulted in a 50 percent reduction in delay. Accident occurrences shifted from primarily right-angle to left-turn shortly after operation of the new system began in the Summer of 1982. However, after motorists adjusted to the new system (about a six-month period) accident occurrences have shown a marked decrease.

Additional services provided by WACE to the City of Bryan included:

1. Collection of turning movement counts and 24-hour traffic volume counts at specific locations in the City to provide design data and traffic growth patterns.
2. Analysis of high-accident locations within the City and recommendations of improvements at those locations.
3. Recommendations for most cost-effective installation of new or improved roadway lighting.

The Bryan Traffic Engineering Study was important to the author because it provided a close working relationship with City employees and continually reminded the author of the need to respect and under-
stand the basic needs and concerns of public entities. Continuous involvement with the private sector often makes it more difficult for a consultant to remember government's viewpoints and perspectives.

**Harris County Signal Projects.** During 1982, WACE signed three separate contracts with the Harris County Engineering Department which required the firm to prepare construction plans and specifications for traffic signal installations at nine (9) intersections in Harris County. The signal projects totaled over $300,000 in construction costs. The author was responsible for each of these projects and each set of plans and specifications were completed on schedule. As of April, 1983, traffic signals are operational at six (6) of the intersections and are under construction at the remaining three (3) locations.

Preparation of signal construction plans requires expertise in three general areas of engineering: traffic, civil, and electrical. Few engineering firms in the State of Texas possess the expertise to develop signal construction plans. It appears that such a specialty would be lucrative; however, that is not the situation. In virtually every traffic signal project, a governmental agency is the client, either federal, state, county, or city. Governmental agencies are very restrictive and tight when it awards engineering design contracts. Usually engineering fees are based on percentages of construction costs which are held fairly low due to competitive bidding. Dealing with large bureaucracies always results in lengthy waiting periods for reimbursement. Generally, there is very little profit to be earned in preparing traffic signal construction plans. However, these projects provide some income to the firm and fill time gaps between larger projects.
The Grove Traffic Impact Study. In September, 1982, construction plans were being prepared for a large office/multi-family complex by Garrett Engineering, a local civil engineering firm. The complex was to be built adjacent to 29th Street in Bryan, Texas, and was to eventually contain 124,780 square feet in office space and 128 two-bedroom apartments. (See Figure 8). All traffic generated by the complex was initially scheduled to use only one access point on 29th Street. Garrett Engineering was convinced that additional access was required and desired to have a traffic impact study conducted to determine traffic flow volumes to be generated by the complex.

Existing traffic volume on 29th Street adjacent to the project site was found to be about 14,000, approximately 70 percent of the roadway's capacity. The Grove development would generate approximately 4,000 vehicles daily. Future office development near the site of The Grove is expected to generate an additional 2,500 vehicles daily. There was no doubt that 29th Street would be operating beyond capacity levels within the next two or three years. (5)

An analysis was performed to determine the estimated peak period traffic volumes generated by the complex, and then to compare these volumes with available gaps in the existing traffic stream on 29th Street. The results of this analysis indicated that if only one access point (Main Entrance) to The Grove is provided along 29th Street, then considerable vehicular delay and potential conflict would result immediately. Consequently, the author recommended that Goessler Road, a narrow dirt road, be reconstructed as a paved two-lane roadway between 29th Street and Kent Street to provide convenient circulation to/from
The Grove development. (5)

Phase I development of The Grove is scheduled for completion in the summer of 1983. The reconstruction of Goessler Road has been completed. This project was very self-satisfying to the author since the major recommendation of the project report was accepted and implemented immediately.

LEGAL

For many years, Dr. Ned Walton has been serving as an expert witness in tort claim lawsuits arising out of traffic accidents. He was active in this unique service before establishing the firm of WACE in 1980, and has remained an active participant since that time. The author became involved in legal work prior to beginning the internship period, but became much more involved in 1982.

WACE has been involved in over 50 legal cases in its short history and has represented the States of Texas, Arizona, Arkansas, and Louisiana, the Counties of Bexar in Texas, Riverside in California, and Maricopa, Pima, and Yavapai in Arizona, Lafayette Parish, Louisiana, City of Tucson, Arizona, and four Railroad Companies, Kansas City Southern, Missouri Pacific, Southern Pacific, and Burlington Northern. Most of the cases handled by WACE were for the Texas State Department of Highways and Public Transportation.

During his internship period, the author did not testify in court or give a deposition. His duties were to assist Dr. Walton in collecting the data necessary to perform engineering analysis of the traffic accident that caused the lawsuit, and to provide a firm basis
on which to base general conclusions. Specifically, these duties included:

1. Inspection of the site of the accident and photographic recording of site.

2. Collection of geometric data at the site for use in reconstructing accidents and in performing calculations.

3. Review of documents relative to the lawsuits, especially depositions of witnesses to the accidents, accident victims, investigating officer, and other expert witnesses.

4. Documentation of accident records, roadway construction plans, traffic volume counts, weather data, and any other information pertinent to the site.

The author was involved in over 18 different legal cases during his internship period. In each case, an evaluation of available engineering materials was made to assist in determining probable cause or causes of the traffic accidents. Information was provided to the client that assisted him in the decision process for responding to possible tort litigation through preparing sound defenses, settling, and, in some cases, securing summary judgment through the court without trial.

Many cases without merit often go to trial. There appears to be a serious need for some type of judicial review system that would prevent cases without merit going to trial. Various jurisdictions have experimented with such judicial reviews but there is no uniformity or widespread acceptance of these. There is a reluctance on the part of the legal profession to accept anything short of complete jury trial for any claim regardless of merit. A good review system could eliminate a great majority of these judicial proceedings freeing the court system and taxpayer's dollars for more worthwhile claims. Several states use
a "claims commission" where claims can be heard short of formal judicial proceedings. Results from the "claims commissions" are not necessarily binding and relief can still be obtained through the court process.

PROPOSAL PREPARATION

The author was responsible for the preparation of four proposals during his internship period. Each of the four proposals was addressed to different clients and concerned diversified engineering projects. It is disappointing to note that none of the projects was awarded to WACE. Although the success rate was zero percent, the author gained valuable experience in the preparation of project proposals and will incorporate lessons learned in future proposals. The proposals are discussed in summarized fashion in the paragraphs to follow.

**Hempstead Sanitary Sewer System.** The City of Hempstead invited proposals from engineering consulting firms that were interested in conducting an inventory of the City's sanitary sewer system, making recommendations to improve the existing system, and planning for future improvements to the system. (6) WACE responded to the City of Hempstead in February, 1982, with a joint venture proposal with McClure Engineering, Inc., and two instructors from the Civil Engineering Department at Texas A&M University. The author wrote approximately 80 percent of the proposal including incorporating comments from the University instructors.

Apparently, the City of Hempstead decided not to fund the study because WACE has not received a response as of this date. It is disappointing to expend extensive effort on any project and not receive
any feedback, pro or con. Although the City of Hempstead may eventually fund the project, this possibility becomes more remote with the passage of time.

Roadway Optimization Program for the City of Houston. In the early spring of 1982, WACE prepared an unsolicited proposal to the Director of the Traffic and Transportation Department of the City of Houston, Texas. The author was responsible for organizing the proposal and wrote about 70 percent of its contents. WACE was interested in assisting the City of Houston in developing a Roadway Optimization Program that would help alleviate the City's severe traffic congestion.

Roadway optimization pertains to roadway operational improvements that utilize existing roadway facilities and modifying them in some manner so that more efficient traffic flow results. These improvements consist of but are not limited to the following: (7)

1. Reversible lanes.
2. One-way street conversion.
5. Safety improvements.
6. Freeway access/egress restrictions.
7. Turning restrictions.
8. High-occupancy vehicle lanes.
10. Signing and lane marking improvements.

Roadway optimization improvements were considered ideal to the City of Houston because the private automobile will always be the major mode
of transportation in the City regardless of how many miles of heavy rail are built or how many buses are put on the road. Improved roadway operations were also considered critical for improved bus service. (7)

WACE received no response from the City of Houston. Although the firm did not expect an immediate contract offer from the City, it did expect to receive the opportunity to discuss the proposal with the Director of the Traffic and Transportation Department. It did not receive either.

Traffic Impact Study for a 300-Acre Development. In March, 1982, the author prepared a proposal to conduct a traffic impact study for a 300-acre development along the East Bypass in College Station, Texas. The study would have been conducted similar to The Grove Impact Study previously discussed. The goals of the study were to estimate traffic volumes to be generated by the project, to locate the most effective access locations for the project, and to plan an efficient roadway system for the project.

The developer of the project must have reconsidered his desire for a traffic impact study because WACE was never contacted after submitting the proposal. Once again, the author experienced the frustration of nonresponsiveness from a potential client.

Development of Optimum Line Widths for Two-Lane Rural Roads. WACE prepared a proposal for this project and delivered it to the Federal Highway Administration in the summer of 1982. The Texas Transportation Institute (TTI) at Texas A&M University teamed with WACE on this project to form an effective and experienced team. The author was responsible for organizing the proposal for submittal and wrote about 20 percent of
its contents. The purpose of the study was to investigate the benefits (if any) of changing the existing 4-inch roadway edgeline width to two inches, six inches, or eight inches. (8)

WACE and TTI were convinced that they were exceptionally qualified to conduct this study. Their opinion was apparently shared by the Federal Highway Administration since the team was selected as one of the top three finalists based on technical qualifications. Unfortunately, WACE and TTI eventually lost the project to a private consulting firm in the Washington, D.C. area.

In the notification letter sent to WACE by the Federal Highway Administration, the name of the firm selected and the cost of the contract were identified. The cost of the project was much less than the cost estimate submitted by WACE and TTI. Consequently, it appeared that cost may have been a deciding factor. The result of this disappointing experience is that WACE is now very hesitant to submit proposals for federal projects. The chance of being selected is always slim, and a small firm cannot afford to prepare expensive proposals unless the chances of being selected are very good. The experience also reinforced the author's belief that selection of a consultant should be based only on his capabilities and competence, a belief strongly supported by the National Society of Professional Engineers and the State of Texas.

ADMINISTRATION

The author was responsible for the total administrative efforts of each of the projects discussed in this chapter. He was responsible for managing and directing all engineers, technicians, and draftsmen in-
involved in the studies, handling all correspondence, preparing billing statements, and performing inspections at project sites, where appropriate. He also scheduled project activities so that project deadlines were met; consequently, each project was completed on-time. WACE is committed to meeting its self-imposed deadlines because other than cost, perhaps, no other criterion is more important to a client.

Other administrative duties included important and mundane activities that fall under the responsibilities of a firm's Chief Operating Officer. Specific duties assigned to the author included:

1. Hiring and releasing employees.
2. Handling insurance claims.
3. Maintaining filing system.
4. Purchasing office equipment and supplies.
5. Preparing firm's operation policies.
7. Handling general day-to-day operation's decision-making.

The author eventually spent approximately 20 to 25 percent of his time involved in administrative functions. As the growth of WACE continues, administrative duties will also increase in both scope and complexity, thereby requiring the author to spend even a greater percentage of his time handling administrative duties.
CHAPTER V
APPLICABILITY OF THE DOCTOR OF ENGINEERING PROGRAM

The Doctor of Engineering degree can be described as the combination of advanced graduate training in engineering and business coupled with an opportunity for practical experience in applying the knowledge and technical training gained from both fields. Although the Doctor of Engineering degree is constantly compared to the Doctor of Philosophy (Ph.D.) degree in regards to content and purpose, the two degree programs are not necessarily analogous. The differences between the two are best illustrated by comparing the goals of the two doctoral programs.

With a strong emphasis on management skills, the Doctor of Engineering degree prepares the engineering student to enter the world of business, public or private, and to perform the roles of both engineer and manager. The Ph.D. degree prepares the engineering student to enter the world of academics and research, both in the public and private arenas. A key function of University faculty members is the ability to attract research. The Ph.D. degree provides valuable training in this area. However, neither the Ph.D. program nor the Doctor of Engineering program teaches its students to instruct on the college level. It is assumed that virtually anyone capable of earning a doctorate possesses the ability to instruct college students. This assumption has some merit; however, the ability to instruct at the college level lies within an individual and not within a degree program. Doctor of Engineering graduates should be considered equally capable of instructing college students in comparison with Ph.D. graduates.
CAREER GOALS AND OBJECTIVES

The author has always believed that education is one of the few things in life that cannot be taken from an individual. There is little doubt that graduate level education provides a student with a diversified background, better prepares an individual for his career, and provides greater career opportunities.

The author established the attainment of a doctoral degree as a personal goal during his undergraduate studies at Texas A&M University in the early 1970's. At that time, the author aspired to earn a doctorate in order to teach and perform research at a large university. Although the wish to enter a university environment waned as the author's career gradually moved toward the private engineering consulting business, the desire to obtain a doctoral degree remained strong. The Doctor of Engineering Program proved to be the solution. The program has provided the means for the author to obtain the doctoral degree while pursuing a career in private industry.

Eventually, the author will instruct at the university level. This is a long-range goal. As a short-range goal, the author will remain content to teach on a part-time basis, and to take advantage of opportunities to teach short courses as a private consultant. A doctoral degree certainly increases the opportunity to teach.

Other immediate goals of the author include the continuance along his present career course into personnel management. Eventually, most successful engineers gradually move out of the day-to-day engineering activities and into management activities.

A final definitive goal is to become more proficient as an expert
witness in lawsuits involving tort claims resulting from automobile accidents. The label of "Dr." will add significantly to establishing immediate credibility as an expert witness.

BENEFITS OF THE DOCTOR OF ENGINEERING PROGRAM

Prior to enrolling in the Doctor of Engineering program in 1980, the author had earned a Master of Engineering degree in Civil Engineering and he had also worked as a traffic engineer in both public and private sectors. The Doctor of Engineering program allowed the author to continue to expand his transportation engineering expertise through additional coursework. The author originally completed traffic engineering coursework at Texas A&M University in the early 1970's, including those courses shown in Table II.

These courses provided the author with a strong background to begin his career. Additional courses which furnished valuable information were taken after enrollment in the Doctor of Engineering program. Civil Engineering 452 (Railroad Engineering) provided the author with an education in railroad history and operations that is invaluable in understanding railroad design considerations and railroad interaction with vehicular traffic. Civil Engineering 672 (Urban Transportation Study) taught the author the principles of traffic forecasting and the methodology used to project future traffic volumes on city streets.

Other engineering courses reminded the author of the necessity to incorporate engineering economics in engineering decision-making processes and to perform all business activities in an ethical manner. Industrial Engineering 666 (Cost Estimating for Engineering Economics
## TABLE II

### ORIGINAL TRAFFIC ENGINEERING-RELATED COURSEWORK

<table>
<thead>
<tr>
<th>COURSE NO.</th>
<th>COURSE NAME</th>
</tr>
</thead>
<tbody>
<tr>
<td>CE 612</td>
<td>Transportation in City Planning</td>
</tr>
<tr>
<td>CE 613</td>
<td>Urban Engineering</td>
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<tr>
<td>CE 617</td>
<td>Traffic Engineering Characteristics</td>
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<td>CE 618</td>
<td>Traffic Engineering Operations</td>
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<td>CE 624</td>
<td>Design of the Driving Environment</td>
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<td>CE 626</td>
<td>Roadside Safety Design</td>
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<tr>
<td>CE 634</td>
<td>Airfield Planning and Design</td>
</tr>
<tr>
<td>CE 636</td>
<td>City Street Design</td>
</tr>
<tr>
<td>CE 640</td>
<td>Freeway Design and Operations</td>
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and Planning) educated the author in the importance and applicability of utilizing economics in engineering design and planning activities. Interdisciplinary Engineering 671 (Professional Ethics and Practice) reinforced the author's commitment to function within the engineer's code of ethics and always to give the public's concern and safety top priority when making engineering design considerations.

The Doctor of Engineering program is intended to prepare an individual to function in a business environment. Specific courses are selected to provide training in business-related topics, including basic accounting principles (ACCT 640), financial management (FIN 635), and management principles (MGMT 655). Additional business courses, selected by the author, included Marketing Administration, Microeconomics, Macroeconomics, and Business Statistics. (The latter four courses were transferred from the University of Houston.) These business courses provided the author with very valuable information that has been utilized extensively by the author during his tenure at Walton & Associates/Consulting Engineers, Inc.

Two additional courses taken by the author were considered extremely worthwhile and deserve additional comment. Interdisciplinary Engineering 671, Professional Ethics and Practice, proved to be an excellent arena for discussing engineering ethics. The class contained a mix of students of various ages (low 20's to low 40's) and backgrounds. Two students were military officers, two students were relatively inexperienced, and one student was an engineer with over 20 years of experience. The author was the remaining student and also was one of three registered professional engineers in the class. Ethics
results from a long-term evolutionary learning process and does not lend itself well to being taught as subject matter in a university course. Differences in socio-economic and cultural backgrounds causes variances in ethical practices. What is ethical to one individual is not necessarily ethical to the next individual. To overcome some of the difficulty in handling this topic, guest lecturers were used to provide valuable input to class discussion. The author's philosophy toward ethical practices within the engineering profession was not altered by the course; instead, it was strongly reinforced. The author was encouraged to be mindful of ethics in all professional relationships and actions. All engineering students should be strongly encouraged to take a course in professional ethics at the undergraduate level.

The second praiseworthy course was MGMT 643 (Legal Relationships). It was essentially a course in Business Law which provided the author with an excellent education in contract law and legal relationships common to the business environment. The author considered the course to be exceptional legal advice. The course also addressed the reasoning behind courtroom procedures used in this country, and explained much of the terminology used in the preparation of legal documents and in the conduct of courtroom trials.

The author was very pleased with the classroom instruction received during his involvement with the Doctor of Engineering program. The courses proved invaluable in preparing the author for a career in business for the following primary reasons:

1. The engineering-related courses prepared the author to pursue his career in Transportation Engineering with a very strong background in that discipline.
2. The business-related courses provided the author with a broad-based background of specific business activities, management principles, and administrative skills, which are all necessary to run a successful business.

3. Additional courses (specifically Professional Ethics and Practice and Legal Relationships) reminded the author of the necessity of conducting business activities ethically, morally, and legally.
CHAPTER VI
SUMMARY

This report describes Joseph D. Blaschke's internship experience at Walton & Associates/Consulting Engineers, Inc., (WACE) in Bryan, Texas. The purposes of the internship were to apply training and knowledge to solve engineering problems in a non-academic environment, and to observe and document the problems associated with the inception and development of an engineering consulting firm.

WACE was founded in February, 1980, by Dr. Ned E. Walton. The firm, based in Bryan, Texas, initially specialized in high technology and transportation engineering services, but it gradually expanded to other consulting services in civil, electrical, mechanical, and structural engineering and construction management. In three short years, WACE has grown to a staff of 14, including five (5) registered professional engineers and three (3) Engineers-in-Training. The firm takes pride in its integrity, strict adherence to the Engineering Code of Ethics, professional service to its clients, and desire to serve the public.

The author was responsible for twenty (20) engineering projects during the internship period. Thirteen (13) of the projects were completed during 1982, and the remaining seven (7) were continued into 1983. Nine (9) of the projects were related to transportation engineering, and the other eleven (11) were general civil engineering projects. Additionally, the author wrote or co-authored four (4) project proposals, and assisted Dr. Walton in collecting and reviewing material for approximately 18 expert witness testimonies in tort claim lawsuits. During the internship period, the author was the Vice-President of the firm.
and its Chief Operating Officer. He was also the Head of both the Civil and Transportation Engineering Departments.

The establishment of an engineering consulting firm requires a great deal of fortitude and financial risk. For every successful firm, there are one or two that have failed. Success usually occurs after several years of concentrated efforts. WACE is one of those firms still striving for stability but its determined optimism alone insures future success.

Engineering personnel employed by a small firm need to have multiple skills and abilities to apply those skills, a need which generally requires engineers who are well-experienced or have strong educational backgrounds. Older, experienced engineers command salaries greater than what a small firm can afford. Consequently, many small firms like WACE employ young but highly-educated engineers who anticipate long term employment and long-term benefits. The major disadvantage of using young engineers is their lack of experience which causes indecision during a project's initial stages and deliberate preparation of construction plans. WACE is staffed by a young group of professional engineers who continually learn from their experiences but each has a strong desire to excel and succeed.

With a strong emphasis on managerial skills, the Doctor of Engineering program prepares the engineering student to enter the world of business, public or private, and to perform the roles of both engineer and manager. Coursework completed by the author prepared him well for the dual assignment. Business-related courses were very broad and they addressed those specific areas of concern (business law, accounting,
finance, and economics) which are invaluable to a young manager of a small business. The engineering-related courses provided the author with a strong background in transportation engineering, thereby giving him a specific area to direct his professional development.

The author had established three specific professional goals prior to entering the Doctor of Engineering program:

1. To prepare himself for instructing students at the college level;

2. To become more involved in the personnel management activities of the small engineering consulting firm for which he was employed; and

3. To become more proficient as an expert witness in lawsuits involving tort claims resulting from automobile accidents.

The author is convinced that the Doctor of Engineering degree will aid him significantly in attaining those goals.
REFERENCES


APPENDIX A

ADDITIONAL INTERNSHIP PROJECT ASSIGNMENTS
ADDITIONAL INTERNSHIP PROJECT ASSIGNMENTS

In addition to the projects discussed in Chapter IV of this report, the author was directly involved in the following projects during his internship experience.

Copperfield Off-Site Sanitary Sewer and Water Project, Bryan, Texas. In a joint venture project with McClure Engineering, Inc. of Bryan, Texas, Walton & Associates/Consulting Engineers, Inc. (WACE) prepared engineering construction plans and specifications for the off-site sanitary sewer and water line for Copperfield Subdivision, a 190-acre development in Bryan, Texas. The author was the project director for WACE.

Shirewood Subdivision, Bryan, Texas. In another joint venture project with McClure Engineering, Inc., of Bryan, Texas, WACE prepared the necessary plats and engineering construction plans and documents for this 68-acre, $1,000,000 development. Engineering services included design of streets, drainage, sanitary sewer, water, and other utilities. The author served as WACE project engineer on this effort.

Holleman Drive Extension, College Station, Texas. The author was responsible for preparing construction plans for streets, utilities, and drainage for an 860-foot, $80,000 extension of Holleman Drive, a major collector in College Station. The project was unique in that it contained a major at-grade railroad crossing that had to be designed as part of the street construction plans.

Willow Run Subdivision Feasibility Study, Bryan, Texas. The author was responsible for the conduct of a feasibility study for Willow Run Subdivision, a 19-acre tract of land in Bryan, Texas. The results of
the study indicated that residential development of the land was feasible but drainage and sanitary sewer design required comprehensive planning and extraordinary emphasis.

**Site Utilization Study, Bryan, Texas.** The author performed a Site Utilization Study of a 4.2-acre tract of land in Bryan, Texas, to determine its potential development as a small office park. Three different conceptual plans were devised and one was selected by the client to be used as a sales exhibit. The most interesting aspect of this project was the triangular shape of the tract of land.

**Villa Forest West Apartments, Bryan, Texas.** The author was responsible for designing the parking lot for the 96-unit Villa Forest West Apartment Complex in Bryan, Texas. The assignment was made difficult by the lack of available parking area due to high density development of the apartments and the loss of considerable space to drainage detention basins.

**Beltway 8 Signal Projects, Harris County, Texas.** WACE was selected as a subcontractor to two Houston-based consulting engineering firms which were preparing roadway construction plans for Beltway 8, the new freeway "ring" around the outskirts of the City of Houston. WACE was asked to prepare the signal construction and roadway marking plans for the sections of Beltway 8 assigned to the two firms. Signal construction plans were prepared by the author for a total of five intersections along Beltway 8.

**LaPorte Signal System Project, LaPorte, Texas.** The author supervised the conduct of a Signal Warrant Study for a group of five traffic signals along a major arterial in LaPorte, Texas, and the preparation of
signal construction plans to modify those signals. The project also recommended the removal of one existing traffic signal, interconnection of the remaining traffic signals, and roadway channelization modifications.

**Intersection Design Modifications, Bryan, Texas.** At the request of the City of Bryan, the author prepared a conceptual plan for the geometric modification of the Intersection of Briarcrest Drive and Villa Maria Road, two major thoroughfares in the City of Bryan. The plan incorporated dual-left-turn lanes at the "Tee" intersection.
APPENDIX B

CORRESPONDENCE RELATIVE TO INTERNSHIP
August 28, 1981

Dr. N. J. Rowan
Civil Engineering Department
Texas A&M University
College Station, TX 77843

Dear Dr. Rowan:

This is to advise you that I desire to initiate those procedures necessary to approve my internship for the Doctor of Engineering program. The Bryan-based firm of Walton & Associates/Consulting Engineers, Inc. will be my employer and Dr. Ned E. Walton, President of the firm, will serve as my immediate supervisor. It is my intent to spend a full year (January 1 - December 31, 1982) as an intern.

Since I am a registered professional engineer and currently employed as a principal with Walton & Associates/Consulting Engineers, Inc., the objectives of my internship will be slightly different from that of a typical internship. I intend to satisfy the purposes of the internship (apply my knowledge and training to solve engineering problems and to function in a non-academic environment) and to report on my experiences. However, I believe that a second objective of my internship would be to document (and report on) the problems associated with the inception and development of an engineering consulting firm. At the end of my internship, Walton & Associates/Consulting Engineers, Inc. will be three years old. My internship report will contain a narrative of my engineering experiences during the year and include a section on the initial three-year growth and success of the firm.

I have been informed that the members of my committee must approve the tentative objectives of my internship, the sponsoring business, and the supervisor. Following their approval, a letter must be sent by you to the Graduate College, through the Dean of Engineering, outlining the details of my proposed internship. The Graduate School will desire a resume of Dr. Walton so I am enclosing one with this correspondence.

Please let me know if additional information is required, and I thank you in advance for your assistance.

Sincerely,

Joseph D. Blaschke, P.E.

JDB/jr

Enclosure

cc: Dr. Ned E. Walton

Brazos Savings Building, Suite 420 • 2800 S. Texas Ave. • Bryan, Texas 77801 • 713 / 779-3144
RE: Internship, Doctor of Engineering
Joseph D. Blaschke

Dear Dr. Rowan:

I am pleased to provide this report on the internship of Joseph D. Blaschke, candidate for the Doctor of Engineering degree. Mr. Blaschke's internship was for the period January 1-December 31, 1982.

Mr. Blaschke joined our firm as a principal in May, 1980 shortly after our incorporation as a Texas corporation, and he is a registered professional engineer. Thus, his internship has probably been slightly different from that of a typical internship. Certainly, he has fulfilled his objective of applying knowledge and training to solve engineering problems and to function in a non-academic environment. But, in addition to this, he has dealt daily with the problems associated with the inception and development of an engineering consulting firm. For the last six months of his internship, Mr. Blaschke served our firm as Chief Operating Officer. During his association with our firm, we have grown from a two-engineer staff to a nine-engineer staff with 10 support personnel.

Perhaps it is appropriate to outline Mr. Blaschke's activities for the internship period.

Traffic

Responsible for our traffic/transportation division. Supervised two registered professional traffic engineers. Performed or supervised the following:

- 5 intersection signalization projects in LaPorte, Texas
- 9 intersection signalization projects in Harris County, Texas
- 6 intersection signalization projects in Bryan, Texas
- Master Traffic Study in Bryan, Texas
- Impact Study for The Grove development
Civil

Responsible for our general civil division. Supervised one civil engineering EIT. Performed or supervised the following:

- Woodway West Subdivision Design
- Copperfield Subdivision Off-Site Sewer Design
- Master Plan for Conlee Industrial Park
- Site Utilization Plan for Stephenson Property
- Southern Centre Drainage Plan
- Willow Run Parking Plan
- Christmas Store Water and Sewer Plan
- Pinion Creek Water Distribution System
- Holleman Drive Extension
- Shirewood Subdivision Development Plan
- Villa Forest West Parking Plan

Legal

Participated in development of case material for Texas State Department of Highways and Public Transportation legal cases. Assisted in 18 cases.

Administrative

Served as Chief Operating Officer. Responsible for day to day coordination of staff and operations. Assigned and monitored projects in transportation, civil, electrical, mechanical and structural engineering. Administered company benefits program. Participated in client development. Primary responsibility for client development and project development in transportation and civil engineering divisions.

Mr. Blaschke is a tremendous asset to our firm. His knowledge and application of engineering technology gained in the Doctor of Engineering program has been beneficial to our success. He has gained good business insight which is a definite plus for a group of struggling engineers.

The purposes and objectives of Mr. Blaschke's internship as outlined in his proposal letter of August 28, 1981 have been fulfilled to my satisfaction. I am definitely pleased that he pursued the Doctor of Engineering degree and I feel he and the firm will benefit. If you need any additional information or input, please let me know.

Sincerely,

Ned E. Walton, Ph.D., P.E.

NEW/jr
APPENDIX C

PROFESSIONAL EXPERIENCE PRIOR TO INTERNSHIP
PROFESSIONAL EXPERIENCE PRIOR TO INTERNSHIP

The following record depicts the author's professional experience and list of publications prior to beginning his internship in January, 1982.

EXPERIENCE

January - December 1972
Worked part-time for Texas Transportation Institute, Texas A&M University, on various research projects. Primary work involved development of a roadside inventory system to identify existing hazards and to determine the most cost-effective method of eliminating those hazards.

January 1973 - February 1975
Stationed as Second Lieutenant at Fort Carson, Colorado with Construction Engineer Battalion. Scheduled material hauling activities of a fleet of 30 trucks, supervised post rock crusher and quarry operations, and served as post traffic engineer.

March 1975 - March 1977
Stationed as First Lieutenant and Captain with the Military Traffic Management Command Transportation Engineering Agency, Ft. Eustis, Virginia. Performed traffic engineering operations and planning studies for various military installations (Army, Air Force, Navy & Marine) throughout the United States, including the Pentagon.

April 1977 - December 1977
Worked as a Traffic Engineer II with the City of Houston's Department of Traffic and Transportation on a special study funded by the Texas Office of Traffic Safety. Developed a systematic procedure to identify the most critical high-accident locations within the city based upon a combination of traffic accident rates related to total number of accidents, accident severities, and accidents per traffic volumes.
January 1978 - January 1979  
Served as a State Office of Traffic Safety Area Traffic Engineer for Harris (Houston) and Montgomery Counties. Assisted city and county officials in obtaining State and Federal Traffic Safety Funds for various projects intended to identify, analyze, and correct traffic operational deficiencies and accident hazards.

January 1979 - June 1979  
Employed as Assistant Director of the City of Houston's Department of Traffic and Transportation. Performed specific traffic engineering operational studies upon special request of the Director of the Department. Studies included: (1) Roadway Optimization study to determine the feasibility of developing new one-way streets or reversible lane operations on existing urban streets; (2) CBD Loading Zone Efficiency Study; (3) Potential of Using Variable Message Signing to influence Gate Usage for Astrodome Activities; and (4) Development of a new organizational structure for the department.

June 1979 - April 1980  
Employed as a consulting engineer with the firm of S. Craig Hollmig, Inc., in New Braunfels, Texas. Performed various traffic engineering consulting services within the City of San Antonio and other Central Texas Cities. Primary activities included a Signal Design and Construction Project for the City of San Marcos, Texas, and a Traffic Impact Study for a large apartment development in Alamo Heights, a suburb of San Antonio. Other engineering projects included subdivision layouts, sewer and street design, sewer treatment plant design, and parking area design.

May 1, 1980 - December, 1981  
Employed as principal with the firm of Walton & Associates/Consulting Engineers, Inc. in Bryan, Texas. Assisted in designing channelization for a two-mile section of a primary arterial in College Station, Texas,
May 1, 1980 - December, 1981 developing street construction specifications for the City of College Station, and performing a roadway base and surface treatment analysis of existing streets in Bryan, Texas. Performed traffic impact study for proposed Datapoint Corporation's Corporate Headquarters site in San Antonio, Texas. Acted as Project Manager for 1981 Bryan, Texas traffic engineering study. Prepared street and railroad crossing construction plans for section of primary collector in College Station, Texas.

PUBLICATIONS

Books


Technical Journals Papers

Harris County Gets SASS'y, a Report on the Computerized Traffic Accident Storage and Retrieval System (SASS) for Harris County, Texas, TexITE Newsletter, with Paula Hogan, January, 1979.

Selected Reports

"Analysis of Reported Traffic Accidents Occurring on Richmond and Westheimer Avenues Between South Shepherd and Westernmost Houston City Limits -- January 1, 1980 to April 30, 1981", prepared for Director, City of Houston Department of Traffic and Transportation, November, 1981.

"A Study of Pedestrian Accidents Occurring in the City of Houston, Texas Between January 1, 1979 and September 1, 1980", prepared for Director, City of Houston Department of Traffic and Transportation, December, 1980.


"Proposed Organization of the Department of Traffic and Transportation, City of Houston, Texas", prepared for Director of same Department, March, 1979.

VITA

JOSEPH DAVID BLASCHKE

Mr. Blaschke, the son of Herbert and Alice Blaschke, was born on September 30, 1949, in New Braunfels, Texas. He and his wife, the former Margaret Dawn Lewis, have two sons, Byron and David.

Mr. Blaschke graduated from New Braunfels High School in 1967 and attended Texas A&M University. He received a Bachelor of Science Degree in Civil Engineering in 1971 and a Master of Engineering Degree in 1972 from the University. In 1973, Mr. Blaschke joined the United States Army and, after serving four years stateside, was honorably discharged while holding the rank of Captain.

From 1977-1978, Mr. Blaschke served as a traffic safety engineer for the Governor's Office of Traffic Safety for Harris County, Texas. In early 1979, he accepted a six-month assignment as Assistant Director of the Traffic and Transportation Department for the City of Houston. Mr. Blaschke then moved to New Braunfels, Texas, and was employed by the engineering consulting firm of S. Craig Hollmig, Inc., as a principal within the firm.

In 1980, Mr. Blaschke accepted a position as principal with the firm of Walton & Associates/Consulting Engineers, Inc. in Bryan, Texas. In 1981, he was given the position of Vice-President of the firm, a position he currently maintains.

Mr. Blaschke is a registered professional engineer in the State of Texas (No. 42200). His permanent address is: 3807 Holly, Bryan, Texas 77802.

The typist for this report is Mrs. Joy Ramsey.