

**JEFFREY W. BUCKHOLZ, PhD, P.E., PTOE**  
**Chief Transportation Engineer**

Although a large number of traffic accidents are caused either by driver error or the influence of drugs or alcohol, a substantial number are caused by deficiencies within the roadway itself. These deficiencies may be caused by a wide variety of design or maintenance errors, including the improper placement or wording of signs, missing or confusing pavement markings, or improperly operating traffic signals -- just to name a few. Unfortunately, lack of training, or simple oversight, on the part of well-meaning engineers often results in dangerous designs finding their way off the drawing board and into the field. I specialize in the identification and remedy of such design deficiencies and can provide expert testimony in this area.

I have 33 years of hands-on technical experience in the traffic engineering field, running my own consulting firm for 22 of those years. I am a recognized national expert in traffic signal operation, timing, design, and construction and am also very proficient in pavement marking design, roadway signing, and work zone traffic control. However, I am not an accident reconstruction expert. I have participated in over 80 cases with many of these cases involving deposition work and a number of these cases going all the way to trial. I have given both live and videotaped testimony and have testified for both the plaintiff and the defense. It should be emphasized that I am a practicing engineer and that my expert testimony work constitutes only a portion of my engineering practice.

**Education**

UNIVERSITY OF TOLEDO, Toledo, Ohio:  
Bachelor of Science in Civil Engineering, Magna Cum Laude, 1976

UNIVERSITY OF CALIFORNIA, Berkeley, California:  
Master of Science in Civil Engineering, Transportation Major, 1977

UNIVERSITY OF TOLEDO, Toledo, Ohio:  
Master of Business Administration, 1983

MASSACHUSETTS INSTITUTE OF TECHNOLOGY, Cambridge, Massachusetts:  
Postgraduate Studies in Transportation, 1984-1985

UNIVERSITY OF FLORIDA, Gainesville, Florida:  
Doctor of Philosophy in Civil Engineering (Transportation Major, Statistics Minor), 2007

**Professional Status**

- Registered Civil Engineer in Florida, Georgia, California, Ohio, Michigan and Massachusetts
- Professional Traffic Operations Engineer (PTOE)
- Adjunct Professor, University of North Florida Engineering Department
- Certified Unlimited Electrical Contractor in Florida (EC-0001856) and Georgia (ER-101784)
- Level III IMSA - Certified Traffic Signal Technician
- Level II IMSA - Certified Signs & Markings Specialist
- Author - IMSA Levels I and II Traffic Signal Training Manual
- Author - IMSA Traffic Signal Inspection Manual
- Author of Eight On-Line Continuing Education Courses in Traffic Signal Design and Operation
- ATSSA Certified for Florida Advanced Work Zone Traffic Control
- Fellow – Institute of Transportation Engineers

**Experience**

- JW BUCKHOLZ TRAFFIC ENGINEERING, Consulting Engineers, Jacksonville, Florida
- VOLLMER ASSOCIATES, Consulting Engineers, Boston, Massachusetts
- TOLEDO METROPOLITAN AREA COUNCIL OF GOVERNMENTS, Toledo, Ohio
- SAN DIEGO COUNTY DEPARTMENT OF TRANSPORTATION, San Diego, California
- McDONNELL, PROUDFOOT & ASSOCIATES, Consulting Engineers, Toledo, Ohio

**Principal publications:**

- Buckholz, JW, Signal Supports, Indications and Signing, CED Engineering Continuing Education Course, 2010
- Buckholz, JW, Designing Traffic Signals, CED Engineering Continuing Education Course, 2010
- Buckholz, JW, Introduction to Traffic Signals, PDH Engineer Continuing Education Course, 2010
- Buckholz, JW, Planning for Traffic Signals, PDH Engineer Continuing Education Course, 2010
- Buckholz, JW, Basic Signal Timing Concepts, PDH Online Continuing Education Course, 2010
- Buckholz, JW, Traffic Signal Detection Systems, PDH Online Continuing Education Course, 2010
- Buckholz, JW, The Signal Controller Cabinet, PDH Site Continuing Education Course, 2010
- Buckholz, JW, Traffic Signal Phasing, PDH Site Continuing Education Course, 2010
- Buckholz, JW, "A Proposed Transportation System for Roadable Aircraft", Paper Accepted for Presentation at Transportation Research Board Annual Meeting, January 2010, Washington, D.C
- Buckholz, JW, "Theoretical Bounds for Delay Estimation", Paper Submitted for Consideration at Transportation Research Board Annual Meeting, January 2010, Washington, D.C
- Buckholz, JW, "LOS for Oversaturated Conditions, A Proposed Solution for Signalized Intersections", ITE Journal, January 2009
- Buckholz, JW and Courage, KC, "Microscopic and Macroscopic Approaches to Delay Estimation with Oversaturated Conditions", Transportation Research Record No. 2071, Journal of the Transportation Research Board, 2008
- Buckholz, JW, Ph.D. Dissertation, "Real-Time Measurement of Delay at Signalized Intersections", December 2007
- Buckholz, JW, "Detector Switching and Detector Calling", IMSA Journal, Vo. 41, No. 3/03 (May/June 2003)
- Buckholz, JW, "Clamp-On Single Point Ground Testers", IMSA Journal, March/April 2003
- Buckholz, JW, "Choosing Intersection Control (Part II - 3 Case Studies)", IMSA Journal, Jan/Feb 2003
- Buckholz, JW, "Choosing Intersection Control (Part I)", IMSA Journal, November/December 2002
- Buckholz, JW, "The Future of Traffic Signals", IMSA Journal, September/October 2002
- Buckholz, JW, "Limitations of Coordinated Signal Timing Programs", IMSA Journal, July/August 2002
- Buckholz, JW, "Ten Common Deficiencies of Signalized Intersections", IMSA Journal, May/June 2002
- Buckholz, JW, "Check Timing Values (Construction Timings)", IMSA Journal, November/December 2001
- Buckholz, JW, "Fully-Actuated Traffic Signal Control", IMSA Journal, July/August 2001
- Buckholz, JW, "Stop Line vs. Upstream Detection (Volume-Density Operation)", IMSA Journal, May/June 2001
- Buckholz, JW, "Dilemma Zone Protection", IMSA Journal, March/April 2001
- Buckholz, JW, "IMSA Level II Traffic Signal Update (Preventive Maintenance)", IMSA Journal, Jan/Feb 2001
- Buckholz, JW, "Lane Discipline in Multi-Lane Roundabouts", IMSA Journal, November/December 2000
- Buckholz, JW, "Types of Flashing Operation (Low Volume Flash)", IMSA Journal, July/August 2000
- Buckholz, JW, "Improving Driver Education", IMSA Journal, May/June 2000
- Buckholz, JW, "The Benefit of Full Time Inspection (Tailored Inspection)", IMSA Journal, March/April 2000
- Buckholz, JW, "Stop Line vs. Upstream Detection Areas (Right Turn Slip Lanes)", IMSA Journal, Jan/Feb 2000
- Buckholz, JW, "Cabinet Grounding", IMSA Journal, November/December 1999
- Buckholz, JW, "The New IMSA Traffic Signal Inspection Manual", IMSA Journal, September/October 1999
- Buckholz, JW, IMSA Traffic Signal Inspection Manual, 1999
- Buckholz, JW, "Travel Time Runs", IMSA Journal, July/August 1999
- Buckholz, JW, "Types of Flashing Operation (Yellow/Red vs. Red/Red Flashing)", IMSA Journal, May/June 1999
- Buckholz, JW, "Typical Background Cycle Lengths", IMSA Journal, March/April 1999
- Buckholz, JW, "Delay Detection", IMSA Journal, January/February 1999
- Buckholz, JW, "Left Turn Phasing", IMSA Journal, November/December 1998
- Buckholz, JW, "Traffic Signal Update (Level I and II Test Summary)", IMSA Journal, September/October 1998
- Buckholz, JW, "Traffic Signal Update (Australia-New Zealand Traffic Control)", IMSA Journal, July/August 1998
- Buckholz, JW, "Troubleshooting", IMSA Journal, March/April 1998
- Buckholz, JW, "Current", IMSA Journal, January/February 1998
- Buckholz, JW, "Maximum Usable Area of the Conduit", IMSA Journal, November/December 1997
- Buckholz, JW, "Check Timing Values (Dual Entry)", IMSA Journal, September/October 1997
- Buckholz, JW, "New Level I Signal Manual Arrives", IMSA Journal, July/August 1997
- Buckholz, JW, IMSA Level I Traffic Signal Training Manual, 1997
- Buckholz, JW, "Fiber Optic Cable", IMSA Journal, May/June 1997
- Buckholz, JW, "Railroad Preemption", IMSA Journal, March/April 1997
- Buckholz, JW, "Relative Offset", IMSA Journal, January/February 1997
- Buckholz, JW, "Basic Signal Timing Concepts", IMSA Journal, November/December 1996
- Buckholz, JW, "Required Inductance", IMSA Journal, September/October 1996
- Buckholz, JW, "Pedestrian Phasing", IMSA Journal, July/August 1996
- Buckholz, JW, "The Detector Test Panel", IMSA Journal, March/April 1996

Buckholz, JW, "Mast Arm Pole Length", IMSA Journal, January/February 1996  
Buckholz, JW, IMSA Level II Traffic Signal Training Manual, 1994  
Buckholz, JW, "The 10 Major Pitfalls of Coordinated Signal Timing", ITE Journal, August 1993  
Contributed Section 36.14 (Traffic Engineering for the Criminal Defense Attorney) to Chapter 36 (Expert Witnesses) of Defense of Drunk Driving Cases: Criminal – Civil, Volume 4, Matthew Bender, 1989  
Buckholz, JW, Transportation Resource Decision-Making Framework, University of California Institute of Transportation Studies, December 1977

**Scientific and professional societies of which a member:**

Institute of Transportation Engineers - Fellow (member since 1983)  
International Municipal Signal Association (member since 1989)

**Honors and awards:**

ESI 6355 Outstanding Project Award: "Traffic Signal Simulation", University of Florida, 2004  
IMSA Journal Award for Journalistic Excellence, 1997 and 1998  
Ohio Citizens Outstanding Student Award, 1983  
Tau Beta Pi Engineering Honor Society, 1975

**Educational service:**

University of North Florida

Instructor, Advanced Transportation Engineering, Spring 2005, 2006 and 2007  
Instructor, Introduction to Transportation Engineering, Fall 2006

**Professional development activities in the last six years:**

February 2011 Disciplinary Review for the Florida Board of Professional Engineers (Gateway Greens)  
Taught IMSA Traffic Signal Level I Certification Class, January 2011, Nassau, Bahamas  
Presented at Transportation Research Board Annual Meeting, January 2010, Washington, D.C., "A Proposed Transportation System for Roadable Aircraft"  
Attended FDOT Quality and Level of Service Workshop, December 2009  
Attended Transportation Research Board Annual Meeting, January 2009, Washington, D.C.  
Presented Paper at Penn State Transportation Engineering and Safety Conference, December 2008, State College, Pennsylvania, "Common Deficiencies of Signalized Intersections"  
Reviewed Paper Submission for 2009 Transportation Research Board Annual Meeting: "Three Dimensional Mapping of Inductive Loop Detector Sensitivity Using Field Measurement".  
Presented at 10<sup>th</sup> International Conference on Applications of Advanced Technologies in Transportation, May 2008, Athens, Greece, "The Real-Time Estimation of Delay at Signalized Intersections"  
Reviewed 2 Paper Submissions for 2008 International Conference on Applications of Advanced Technologies in Transportation: "Development of Macroscopic Performance Measures from Traffic Simulation", and "Innovative Traffic Signal System for the Intersections of Under-Crossing Freeways in the Southern California Area".  
Presented at Transportation Research Board Annual Meeting, January 2008, Washington, D.C., "Microscopic and Macroscopic Approaches to Delay Estimation with Oversaturated Conditions"  
Reviewed Paper Submission for 2008 Transportation Research Board Annual Meeting: "Real-Time Methods for Quantifying Arterial Progression Performance".  
Attended Mid-Year Meeting of TRB's Highway Capacity Committee in Charlotte, North Carolina, July 2007  
Attended Transportation Research Board Annual Meeting, January 2007, Washington, D.C.  
Reviewed Paper Submission for 2007 Transportation Research Board Annual Meeting: "Event Based Data Collection for Generating Actuated Controller Performance Measures".  
Attended Transportation Proportionate Fair Share, Concurrency & Financial Feasibility Workshop, May 2006  
CCEC Symposium, University of North Florida, April 2006, Presented: "Visible and Non-Visible Delay at Signalized Intersections"  
Presented at Transportation Research Board Annual Meeting, January 2006  
PhD Progress Report in Transportation Operations and Traffic Control Session  
Attended Signal Capacity Analysis Workshop, Aug. 2005  
Attended Transportation Research Board Annual Meeting, January 2005

A sampling of projects for which Dr. Buckholz has been the principal investigator:

- o The design of a 36-signal closed loop system for St. Johns County, Florida. A detailed set of plans and an extensive set of special provisions were developed for this state-of-the-art traffic control system which utilizes fiber optic cable for master-to-local communications. Since a large portion of the system is within historic St. Augustine, a number of important aesthetic and archeological issues had to be addressed within the plans and specifications.
- o Preparation of a long-range transportation planning study to analyze the effect of the LaVilla/Brooklyn development project, a major new development covering the western portion of Downtown Jacksonville. The Jacksonville Urban Area Transportation System (JUATS) files were updated to reflect land use and network changes associated with the new development. Network changes included freeway ramp closures, road closures, road realignments, and changes in the number of travel lanes. Complete area simulations were executed using the OS/2 version of FSUTMS and daily traffic volume mappings were plotted. AM and PM peak hour traffic flows were derived from the daily flows using peak hour information obtained from downtown traffic counts. The peak hour capacity situation at critical links and intersections was established, deficient areas were identified, and network modifications were recommended.
- o Provided Inspection Services for the Installation of Overhead Changeable Message Signs and Radar Detection Along I-595 in Ft. Lauderdale, Florida. Served as resident engineer on this CMS system, providing services that included: Factory Acceptance Testing, system testing, fiber-optic inspection, power service inspection, and conduit and wiring inspection. The system has 23 full-matrix overhead truss and cantilever mounted signs with fiber-optic flip disk technology.
- o A transportation planning and access management study for SR 21 (Blanding Boulevard) in Clay County. This study developed future traffic volumes, identified locations where median closures or modifications were needed, and set the recommended lane configuration at each signalized intersection. Numerous meetings were held so that the results of the study could be presented to the Florida Department of Transportation, local officials, and the general public.
- o Completed a corridor study to identify the appropriate lane configuration and traffic control along 6 miles of SR 820 (Pines Boulevard) from Interstate 75 to SR 25 (US 27) in Pembroke Pines, Florida. The desired mainline lane configuration, intersection lane configuration, and median arrangement for the 10-year (2006) design horizon were established in this study. Appropriate traffic signal locations were also identified.
- o Prepared signing plans for 16 State Roads in the Orlando area. The work included the inventory of existing signs, the conversion of all the numerical signs from English to Metric, and the modification of all the substandard non-numerical signs to meet FHWA standards. Design improvements were made with respect to such items as sign legend, clear zone, longitudinal placement, reflectivity, and letter size. The design work included approximately 1500 signs and resulted in a 400-sheet set of detailed signing plans, included an extensive set of guide sign worksheets.
- o The design of a 14-signal closed loop system for SR 21 in Clay County, Florida. A detailed set of plans and special provisions were developed for this system which utilizes fiber optic cable for master-to-local communications. A complete set of signing and pavement marking plans for the SR 21 corridor were also developed and lane closure calculations were completed.
- o A long-range transportation planning study using the St. Johns County FSUTMS model was conducted in support of the conceptual design effort for the County's new "North-South" corridor. Future traffic volumes were established along the corridor and at each major intersection. These design volumes served as a basis for determining the proper lane configuration and traffic control for both the mainline and the intersections. The optimum mainline lane configuration and intersection lane configuration for both the short term (2005) design horizon and the long term (2020) design horizon were established in this study.
- o Factory Acceptance Testing of Econolite Controllers in accordance with the requirements of the State of Vermont Agency of Transportation. Over a period of three years, factory acceptance testing of Econolite controllers was conducted at Econolite's east coast assembly facility in Jacksonville, Florida. The controller, conflict monitor, and cabinet were put through an extensive set of operational tests and various electrical

measurements were made to ensure proper cabinet construction. A check was also made of all timings, including coordinated timings, to ensure compliance with the plans and specifications.

- o A transportation planning study for the US 1 corridor in St. Johns County, Florida. Public participation is a key element of this project with three formal public presentations being provided. Slide presentations with accompanying pre-recorded scripts were used, along with extensive sets of aerial photographs. Press releases and public notices were prepared and mailing lists of adjacent property owners and local officials were developed.
- o A retiming project for 18 signals on Roosevelt Blvd. (US 17) in Jacksonville, Florida. Coordinated traffic flow was achieved along this busy corridor which carries both downtown commuter traffic and traffic generated by Jacksonville Naval Air Station, the largest employment location in Northeast Florida. Many of the signals along the corridor have railroad preemption and it was necessary to accommodate the railroad preemption in developing the revised timing plans. The presence of a number of continuous thru lanes along the corridor also required special consideration.
- o Served as resident engineer in charge of construction for: a 37-signal fiber optic closed-loop system in St. Johns County, Florida; 32 signals on SR 5 (Main Street) in Jacksonville, Florida; and a 73 signal expansion to the UTCS signal system in Broward County (Ft. Lauderdale), Florida. Also provided on-site construction inspection services for new traffic signals in Duval and Nassau County, Florida. Monitored construction quality, adherence to plans and specifications, and work zone safety.
- o Completed a corridor study to identify the appropriate lane configuration and traffic control along 1.5 miles of SR 806 (Atlantic Avenue) from Jog Road to Florida's Turnpike in southwestern Palm Beach County. The desired mainline lane configuration, intersection lane configuration, and median arrangement for both a 5-year (2003) and 20-year (2018) design horizon were established in this study. Warranted traffic signal locations and optimum signal phasing were also identified.
- o The design of a 22-signal closed loop system along Lem Turner Road in Jacksonville, Florida. A detailed set of plans and an extensive set of model 170 technical special provisions were developed for this traffic control system which will utilize fiber-optic master-to-local communications. Prior to initiating the design, a detailed system timing report was prepared for FDOT review which contained information on existing signal operation and identified needed signal improvements.
- o Preparation of a long-range transportation planning study to support of the improvement of Monument Road in Jacksonville, Florida. Jacksonville Urban Area Transportation System (JUATS) files were updated to reflect land use and network changes for the various alternatives under study. Area simulations were executed and diversion studies were carried out using FSUTMS. Using the results from the computer planning models, cordonline counts, existing turning movement counts, and our knowledge of the area, we were able to identify the best roadway configuration and intersection geometrics for the future Monument Road Corridor.
- o The design of an overhead lane use control system for Birmingham Avenue in Jacksonville, Florida. Birmingham Avenue is a major east-west roadway located inside the Jacksonville Naval Air Station. A complete set of final plans and detailed technical special provisions were prepared for this job in accordance with US Navy Specifications. This project involves the construction of 7 overhead lane use gantries and a supporting communications and control network with central monitoring and manual override. Since the direction of the entire roadway must be reversed to handle commuter traffic, it was also necessary to design a complete system of electrically powered single message and dual message fiber optic blank-out signs (one way, no right turn, no left turn, etc.)
- o A retiming project for 37 traffic signals on San Jose Boulevard (SR 13) in Duval County. Coordinated traffic flow was achieved along this heavily-travelled commuter route through the field implementation of a series of new timing plans. The corridor was divided into logical subsections with separate timing plans tailored to each subsection.
- o Trailblazer and guide sign design for the Sawgrass Expressway in Ft. Lauderdale, Florida. This signing project involved an extensive sign inventory from which a conceptual signing plan for this 36 mile facility was developed. Once the conceptual design was approved, a final plans package was prepared.

- o A traffic study and feasibility analysis for the installation of reversible lane signals on Birmingham Avenue. This study, which was conducted for Jacksonville Naval Air Station, examined a number of reversible lane design options before recommending a system of overhead lane use control signals and dual message blank-out signs.
- o A traffic signal retiming project for 40 signals on Blanding Boulevard (SR 21) in Clay and Duval counties. Coordinated traffic flow was achieved along this heavily-travelled commuter route through the field implementation of new AM-peak, PM-peak, Off-peak and "shoulder-period" timing plans. Both hard-wire and time-based interconnection was used to provide the needed coordination and a special phasing scheme was developed for the compressed diamond interchange in the middle of the corridor.
- o A retiming project for 23 signals on University Boulevard (SR 109) in Duval County. Coordinated traffic flow was achieved along this heavily-travelled circumferential arterial through the field implementation of a complete set of new timing plans.
- o A traffic study for the extension of 50th Street in Jacksonville, Florida. 50th Street is a primary access route for semi-trailer traffic destined for industrial and port-related facilities in North Jacksonville. This study identified future traffic volumes, suggested a suitable cross section and pavement design for the extension, and recommended appropriate traffic control devices.
- o A truck access study for the ITT-Rayonier Mill in Fernandina Beach, Florida. Seven alternative access routes were evaluated and a preferred route chosen. Both short term and long term recommended improvements were identified. These included signal equipment and timing modifications, signing and striping enhancements, and geometric improvements.
- o A traffic impact study for the St. Augustine Outlet Center in St. Johns County, Florida. This 220,000 sf factory outlet mall, which will be located near the interchange of I-95 and State Route 16, will have a substantial impact on the surrounding road system. Needed roadway, signalization, and interchange improvements were identified. Subsequent to the traffic study, a traffic impact fee analysis was completed.
- o A traffic impact study for the Baptist Outpatient Center in downtown Jacksonville, Florida. This 135,000 sf medical facility will serve as a regional center for acute eye care and cancer treatment. A circulation plan was developed that would provide suitable access for a difficult site location. Completion of the study required coordination with the Florida Department of Transportation, the City of Jacksonville Traffic Engineering Department, the City of Jacksonville Planning Department, and the Jacksonville Transportation Authority.
- o Preparation of a revised highway master plan for downtown Chattanooga, Tennessee. In order to open-up the banks of the Tennessee River for cultural development, it became necessary to close a major highway running along the river. A revised highway master plan was developed to accommodate both the diverted traffic from the highway to be closed and the generated traffic from the new cultural center.
- o Preparation of a long-range transportation planning study to analyze the traffic effects of the proposed Regency By-Pass and to identify the required mainline, interchange, and intersection lane configurations. The Jacksonville Urban Area Transportation System (JUATS) model was updated to reflect network changes and diversion studies were carried out using the multi-period/multi-path transit module of FSUTMS.
- o A traffic engineering analysis and functional roadway design for Boston's Third Harbor Tunnel/Seaport Access Road. This included all phases of transportation modelling (trip generation through traffic assignment) as well as highway capacity analysis.
- o The design of a proposed new interchange and terminal roadways for Logan International Airport. This included the design of exclusive commercial vehicle lanes to be used by taxis and buses, the redesign of complex traffic weaving sections, and the design of a simplified signing system for the airport. Due to the many modes of travel to and from Boston's Logan Airport, it was necessary to develop a special computer model for traffic forecasting.

- o Development of a transportation master plan and proposed roadway system for the City of Westland, Michigan. The area involved included a large shopping mall, single family and multiple family residential areas, and strip commercial development. New roadways and intersection improvements were recommended.
- o Design of an access system and internal roadway system for Ohio's newest state park. A linear regression model was developed for forecasting attendance and associated traffic. Internal park roadways, activity parking areas, and the camper check-in area were all designed to be visually pleasing and to minimize disruption to the environment.
- o Parking study for Boston's World Trade Center and Fish Pier. An analysis of future parking demand versus available supply was prepared by 5-year intervals. A structured parking facility was recommended to handle expected parking demand increases due to future office expansion.
- o Participated in the development of Traffic Impact Fee procedures and monitoring systems for Rockland, Massachusetts and Amelia Island, Florida. An equitable procedure for assessing both immediate and future developments was prepared. This procedure was based on past legal precedents and current transportation theory with regard to impact fees.
- o Served as project manager on eight minor highway design projects located in District II of the Florida Department of Transportation. These projects included road widenings, bridge approaches, and intersection widenings. Responsibilities included: participation in plan preparation, coordination of project submittals, plan review to ensure adherence to safety criteria, and overall review of plans, specifications, and bid items.
- o Designed maintenance of traffic plans for the temporary closing of three railroad crossings in St. Johns County Florida. These plans included detour signing with all signs and barricades in accordance with the Manual on Uniform Traffic Control Devices.
- o Signing, striping, geometric design and signal design for many intersections in Florida, Ohio, Michigan, and Massachusetts. Work included: signal warrant analysis, the use of microcomputer programs such as SOAP, TRANSYT, and PASSER to set signal timings, accident analysis, and capacity analysis based on the 1985 and 1994 Highway Capacity Manual.
- o Preparation of numerous Traffic Impact studies and Environmental Impact Reports for project developments throughout New England and Florida. These developments included office parks, regional shopping centers, medical facilities, resorts, and housing developments.