

Institute for Transportation at New Jersey Institute of Technology

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The Institute for Transportation at New Jersey Institute of Technology (NJIT), was originally established in February 1988 as the Center for Transportation Studies and Research. The institute is one of 23 research centers within NJIT, placing the university in the top 10 of the most rapidly expanding technological universities nationwide. Research efforts are primarily concentrated on protection of the natural environment, exploration of new forms for the built environment, and enhancement of U.S. competitiveness in a national market through computer-integrated manufacturing and management expertise using technology.

The broad range of programs available at NJIT provides a challenging environment for the institute. These programs are a continual resource, supplying the transportation program with interdisciplinary study in the areas of engineering, architecture, actuarial science, organizational and social sciences, and computer and informational sciences. The university setting furnishes a laboratory for exploring current transportation issues and the metropolitan area provides an interactive testing arena containing a combination of high-population density, economic activity, and industry. Included in the transportation network are extensive and con-

gested roadways, public transit systems, and busy airports.

The Institute for Transportation provides a home for faculty with diverse backgrounds who hold positions in various schools and departments throughout the university, including the Newark College of Engineering, which houses the Department of Civil and Environmental Engineering and the Department of Mechanical and Industrial Engineering; the College of Science and Liberal Arts, which contains the Department of Social Sciences and Policy Studies; and the School of Industrial Management. Currently there are 9 faculty and staff members, 10 associated faculty, and 15 graduate students who are involved with research contracts in excess of \$4 million.

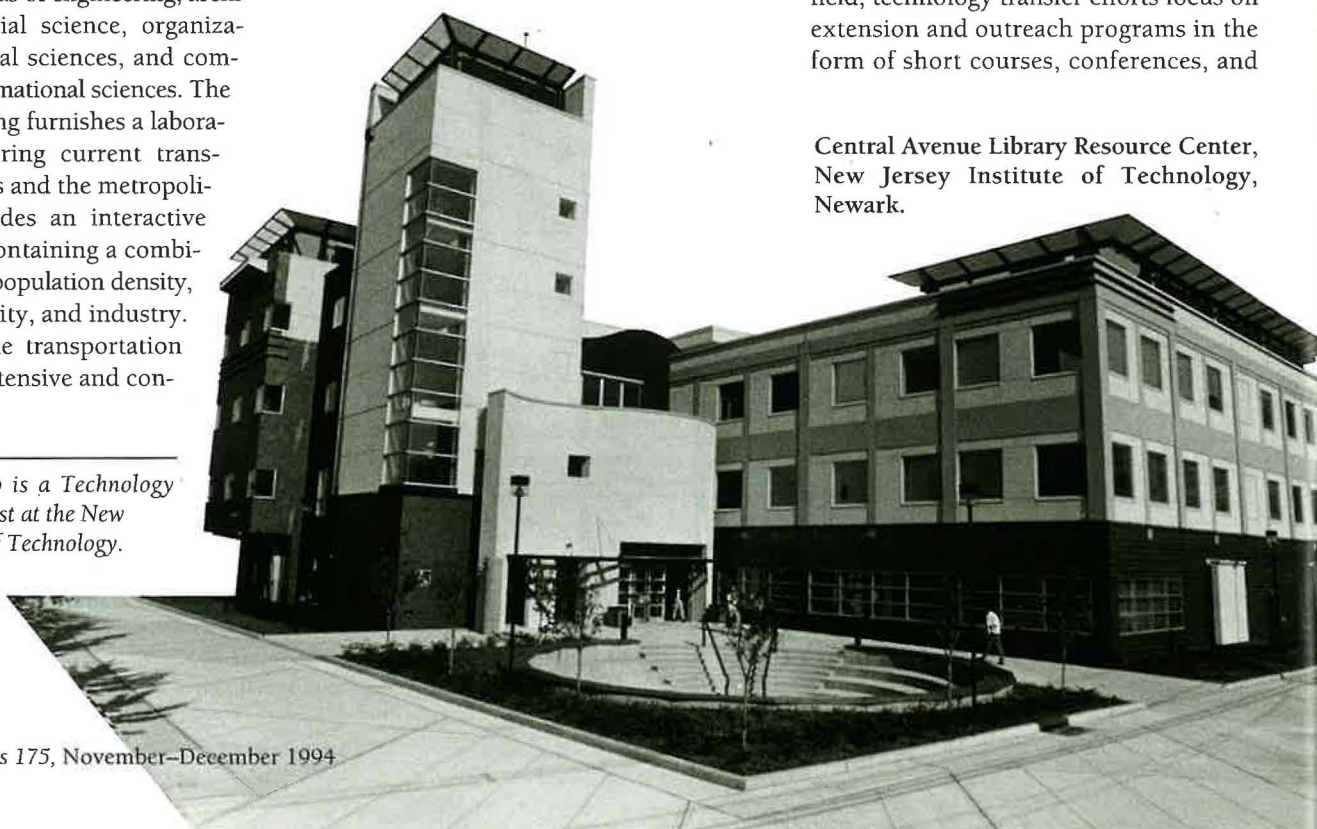
Institute's Transportation Program

The transportation program at NJIT is conducted through the institute and includes education, technology transfer, and research activities. The mission of the institute is to produce trained professionals in the areas of planning, design, and management of transportation systems in both the private and public sectors as a transportation focal point for the New Jersey/New York Metropolitan Regional transportation agencies. The Interdisciplinary Program in Transportation offers designated M.S. and Ph.D. degrees in transportation. Also offering advanced degrees concentrating in the transportation area are the Civil Engineering Department and the School of Industrial Management.

Because transportation is a growing field, technology transfer efforts focus on extension and outreach programs in the form of short courses, conferences, and

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seminars. Moreover, a forum is provided in which transportation professionals can exchange ideas.

Research at the Institute for Transportation has been conducted for federal, state, and private companies in a variety of areas. The federal agencies involved are as diverse as the Federal Railroad Administration, Maritime Administration, and the Environmental Protection Agency. The National Cooperative Highway Research Program and the National Science Foundation have also funded research projects. The New York State Department of Transportation, New York City Department of Transportation, as well as entities such as the New York State Science and Technology Foundation Commission, Central Brooklyn Model Cities Program, the New York State Research Development Authority, and others have crossed the river to NJIT for transportation research services. Projects have been conducted in New Jersey for the state, the Department of Environmental Protection, Public Advocates Office, Water Authority, Tri-State Regional Planning, and the Port Authority of New York and New Jersey. Groups from the public sector that have benefited from institute research include the United Parcel Service and the EXXON Education Foundation.

Transportation-specific areas in which the institute is proficient include traffic data collection, facility location, vehicle/crew routing and scheduling, network analysis, logistics, needs assessment and performance, optimization, operations management, transportation and environmental system safety, planning, and urban systems.

Other transportation-related research expertise can be found in such areas as economics and finance, international business, labor relations, human resources and training, and legal and political systems impacts. Institute faculty members also have extensive knowledge and experience in quality control, service/product planning and marketing, robotics and automation, modeling and simulation, as well as geographic information systems (GIS) and other computer applications.

The institute also has an in-house computer laboratory. A network of PC workstations is available for students to run a variety of software packages for optimization, planning, and modeling to provide state-of-the-art research results for NJIT clients. In addition, more powerful Sun Sparc systems are available for use in several GIS-related and other projects requiring systems with greater computational abilities.

Research efforts, the educational program, and technology transfer activities are carried out through several programs. Under its intelligent transportation systems thrust, the institute has been designated by the Federal Highway Administration as an intelligent vehicle-highway systems (IVHS) Transportation Center in the northeast United States. In addition, the Federal Highway Administration and the Federal Transit Administration have appointed the National Center for Transportation and Industrial Productivity as one of 13 centers within the established University Transportation Centers Program.

The Institute for Transportation also participates in collaborative research and technology transfer as one of 12 members within UTC's Region II consortium. These programs encompass a wide variety of industry and government research projects. In addition, individually funded projects allow the exploration of specific research pursuits not addressed within the primary programs.

FHWA IVHS Cooperative Agreement

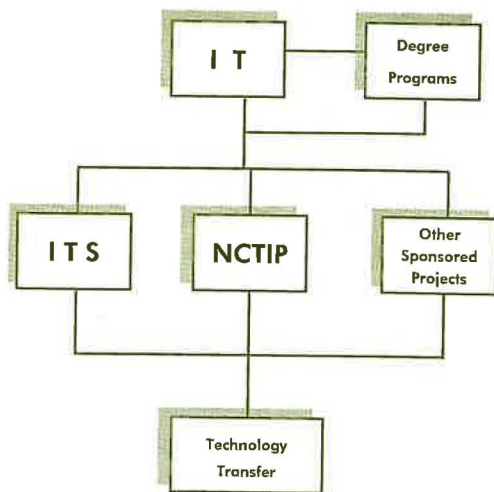
The creation and implementation of effective IVHS requires extensive education

and training. At NJIT, IVHS seminars as well as transportation programs and short courses are offered. In spring 1993 a seminar sponsored by FHWA, JHK and Associates, and the Mitre Corporation was held for the purpose of familiarizing operating agencies in the region with the necessary IVHS requirements and some of the IVHS technology alternatives and issues. Proceedings developed from this seminar are available for distribution to further the awareness of IVHS.

Short courses and program courses are designed to integrate innovation and experience. A short course on IVHS is currently being developed to provide transportation professionals with knowledge of new and existing technologies and theories and to educate the upcoming generation of professionals to respond to future transportation needs. Transportation program courses are continually developed to respond to the changing role of transportation in society.

In an effort to facilitate IVHS technology transfer, the institute participates in a public/private IVHS Forum, primarily through the Committee for a Smart New Jersey (CFSNJ). The first ITS (formerly IVHS) AMERICA regional affiliate established in the nation, CFSNJ brings together public agencies, consulting firms, and private sector providers of IVHS-related equipment and services for discussion on the most recent developments, exchange of ideas, regional problem assessment, and other issues of mutual interest. Special emphasis is given to deployment opportunities and possible cooperative efforts in the region, especially potential public-private sector projects. Faculty and staff are actively involved in subcommittees and regularly attend quarterly forums and annual meetings. The first annual CFSNJ IVHS Symposium in October 1993 was cohosted by the institute.

NJIT has designed a test plan for the evaluation of the advanced "second generation" electronic toll collection technologies. In this project, the focus will be on advanced Smart Card technologies currently under consideration for the New York/New Jersey Metropolitan Region.



Institute for Transportation organizational chart.

NJIT is also working with AT&T on multimedia advanced traveler information systems, developing algorithms to be used in route planning, ride-sharing, and transit schedule information accessing. A GIS (tailored by the institute) will provide real-time traffic information using a major highway in a large urban area and the adjacent road network. This task includes a demand component for the Travel Information Service (TIS) study funded jointly by FHWA and AT&T, which is designed to identify important data elements that should be included in the TIS subscriber's profile contained in the GIS. Stated-choice theory is being used to construct the demand models. Another study task will be to determine the demand for and marginal value of three classes of TIS information: route guidance, rideshare, and transit.

Other IVHS Activities

A study sponsored by the Region II University Transportation Research Consortium and jointly conducted with Princeton University and the City University of New York led to an early recognition of the need for a multimodal approach in intelligent vehicle-highway systems instead of the standard highway/automobile focus. These systems were explored

for the New York–New Jersey region to demonstrate that acquisition, processing, and distribution of real-time transportation information would lead to a more efficient use of the existing transportation system. The study targets regional opportunities in IVHS by incorporating a Qualitative Regional Plan into the final report.

In an effort to incorporate IVHS into the curriculum in a more substantive way, the institute is conducting a study with AT&T to develop an amended graduate degree program that concentrates on the future role of IVHS. The program is currently being modified by the development of an "IVHS option" in the Departments of Electrical and Computer Engineering and the Department of Computer and Information Science. Moreover, a continuing education program is being investigated to develop the human resources needed to support IVHS.

National Center for Transportation and Industrial Productivity

The National Center for Transportation and Industrial Productivity aims to increase productivity through transportation improvements that allow more efficient movement of people and goods, and provision of services. This goal will be achieved through education, program participant expansion, human resource development, research, and technology transfer.

The terms "industrial" and "productivity" are broadly defined within the NCTIP umbrella and include three categories of research efforts: freight movement efficiency; passenger movement efficiency; and facility, institutional, and regulatory efficiency. The first category covers improvements in scheduling, routing, and handling of raw materials, finished goods, and equipment, which may improve the efficiency of manufacturing, retailing, non-profit, and public transit entities. Public transportation improvements can be made through the second category and also include changes in scheduling and routing for more efficient passenger travel. The final category primarily concentrates on the environmental framework, both phys-

ical and regulatory, within which transportation operates. NCTIP efforts will be equally divided among public transportation and other freight and passenger modes.

The faculty at the Institute for Transportation are continually expanding the curriculum to exceed the requirements established by NCTIP. New courses cover current methods for evaluation and analyses of various aspects of transportation. A policy board consisting of representatives from NJIT serves to monitor NCTIP directives and helps to ensure their integration into affiliated departments. The policy board precipitates the introduction of transportation options into undergraduate programs by developing electives and incentives for students.

Excellence and leadership in the field of transportation are sought and encouraged to maintain a high level of proficiency within NCTIP. An advisory board consisting of government, industry, and university representatives was created to ensure the success of the program in the future. This group evaluates worthy research in areas such as freight and passenger movement, facilities, and institutional and regulatory efficiency to provide matching funds through NCTIP.

Research in several areas is being explored for possible funding under NCTIP. For instance, Consolidated Rail Corporation (Conrail), the largest freight railroad in the northeastern United States, has provided funds to support graduate students with an interest in transportation. These students will study the complex public policy issues that relate to transportation in large metropolitan areas such as the New York/New Jersey Metropolitan Region. Students will gain a clear understanding of various issues in financing infrastructure investments in a metropolitan region. Ultimately, students—future transportation practitioners—could gain a practical understanding of the interaction between public policy and the economics of capital-intensive freight carriers and how this interaction affects the provision of efficient and cost-effective transportation services.

In addition, the Institute for Transportation has held exploratory meetings