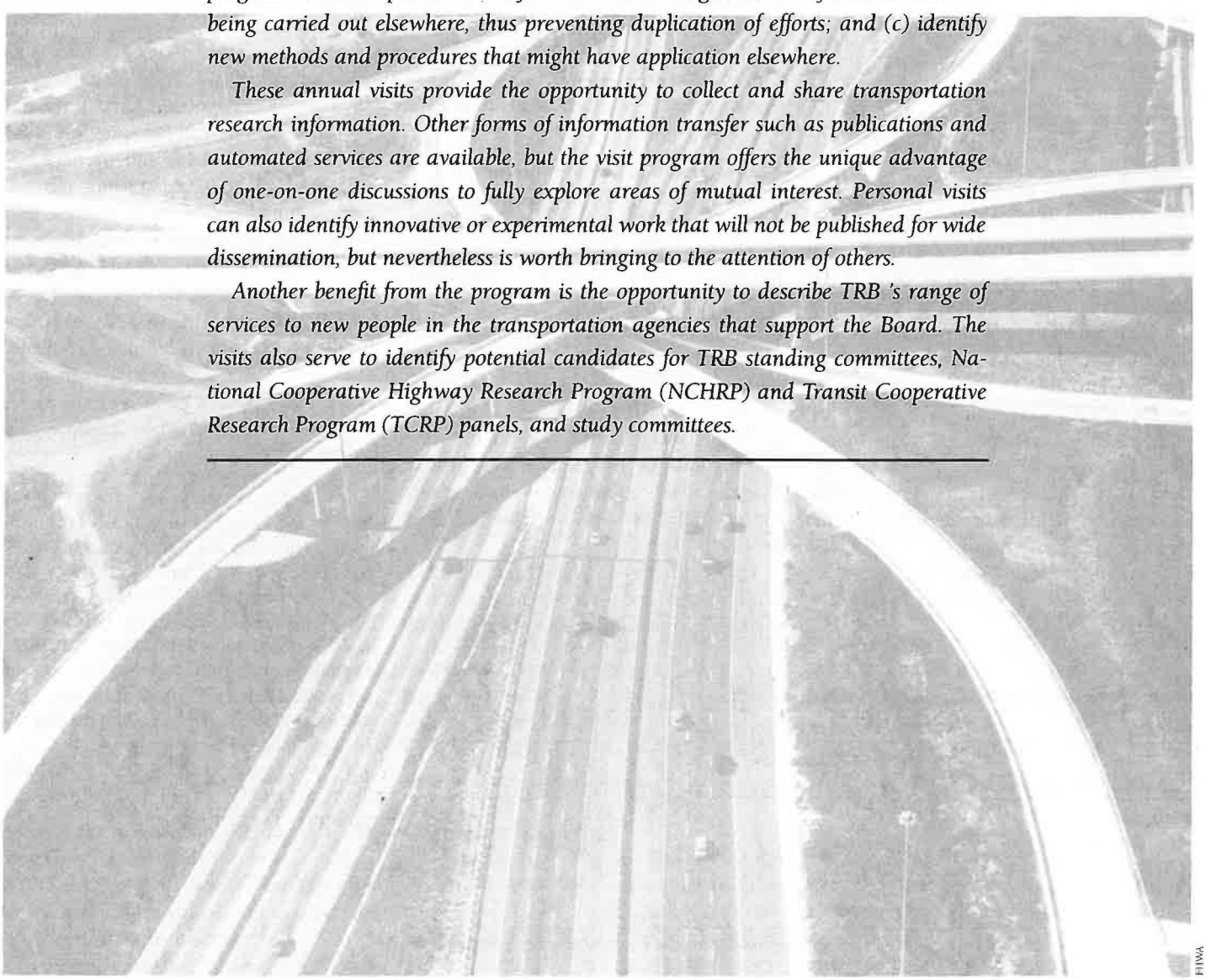
TRB'S Field Visit Program 1991–1992

Each year Transportation Research Board staff members visit every state highway and transportation department, many universities and transit and other modal agencies, and representatives from industry. The objectives of the field visit program are to (a) learn of problems facing the organization visited and to pass on information pertinent to the solution of these problems; (b) learn of research activities in progress or contemplated and inform the visited organization of similar research being carried out elsewhere, thus preventing duplication of efforts; and (c) identify new methods and procedures that might have application elsewhere.

These annual visits provide the opportunity to collect and share transportation research information. Other forms of information transfer such as publications and automated services are available, but the visit program offers the unique advantage of one-on-one discussions to fully explore areas of mutual interest. Personal visits can also identify innovative or experimental work that will not be published for wide dissemination, but nevertheless is worth bringing to the attention of others.

Another benefit from the program is the opportunity to describe TRB 's range of services to new people in the transportation agencies that support the Board. The visits also serve to identify potential candidates for TRB standing committees, National Cooperative Highway Research Program (NCHRP) and Transit Cooperative Research Program (TCRP) panels, and study committees.



FHWA

Not surprisingly, this year the top priority of the state departments of transportation is trying to sort out the various provisions of the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA). The combination of the Clean Air Act Amendments of 1990 (CAAA) and ISTEA will have a significant impact on the planning and implementation of transportation programs. The shift of responsibility from the state level to the metropolitan planning organizations (MPOs) is viewed from different perspectives in different states. In some states, insignificant changes are expected (i.e., a continuation of the existing state-MPO relationship), whereas in others there is concern over new responsibilities being assigned to MPOs that are eager to assume added responsibility but lack the necessary staff resources and planning capability.

Other concerns relating to ISTEA include the need to find state funds to match the increased level of federal funding (coupled with the higher matching ratios required of states), changes in the relative amount of federal funds distributed back to each state (donor/donee relationships), uncertainty about how to address the increased emphasis on intermodal considerations, and the greater flexibility in switching funds from highways to transit.

The legislation also requires greater attention to environmental issues and, although states appear to support the overall objectives, there is considerable concern about how to incorporate many of the environmental and enhancement aspects into ongoing planning, construction, and maintenance activities. The provisions of CAAA are of equal or greater concern, with a number of states being unsure of the ability to satisfy the requirements placed on nonattainment areas.

The transportation research community enjoyed a productive year. The Strategic Highway Research Program (SHRP) made significant progress in its penultimate year of operation. SHRP is actively addressing the need to ensure that forthcoming research products will be implemented and preparing for the transition of its continuing activities to the Federal Highway Administration (FHWA) and TRB. States are preparing to carry out their role in SHRP's long-term pavement performance (LTPP) project, which will continue for 15 years. Other research-related highlights include ISTEA authorization of an intelligent vehicle-highway system (IVHS) research initiative, additional funding for NCHRP and establishment of TCRP.

PHN

Scenic byways sign marks entrance to Ozark National Forest. Provisions for scenic byways are included in Intermodal Surface Transportation Efficiency Act of 1991.

These issues and many others were discussed with hundreds of transportation professionals as TRB staff visited state agencies, universities, and industry groups during the past year. The following is a summary of transportation issues, trends, and research activities identified during those visits and through other staff efforts.

Planning

Significant changes in transportation planning are expected to result from the passage of ISTEA. Currently, states and metropolitan areas are assessing the major impacts of the act on various elements of the planning process. ISTEA establishes an enhanced role for local governments, presenting a challenge to states, metropolitan areas, and local governments in forming new partnerships.

Key requirements of ISTEA that will affect planning at the state and metropolitan levels include

- A long-range plan for each metropolitan area identifying transportation facilities (including intermodal facilities) that will function as an integrated transportation system.
- A transportation improvement program for each metropolitan area, prepared by MPOs in cooperation with state and transit operators.
- Designation of all metropolitan areas of more than 200,000 population as transportation management areas.
- Establishment of a statewide planning process, coordinated with the transportation planning carried out in metropolitan areas, taking into consideration all modes of transportation. Land use, energy, environmental concerns, and social impacts are among the many factors specified.
- A long-range transportation plan for all areas of the state, including adequate bicycle and pedestrian facilities.
- A statewide transportation improvement program that includes all projects to be funded with FHWA and Federal Transit Administration (FTA) funds.
- Development of management systems for pavements, bridges, highway safety, traffic congestion, public transportation facilities and equipment, and intermodal transportation facilities and systems.

In metropolitan areas the management

VIRGINIA DEPARTMENT OF TRANSPORTATION

Use of high-occupancy vehicle lanes and other measures to combat congestion and add capacity within existing rights-of-way is being explored by many state DOTs.

systems are to be developed and implemented in cooperation with the MPOs. In transportation management areas, congestion management systems must provide for effective management of new and existing transportation facilities through the use of travel demand reduction and operational management strategies.

Other congestion-mitigation and air quality programs in ISTEA direct funds to transportation programs and projects that will, or are likely to, contribute to attainment of a National Ambient Air Quality Standard. The U.S. Department of Transportation (DOT) is required to consult with the Environmental Protection Agency (EPA) to determine whether a transportation project or program will contribute to attainment of a standard unless the project or program is included in an approved state implementation plan. Funds under this program cannot be used for a project that will result in the construction of new capacity for single-occupant vehicles unless the projects consist of a high-occupancy facility available to single-occupant vehicles at other than peak travel times. Funds are apportioned to states based on ozone nonattainment area populations, and the apportionments are weighted by severity of air quality.

Finance

ISTEA has significant ramifications for state transportation financing. It authorizes $155 billion for transportation programs in fiscal years 1992–1997, but actual appropriations may be less because of federal budget and deficit limit constraints.

Most of the additional funding from both the state and federal governments will be used for rehabilitating and improving existing highway and transit systems. Only an estimated 10 to 12 percent of the funds will be used for new facilities. Planning and environmental review requirements for new construction projects currently take an average of 6 to 8 years to complete. As a result, more construction funds may be available for the next few years than can be expended.

Although there will be more federal funding for transportation, the ratios of federal matching funds will be lower. At the same time, state revenues have not only not been expanding, they have been eroding because of the recession. As a result, some states will have to increase their transportation user fees again (states have increased user taxes 150 times since 1980) or use the borrowing provisions provided under ISTEA. Although a few state legislatures have diverted transportation user fees for nontransportation purposes, there now appears to be greater emphasis on using these funds on transportation infrastructure investments that create jobs and stimulate the economy. For the time being, it looks as though user fees will continue to be the primary method of financing transportation programs. In the future, environmental concerns and the introduction of alternative fuels may require the taxation of vehicle usage by other means than license and motor fuel taxes.

ISTEA creates fundamental changes in the intergovernmental relationships and responsibilities for funding transportation systems. The federal government will limit its funding to construction and maintenance of the designated national highway system. State and local governments are given greater responsibility for block grant funds under ISTEA, and there is greater flexibility and transferability of funds between highway and transit programs.

Manpower and Human Resources Management

In order to balance state general fund budgets, legislatures and governors have continued their efforts to reduce the number of state employees. At first this was accomplished by eliminating vacant positions, then through hiring freezes and early retirement programs. In some states, layoffs and elimination of filled positions have occurred. Because of the shortage of staff, there has been a continuing reliance on contracting out of services.

Many state DOT personnel have reached retirement age during the past five years, producing a steady growth in the rate of retirements. With the additional incentives provided by state legislatures for early retirement, combined with a narrow window of time in which to elect the option, a sig-

nificant number of people have left state government, including many middle- and upper-level managers.

Many states are now aggressively hiring entry-level engineers, administrative personnel, and specialty professionals such as environmentalists and computer analysts. A major concern now is to provide adequate technical and managerial training for these new staff members.

Environment

As previously noted, the two main pieces of legislation driving environmental concerns are ISTEA and CAAA. In order to meet air quality standards, draconian transportation measures will be needed in nonattainment urban areas. In addition to providing transportation management systems that will limit the use of single-occupant motor vehicles and induce modal shifts to transit and other multiple-occupancy vehicles, major efforts will be needed to introduce new, less polluting alternative fuel vehicles (electric vehicles and vehicles that use reformulated gasoline, ethanol, methanol, and LP gas). Faster turnover of the vehicle fleet to eliminate the older, less fuel-efficient vehicles will also be required.

Each state must provide EPA with an approved state implementation plan before it will be permitted to build a project in urban areas. Conformity with CAAA is a major requirement of state and local transportation agencies and failure to do so will not only result in sanctions but also cause denial of construction permits. Clearly, all urban transportation projects now have to be designed to improve air quality. Associated with these programs is the need for improvements in transportation and air quality forecasting techniques and models so that projects are not accepted or rejected because of inaccurate forecasts.

Under ISTEA, a 1/2 percent minimum apportionment to each state is set aside for congestion mitigation and air quality improvement programs. In addition, 10 percent of the Surface Transportation Program block grant funds is set aside for transportation enhancements, including bicycle and pedestrian facilities, scenic easements, landscaping, historic preservation, removal of outdoor advertising, and mitigation of water pollution.

Wetlands continue to be a major environmental concern. Definitions of wetlands, replacement ratios, and the use of wetland banking are the key unresolved issues.

Design

All states are required to have a fully operational pavement management system (PMS) by January 13, 1993. States as well as local and foreign governments have been working to develop and implement effective PMSs for several years. SHRP will provide information on pavement life and design and rehabilitation that can be incorporated into these systems. ASTM has been working on standards for all aspects of the PMS process, and researchers have been greatly expanding the knowledge base of PMS and related technologies.

The challenge facing states at present is to meet the deadline and develop a PMS that is appropriate for the state. The future challenges include integration of PMS into the decision-making process; incorporation of new equipment, techniques, and philosophies into PMS; and the continual enhancement of PMS. This information will be shared at the Third International Conference on Managing Pavements, May 21–26, 1994, in San Antonio, Texas.

States are currently considering the scenic byways provisions that are included in ISTEA. The topic of scenic byways has been studied by the TRB Task Force on Scenic Byways and Recreational Travel and was the subject of the summer meeting of three TRB committees. Bridge aesthetics is another area receiving attention. *Bridge Aesthetics Around the World*, produced by TRB, was the culmination of considerable work by the TRB bridge committees and 22 international authors.

States are developing or have completed programs to evaluate the susceptibility of their structures to scour. Research efforts are under way to develop instrumentation and expert systems to help in the field investigation of sites, and also techniques to nondestructively ascertain foundation details.

NCHRP Project 12-33, Development of a Comprehensive Bridge Specification and Summary, is nearing completion, and the states have had an opportunity to work with and comment on the second and third drafts of the specification. Once the specification is complete, AASHTO will need to make decisions on its adoption.

Metrication is another major issue for

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A major environmental program under ISTEA is the control of outdoor advertising.

state DOTs. FHWA has developed its plan to comply with the Omnibus Trade and Competitiveness Act of 1988, which will lead to the use of SI units in direct federal and Federal-aid construction contracts by September 30, 1996. AASHTO has established a Task Force on Metrication under its Standing Committee on Highways that will be working with other groups to bring about a smooth transition to metric. The ASTM Manual E 380-91, Standard Practice for Use of the International System of Units, has been adopted as the standard for all federal agencies for conversion to metric. TRB is starting to require metric units in its publications.

Materials and Construction

State agencies are becoming more interested in experimenting with innovations in contracting practices. Concepts currently being evaluated include design/build, time-plus-cost bidding, lane rental, and the use of warranties.

With fewer state transportation agency personnel available to ensure quality construction, states have expanded their efforts in re-evaluating their testing and inspection methods and procedures. Quality control and quality assurance specifications are becoming more widely accepted, particularly in the areas of bituminous and portland cement concrete pavements.

The recycled rubber provision in ISTEA has captured the attention of state agencies. Increased research activity is highly likely as agencies struggle with their concerns about performance, recycling, and health and environmental impacts.

Stripping and rutting in asphalt pavements are ongoing problems for state agencies. Research is continuing on the use of large-stone mixtures in mitigating rutting. Stone mastic asphalt (SMA) mixtures, used in Europe to resist rutting, are also being evaluated by several states.

Soils, Geology, and Foundations

Several states are interested in management procedures for rating, predicting, controlling, and mitigating landslide and rockfall hazards. Some states are conducting research to address these issues, and a TRB task force report on landslide investigation and mitigation will be available in 1993.

States are currently concerned with long-term performance and design criteria for drainage systems for a variety of field conditions. An NCHRP project is addressing these concerns, and several states have provided field sites to conduct forensic investigation of geosynthetic drainage systems. Use of geosynthetic systems is becoming common for pavement drainage.

Drilled shaft foundations for highway structures are being used to a greater extent. Because of the high costs of static load tests generally used to determine capacity and settlement, studies are currently being conducted on the feasibility of using less costly dynamic tests, commonly used for driven piles, for this purpose.

PAIN

Indiana Department of Transportation began operation of accelerated pavement testing device in June 1992.

Some constructed projects (mostly experimental) are under way using lightweight materials for certain purposes such as embankments. Materials that have either been used or are being considered include waste rubber tires, styrofoam, wood fiber, wood chips, and fly ash.

A limited number of studies using centrifuge modeling to determine performance of transportation structures during earthquakes, axial and lateral load capacities of piles, and causes of slope failures, are being conducted at universities for the state transportation departments.

Maintenance

Reductions in the number of maintenance personnel, an aging roadway system with increasing maintenance needs, and increased costs associated with environmental concerns are significant factors affecting state maintenance programs. To address these issues, researchers are developing equipment to mechanize labor-intensive activities, exploring the use of nondestructive testing techniques to evaluate roadway and structure conditions, and applying life-cycle analysis techniques to determine the true cost of a material from its purchase through disposal.

Mechanization holds the promise of improving the quality of the end product and allowing the performance of many activities at night or during other low traffic volume periods. One state is using a remote controlled shadow vehicle in its maintenance operations, and SHRP researchers are developing an automated pothole patcher and a joint-and-crack-filling robot. Contractors are being used to perform maintenance activities that can be easily defined and inspected. These activities include guardrail repair, bridge painting, joint sealing, bridge deck repair, roadside vegetation control, and storm drainage pipe replacement and repair.

Environmental concerns have prompted changes in several maintenance areas. Removal, containment, and disposal of lead-based paints continue to increase maintenance costs. Problems with leaky fuel tanks have prompted several states to get out of

the fuel distribution business and to start purchasing gasoline from commercial stations. Others are replacing underground storage tanks with double-walled underground systems or installing above-ground tanks with containment systems. Salt storage facilities to cover stockpiles, and containment systems to capture brine runoff are becoming standard in the Snow Belt states. Increases in litter on highways have been reported in areas where landfills have been closed or disposal restrictions have been implemented. Chemical spraying programs for weed and brush control are also being modified in response to environmental concerns. States are attempting to incorporate effective use of natural forces and ecological principles into their roadside vegetation management strategies.

Snow removal and ice-control technologies in the form of weather forecasting systems and road surface condition devices are being applied to highway winter maintenance strategies. Several states are experimenting with anti-icing techniques in an attempt to reduce salt usage. Several foreign countries are installing friction-measuring devices on supervisors' vehicles. These devices and road-weather systems are being used to identify when and what type of maintenance actions are needed. The objective is to reduce the amount of chemicals being applied while providing an adequate level of safety for the motoring public.

Worker safety continues to carry a high priority rating in transportation agencies. In addition to addressing the needs of the motoring public in passing through maintenance sites, there is increased emphasis on raising the level of safety associated with the performance of maintenance activities. Several experimental devices to detect vehicle entry and worker notification have been tested in the last few years, and truck-mounted attenuators continue to receive high praise from maintenance crews.

Life-cycle cost analyses are being used in the procurement of new equipment, and several states are exploring the use of standardized equipment specifications to reduce purchase costs. The educational and experience requirements for shop mechanics are increasing as manufacturers install more high-tech devices on new equipment.

PARKER/PENNSYLVANIA RESOURCES COUNCIL, INC.

Waste rubber tires are among materials tested for experimental use as fill material in embankments.

Traffic Operations

Traffic congestion, the development of "smart" cars and highways, air quality, and new provisions of ISTEA are changing the way transportation services are provided.

CAAA and the financial hardships facing most states are causing them to seek alternative ways to add capacity within the existing right-of-way. Remedies that are currently being used include more efficient use of existing pavements, the use of freeway shoulders and the narrowing of existing lanes by restriping to provide additional lanes, employing reversible lanes on both freeways and arterial streets, and the use of high-occupancy vehicle (HOV) lanes.

Techniques for freeway incident management are receiving considerable interest in many states and urban areas. Several areas of the country already have comprehensive incident-management programs in place and many others are in the process of developing such programs. In Chicago, for example, where an incident management program has been in place since the 1960s, it is estimated that the program is returning $17 in benefits for each dollar spent.

A significant provision of ISTEA requires states to develop and implement a traffic congestion management system. Another primary feature of ISTEA affecting traffic operations is a mandate to develop new approaches for providing transportation in the 21st century. IVHS is one of these new approaches, and the act establishes an IVHS program of approximately $660 million over the six-year authorization period.

Thus the major research focus in traffic operations for the next decade will be on smart cars and highways. IVHS includes a range of technologies that can improve mobility, enhance safety, and maximize the use of existing transportation facilities. IVHS technologies include advanced traffic management systems, advanced traveler information systems, advanced vehicle control systems, and commercial vehicle operations. Still another traffic-related ISTEA pro-

PENNSYLVANIA RESOURCES COUNCIL, INC.

Increased litter on highways has been reported in areas where landfills have been closed or disposal restrictions implemented.

vision is that the capital and operating costs for traffic monitoring, management, and control facilities are eligible for federal funding.

Safety

President Bush's goal to reduce the fatal accident rate to 2.0 by 1992 was more than satisfied in 1991 with a death rate of 1.9 per 100 million vehicle miles driven. Reaching such a goal also suggests that further substantial improvements in safety performance are possible and continue to be highly justified from a cost-benefit standpoint as well as in terms of human suffering and system operation.

No single safety countermeasure is responsible for progress to date. Rather, the many safety initiatives, both research and programmatic, combine for gains on many fronts. Many examples are found in states and local communities. For example, one community traffic safety program reduced alcohol-related fatalities by 32 percent and achieved the highest seat belt use rate (60 percent) in the state. In general there is interest in identifying higher-risk groups within the driving population and developing safety strategies to reduce their crash involvement.

Development of improved traffic records capabilities continues. A study showing the uses and value of linking medical data to accident records was completed, and software is being developed to aid states in implementing this linkage. To improve the usability of state accident data, the National Highway Traffic Safety Administration developed the CADRE core set of data elements. If each state has this data set represented in its accident reports, analyses of crash data at the state, multistate, and national levels will be substantially improved.

In the coming year the development of the Safety Management Information System required of each state by ISTEA legislation will be of great interest. This system appears to be an opportunity to integrate a number of data sources to aid safety-related decision making.

Accumulated experience with air bags shows them to reduce driver deaths in frontal crashes by 28 percent compared with automobiles having lap and shoulder belts only. Moderate to severe injury was reduced by 25 to 29 percent in airbag-equipped automobiles.

An evaluation of administrative license revocation (ALR) laws found a range of decreases in driver fatal crash involvement of 0 to 30 percent. The median decrease for the 17 states evaluated was 6 percent (29 states have ALR laws). Assuming a 6 percent reduction, about 347 additional lives could be saved per year if the 21 remaining states adopted these laws. Although every state has a 21-year-old drinking law, greater emphasis on enforcement and closing loopholes in the laws is needed.

Pedestrian and bicycle safety is receiving increasing emphasis in states, and ISTEA renewed emphasis on nonmotorized transportation.

Older drivers continue to concern highway designers and operators. Research programs are in progress in signing and delineation and intersection geometrics and operations. A measure of visual functioning (useful field of view) has been shown to be highly related to older driver crash experience and is being further developed for use with older driver populations. By pursuing these research programs now, the technology should be available and implemented

TOBIAS

Pedestrian and bicycle safety is receiving increased emphasis in most states.

early in the next decade to cope with the increasing numbers and need for mobility of older drivers.

Transit, Aviation, Rail, and Water Transportation

Transit

The continued trend of shifting responsibilities of public functions to lower levels of government is being especially hard felt in transit operations. Many cities have found it necessary to substantially increase fares while decreasing service, whereas others are using special marketing strategies, such as higher discount passes, to retain current riders and attract new ones.

Interest in commuter rail services is intensifying all across the nation. Many large cities have found abandoned or little-used rail trackage corridors viable for commuter rail operations. Because the right-of-way is already in place, time-consuming preconstruction procedures are shortened, allowing for a quicker start-up of service. Other transit options that require lower initial capital costs, such as HOV restrictions and light rail transit, are also gaining in popularity.

The bus industry is in the midst of the most significant transition it has experienced in years. CAAA and other laws and regulations present new challenges for bus manufacturers and transit operators alike. A lot of attention is being paid to environmental issues, with special emphasis on controlling emissions. Other requirements for transporting the mobility impaired prompted rediscovery of the long-dormant low-floor bus and inspired the development of new lift devices for ease of bus entry.

With the enactment of ISTEA, major changes have occurred for public transportation research. Although in the past funding for transit research was low and fluctuated widely from year to year, the new act authorizes a direct take-down of the annual federal transit funds, similar to that used for the federal highway program. Specified allocations will be made for defined national, state, and other programs. Of particular significance is a new state and local program that should encourage transit research at local levels of government. An agreement has been reached among the Transit Development Corporation (TDC), FTA, and TRB for the management of the new TCRP. TDC will serve as the governing board with the responsibility for selecting the annual program, and TRB will appoint technical panels to oversee the conduct of studies and serve as the program administrator. Projects for the first year have been designated, including one aimed at studying the special needs of the transit industry for more rapid implementation of research findings.

CONNECTICUT DEPARTMENT OF TRANSPORTATION

Narrow Connecticut Impact Attenuation System developed by ConnDOT has been successfully crash tested and approved for use on Federal-aid highways.

Aviation

Continuing recession in the United States and softening economic conditions in many European and Asian countries produced a difficult business climate for commercial aviation in the past year. Domestic airline passenger traffic fell 1.6 percent in 1991, and airline passenger traffic worldwide declined for the first time in history.

The impact on the U.S. airline industry has been devastating. The combined operating losses of U.S. carriers for 1990 and 1991 totaled almost $6 billion. The losses in 1991 ($3.3 billion) were the largest in a single year in the history of the U.S. airline industry. Even the financially strongest airlines were in dangerous positions.

The three largest airlines (American, Delta, and United) account for more than half of all domestic traffic. In an attempt to boost ticket sales, American Airlines announced a sweeping program of fare reduction and simplification in April 1992. Other carriers quickly followed suit, even the financially weakest. Although it is too early to tell whether this move will generate increased revenue, many industry analysts expect that fare cutting will work primarily to the advantage of the Big Three.

Regional airlines fared somewhat better than major and national carriers in 1991, with enplanements rising 3 percent from 1990 to 1991. The regional airline segment continues to show increasing concentration. The top third of the 149 regional airlines operating in 1991 carried more than 96 percent of the passengers. All but 8 of the top 50 are code-sharing partners of major or national carriers, and their enplanements increased twice as fast as regionals as a whole. The continued success of code-sharing regionals is closely tied to that of their larger partners.

The economic difficulties of the airline

PORT AUTHORITY OF ALLEGHENY CO

Clean Air Act Amendments of 1990 and other recent legislation present new challenges for bus manufacturers and transit operators.

industry have had a mixed effect on airports. The drop in overall traffic and the failure of several large carriers have helped ease delays at major hub airports. In some cases airport authorities have been able to defer capacity-related investments until economic conditions improve. On the other hand, the decline in passenger traffic has meant lower revenues from on-airport activities and from the trust fund monies distributed by the federal government on the basis of passenger enplanements. The impact has been particularly severe at airports serving as major hubs for airlines that have ceased operations or scaled down their activities as a result of bankruptcy.

Many airports are seeking to increase the funds available for needed investments through levying the passenger facility charges (PFC) authorized by Congress in 1990. PFC is essentially a head tax of up to $3 that an airport can charge departing passengers. Airport operators see the PFC as an important new source of funds for improvements needed to comply with federal regulations on noise, environmental impacts, and airport access for passengers with disabilities. At a time when airlines are reluctant to invest in airport projects and state and local budgets are tightly constrained, PFC is a welcome, and independent, source of revenue.

Another important source of aid for airports could be ISTEA, which calls for increased intermodalism in planning and implementing transportation projects, including airports. ISTEA is expected to have a significant effect on airport ground access, intermodal connections at airline terminals, and overall integration of air with other modes of transportation.

Rail

From the standpoint of the states, rail-related issues of greatest concern continue to be preservation of essential rail freight services and development of rail passenger services. Most state rail programs lack a predictable funding base and tend to receive less attention than the much larger highway programs. Modal-oriented public planning and investment have proven to be economically inefficient. With the passage of ISTEA, the emphasis has been shifted from individual modes to intermodal transportation, and states and metropolitan areas will have new responsibilities and options in planning and programming investments that integrate the various modes.

A growing number of states are studying

BOEING

Domestic airline passenger traffic fell 1.6 percent in 1991, and airline passenger traffic worldwide declined for the first time.

AMTRAK

A growing number of states are studying conventional intercity, commuter, and high-speed rail passenger services as potential solutions to congestion problems.

potential rail passenger services, including conventional intercity, commuter, and high-speed services, viewing these technologies as potential solutions to congestion problems. Amtrak has begun major improvements to the Northeast Corridor, including electrification between New York and Boston, which will dramatically improve the trip time, making rail more competitive with air and automobile travel. Later this year Amtrak will also test a Swedish tilt train (passenger compartment tilts on curves to allow higher speeds) on the Northeast corridor that may also lead to shorter trip times. Texas has entered into a 50-year franchise agreement for the construction and operation of a high-speed rail system that is planned ultimately to link the major cities in the state.

Maglev technology is being considered in a number of corridors. The National Maglev Initiative, a cooperative venture among the Federal Railroad Administration (FRA), the Army Corps of Engineers, and the Department of Energy, has a major research program under way to determine both the technical and economic feasibility of developing a maglev industry in the United States in the next 20 years. ISTEA provides funding for a Maglev Prototype Development Program, and funding has also been provided to FRA for safety research related to high-speed rail and maglev.

From the standpoint of the railroad industry, improving the quality of service has become the driving force behind investing in new technology to improve operations. For example, the Association of American Railroads has recently approved standards for specifications and installation of automatic equipment identification transponders for use on railroad rolling stock to be implemented by January 1, 1995, that will provide more accurate and timely information on the status of individual rail shipments. These standards will be the same for rail, truck, ocean, and intermodal carriers.

Development of advanced train control systems continues to be supported by the rail industry. The use of satellites and transponders for rail traffic control holds promise for more efficient and safer operations and for providing higher-quality service. Railroads are also benefitting from investment in electronic data interchange and improved car management systems.

Continued growth in intermodal traffic results in part from innovative contracting arrangements between motor carriers and railroads that provide quality door-to-door intermodal services.

Water Transportation

With the passage of ISTEA, access to the nation's ports and intermodal connectivity have now been recognized as major issues. Ports, serving as interchange points with

connecting landside transport systems, are recognized as crucial transportation links under ISTEA. To provide some perspective, 30 coastal states have 1,900 deep-draft port facilities of varying size, and 21 states have 1,700 public and private inland water port facilities. Although ISTEA specifically designated port access as critical to national freight movement through "efficient intermodal transportation systems," specific funds were not allocated, thereby leaving major planning and funding issues for local resolution.

The issues of funding and capacity face both the shipping industry and the port industry on various levels. The decline of the U.S. merchant marine fleet remains an issue of national policy debate, and it is currently under review by a presidentially appointed blue-ribbon panel. Consistent with the attention to the adequacy of a national flag fleet, both the costs and the capacity of the diverse system of national ports present issues that are of national and local concern that must respond to diminishing public funds.

To maintain channel depths and waterway infrastructure, user fee charges have proliferated. During the past decade almost a dozen user taxes have been implemented or are under active debate. On the environmental front, the Oil Pollution Liability Act of 1990 confronts vessel operators with a new assessment structure, and states are actively developing additional local statutes regarding marine pollution.

The appropriate level of cost sharing that ports, waterways, and vessels can sustain is a critical issue as local MPOs and state DOTs grapple with their new mandate under ISTEA to develop comprehensive intermodal plans. The capital demands for competitive port facilities are sharply escalating. From 1946 through 1989, $10.5 billion was invested in U.S. public ports (coastal only). More than 50 percent ($5.6 billion) of that amount was invested in the 11-year period from 1979–1989. This growth pattern parallels recent changes in the maritime industry. Not only has the growth of waterborne commerce demanded new facilities, but changing technology, deregulation, steamship and port rationalization, and the advent of double-stack trains have permanently altered the expectations of port facilities.

PAN

TDOT ferry crosses Tennessee River. Innovative ferry technologies present viable transportation options in areas where congestion and air pollution are most acute.

To maintain a competitive port facility, states and MPOs will have to address increasingly complex issues of highway and rail access, wetlands protection and mitigation, air quality standard adherence, and management of other environmental issues that accompany huge intermodal traffic flows.

Additionally, ports traditionally occupy coveted waterfront areas that face conflicting land-use priorities. Increasingly, ports are diversifying and becoming involved in nontraditional activities to enhance revenues and to integrate value-added services for the community.

Water transport of passengers (and in some cases freight and passenger movements combined) is an underused option that is receiving examination in large coastal urban centers. In these areas where congestion and air pollution are most acute, innovative ferry technologies and intermodal facilities present viable options. Large ferryboat operations, as well as smaller local operators, seek consistency of regulations to enable their industry to reach its potential.