

STATEWIDE INTERMODAL TRANSPORTATION PLANNING IN THE LESS URBANIZED STATE

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• THE 1970 census indicates that 58.8 percent of Tennessee's population resides in urban areas. There are 18 of the state's 95 counties that have an urban population exceeding 50 percent of the total population within these counties. Four urbanized areas in these 18 counties account for 1,488,624 persons or 64.6 percent of the total urban population in the state. Total land area in the state is 41,328 square miles, and the 4 counties containing urbanized areas account for 2,321 square miles or 5.6 percent of the state's land area. Population density in Tennessee ranges from a high of 956.3 persons per square mile in Shelby County to a low of 12.7 persons per square mile in Perry County; the state's average density is 94.9 persons per square mile. Population densities in the 4 urbanized areas range from a high of 3,584 to a low of 1,187 persons per square mile. From the foregoing, it is evident that Tennessee does not compare, in degree of urbanization, with the northeast corridor or major population centers of the United States.

Transportation available in Tennessee includes highway, air, rail, waterway, and pipeline. Total highway mileage amounts to 78,666 miles of which 9,488 miles are designated the Interstate and state system. Seventy-two percent of the state's Interstate System is open to traffic, and the remaining mileage is in the design or construction phase.

There are 9 commercial airports serving 13 air carriers in the state. During 1970 total aircraft operations at these 9 airports amounted to 995,840 flights. This number includes scheduled air carrier, charter, general, and military operations. Scheduled air carrier departures during the year totaled 127,586; 98 percent of the schedules were accomplished.

Currently there are 18 railroad companies operating more than 5,250 miles of trackage in the state.

Waterway operation is limited to the Cumberland, Tennessee, and Mississippi Rivers. There are 95 barge lines operating on the Cumberland and Tennessee Rivers. The Mississippi River being a major waterway provides a channel capable of accommodating numerous barge and ocean-going freighters. Freight shipments on the Cumberland during 1970 totaled 5.6 million tons; 597 million ton-miles were logged. Freight shipments on the Tennessee totaled 25.5 million tons, and 3.668 billion ton-miles were logged. Complete records for freight shipments on the Mississippi were not readily available, but the Port of Memphis handled 8.1 million tons during the year.

Seventeen pipeline companies operate 4,660 miles of pipeline traversing and terminating in Tennessee.

Intermodal transportation planning efforts have been, in years past, definitely limited on a statewide basis. During the past decade when a major emphasis was placed on the comprehensive, cooperative, and continuing urban transportation planning process, as required by the Federal-Aid Highway Act of 1962, intermodal planning has been recognized as a necessity. Therefore, impetus was given to incorporating planning for all modes into the process.

Historically, the Department of Highways has been responsible for all highway planning and urban transportation studies. The department's experience in origin-destination surveys dates back to the early 1940's when studies were concerned primarily with specific route locations rather than with the development of an integrated street and transportation system. The Nashville Urban Area Transportation Study was initiated in 1958 and was the first comprehensive study undertaken in the state. This

study was a cooperative effort, and the Department of Highways was responsible for the travel and terminal facilities inventories, analyses, and report publication. An agreement with the local governing bodies assigned responsibility for all related studies to local government. All subsequent urban study agreements have assigned related study responsibility to local government.

These agreements have stipulated that there would be a study of air, rail, water, and transit coordinated with the highway and street planning study. Through the cooperative process, total transportation deficiencies have been identified, and recommendations to alleviate deficiencies by improving access, terminal facility location, joint use, and exclusive transit use resulted.

A specific example of coordinated intermodal or multimodal planning resulted in the recommended sharing of a high-use corridor in Memphis. Here an existing railroad right-of-way and trackage in the median of a proposed freeway could serve existing high-density residential development, Memphis State University, existing rail and trucking terminals, and proposed high-density residential and commercial development. This corridor development concept also provides for an interchange with a proposed freeway extension to serve future expansion of Memphis International Airport.

The modal-split analysis and transit-use projections in the Memphis studies did not indicate that rail rapid transit would be feasible during the current planning period, but the corridor design concept does not preclude rail rapid transit with terminal parking at some time beyond 1985. The present railway intersects with another railway that traverses the central business district and serves a highly developed industrial area along the Mississippi and Wolf Rivers and the Wolf River Harbor. This corridor, when developed, will provide, through early and continued planning during implementation, expeditious travel among terminal facilities serving all modes present and anticipated in Memphis.

Another example of intermodal planning in urbanized areas resulted from TOPICS planning that has currently advanced to the implementation stage. In Nashville, detailed analysis of transit operations along 1 route was included in the TOPICS study, and high transit usage locations were identified. These locations were selected for special design consideration; and special bus pullout lanes, lighted and heated shelters, and adequate signing are being designed. The selected sites are so located that the buses can exit the pullout lanes during the main street red phase of traffic signalization, and consideration is being given to include detection in the pullout so that preemption by the bus will minimize stop time at the special shelters. Special agreements with shopping centers having surplus parking facilities are being negotiated in an attempt to generate park-and-ride usage along this route. If these concepts and designs prove successful, they will be followed in all high-use corridors in the area. Similar concepts are being utilized in Chattanooga and Knoxville.

Currently the Department of Highways and the City of Knoxville have an agreement to share financially in the development of an expressway facility in Knoxville that would provide improved access between a major pipeline terminal and the Interstate System. This terminal is the distribution point for much of the fuel used in portions of states.

During the intermodal planning relating to the location of the Interstate System in Tennessee, airport access was considered from the beginning. During the preliminary location and subsequent cost estimate studies, origin-destination survey data from earlier studies were used and supplemented with current traffic volumes to the 6 major air carrier airports in the state. Available data provided the necessary inputs to ensure adequate access to the larger airports in the state. Subsequent studies and coordination with the airports have resulted in planned or constructed freeway or expressway access to 4 of the state's airports. Present planning and coordination with the Knoxville airport will result in improved access to a new terminal facility currently under construction. Coordination with the Tri-Cities Airport Authority has guided construction of airport access and parking facilities at the terminal and established design of an expressway connection between the terminal and Interstate 81. This airport and Interstate route serves the highly industrialized areas of Bristol, Kingsport, and Johnson City in east Tennessee.

Permanent automatic traffic recorders have been installed at the main entrance to Tennessee's 2 largest airports. Annual traffic counts are made at all other air carrier airports. Data from these traffic recorders provide sufficient surveillance to monitor ground transportation needs. Periodic travel time studies between the central business district and each airport are conducted to monitor access traffic operational characteristics. These data have been and are being used to recommend TOPICS improvements where traffic congestion problems have been identified. Airport managers, authorities, or commissions provide the Department of Highways with statistics on enplaning and deplaning passengers, airfreight and airmail shipments, and number of charter flights on an annual or as-requested basis; and these data are correlated with the traffic data to establish trip generation rates to be used in planning studies. Additional air travel data will be available for coordinated planning studies on completion of a statewide air travel survey. Urban and statewide study inputs have been provided by the Department of Highways.

Completion of statewide transportation planning studies has been slow because of involvement in the nationwide Highway Functional Classification and Needs Study and other studies that are assigned a higher priority. The Research and Planning Bureau agreed to undertake a statewide O-D model development study several years ago, and considerable effort has been expended. Our concept in this study has been to treat the state as a large urban area and develop trip generation and distribution models. It was agreed that the state boundary would form the external cordon, and O-D stations were selected at all major local, state, and U. S. route crossings of the boundary. Current urban area external O-D stations in 5 state-line urban areas were recoded and incorporated into the data base. The Kentucky State Highway Department subsequently initiated a similar study and agreed to cooperate by conducting the state-line interviews at half of the O-D stations along the Kentucky-Tennessee boundary. The total number of external O-D stations being used in the study is 91. Internal traffic zones for the study were established by utilizing U. S. Bureau of the Census standard location areas, or aggregates thereof, which are basically census county divisions. The total number of zones being utilized is 535.

Internal (home) interviews were conducted after standard location areas were stratified by population density, and cluster samples were selected in 120 areas. The standard urban area home interview form was used in obtaining internal travel patterns. These data have been supplemented with small urban area O-D data recoded to the appropriate format. All small urban area O-D studies initiated subsequent to the statewide O-D model development study have been coded to the statewide format and incorporated into the base file.

The Research and Planning Bureau in cooperation with the Parks Division of the Department of Conservation conducted origin-destination surveys at all state parks in an attempt to identify vacation and recreational travel within the state. These data are obtained during peak vacation and recreation travel periods that include holidays and weekends. These data have been used to coordinate development of improved access to state parks and will be incorporated into the statewide model development study.

An inventory of commercial vehicle travel patterns was obtained concurrently with the home interview phase of the study. The Tennessee Motor Transport Association provided a listing of all trucking firms operating within the state, and the interview sample was selected from this listing. The sample was controlled to include over-the-road, transfer, and local delivery operations. These data supplement external O-D truck interviews and have been further supplemented by annual loadometer studies conducted in the state.

Analysis to date includes building the statewide network, plotting selected trees, and assigning present external traffic to the network. Preliminary trip generation analyses have been initiated but will not be completed until additional census data are available and statewide employment data recently ordered are received.

The Department of Highways has recognized the need for expediting completion of the statewide model development study. A consultant has prepared a proposal to develop and document a study design and evaluate data input requirements. It is anticipated

that the consultant contract will also include completion of the study analysis and document coordination of planning evaluation techniques to be used in the state's long-range priority programming procedure.

Intermodal planning gained emphasis at the state highway department level during completion of the National Highway Functional Classification and Needs Study (1970-1990); the department was designated coordinating agency for the National Transportation Planning Study. The Research and Planning Bureau was designated to provide required input from the highway study and assist the Highway Programming Bureau with coordination for other modal inputs. A consultant was employed to assemble all inputs and prepare the required data submission and narrative. Scheduling required considerable cooperation among the consultant, Highway Programming Bureau, Research and Planning Bureau, Tennessee Aeronautics Commission, development districts, councils of government, and local planning commissions. Data relative to air and transit usage and needs available from the urban transportation planning process were provided to the department's consultant. Subsequent evaluation of the data resulted in departmental and consultant contact with the above-indicated agencies to secure additional data where needed. During the final analyses, each airport agency, transit operator, and local planning agency was invited to evaluate the results of the various funding level allocations, and final needs adjustments were made.

Future intermodal transportation planning in Tennessee will be enhanced as the long-range priorities programming techniques are evaluated and modified and a statewide data bank is developed. The data bank will include but not be limited to a complete inventory of the highway system stratified by the state's functional classification, geometrics, structural condition, traffic volume, accident record, improvement cost estimate, and priority for improvement. A supplement in the data bank will include land use socioeconomic inputs to assist in an annual systems evaluation and intermodal planning coordination. It is anticipated that the Department of Highways will be reorganized and that a department of transportation will be established during the current year. Operations within the framework of the proposed department of transportation will strengthen our existing excellent working relation with all transportation modes, and intermodal planning will continue on a more meaningful base with divisional responsibility for the various modes being aligned under one administrative officer.