

# Transportation Planning Data for the 1990s

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The New York State Department of Transportation (NYSDOT) is tasked with spending approximately \$3 billion over the next three years for improvements to New York's transportation system. To carry out these responsibilities, NYSDOT must have good, reliable travel data on which to base its forecasts and, ultimately, its project and design decisions. Metropolitan area planners have expressed concern about the continued use of travel data gathered in the 1960s as the basis of travel simulation modeling in the 1990s. Because of the high costs, it is unlikely that comprehensive land use, transportation system, and travel surveys will be done in New York State in the 1990s. However, there are valid alternatives which meet regional data needs at lower costs. NYSDOT has begun to identify and collect the data necessary for travel forecasting, in addition to its regular monitoring and special data collection activities. New York's approach is to carefully coordinate any new travel survey activities to maximize their utility and to rely on the appropriate sharing and reuse of existing data when and where possible. Indications are that this approach will supply the required planning data to enable NYSDOT to formulate its capital program for the 1990s and shape the State's long-range transportation plans for the twenty-first century.

The New York State Department of Transportation (NYSDOT) is tasked with judiciously spending approximately \$3 billion over the next three years for improvements to New York's transportation system. The majority of these funds will go to the implementation of highway system improvements. NYSDOT is also updating its long-range transportation plans for its urban areas in order to prepare strategies to meet the mobility needs of the 1990s and beyond. To carry out these responsibilities, the Department must have good, reliable travel and trip-making data on which to base its forecasts and, ultimately, its project and design decisions.

To support these two major activities, the Department, in cooperation with the state's 12 Metropolitan Planning Organizations (MPOs), and working within the Unified Planning Work Program process, has begun to define its transportation planning data needs beyond those to be met by the 1990 Census, while taking steps to maximize the use of existing data.

NYSDOT has also taken the initiative in acquiring necessary travel and trip-making data by supporting New York City MPO participation in the enrichment of the Nationwide Personal Transportation Study, offering to coordinate statewide acquisition of the 1990 Census Transportation Planning Package, working with universities to collect sample survey information and to explore data transferability issues, and providing technical and administrative help to local data collection

initiatives. All these actions are part of an overall effort to effectively and efficiently acquire and supply the information needed to develop its capital programs and long-range plans.

## HISTORICAL PERSPECTIVE

During the early and mid 1960s, NYSDOT designed and administered comprehensive surveys to inventory travel and land use in eight upstate New York urban areas (Buffalo, Rochester, Syracuse, Utica, Capital District, Elmira-Corning, Glens Falls, and Binghamton). The purpose of these surveys was to collect data to support the creation of a travel forecasting capability that would aid in the development of long-range plans and capital programs in the State's urbanized areas. NYSDOT collected information on typical weekday travel by persons and vehicles in the survey areas by conducting in-person home interviews of a sample of area households. The sample sizes of these surveys were large, ranging from 2,400 households in Binghamton to 13,000 households in Buffalo.

These surveys were designed to gather data on the auto occupancy, highway facility use, origin, destination, trip type, mode, land use, distance, and duration of all sampled household trips, along with detailed socioeconomic characteristics of the household, including household size, age of its members, income, and auto availability. Information on travel made within the survey areas by persons or vehicles located outside the areas was obtained by a roadside interview of a sample of the drivers of vehicles crossing cordon lines.

In addition, NYSDOT administered comprehensive telephone home interviews travel surveys in the Poughkeepsie and Jamestown urban areas during the 1960s and in 53 upstate counties (north of Westchester and Rockland) in 1970. A specialized telephone survey was administered in the Ithaca area during 1973 to determine the impacts of Cornell/Ithaca college student travel.

The Tri-State Regional Planning Commission (of which NYSDOT was a member) conducted a comprehensive origin and destination survey in the New York City area in 1963–1964. Nearly 50,000 households were interviewed at a cost of \$2.5 million.

During the 1970s, NYSDOT updated the travel data collected in the 1960s through a resurvey of the Buffalo and Rochester urban areas. These resurveys were designed to detect changes in the trip generation rates and trip lengths over time in their respective areas. The type of information obtained was similar for both time frames and areas; in addition to home interviews and roadside (cordon) surveys, an

opinion section was also included. These updates were done with smaller sample sizes than used in the 1960s with acceptable accuracy. The major difference between the 1960s and 1970s surveys was the absence of the land use inventory in the 1970 efforts.

Analysis of the resurvey results revealed that trip generation rates, disaggregated by household income, size, and auto availability (the parameters used for forecasting future travel) and by district, varied widely over the period in the respective survey areas; however, on an aggregate level, the areas show no major changes in trip rates (1,2). These travel surveys, along with inventories of existing land use and highway network configurations and their resultant data bases, are still used for estimating present travel.

Because of the high costs associated with comprehensive land use, transportation system, and travel surveys of the scope and size of those conducted in the 1960s, it is unlikely that major updates, of the same scale, will be done in New York State in the 1990s. However, there are valid alternatives that meet regional data needs at lower costs. For example, a 1983 survey of Capital District households effectively used a mail-out/mail-back technique resulting in 2,600 completed interviews. The cost of the survey administration was \$14 for each completed interview, exclusive of pretest and instrument design costs. Data obtained from this survey have been applied in the calibration of a regional travel forecasting model for the Albany-Schenectady-Troy area (3).

Advances in survey design, technology, administration, and sampling procedures now allow for more cost-efficient updates. Smaller sample sizes, less detailed questionnaires, the availability of surrogate land use information (Census data, employment projections), and the use of multistaged samples (whereby households are stratified by a small amount of information collected from a large sample and a subset of that sample is targeted for in-depth interviews) may be cost-effective alternatives to administering larger surveys.

## NEED FOR DATA UPDATES

Forecasts of future travel are essential in the evaluation of alternative transportation system plans and in the selection of elements to the Department's capital program. Accurate travel simulation capabilities supported by current data are also necessary in order to identify the need for, and effects of, highway projects and to permit an assessment of the transportation impacts of proposed development.

Metropolitan area planners have expressed concern about the continued use of 1960s travel data as the basis of travel simulation modeling. The feeling among them is that changes in the highway and transit network, economy, land use, and demographics of the metropolitan areas in New York State may have rendered the 1960s data, and travel forecasts developed on the basis of those data, largely obsolete.

## Demographic Changes

The metropolitan areas of New York State have experienced many changes in recent years. For example, the population of the New York City SMSA is now over 17 million, making

it the largest SMSA in the country. Since the 1960s, it has seen major changes in the makeup of its population groups, and most likely their travel patterns, habits, and needs. The City's sheer size and dynamics have necessitated the involvement of numerous agencies in collecting travel data; their efforts are coordinated by the New York Metropolitan Transportation Committee (NYMTC). The effort in maintaining and updating this data base is enormous and requires constant attention. However, variations in the availability of resources have not allowed for a consistent maintenance of this data.

## Societal Changes

Changes in the makeup and size of the work force and households have also caused a need for updating New York's travel data base. These changes include:

- increased labor force participation by women, which affects the number and types of trip demands on the transportation system;
- the aging of America, which has impacted travel patterns (the directions and magnitude of the impacts are yet to be determined: longer life span and better health care may translate into longer work force participation, maintaining the volume of work-related trips, but perhaps altering their spatial and temporal distribution; alternatively, early retirement, coupled with increasing discretionary time and financial resources and good health among the elderly, could result in more recreational travel); and
- smaller family size, which has led to an increase in the rate of formation of new households, the basic unit of trip-producers used in the development of trip generation forecasts (this increased rate of household formation has added trips to the network at a rate higher than attributable to population growth alone).

## Land Use and Transportation System Changes

Major changes in the type and intensity of land use have affected the type, volume, direction, and temporal demand of travel on the state's transportation system. In turn, improvements to the transportation system have driven land development and use changes in both rural and existing developed areas. In combination, these dynamics have resulted in two general development trends that have affected our ability to forecast future travel with 1960s data: rapid urbanization in rural areas and changes in downtown land use.

### *Development/Expansion of Rural Areas*

The high cost of land near the center of the urbanized areas, coupled with the availability of affordable land and modern transportation at the urban fringe, has aided in the residential, commercial, and industrial development of New York's rural areas. The provision of increased highway capacity, park-and-ride facilities, rapid rail, light rail, express bus transit services, and high occupancy vehicle lanes in New York State has shortened overall travel times and increased the accessibility to

formerly rural areas. These areas have made available an affordable and convenient lifestyle for many New Yorkers who are now able to commute from residences far removed from downtown employment centers.

In certain instances, rapid urbanization of formerly rural areas has taxed the transportation system towards its designed capacity. Travel forecasts, fed by reliable data, are especially needed here to properly plan for this growth.

One example of the rapid urbanization of a largely rural area in upstate New York is the expansion of Fort Drum in Jefferson County to accommodate the U.S. Army's 10th Mountain Division. This military base and its associated growth will warrant designating the Watertown area as an MPO in 1990. This, in turn, will require the development of a data collection effort and forecasting capability where none previously existed.

Changes in the transportation system itself have also caused industrial location patterns to change. Traffic congestion and transportation system obsolescence in the inner cities have helped encourage industry to move to more accessible areas at the urban fringe. No longer tied to the central city for transport of labor, raw materials, and finished goods, modern industry is finding expressway interchanges and airport vicinities as prime locations.

#### *Changing of Existing Developed Areas*

The changing nature of the international economy has affected the ability of some of the State's heavy industry to compete. Nowhere is this more apparent than the Buffalo region's steel industry, which due to foreign competition now lies dormant. This has resulted in a shifting of employment and trips away from the industrial area towards other areas of the region.

There is also evidence of land use and travel pattern changes within New York's central business districts (CBDs). Once thriving retail stores headquartered downtown have scaled back or left for suburban malls. These have been replaced with smaller specialty shops, hotels, and restaurants. A resurgence of cultural and athletic facilities for entertainment and recreation has occurred in several downtown areas. Pedestrian and transit malls have also brought new economic activity geared to small package goods and shoppers without cars. Transportation terminals and warehousing have been transformed into restaurant, retail, and residential uses.

Recognizing that these economic, transportation system and associated land use changes have occurred, New York State is now taking steps to account for these changes in our forecasting methods.

#### **Effect of Changes on Travel Demand**

The location of business and population away from the central cities has blurred the pronounced directionality associated with the traditional suburban to downtown commute and may impact trip lengths and mode split relationships. The availability of flex-time, night-time work, and off-peak goods movement has caused a levelling of demand across time of day.

Such changes in the distribution of trips across time and space suggest the need for new origin-destination information.

### **NEW DATA TO SUPPORT CAPITAL PROGRAM AND LONG RANGE PLANNING**

NYSDOT currently collects data for monitoring the performance and sufficiency of the state's highway system. This routinely includes continuous and coverage traffic counts, truck weights, speed, and vehicle classification data. In addition, special data collection activities result from legislatively mandated programs or cooperative efforts with other agencies.

In a major effort to support the Department's long-range planning initiatives, NYSDOT, in cooperation with the state's MPOs, plans to identify and collect the data necessary for developing and calibrating travel forecasting models in addition to its regular monitoring and special data collection activities. This will include collection of basic household, socio-economic (i.e., Census), and trip making data. Up-to-date land use and local highway network and transportation system configuration data is generally available from other sources and, where obsolete, would be updated.

#### **Federal Data Sources**

On April 1, 1990, the Bureau of the Census conducted the decennial census that collects general population and household information, including age, household size, auto availability, and income data. In addition, the Bureau will sample one out of six households for detailed "journey to work" data. The data set will provide the number of workers making work trips, number of work trips, work location (specific address), work trip time and departure time, mode used, carpool use, auto occupancy, and vehicle type. The Bureau expects to have summary data for commuters by place of residence, place of work, and journey to work for standard Census areas. The Census will be a key source of basic information used in the development of NYSDOT's travel forecasts.

The Census Transportation Planning Package (CTPP) will also be made available to agencies needing Census, journey to work, and socio-economic information summarized by Transportation Analysis Zones (TAZ) or Census tracts for use in travel forecasting applications. Working with and through the American Association of State Highway and Transportation Officials (AASHTO), NYSDOT plans to coordinate the needs of individual MPOs in New York State to acquire this package under one centralized purchase contract.

The U.S. Department of Transportation (USDOT) is also sponsoring the fourth Nationwide Personal Transportation Study (NPTS) in 1990. The NPTS is a household-based survey of the characteristics and personal travel patterns of the U.S. population. The 1990 version of NPTS is comparable in content to the 1983, 1977, and 1969 surveys: questions focus on weekday travel and intercity travel, household and personal socio-economic characteristics, driver information, vehicle information, and worker information; it thus offers a basis for comparison over time and by urban area size. Additional questions on accidents, seat belt usage, and highway type used for selected trips are new additions to NPTS. Unlike Census information, it will provide information on both work and nonwork trips, the latter an increasing share of overall travel. The 1990 version survey sample size will be 20,000 nationally. Based on a proportional sample of 80 samples per million

population, New York State should be allotted approximately 1,400 samples. The NPTS will provide data which can be used to develop cross-classification tables for trip generation and trip length distributions, by trip purpose, for calibrating trip distribution models.

### 1990 NPTS Enrichment

The New York Metropolitan Transportation Council has contracted with the Research Triangle Institute (conducting the survey for USDOT) to increase the number of samples contacted in the New York City/Long Island region, thereby enriching the NPTS sample in that area. Questions will be the same as in the national survey. An additional 700 samples will be requested, which will bring the total size to nearly 1,600 samples in the NYMTC area.

### New York State Data Sources

In addition to reliance on Federal data collection activities, NYSDOT is participating in several other initiatives to focus, develop and update its travel forecasting abilities.

### *University Research Transportation Center Project*

NYSDOT has begun research designed to identify those underlying demographic, geographic, and transportation system features that characterize areas with similar travel and trip making attributes. The Department will have this research carried out as a collaborative effort by Rensselaer Polytechnic Institute and Cornell University, with funding coming from the USDOT's University Research Transportation Centers (URTC) program. The project will get underway in Winter of 1990.

The project will identify travel characteristics that can be transferred among "similar" urban areas, point out those that should not be considered transferable without more detailed area information, and establish "data transferability" guidelines. Ancillary suggestions pertaining to the maintenance and updating of fundamental travel data (including the frequency of resurveys, sample size requirements, and desired data stratifications) will also be developed.

In the near term, the project would provide NYSDOT with additional guidance in the overall design of future survey efforts and should result in a more focused, efficient, and effective resurvey. Over the longer term, basic guidance on the proper use of trip making data in nonsurveyed areas, and on the maintenance and updating of the fundamental trip making data base, should provide the Department, and other users, with increased confidence in the application of such data. It would also provide the Department with a well-developed data maintenance schedule with which it can plan for further data resurvey tasks.

### *Syracuse Area Resurvey*

During the winter of 1989, the Syracuse Metropolitan Transportation Council (SMTC, the local MPO), in cooperation

with NYSDOT and Syracuse University (SU), administered a telephone travel resurvey of the Syracuse area households. The purpose of the survey was to compare the rate of typical current weekday home-based trip making to 1966 rates (the year of the last Syracuse survey).

The resurvey was administered by SU students free of charge to the Department. SMTC provided administrative and telephone support, while NYSDOT provided the technical management. NYSDOT designed the resurvey to be consistent and comparable with the original 1966 Syracuse survey. Travel questions focused on "yesterday's" home-based travel (typically 75 to 80 percent of household trips are home-based) and included questions on home-based work travel and trip length. Socioeconomic questions dealt with household income, age of household members, household size, auto availability, and number of workers on the travel day. A question on household ZIP code helped tie responses to a geographic area.

Respondent confidentiality was assured during the interview; no information on respondent name or address was recorded. In order to keep respondent interest and cooperation, interviews were kept short (about 10 minutes) and limited to 8 questions. The survey was designed as a proxy report; one respondent was queried about the entire household's home-based trips on the day preceding the interview. It was felt that respondents were likely to know the number, type, and mode of home-based trips made by fellow household members. A sample size of 1,035 geographically dispersed households was established, considering the constraints of the University, method of administration, and past knowledge of the variability of the population.

In order to be sure to sample all parts of the study area, 45 telephone exchanges within the 1966 cordon line were identified. A LOTUS program function generated random four-digit extensions within these exchanges. An attempt was made to secure an equal number of successful interviews within each exchange. This approach approximated a sampling proportional to population, in that the larger communities have more exchanges assigned to them; it also assured that all parts within the study area were sampled.

A formal pretest was conducted to test the comprehension of survey respondents, timing of interviews, and the productivity of sample selection process. The results indicated that the survey questions were understood by the public, that the student interviewers understood and could properly carry out the survey, and that the target sample was probably attainable. However, unanticipated administrative problems, coupled with limitations imposed by the academic calendar, weather conditions, and the time students had available to work on the survey led to a smaller than anticipated sample size of 545 completed interviews.

Survey analysis and comparisons showed a modest 24 percent increase in the average home-based person-trip rate of Syracuse area households, despite a 40 percent increase in individual home-based person-trips when compared to 1966. The disparity is due to smaller average household size. Increases in the trip rates were greatest among the smaller and autoless households. Further comparisons showed that 1989 travel by households was relatively insensitive to income compared to 1966, and that travel by lower income households increased more than that of higher income households over the period.

The resurvey effort proved to be a valuable experience for NYSDOT, SMTC, and SU. It allowed NYSDOT to sharpen



its skills in the planning, design, administration, and analysis of surveys in preparation for surveys in other urban areas during the 1990s. SMTC now has a limited updated trip generation capability in support of their travel forecasting efforts. Current areawide trip rates are now available for use with 1990 Census data. SU students gained valuable experience in all aspects of survey procedures and the University enhanced its image in the community through participation in meaningful projects that may otherwise, for lack of resources, go undone.

A cooperative working relationship was established during this pilot effort; based on the success of this effort, SMTC/NYSDOT has developed a complementary panel type survey, being administered by SU students during spring 1990. The survey will measure household total peak-hour travel, including origin and destination, for purpose of revising and calibrating the Syracuse area travel forecasting model.

#### *New York Metropolitan Area Travel Surveys*

The most comprehensive travel surveys in New York State are now underway in the New York Metropolitan area. Although planned and administered by various governmental agencies, these surveys together will provide the most complete picture of total travel in the New York City area since the surveys of the early 1960s.

**Route 9A Project** Since the early 1970s, NYSDOT has been involved in studying transportation alternatives to improve traffic flow on the west side of Manhattan. The initial effort to plan and construct an Interstate facility ended in 1985 with the "trade-in" or redesignation of Interstate funds for transit aid and the reconstruction of Route 9A as an arterial. A major data collection effort has been conducted to develop the basis for the engineering and environmental studies needed to advance the reconstruction project.

The primary effort, in addition to an extensive traffic volume count program, has been an origin and destination survey conducted through the use of a mail-back postcard survey distributed to drivers of passenger and commercial vehicles. The survey effort was divided into two phases: (1) a cordon survey conducted in November 1988 to survey vehicles entering/leaving the Manhattan CBD, and (2) a north/south and an east/west screenline survey conducted in February 1989 to survey internal travel (i.e., travel with both origin and destination in the CBD). The response rate for the cordon line survey was approximately 25 percent; the screenline response rate was somewhat lower.

Additional internal passenger vehicle travel was collected via an interview survey at on-street parking locations throughout the CBD. Also internal commercial travel was surveyed via mail-back questionnaires sent to vehicle owners registered in the CBD. Additional techniques were also used to collect data on taxis and transit services as they may affect the Route 9A corridor. Taxi data (origin and destination) were gathered from trip logs maintained by the taxi drivers. Transit route and usage data were obtained from the Metropolitan Transportation Authority.

The survey results are being coded to a zone system that is directly related to Census tracts, thus providing a linkage

to the Census Transportation Planning Package and other Census products. Travel forecasts will be prepared using the TRANPLAN simulation model modified to accommodate Manhattan's unique travel characteristics.

**MTA Total Travel Survey** The Metropolitan Transportation Authority (MTA), operator of the New York City subway system, commuter railroads, a number of bus systems, and several highway toll facilities, is conducting a total travel survey to measure current person and vehicular movements throughout the New York City region. This will be the first comprehensive travel survey since the original travel surveys were conducted by the Tri-State Regional Planning Commission in the 1960s.

The survey objectives are threefold. First, transit service operators need information about current users of the system in order to make operational decisions at the local level on scheduling, routing, stopping patterns, and the like. Capital investment decisions will also be affected by this information. Second, the surveys will collect travel behavior information for use in near-term marketing activities designed to attract new riders. Third, MTA plans to develop forecasting tools to estimate future ridership and revenues resulting from alternative transit services. The components of the Total Travel Survey include:

- a regionwide random telephone survey of 24,000 households, conducted during April and May 1989, in which respondents were asked to provide an inventory of trips made on the day preceding the interview;
- intercept surveys on the Long Island Railroad, conducted during fall 1989 and winter 1990; and
- an intercept survey on NYCTA rapid transit system conducted in Spring 1990.

The survey results are being coded to a zone structure consistent with Census tracts to allow comparison with population, employment and other available information. The total cost of the project is \$3 million.

#### *Other Urban Area Surveys*

Several New York State MPOs are planning to conduct, or participate in, travel surveys during the 1990s. The Capital District Transportation Committee (CDTC, the Albany area MPO) is reviewing the results of their 1983 mail-out/mail-back home interview survey for possible updating in 1990. Both the Rochester and Buffalo areas are exploring the possibility of conducting travel surveys in their respective areas during the early 1990s to update the base of data used to support travel forecasting capabilities. Maximum use of existing survey data (e.g., New York's Route 219 data) will be made, and coordination with other planning survey efforts (e.g., the Ontario-New York survey) will be undertaken as part of the design of these surveys.

#### *Free Trade Agreement*

The Free Trade Agreement (FTA) is an accord between the United States and Canada in which the two nations have

agreed to a staged elimination (over ten years) of most trade tariffs. The agreement also provides for the elimination of nontariff restrictions, such as quotas, and the liberalization of cross-border service trade, travel, and investment.

The Province of Ontario and New York State both anticipate an increase in border crossing and regional traffic due to implementation of the agreement. Staffs from both governments are working on an approach to better gauge the nature of current and anticipated border area transportation problems and opportunities. Both groups are also concerned with the ability of other modes (rail, air, and water) to meet increased cross-border passenger and goods movement demands. Finally, the Department must devote attention to the support of the economic development opportunities offered by the FTA, wherever they may occur across the State.

A basic step in understanding potential transportation impacts is to determine the relevant characteristics of passengers and goods currently crossing the border, including their origin and destination patterns. New York and Ontario plan to share available data on travel and goods movement; New York's Route 219 survey data and information from Ontario's recent travel corridor studies should prove helpful.

## SUMMARY

The New York State Department of Transportation, in cooperation with the State's local transportation organizations, is

actively involved in defining and obtaining travel data needed to plan for the mobility needs of the 1990s. Because of a limited data collection budget, New York has had to examine very closely the data it needs and try to obtain it in the most efficient manner possible. New York's approach is to carefully coordinate any new travel survey activities to maximize their utility and to rely on the appropriate sharing and reuse of existing data when and where possible. Indications are that this approach will supply the planning data the Department needs to formulate its capital program for the 1990s and shape the state's long-range transportation plans for the twenty-first century.

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