

## **PROJECT UNDERSTANDING**

The South Jersey Travel Demand Model (SJTDM) is a comprehensive multimodal analysis tool capable of simulating and forecasting highway and transit travel in the South Jersey Transportation Planning Organization (SJTPo) region. Many of the transportation planning decisions for the region are based on travel demand model estimates generated from the SJTDM. The model is also utilized to demonstrate conformance with state and federal regulations. SJTPo is responsible for assuring conformity of transportation decisions with the air quality State Implementation Plan (SIP) and the Federal 1990 Clean Air Act Amendments. The post processors (PPAQ and PPSUITE) attached to the SJTDM are used to analyze and satisfy the conformity requirements.

The SJTDM is based on state-of-the-practice analysis tools and techniques, and has extensive capabilities to capture many aspects of travel in the region, and to capture the changing travel conditions associated with a region containing significant recreational travel activities. The model has been in operation for several years now. While the model has been updated and refined a number of times over the past several years, there are areas where the model can be further improved.

Our approach to update the model will be to build on what we have learned through its use and operation on a number of projects and assessments. We propose to strengthen its performance, build upon the enhancements already made, and utilize newly acquired data to perform a new model calibration and verification process. As requested, we have used the ***SJTPo: Model Priorities List*** as a starting point to assemble this scope of work.

PB has joined with three outstanding firms to conduct this project and bring it to a successful completion: Urbitran Associates, URS Corporation and Stump-Hausman, hereinafter referred to as the PB Team. PB, Urbitran, and URS were the original developers of the model and have participated in each revision and update, making our team uniquely qualified to perform this model enhancement project. Further details of each firm's involvement in this project can be found in the Firm Qualifications and Staff Qualifications sections.

## **TECHNICAL APPROACH**

The Technical Approach to this project is divided into eight specific tasks including coordination which will be conducted throughout the project. The following pages present the Technical Approach the PB Team will follow to bring this study to a successful completion.

### **Task 1 – Temporal Model**

The Temporal submodel is a complex set of factors that are utilized to estimate the variation of trip making through the year that enables the SJTDM to generate volumes for any period/day of the year. There are several tables involved in the process including trip purpose, time of day, day of week, and month of year data. These tables are used to derive factors that allow the SJTDM to estimate travel for any day or season of the year. This is important in the SJTPo region because of the varied trip types and seasons of trips. While trips to the beach are at their highest in August, they are much less prominent on a February weekday, yet casino work and trips are prominent during both August and February. The diversity of trip making and the seasonality influence requires that the SJTDM have the adoptability and flexibility that the temporal submodel provides.

The Temporal model is a unique feature of the SJTDM. It also plays an important role in air quality analysis. Ozone and its precursors are prominent in the summer months, while carbon monoxide is at its highest levels during the winter months. With the Temporal model the SJTDM is able to forecast volumes for each of these conditions independently.

The goal of this task is to improve the performance of the predictive capabilities of the model by improving the factor tables.

The PB Team will start with national databases such as the National Household Travel Survey (NHTS). The NHTS contains data concerning trip purposes by time of day for all modes of transportation. The PB

Team will use the DVRPC/SJTPO *Transportation for the 21<sup>st</sup> Century Household Travel Survey* to examine travel time patterns for all conditions and times of the year. This data set is particular to the SJTPO region so it is probably the most pertinent data set. The New York Metropolitan Transportation Council (NYMTC) *Household Interview Survey* (HHIS) is a comprehensive survey data set of travel in New York City, lower New York State and northern New Jersey. Characteristics of this data set have been successfully transferred to other regions and will be used to the extent possible for the SJTPO region. The PB Team will also use elements of the *Census 2000: Journey to Work* data to update the temporal tables.

**Deliverables**

An updated set of Temporal Factors by purpose, time of day, day of week and month of year, and the integration of these tables into the model flow process.

**Task 2 – HPMS vs. Model VMT Fit**

The Highway Performance Monitoring System (HPMS) is the benchmark for vehicle miles traveled (VMT) by area and roadway type in the SJTPO region. It is an inventory/sample of travel in the region and is used by the State and Federal governments to make decisions on transportation funding and legislation. The closer the travel forecasts of the model are to the HPMS totals the better the travel model is considered to be modeling the existing conditions on the street.

The PB Team will attempt to improve the model match to HPMS through better factoring of the Temporal Model and recent previous updates to trip generation and trip distribution. The PB Team will inventory and check the roadway types to make sure that they are reflecting the proper federal roadway classifications. After traffic assignment, new volume totals will be generated by roadway type and area and by season of year. These totals will be factored to reflect annual totals. These annual totals will be compared to the previous totals to monitor if the model is forecasting travel closer to the HPMS totals.

**Deliverables**

A comparison of HPMS VMT totals versus the old model forecasts and new model forecasts.

**Task 3 – Casino and Convention Center Characteristics**

The PB Team will research data sets that look specifically at multi-use casino, hotel and retail trips which are different from casino-only trip generation. The Institute of Transportation Engineers (ITE) Trip Generation Manual contains very sparse information on casino trip generation. The studies cover only six (6) locations and they are all located in South Dakota. This fact is pointed out to say that there is no single strong database of consistent trip generation or time of day information available. It seems that most of the forecasting relies on individual site studies with rates derived from a multitude of sources. The PB team will collect a number of these studies to further refine the casino trip purposes and estimate of casino travel.

The PB Team will also contact the SJTA, the City of Atlantic City and the **Casino Reinvestment Development Authority**, to obtain local traffic impact studies to use in the refinement of Casino and Convention center activities and the **Atlantic City Transportation Plan**. To the extent possible with the available research, the Casino and Convention Center trip generation rates will be updated in the model stream. The PB Team will use traffic counts available in the vicinity of the casinos and convention center to validate these new rates.

**Deliverables**

A listing of updated trip generation rates for casinos/hotel/retail centers and the Convention Center.

**Task 4 – Traffic Pattern Files**

The “pattern” files are a set of files containing traffic counts collected around the SJTPO region by type of facility, direction of travel, and peaking characteristics by area (county). The purpose of the pattern files is to breakdown the travel forecasts into 24 1-hour volumes to reflect volumes across a full day. Basically

these files allow the model to estimate travel for each hour of the day as compared to an aggregate daily volume only. The diurnal patterns are important in forecasting annual travel for HPMS comparison (Task 2) as well as emissions analysis.

The PB Team will utilize information obtained from the ongoing SJTPO traffic count program to update the traffic count pattern files with the latest traffic information available plus available historic data to track patterns of growth. The PB Team assumes that SJTPO has included other agency data into its database, but if needed, the PB Team will collect other high-quality data from these agencies, if available.

**Deliverables**

A set of updated traffic pattern files.

**Task 5 – DVRPC Area Update**

The DVRPC region generates a significant amount of traffic that travels in the SJTPO region, particularly recreational travel. Accurately accounting for these trips is important in creating credible forecasts in the SJTPO region. A significant amount of New Jersey highway network that lies in the DVRPC region is part of the overall SJTPO modeling process. The roadway network and trip tables for the DVRPC region have not been updated in several years, and many improvements have been made in the DVRPC region that are not currently accounted for in the existing networks for the SJTDM. The PB Team will work with the DVRPC to obtain new networks and trip tables for the base and future years and “reattach” them to the SJTPO model using their proprietary “stitching” technique that ties the two networks together and reassigns longer distance origins and destinations across both regions.

**Deliverables**

A new roadway network and trip tables stitched into the SJTPO network for the base and future years.

**Task 6 – Truck Flows**

Freight movement, particularly truck freight movement, is growing in the SJTPO region. As the ports in Philadelphia, southern New Jersey, and northern New Jersey continue to grow and the residential demands continue to grow, goods movement by trucks will also continue to grow to meet these demands.

The PB Team will utilize data and information obtained in NJDOT’s *Comprehensive Statewide Freight Plan* (a PB-lead effort) to update commercial and smaller truck trip generation formulas. Information from classification counts will be used to validate truck volumes across key screenlines, on key roads, and in key corridors to the extent possible

**Deliverables**

A set of truck flow tables and GIS maps by screenline and key roadways.

**Task 7 – Model Calibration and Validation and Report**

**The model will be calibrated to an existing Summer Friday P.M. Peak period condition.** Several of the SJTDM’s submodels will be updated as part of this project. As part of the calibration process, the base year highway assignments will be checked against the existing base of traffic counts. This validation effort will identify when model calibration is considered complete. Checks will be made at several levels starting out at the regional level and stepping down to different categories of aggregation including county, facility type, geographic location and then down to individual facilities.

The PB Team will review the estimates generated by the mode choice model with respect to individual transit modes and routes. The PB Team will utilize ridership data provided by NJ Transit for this effort. We will also inspect boardings at key transit facilities such as rail stations in order to insure proper patronage for the commuter rail service. The PB Team will utilize recent improvements in the reporting features of the South Jersey Model for this effort.

**Deliverable**

The Team will produce documentation on the calibration methods and results of the SJTDM. The submodel updates will be incorporated back into the SJTDM model chain. A technical appendix will be created detailing the validation process and summaries at the various levels of transit and highway aggregation categories.

**Task 8 – Final Report, Training and Installation and Peer Review**

As part of the final report submission the PB Team will provide SJTPO with updated versions of the SJTDM including all input data, driver files, program libraries, model and post processor output for the calibrated existing year model. All report deliverables will be delivered to SJTPO in hardcopy (8 copies) and electronically on CD in Adobe Acrobat (PDF) format. Where applicable, the PB Team will also provide SJTPO with the MapInfo files and workspaces of maps for their use.

The PB Team will install the latest version of the SJTDM on an SJTPO computer. At that time the PB Team will also provide SJTPO staff with training in the use of the latest version of the model including the use of the CENTRAL batch processor.

The PB Team will also make a presentation of the model and its results to the SJTPO Technical Advisory Committee.

The PB Team will coordinate with the SJTPO Technical Advisory Committee to setup and execute the peer review process that will be concurrent with the model development process. Peer reviewers will be provided with data as needed to provide feedback to SJTPO staff. Comments of the peer review team will be included as an addendum to the final report.

**Deliverables**

- Technical Memoranda
- Technical Appendices
- MapInfo Workspaces
- SJTDM Recalibrated/Updated Model CD
- Installation of the updated model onto an SJTPO Computer
- Training for SJTPO Staff
- Peer Review Comments addendum

**Task 9 – Management and Coordination**

The purpose of this task is to orchestrate the involvement of the PB Team and SJTPO staff. We will coordinate with Regional Transportation Plan effort to create economies of scale and data flow and prevent duplicate work. We will maintain contact with the SJTPO staff on information required, progress on each task and project schedule updates. The SJTPO will receive written progress reports every four weeks that will accompany the project invoices. We will attend up to four coordination meeting to review project progress and results.

**Deliverables**

Progress reports every four weeks and coordination notes between the various stakeholders.