

**Scope of Work:**  
**Travel Demand Model Update Phase 2:**  
**Southeast Louisiana Travel Model, New Orleans (SELATRAM)**  
**RPC Project TDMNO**  
**State Project No. H.972274**

**Project Description**

The purpose of this contract is to provide technical services to the RPC as needed in the update, and use of the transportation demand model and associated analytical software used for long-range strategic planning, and other transportation and land use related tasks. This model, the Southeast Louisiana Travel Model (SELATRAM) is used to perform capacity deficiency analysis, future year demand analysis on multiple scenarios, and evaluation of individual needs in study areas over time up to a planning horizon year in a geospatial database format. Currently, SELATRAM is used to model highway and transit movements (and all submodes therein) truck movements, and visitor trip estimation. RPC desires to update the model and subroutines therein, and to retain the geographic highway and transit forecasting capacity of the model which includes Jefferson, Orleans, Plaquemines, St. Bernard, St. Charles, St. John, St. Tammany, Tangipahoa and Washington Parishes (counties) in Louisiana.

The existing travel demand forecasting model used by the RPC was recently updated/ developed in the TransCAD 7.0 environment by Caliper Corp., Newton, Massachusetts, in GISDK scripting language with FORTRAN, Python, and JAVA subroutines embedded in the model stream.

The RPC's goal for SELATRAM is for as many model components as possible to be converted to TransCAD GISDK code for maintainability and incorporation of best practice modeling techniques. Only the truck model will remain in Java. The Python scripts that manage scenario creation will also remain in place. All FORTRAN programs will be replaced.

To most efficiently convert model components to TransCAD, the Consultant will utilize a library of generic TransCAD models. RPC believes this framework is useful for simplifying the setup of lower-level functions in 4-step models, with only the model parameters and "project-level" code (shell code, or one-off functions that are not easily generalized for use in other models) left to be customized. The Consultant will integrate this generic framework into the existing SELATRAM GISDK scripts and use passively collected travel data to define the model parameters.

**Scope of Services**

The services of the Consultant are outlined in this exhibit by task and will consist of, but not limited to the following:

**Task 1 – Replace Trip Generation Module**

The current trip generation phase of the model consists of three routines that need to be replaced at the same time. The following three subtasks describe these routines.

### **1a. Replace Land Use Routine**

The Land Use FORTRAN routine calculates terminal time (parking time) and parking cost by zone. The Consultant shall replace this routine with new GISDK script that calculates these same zonal attributes. This new GISDK script will be tested, and results will be compared to the FORTRAN results.

### **1b. Replace Household Cross-Classification Routine**

The Household Cross-Classification FORTRAN routine calculates zonal-level joint distributions of households by size and income. The Consultant shall replace this with GISDK script that creates the same joint distributions. This new GISDK routine will be tested, and results will be compared to the FORTRAN results. This functionality is part of the generic framework, and so will only require new project level code.

### **1c. Replace Trip Generation Routine**

The Trip Generation FORTRAN routine calculates trip ends by three purposes (HBW, HBO, and NHB), as well as university and non-motorized trip rates. Consultant shall replace this with GISDK script that creates the same trip ends by purpose. The generic framework has this functionality and will be used here. Some new project-level code will be required to handle the university and non-motorized trips. The new trip generation scripts will be moved outside of the feedback loop, meaning it will run just 1 time per model run. The new routine will not use skims as input, and will no longer have a function to generate IE/EI trips since those trip will be generated by a previously developed GISDK script. Results from the new routine will be compared to the FORTRAN results.

## **Task 2: Replace Trip Distribution Module**

The Trip Distribution FORTRAN routine creates person trip tables by 3 purposes. The Consultant shall replace this with code from the generic framework, which offers the option of using a Gravity or Logit formulation for distributing trips. Due to data constraints, the Gravity model will be used for NORPC. Only new project-level code will be required. Friction factors will remain unchanged, unless new data becomes available, in which case the factors can be recalibrated as part of the Model Calibration Task. If these factors are recalibrated, they may need to be segmented by parish, as suggested in the latest version of the model user's guide. The school trip fratar step currently in TransCAD will remain unchanged.

## **Task 3: Replace Mode Choice Module**

The Composite Impedance FORTRAN routine currently calculates composite impedance (mode choice log-sums) from the transit and auto skims. The output is used by trip distribution (for HBW trips only) and mode choice. The Mode Choice FORTRAN routine splits person trip tables by mode, which includes Auto (with occupancy, toll, and HOV nests) and Transit (with walk/drive access and sub-mode nests). The Consultant shall replace these two routines with GISDK code from the generic framework. Due to

the more complex nesting structure of the NORPC model, the framework code will need to be enhanced. Thus, this task is the most substantial effort. The results of the new mode choice model will be compared with the FORTRAN results.

#### **Task 4: Replace Transpose Module**

The Transpose Matrix FORTRAN routine transposes matrices from PA to OD format. The Consultant shall replace this with generic GISDK framework code to handle this function.

#### **Task 5: Replace Time of Day Module**

The Time of Day FORTRAN routine splits trips by purpose into 4 time of day periods. The Consultant shall replace this with generic GISDK framework code to handle this function.

#### **Task 6 – Replace Air Passenger Routine**

The Air Passenger FORTRAN routine generates air passenger ground access trips using forecasted enplanements from the FAA. It then distributes those trips according to the distribution of HBO trip ends, with special adjustment factors for popular tourist districts that attract more visitors than the HBO trip ends would suggest. The routine then does mode choice, which includes private auto, rental car, taxi, shuttle, and transit. The routine also splits these trips by time-of-day. The Consultant shall replace this model with code from the generic framework. Since air passenger trips are not covered by the household survey and are a special market, the distribution, mode choice, and time-of-day parameters and structure will be different than for the household-based models. However, this only requires new project-level code.

#### **Task 7 – Replace Visitor Transit Routine**

This Visitor Transit Model uses an Incremental Logit FORTRAN routine that generates transit trips made by visitors to the region. It does this by pivoting off of the results of a prior model run, and is dependent on an on-board transit survey from 2012. The Consultant shall replace this routine with an incremental logit model in GISDK script. TransCAD has an incremental logit framework that will be used for this task.

#### **Task 8 – Model Estimation**

Many of the current model coefficients were re-estimated in 2000, prior to Hurricane Katrina. Other model coefficients date back to the 1980s. Therefore, these coefficients are in need of updates. The Consultant shall work with RPC to use the NHTS (2011) and other data sources as appropriate to estimate model coefficients for Trip Generation and Mode Choice.

#### **Task 9 – Model Calibration**

The Consultant shall use passively collected georeferenced, passively collected data (such as Airsage or Streetlight) and NHTS to calibrate the trip generation, trip distribution, mode choice, time-of-day modules. Other data sources, such as LEHD, CTPP, ACS, the 2012 transit on-board survey, may also be used in addition to procured data and NHTS data as “fall back” data sources with RPC review and

concurrency in order to calibrate a particular model component. RPC is budgeting approximately \$60,000 for the passive data procurement, based on a zonal geography of 500 TAZ's. SELATRAM consists of 1000 internal zones. As such, the consultant will be responsible for the development of a "district" system that consolidates the existing 1000 zone TAZ structure into a 500 "district" geography. Said geography will be undertaken in conjunction review and approval of RPC personnel. Procured datasets will become the property of the Regional Planning Commission.

#### **Task 10 – Model Testing - Testing New Routines in Integrated Model Structure**

The Consultant shall integrate the new GISDK components describe above into the existing TransCAD model structure, which includes the truck model (Java) and all previously developed TransCAD components (area type calculations, transit access calculations, transit speed calculations, skimming, the external model, matrix calculations, traffic/transit assignments, and assignment summaries). The new model will be tested and end results will be compared to the previous FORTRAN-based model.

The Consultant will perform a variety of sensitivity tests using the updated SELATRAM model, evaluating the outputs for reasonableness and when possible, compare outputs to observed data to check for validity. Outputs shall also be compared to the outputs of the previous SELATRAM model (which relies on FORTRAN). Traffic/ transit ridership and truck data to be used for testing purposes will be supplied to the Consultant by RPC.

The Consultant shall ensure that the revised SELATRAM model is functional on RPC computers that are licensed with TransCAD. Installation guides and/or methodologies will be documented and forwarded to RPC. The Consultant will assist in the installation and will be available to answer questions and troubleshoot problems as they arise for the duration of the contract.

#### **Task 11 – Update User's Guide:**

The Consultant shall update the model documentation to reflect new model estimation and calibration that takes place. The Consultant shall also update the user's guide to reflect how the new model components are specified, and how the model flow has changed. Deliverables for this task include the update of the documentation and User's Guide in MSWord and pdf formats.

#### **Final Deliverable:**

Consultant shall provide three DVD's that include the revised TransCAD script for the SELATRAM model, with appropriate installation instructions that also include the updated users guide as described in Task 4 in MSWord and pdf formats.

Consultant shall provide a summary document/ narrative of work tasks performed and accomplished over the course of the contract. All changes undertaken in SELATRAM will be summarized and highlighted in Model User Guide documentation.

#### **Requirements:**

Consultant must demonstrate having a thorough understanding of TransCAD GISDK, FORTRAN, JAVA, PYTHON, and ESRI Shapefiles. Must demonstrate prior experience in four step model development, (including mode choice with transit sub-modes) in large urban areas (TMA's).

**Contract Time:**

This contract period for the services as described herein shall not exceed 9 months. Model development task shall conclude at month 8, with one month (month 9) reserved for model shakedown and troubleshooting as needed.

**Budget:**

The total maximum budget for accomplishing all the tasks in this scope of work is **\$231,000**, which includes cost of the data set in Task 9.