

PID No. 125093

State Job No. *****

Scope of Services Meeting Time: 12:30 or 1:30pm Date: 11/10/26

Location: Teams

Approved Final Scope of Services Minutes Date: **/**/**

Maintain and Enhance Travel Demand Forecasting Models in Ohio Scope of Services

The Department and Ohio's seventeen Metropolitan Planning Organizations (MPOs) maintain travel demand forecasting models for use in project planning, long-range plan development and other analyses including air quality conformity analysis. The Department seeks qualified firms to perform tasks related to the maintenance and enhancement of the statewide travel demand forecasting model (SW Model), Ohio Medium/Small Modeling System (OMS) models used in the small and medium sized MPOs, the 3C model used in the large sized MPOs, the TransModeler C10 model in Columbus, Cincinnati and Lima, the TREDIS Economic Impact Model (EIM), Simulation Demand Estimator (SDE) tool, and various utilities used for pre- or post-processing.

The SW Model is an integrated econometric/land use/transport model employing tour-based microsimulation for the transport model components. The size and scope of the model require that it be run on one of ODOT's eight dedicated computers. Because this model represents a dramatic paradigm shift from traditional travel demand forecasting models, its various components were custom built for ODOT. As such, ODOT requires consultant support to keep the model software operable for use in transportation project analysis. A 35k zone network and trip tables are being developed. This contract will work on developing components so that estimation can begin after completion of the statewide Household Behavior Inventory/Travel Survey in Fall 2027. New demand models are expected to be implemented in Bentley Agent/OpenPaths software. Supply models may additionally use Caliper TransCAD/TransDNA software. The network will be maintained in Caliper TransCAD software.

Data collection is ongoing for the next generation of the OSWM. The Department is making a concerted effort to update the various input datasets to these models, including highway and transit networks in TransCAD and Cube/OpenPaths, and base year land use inventories, including land coverage, land use/development, water/sewer service areas, and base and future year employment and population for all models. The Land Use and Economic Allocation models, and a 35k zone implementation are top priorities for the OSWM. It is expected that most of the passenger and commercial vehicle models will be shared with the 3C model.

The 3C Model is a state-of-the-art Activity Based Model currently based on the Coordinated Travel-Regional Activity-Based Modeling Platform 2 (CT-RAMP 2). Travel demand is microsimulated at the Micro Analysis Zone (MAZ) level using various leading-edge behavioral model formulations far beyond the simple aggregate statistical models of the four-step model era. Traffic microsimulation was added through the SHRP2 C10 program and has transitioned to TransModeler. The 3C model is implemented for Columbus/Newark, Cincinnati and Dayton. There is also a Lima version that is maintained for testing purposes and is available for research. The TransModeler C10 model is in development for Columbus/Newark, Cincinnati and Lima. New demand models are expected to be implemented in Bentley Agent/OpenPaths

software. Supply models may additionally use Caliper TransCAD/TransDNA software.

In addition to these advanced models, traditional four-step models are maintained for the small and medium metropolitan areas in Ohio and the Consultant may be tasked with transitioning the models from Bentley Cube to Bentley Agent/OpenPaths software. Finally, the consultant may also be tasked with updates and maintenance of the Economic Impact Model (EIM), developed to quantify economic impacts of projects using travel model results and which is implemented in Cube and TREDIS, and with the Simulation Demand Estimator (SDE) tool, which is implemented in Cube and TransModeler. Pre- and post-processors are written in Cube, FORTRAN, GISDK and python and use Cube, TransCAD, TransModeler, R, PowerBI and Synchro. These utilities include network calculators, CMAQ calculators, and utilities to convert networks and demand between Cube and TransCAD or TransModeler and create inputs to TREDIS, among others.

The consultant selected for this contract must at a minimum be able to demonstrate detailed knowledge of the following:

- Land use modeling systems
- Activity allocation models to convert large scale econometrics to small scale travel flows
- Activity and agent-based microsimulation travel demand forecasting models
- Aggregate trip-based travel demand forecasting models
- Population and firm synthesis models
- Commodity driven freight models
- Quick Response freight models
- Project level modeling
- Bentley Cube/OpenPaths and Agent modeling software
- Caliper TransCAD, TransDNA and TransModeler software
- TREDIS
- GitHub
- Python
- Java

It is preferred that the consultant also have thorough knowledge of the following:

- Bentley DYNAMIQ modeling software
- Origin-Destination Matrix Estimation procedures and implementation in modeling software, including Analyst Drive
- Synchro
- R
- PowerBI
- Rust

Detailed knowledge of the SW Model, OMS, 3C, C10 and/or EIM models will be considered a plus.

As mentioned previously, the SW model, 3C, C10 and EIM will be run on one of ODOT's computers. ODOT will provide remote access to the computers but the consultant should anticipate possible time on site. OMS models can be run on any standard computer. The consultant's possession of a computer able to run the SW, 3C, and C10 models will be considered a plus. All models and tools will be placed on ODOT's github account so that they can easily be transferred between ODOT, MPOs and Consultants.

Enhancements to the Ohio suite of models include:

- OSWM, 3C, OMS procedures moved from Cube 6.5 to OpenPaths.
- Rework of the OSWM land use and economic allocation models to better reflect land use changes and network accessibilities.
- Implementation of the 2024 roadmap in Agent/OpenPaths.
- Consolidation and reconciliation of parameter and data sources to ensure changes made by users are reflected consistently throughout the models.
- Updates to model documentation and user interfaces as needed to make models more usable.
- Relocating and/or renaming of input and output files as needed to make the model easier to use.
- Improvements to the travel model interface with TREDIS and its distribution of impacts through time.
- Addition of a supply chain logistics/distribution layer and firm synthesis to the current freight models to provide linkage between long distance freight hauling (ACOM) and local goods distribution models (DCOM) explicitly modeling the locations and attributes of intermodal, warehousing and distribution centers.
- Additional enhancements to the long-distance freight model (ACOM) such as an establishment synthesis model to allow freight generation by establishment rather than aggregate zonal employment, use of agricultural acreage and livestock sales data for disaggregating agricultural flows and use of gravity formulations to inform disaggregation from FAF to TAZ level in addition to employment levels currently used.
- Continue work for update of model base year of all models to circa 2020/2025 including estimation/calibration of alternative specific constants and other parameters as necessary to meet ODOT validation specifications.
- Update/refine and provide training for the TransCAD network management tool for use with Ohio standard network formats (including statewide and MPO networks) that allows projects to be coded to a base network in order to create various alternative networks. This tool also provides for MPO networks to be swapped in and out of the statewide network.
- OSWM/3C/OMS/C10/Assignment Only model validation work.

Possible enhancements to the Ohio suite of models could include, but are not limited to:

- Update of ACOM and/or DCOM with new VIUS.
- Evaluation and enhancement of simplified land use/activity allocation models to improve models' policy sensitivity and geographic response capabilities, including updates from new data.
- Evaluation and consideration of intra-year feedback looping in statewide model.
- Evaluation and implementation of alternate assignment GC equations. Test and implement new path or origin-based assignment methods as they become available
- Evaluation of sampling strategies in destination choice models, including filtering by establishment type.
- Addition of policy sensitive models of air and maritime transportation modes.
- Additional reporting capabilities, including standardized reports in Cube/OpenPaths, Rust, python, PowerBI or R and a GUI for additional reporting.
- Addition of feedback from the economic models (EIM) to the travel models.

- Configuration of the software to run on different computer configurations, including Cloud configurations.
- Overhaul SPG to incorporate population evolution functionality.
- Streamline user ability to influence demographic inputs.
- Support for the 3C SHRP2 C10 implementations including the completion of the MORPC and OKI TransModeler implementations.

Additional tasks could include:

- Update SDE Tool from Cube 6.5 to OpenPaths. This includes possible use of DYNAMIQ as Avenue will no longer be supported. It is expected that Analyst Drive will still be supported. Update other ODOT Cube applications from Cube 6.5 to OpenPaths.
- Project level modeling in support of Certified Design Traffic, which is also being advertised.
- Advisement for the Statewide Household Travel Survey, including the weighting and expansion of the data using NCHRP RRD 400 and the update of NCHRP RRD 400 with Ohio survey data.
- 3C modal enhancements for transit and non-motorized.
- MPO On-Call Modeling Support.

All models and tools will be maintained on GitHub.