Exploring New Model Workflows with OpenPaths

TPB Travel Forecasting Subcommittee Nov 2025

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November 21 2025

Bentley®

OpenPaths Applications

OpenPaths™ EMME®
Multimodal transport planning

OpenPaths™ CUBE™
Multimodal transport planning

OpenPaths™ AGENT®
Modern travel demand modeling

OpenPaths™ DYNAMEQ®
Traffic simulation and DTA

OpenPaths™ CityPhi®
Mobility animation studio

Idea 1 - Explore integrated CUBE<>EMME model workflows

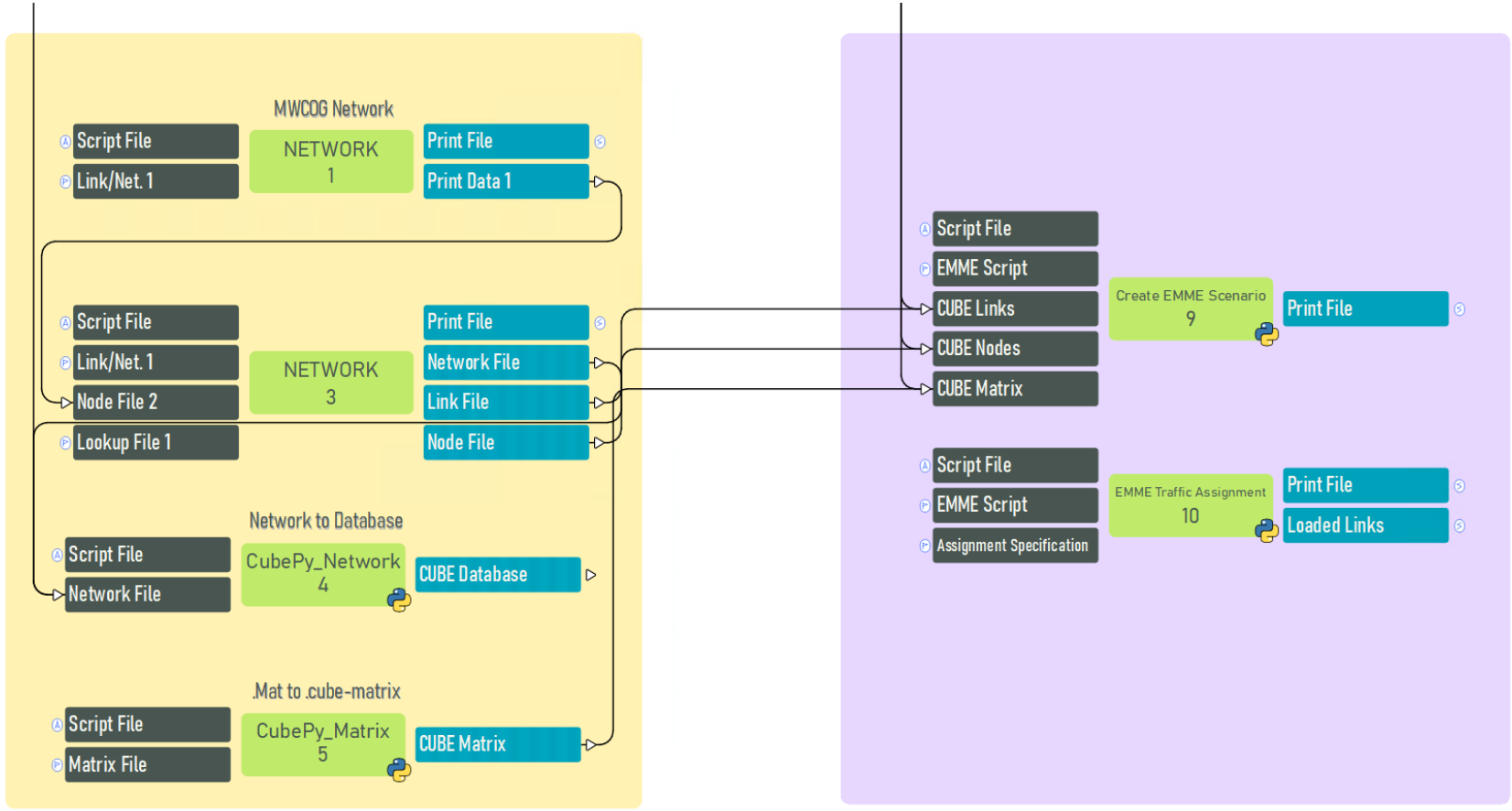
Integrate EMME with CUBE in CUBE workflows

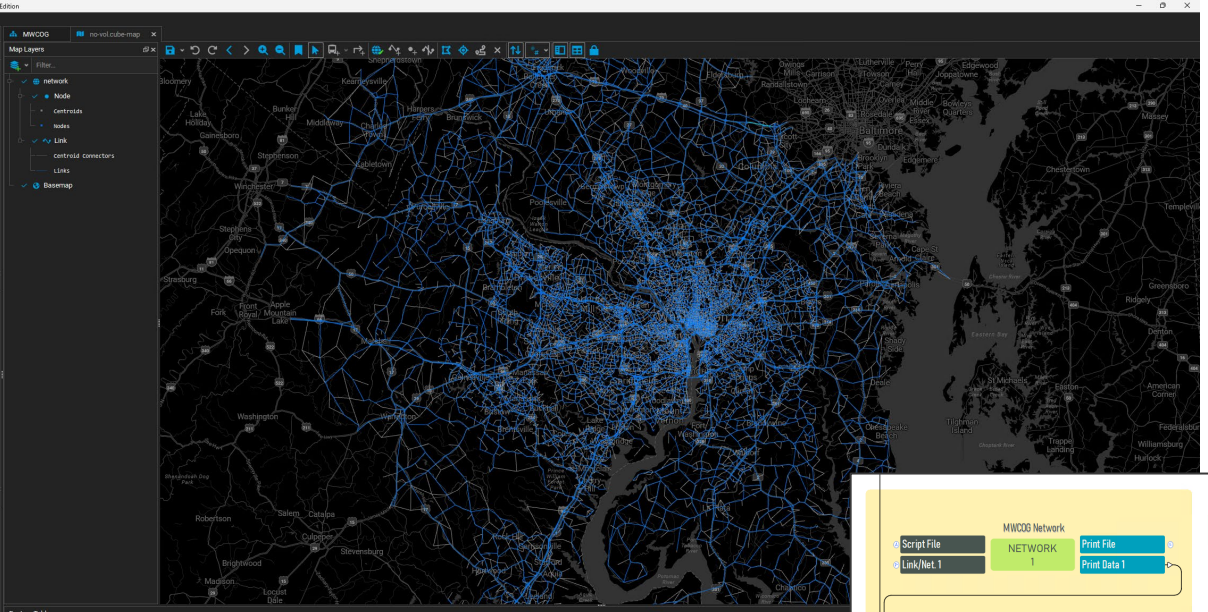
Data interoperability

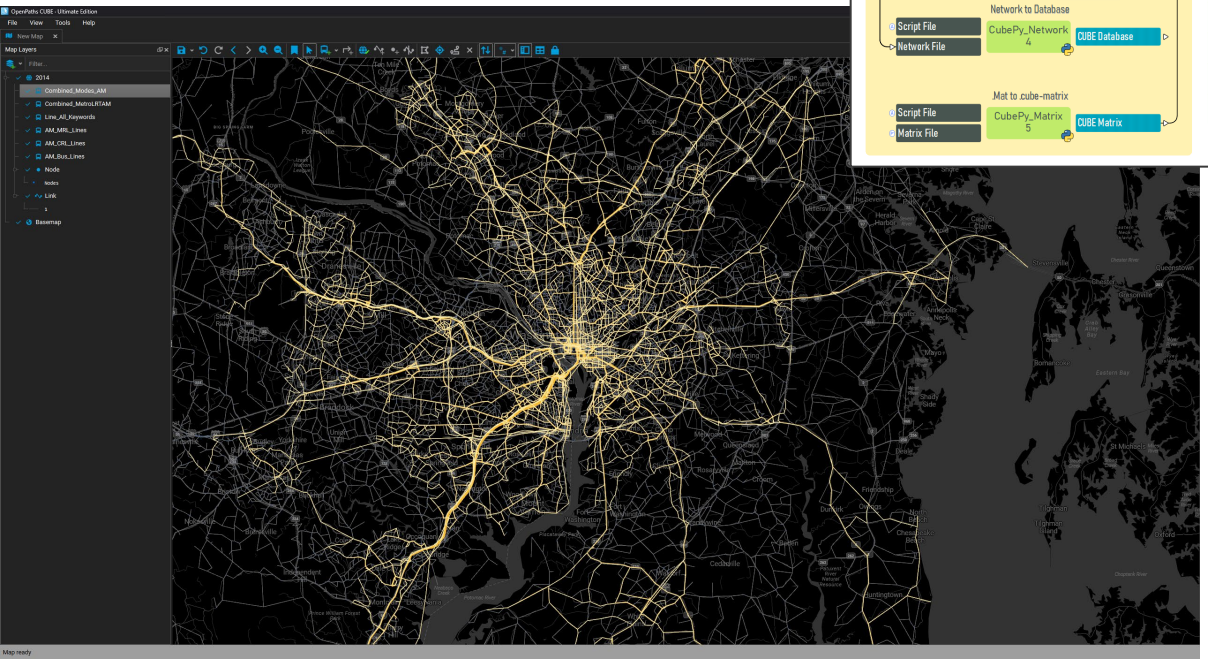
1. Transfer CUBE data to EMME
2. Access EMME APIs from CubePy program box
3. Consolidate results in CUBE

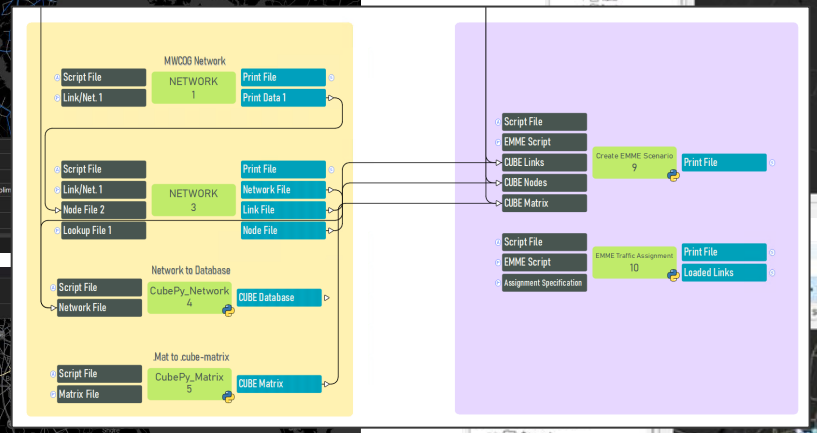
Works with CUBE Application Manager and batch scripts

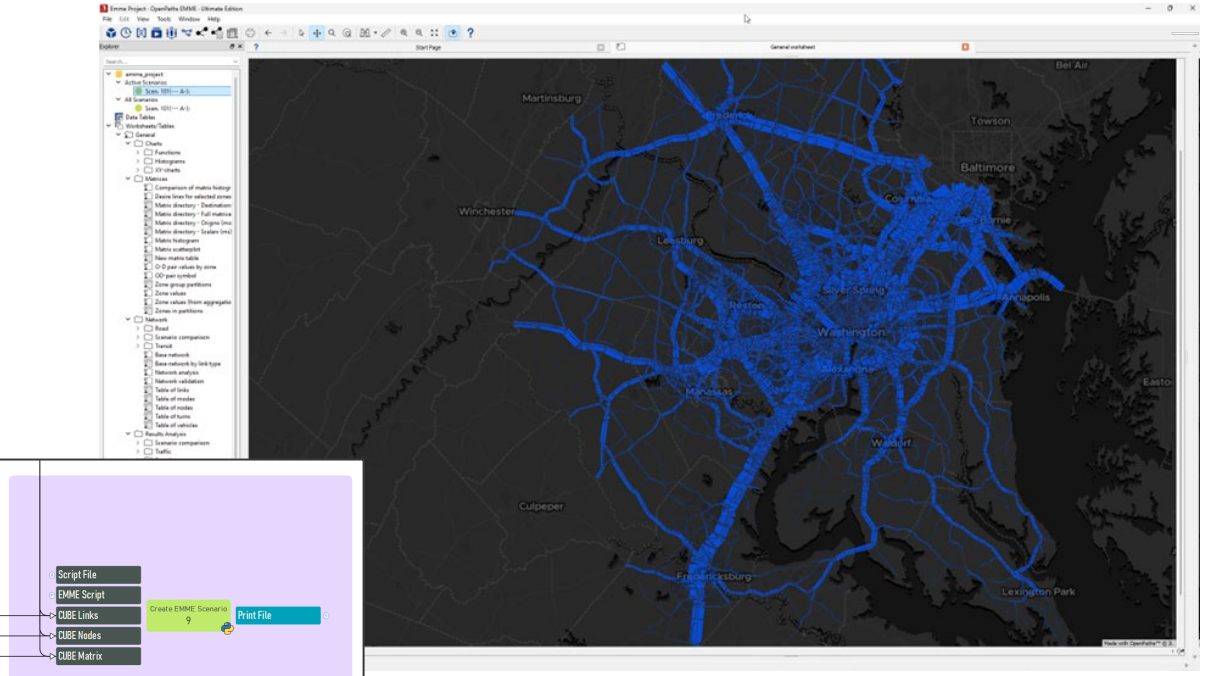
Allows to explore traffic and transit assignments and other licensed functionality

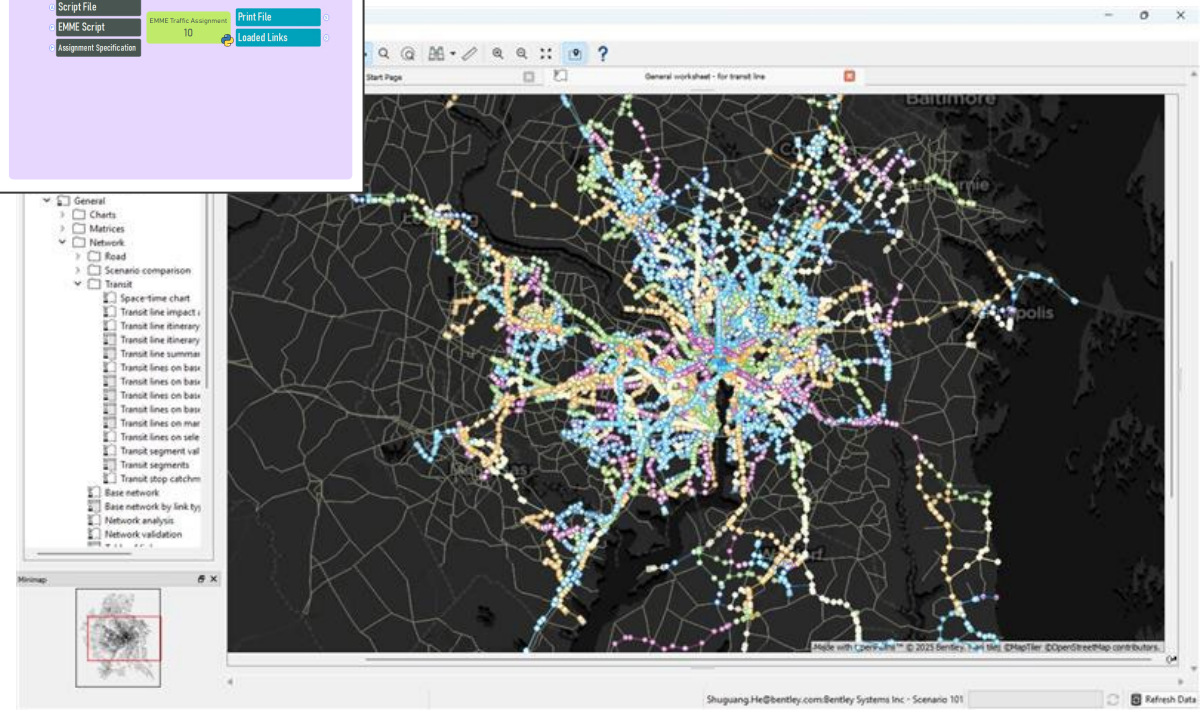




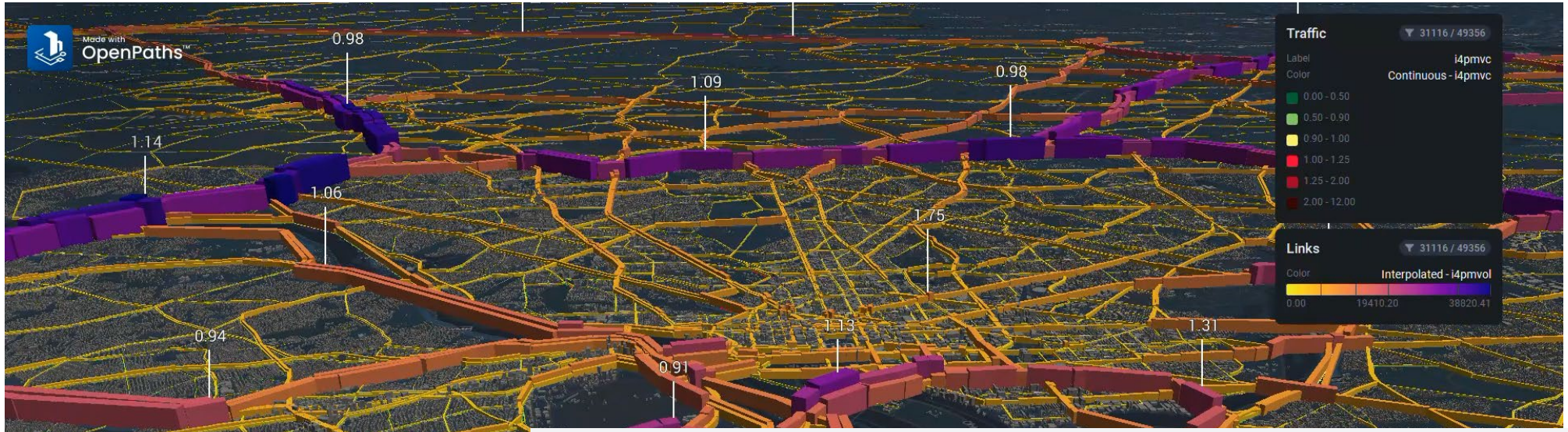


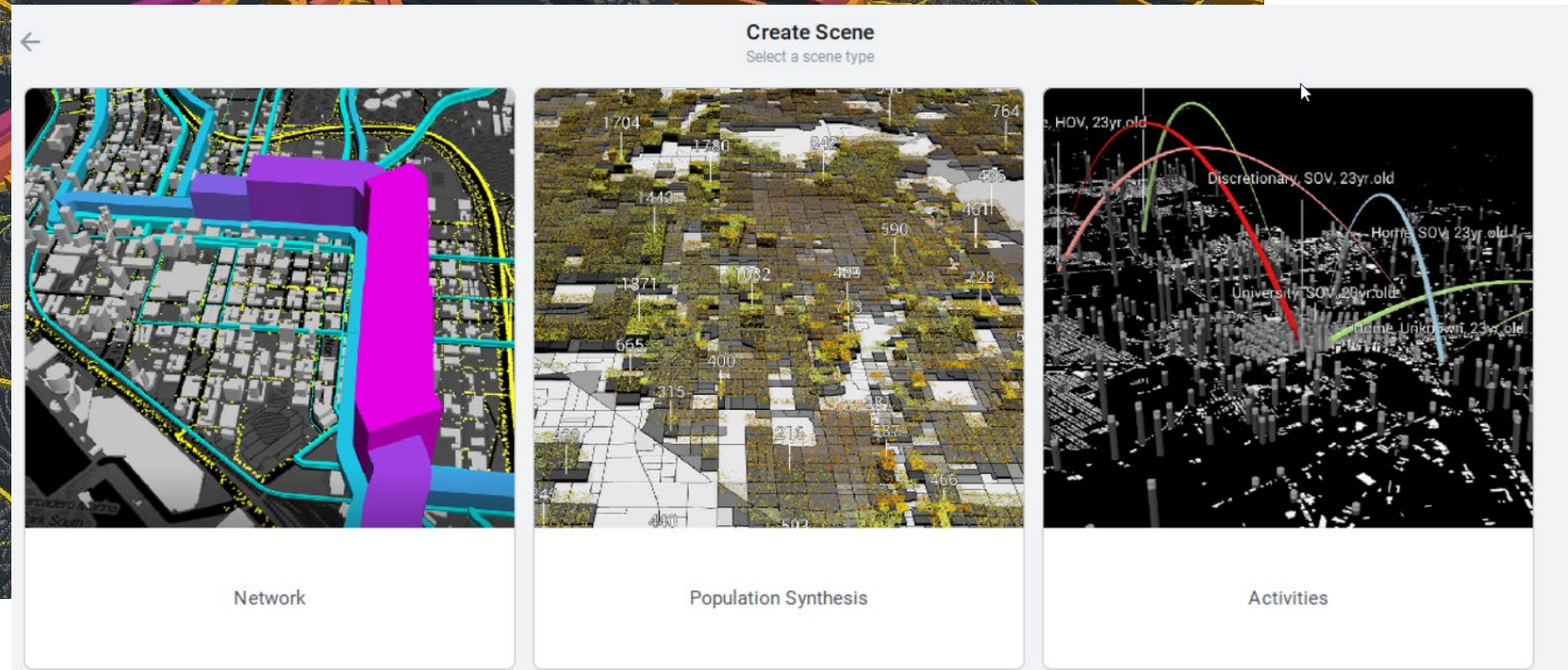

MWCOG Network
Script File
Link/Net. 1
NETWORK 1
Print File
Print Data 1
Script File
Link/Net. 1
Node File 2
Lookup File 1
NETWORK 3
Print File
Network File
Link File
Node File
Network to Database
Script File
Network File
CubePy_Network 4
CUBE Database
Mat to cube-matrix
Script File
Matrix File
CubePy_Matrix 5
CUBE Matrix
Script File
EMME Script
CUBE Links
CUBE Nodes
CUBE Matrix
Create EMME Scenario 9
Print File
Script File
EMME Script
Assignment Specification
EMME Traffic Assignment 10
Print File
Loaded Links





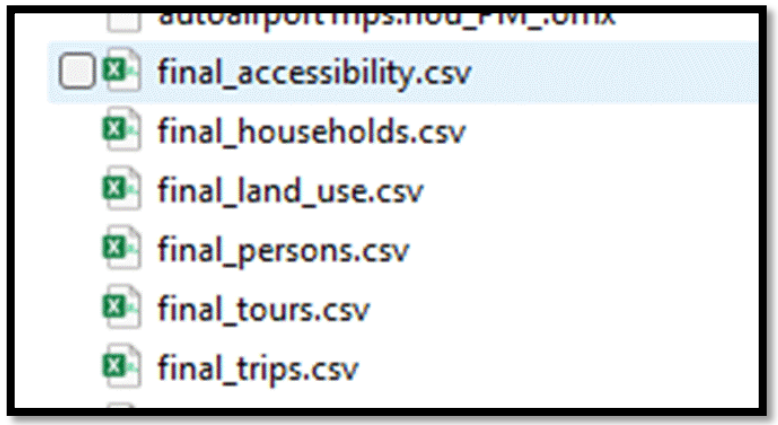
Idea 2 – Visualize Network Results with the Network Scene

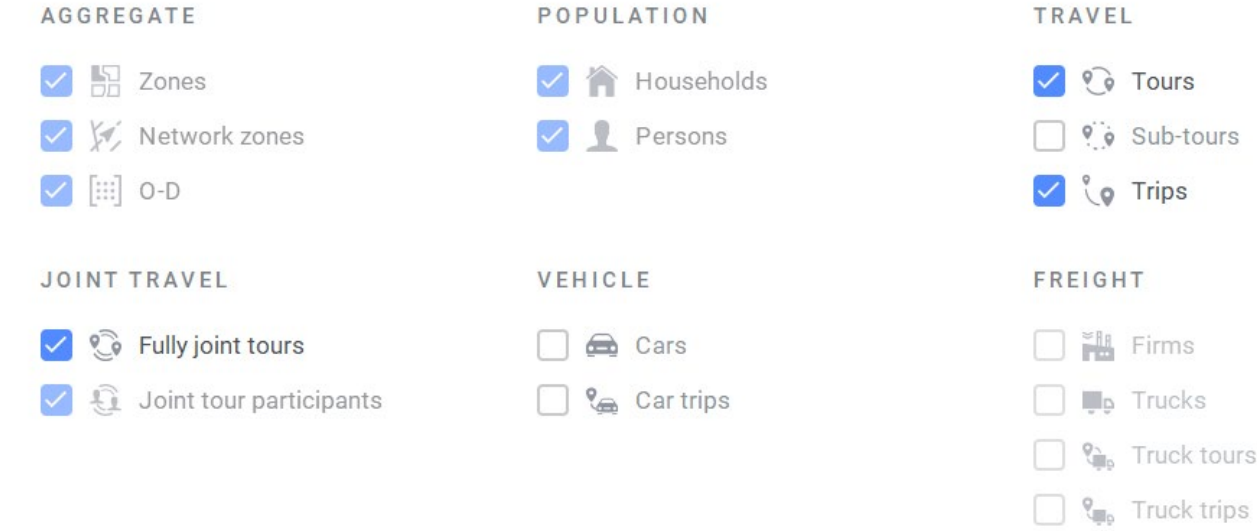




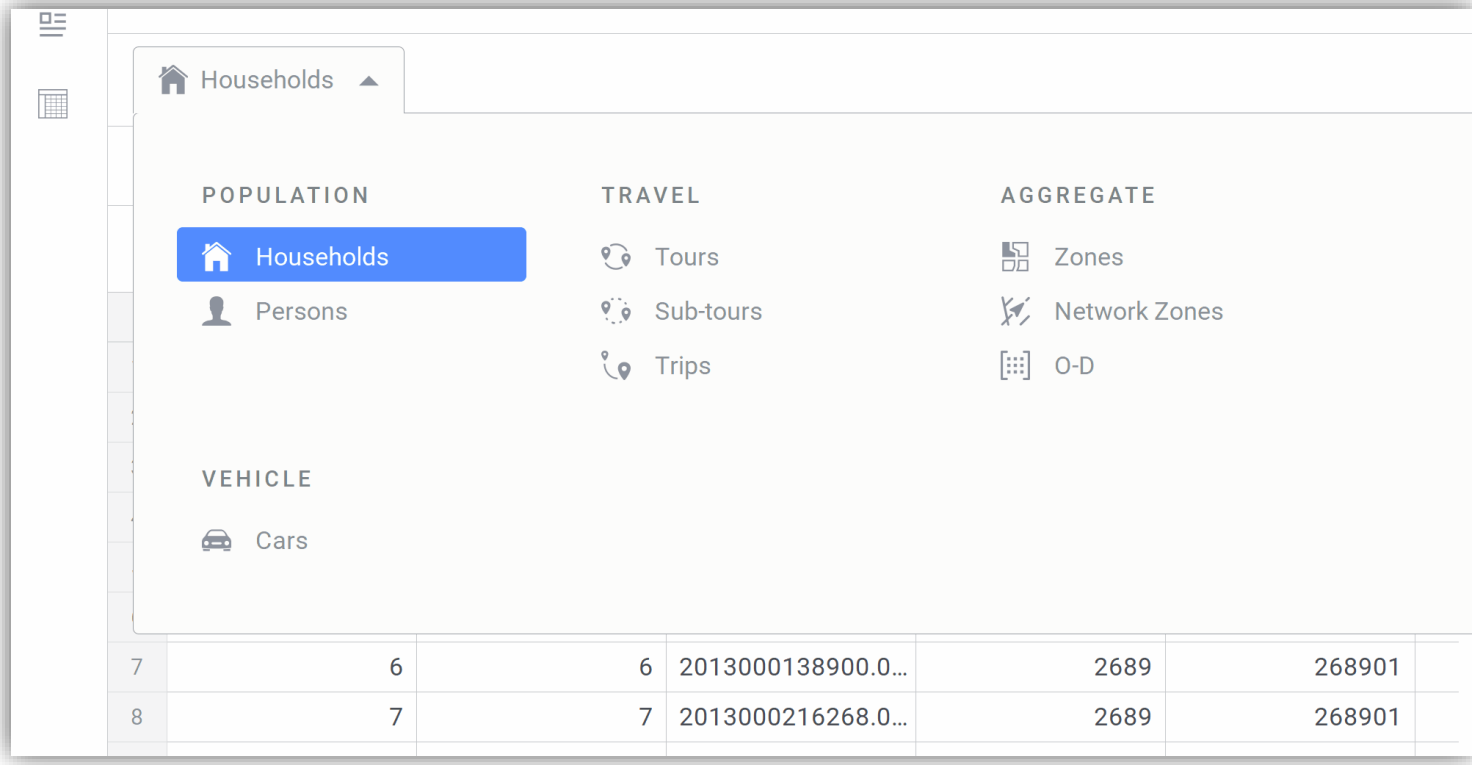
Idea 3 - Import and Connect ABM Results

Full relational data model for ABM

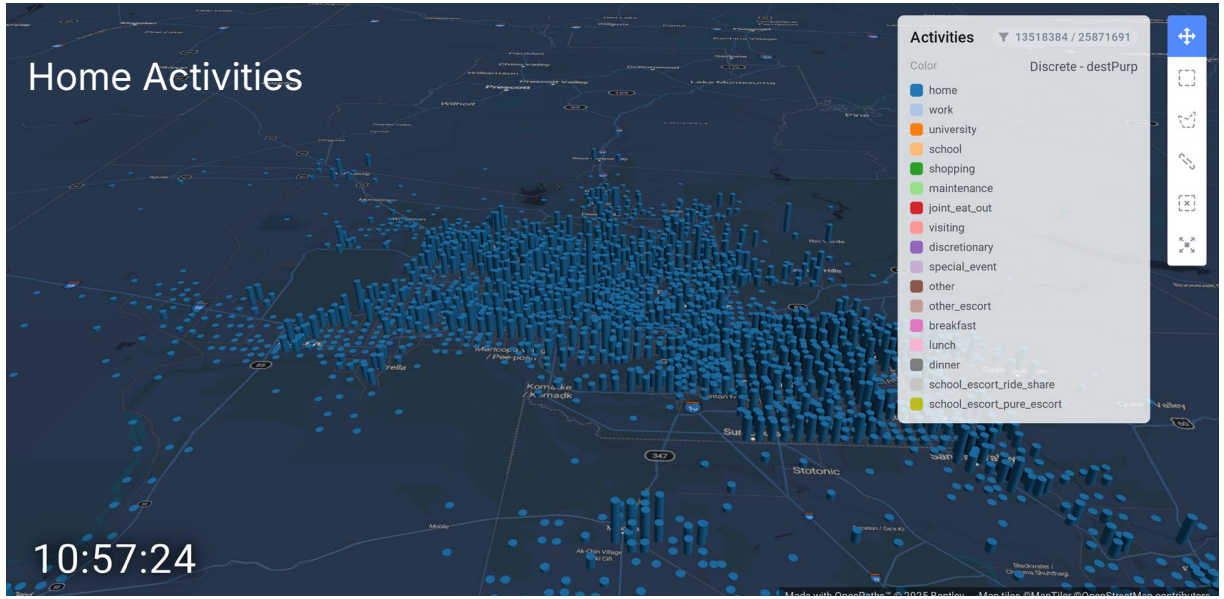


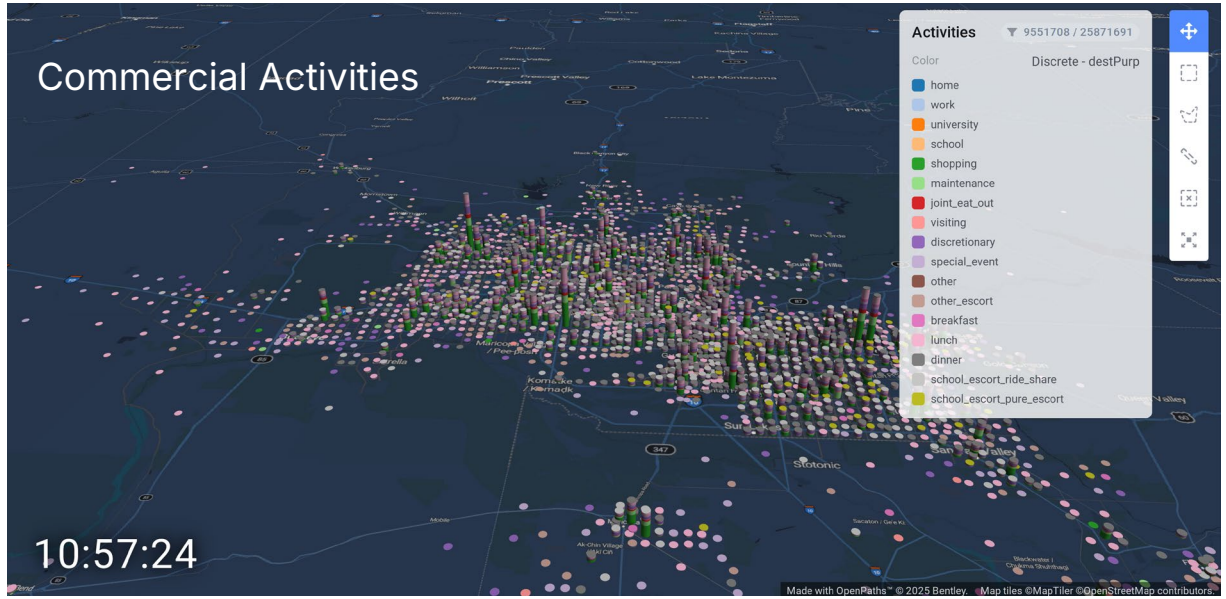


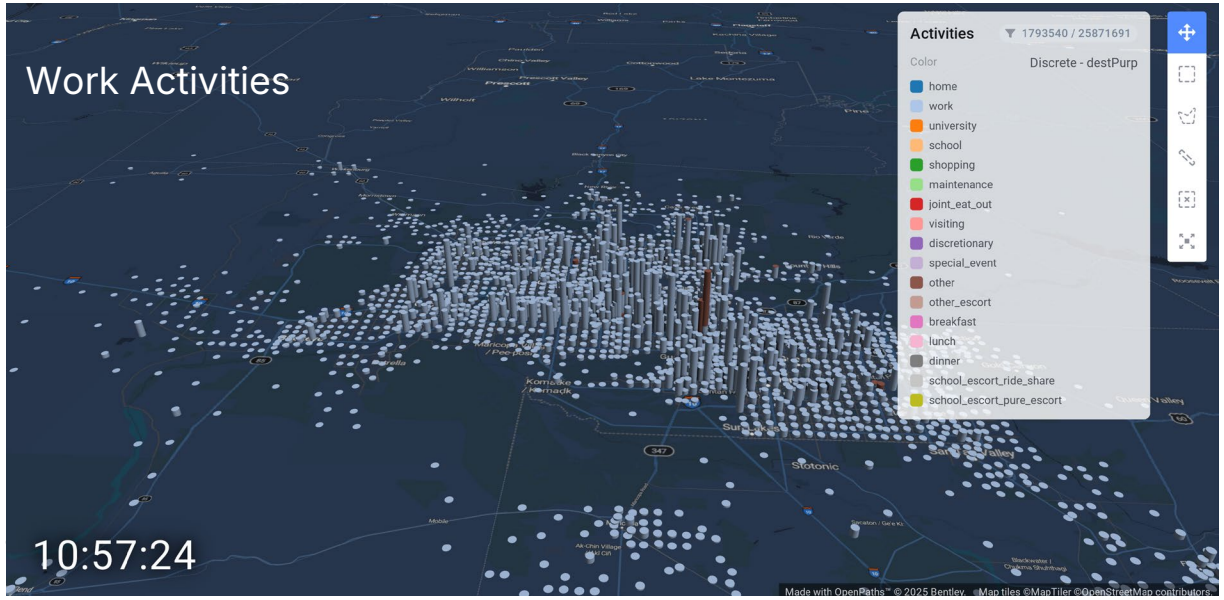
Query map, and model with a full relational data model for ABM

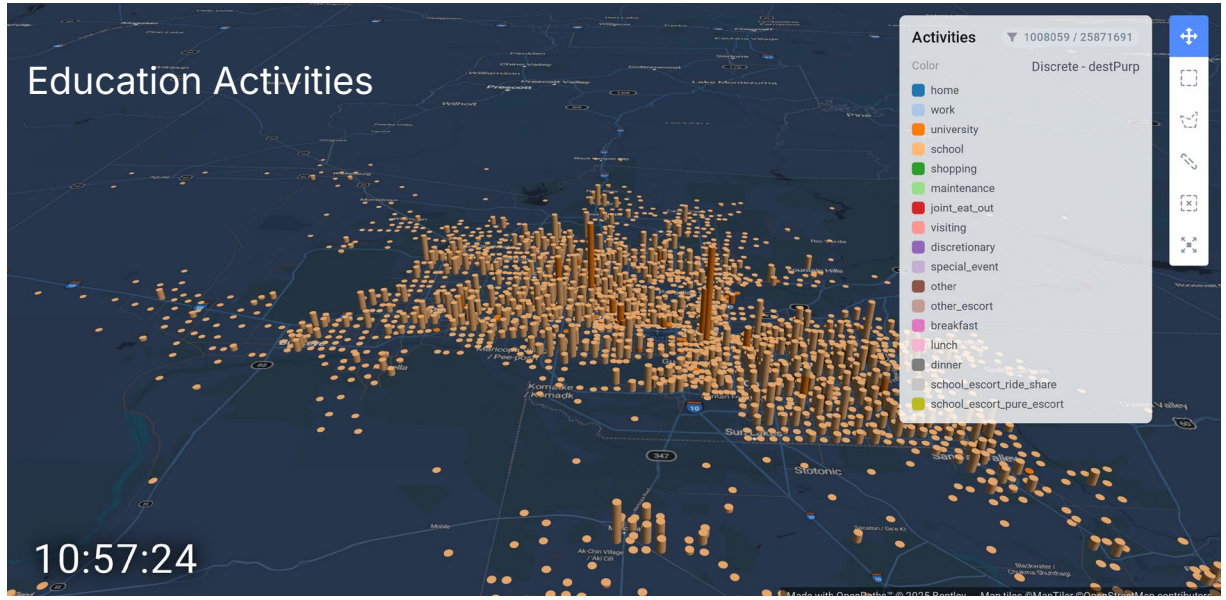


Idea 4 – Visualize ABM with the Activities Scene

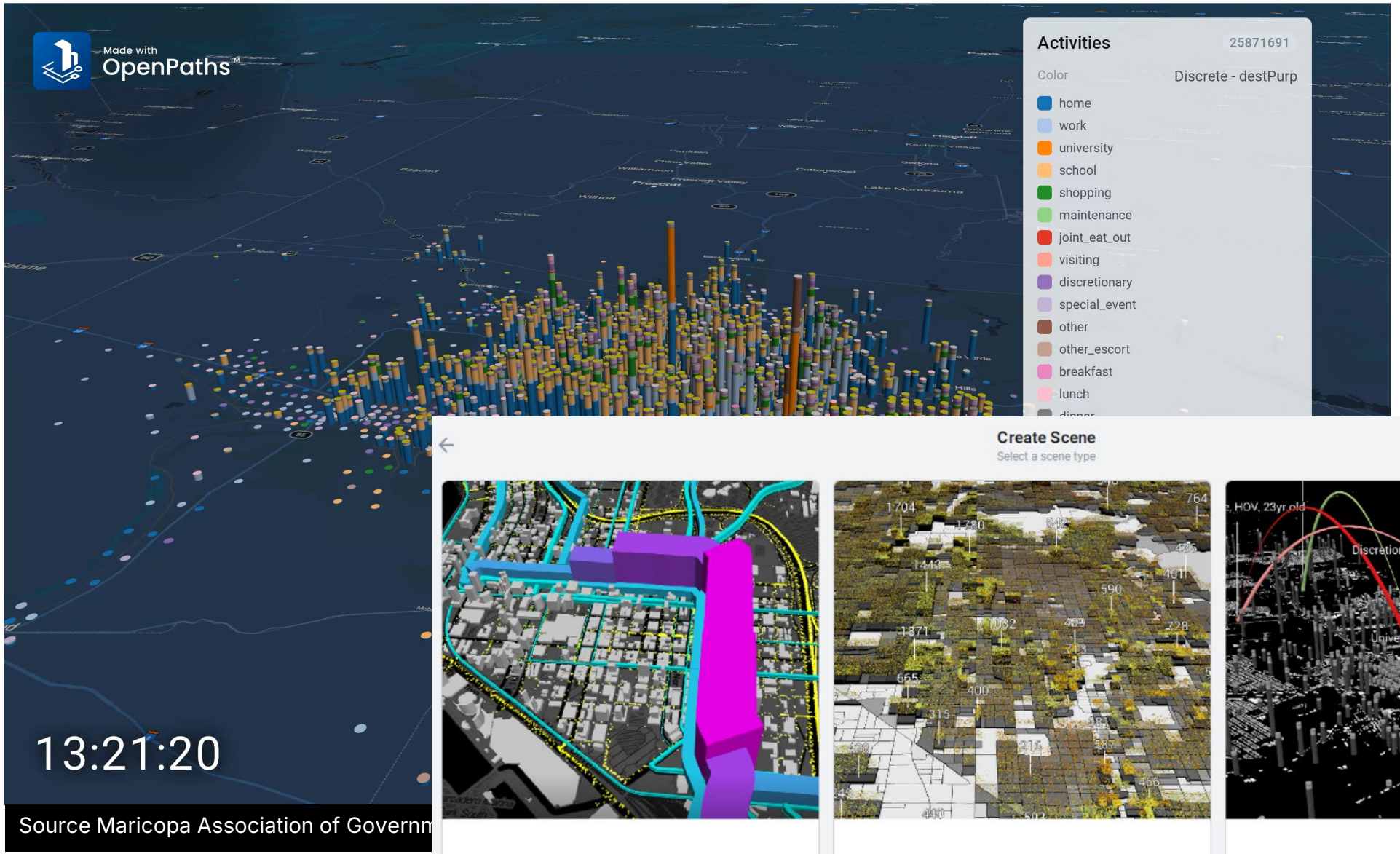




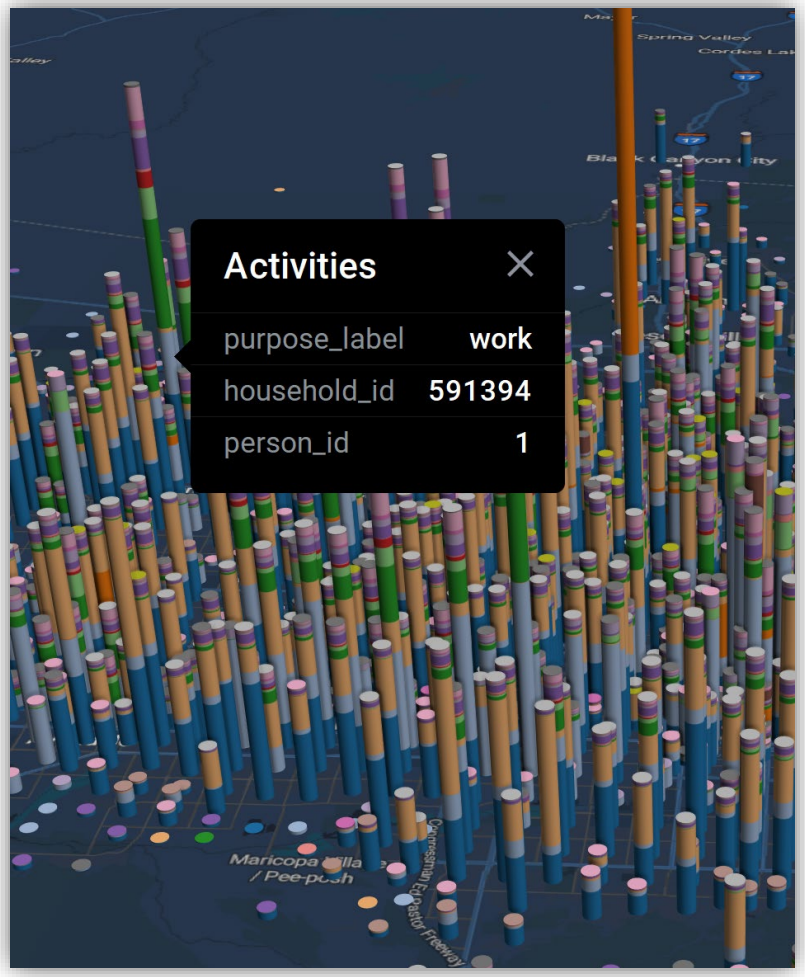


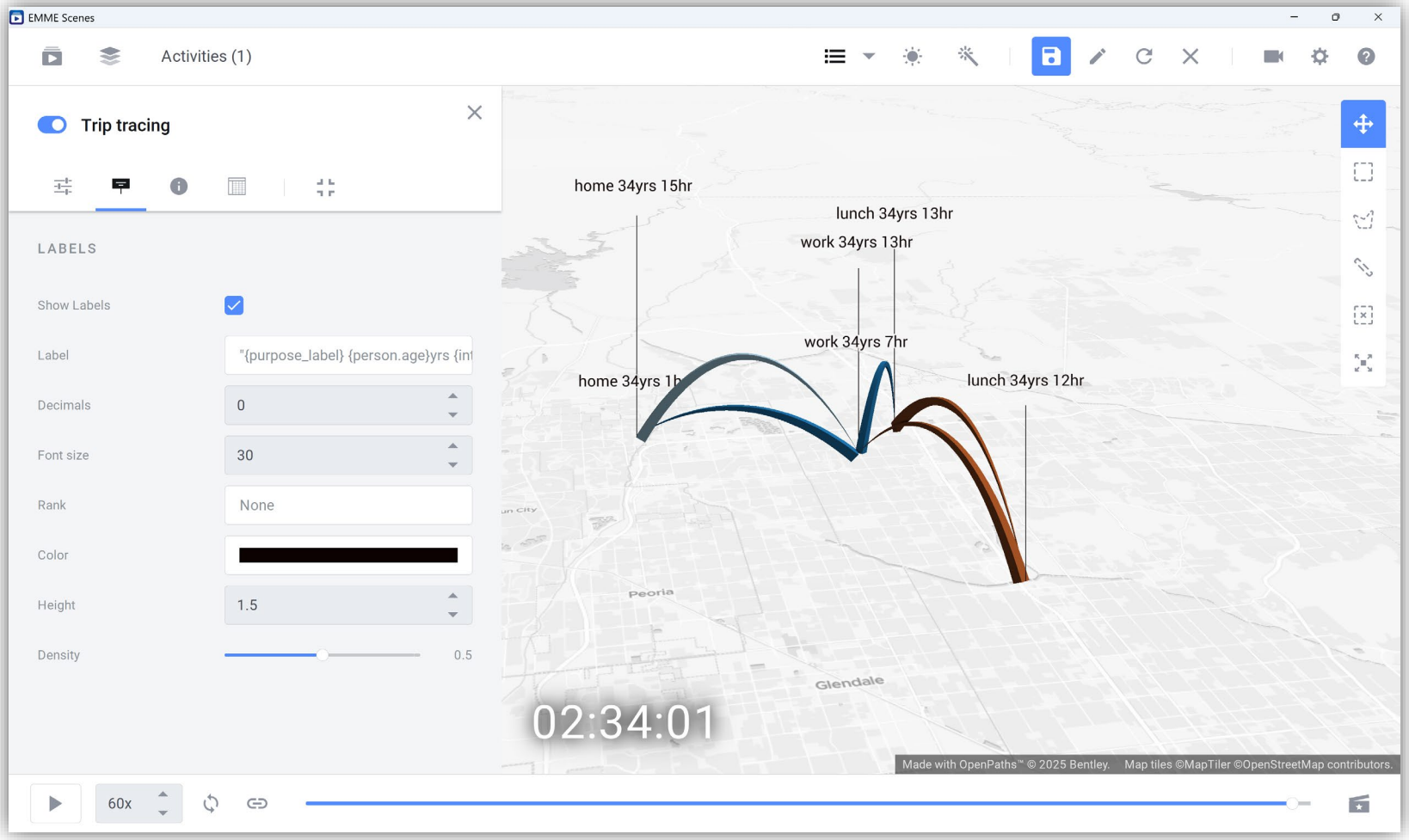


Idea 4 – Visualize ABM with the Activities Scene (2)



Idea 4 – Visualize ABM with the Activities Scene (3)



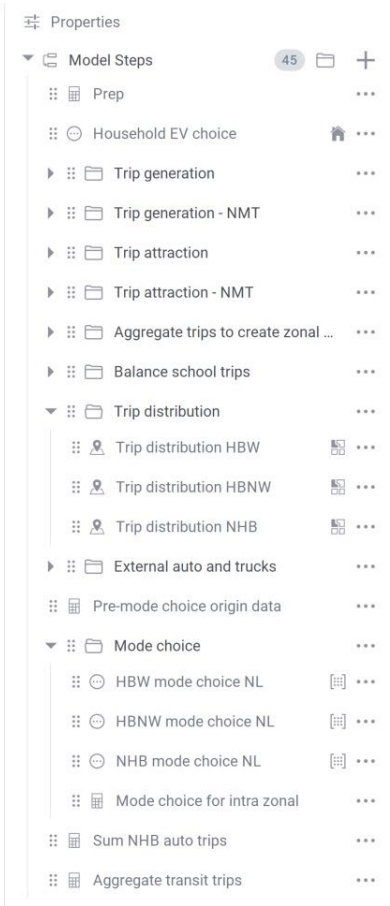


Idea 5 – Improved Trip-based Modeling

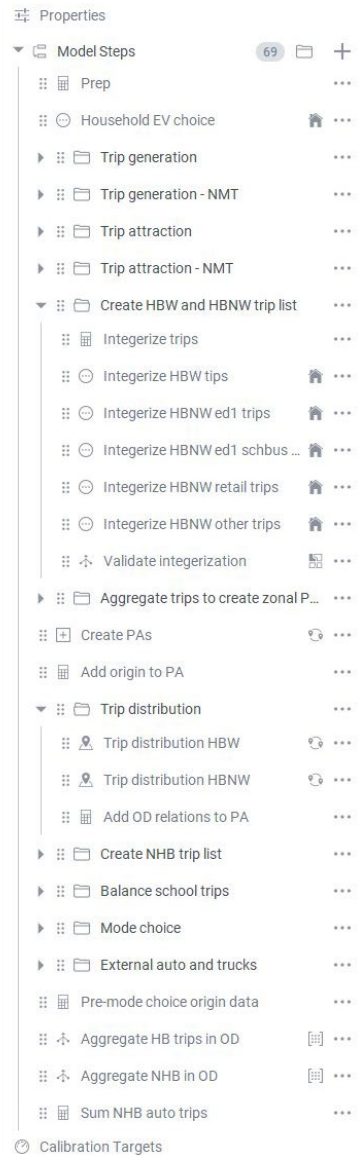
Potential benefits

- User interface
- Ease-of-use and maintenance
- Easier calibration
- Run time improvements

Aggregate trip-based



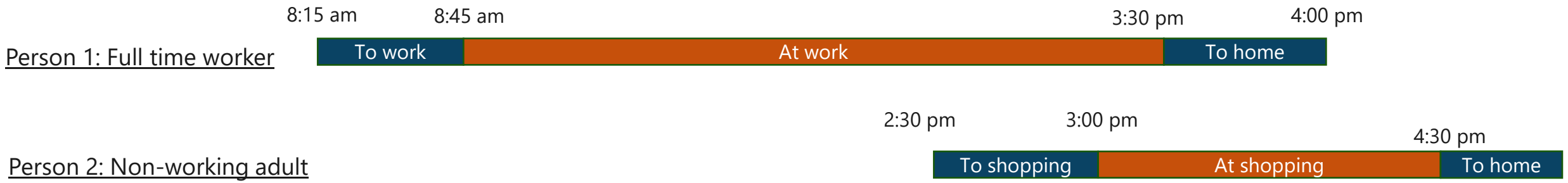
Disaggregate trip-based



Trip-based models for Houston Galveston Area Council

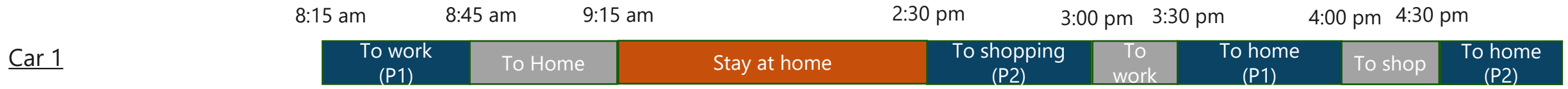
Idea 6 – ABM + AV Scenarios

Schedule



With Car Coordinator: Regular Car

With Car Coordinator: AV



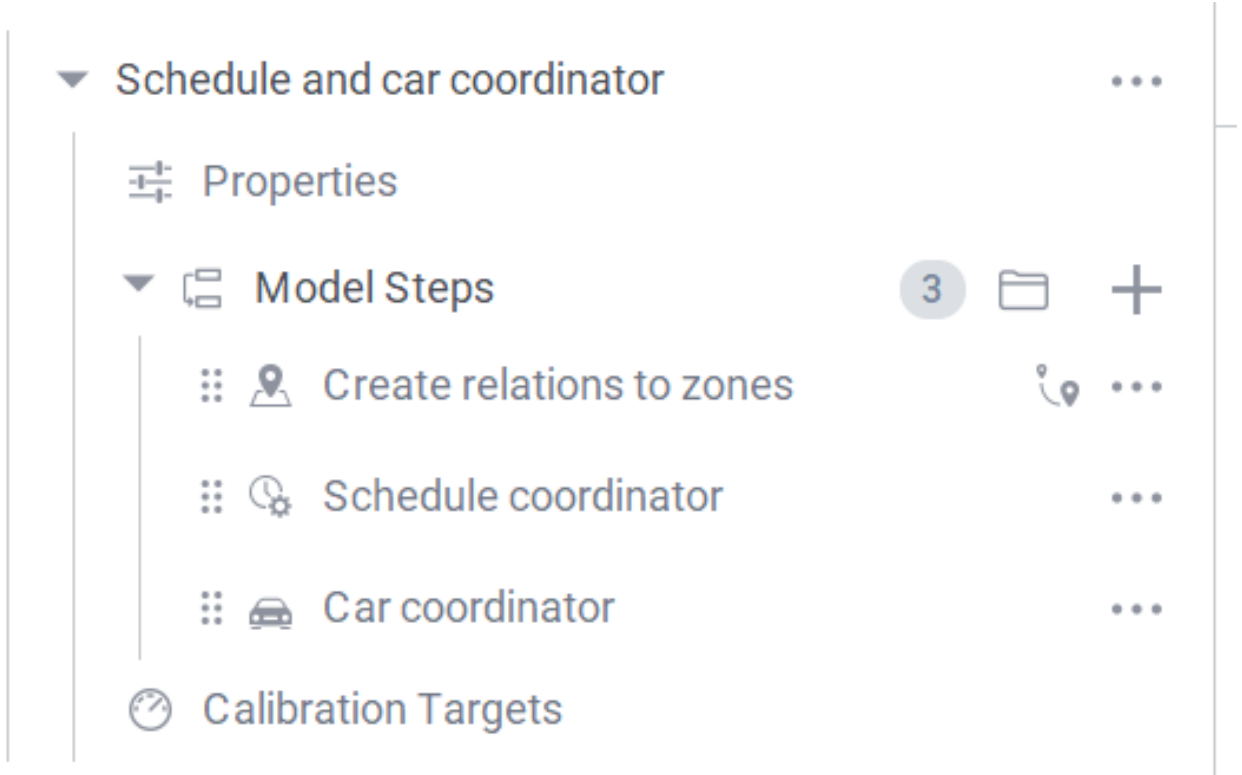
Idea 7 – ABM + AV Scenarios (2)

Explore AV scenarios with Car Coordinator:

- Allocation of household cars to car trips such that two cars cannot be present at two places at the same time
- Cars follow time-space constraints
- Handles intra-household car sharing for AVs
- Handles car repositioning to save parking cost/difficulty for AVs

Schedule Coordinator:

- Creates time-space consistent trip list
- Useful to prepare for Car Coordinator or DTA



Technology Preview and Disclaimer Statement

Subsequent slides refer to roadmap items subject to the below disclaimer

Release plans and timelines are forward-looking estimates and projections only. There can be no assurance that Bentley will be able to meet such estimates or projections by the dates specified, or at all. Do not make purchase decisions based on forward looking roadmaps.

Idea 8* - New OpenPaths Common Traffic Assignment

~4x speedup vs CUBE Highway

MWCOG assignment benchmark

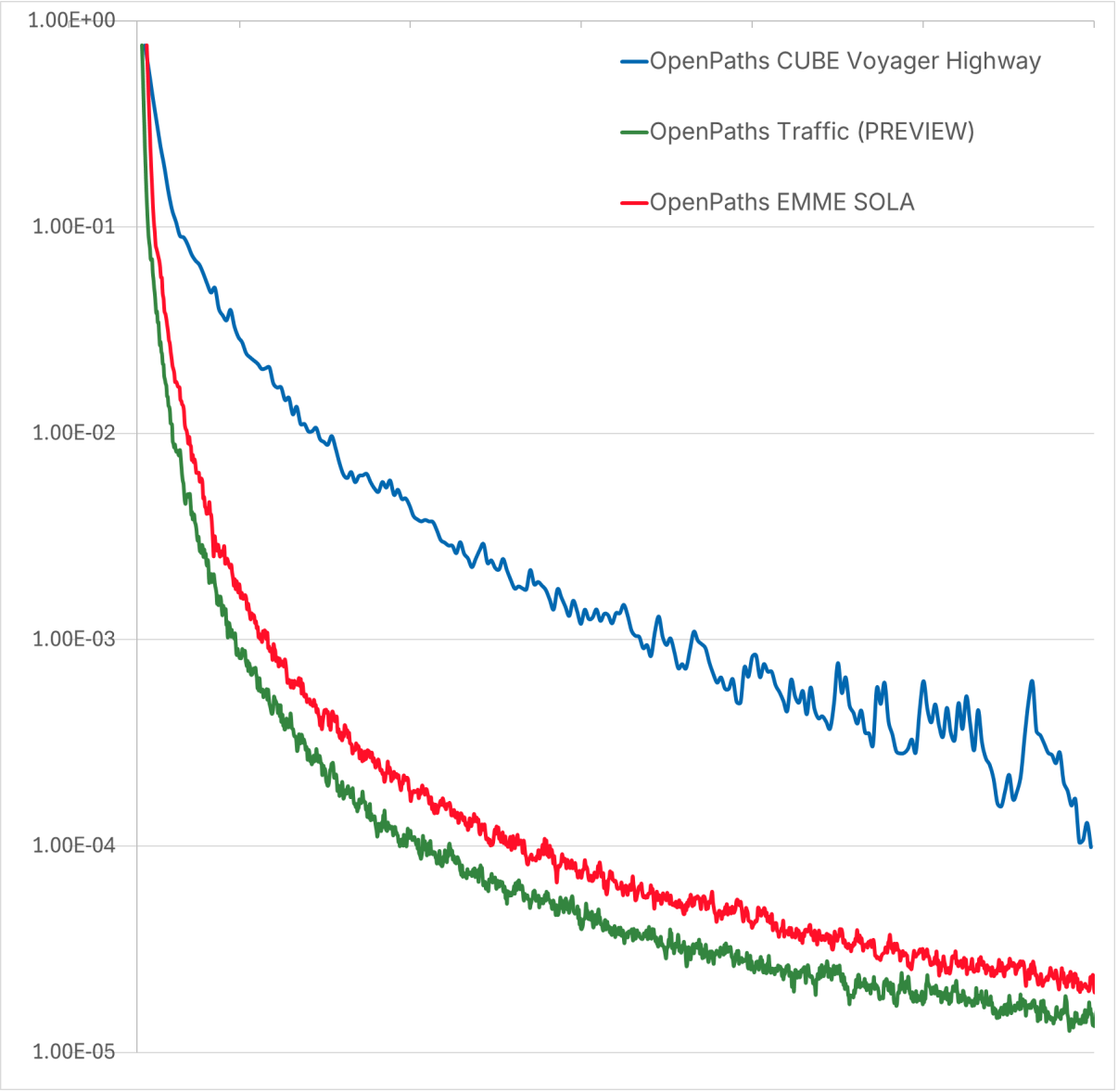
- 3,722 zones
- 50K links
- 55K nodes
- 5 classes

Tested on Intel Xeon Platinum 8573C (2.1GHz base/4GHz boost, 32 threads)

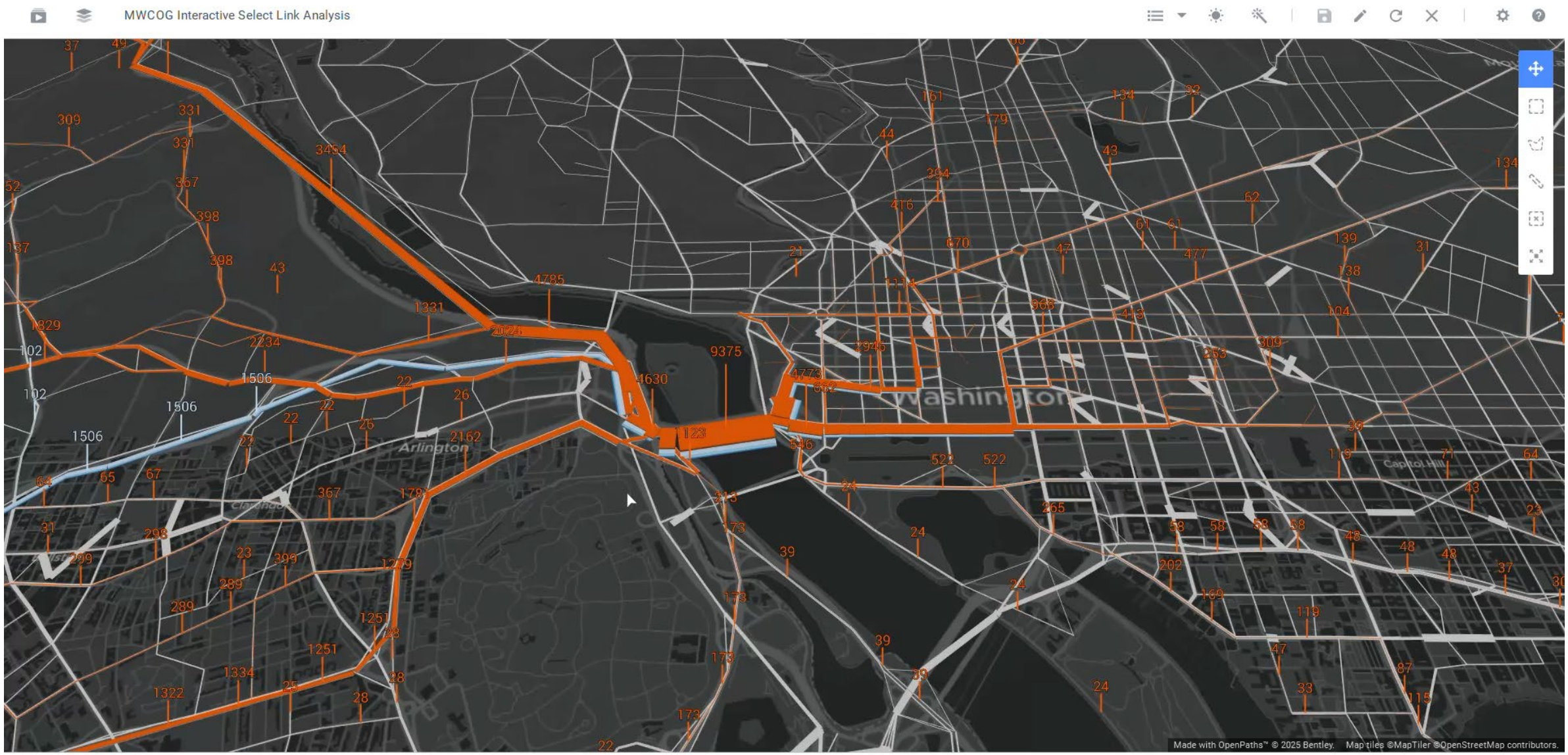
~4x speed up to 10^{-4}

Supports proportionality, user-defined functions, analysis capabilities

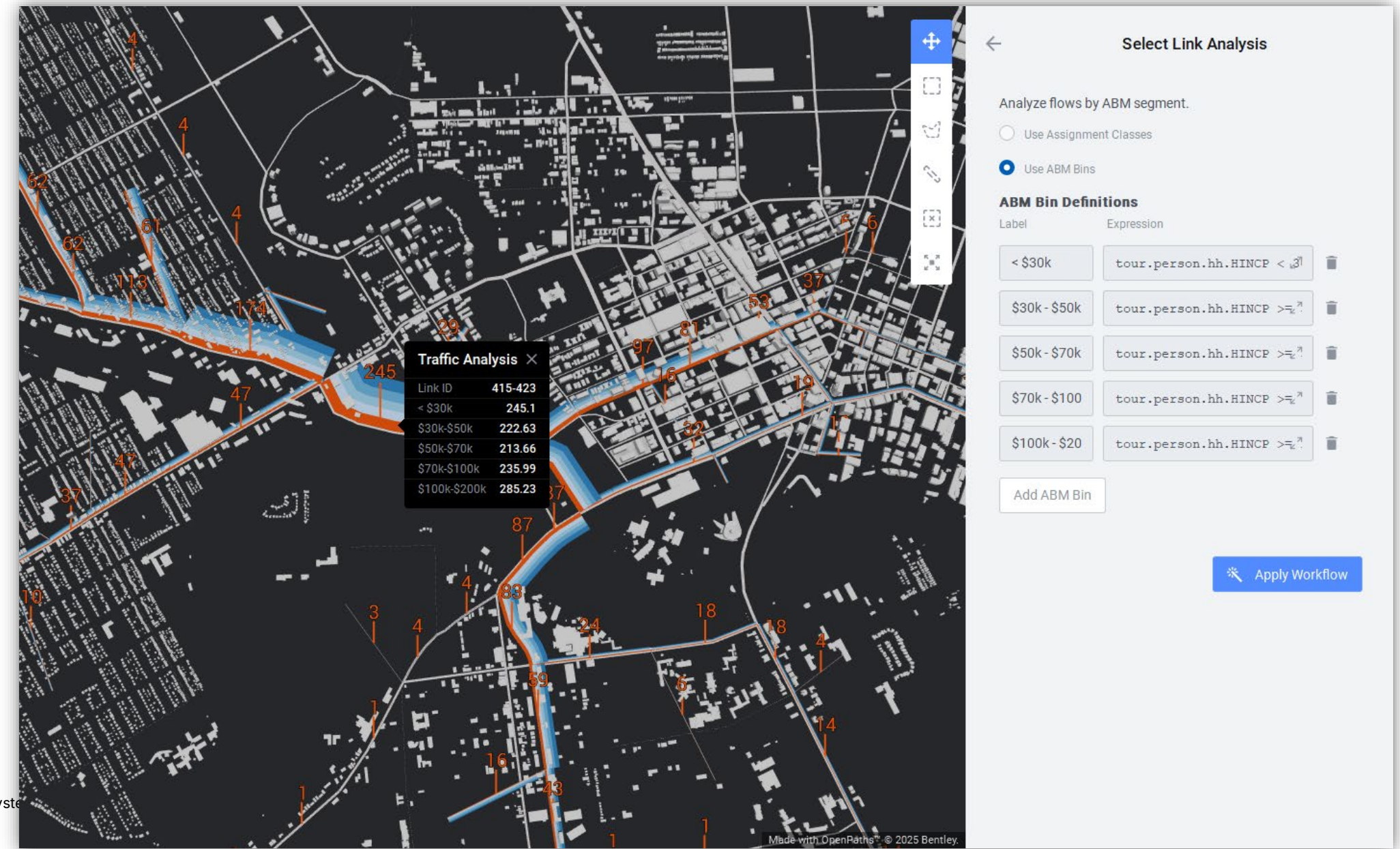
Harmonized assignment for OpenPaths CUBE and OpenPaths EMME



Idea 9* - Interactive Select-Link Analysis



Idea 10* ABM <> Network Analysis



Thank you!

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