ABM Data Integration and Analysis

Modeling Mobility 2025
Minneapolis, MN

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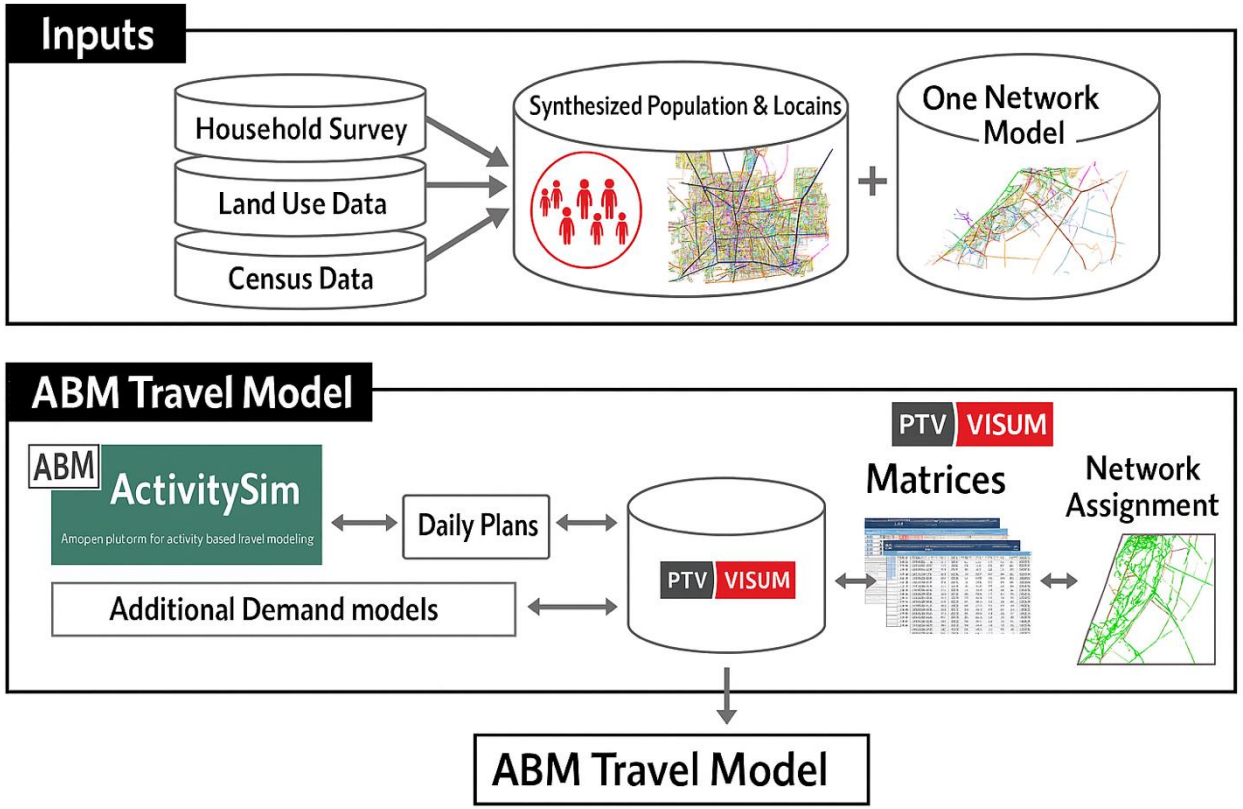
Interfaces with ABM - Overview



Population Synthesis

Household and person-level data generation (e.g., via PopulationSim)

Network Skimming in Visum

Assigns trips to network using detailed skims and routing

Activity-Based Simulation

Activity generation, scheduling, mode and destination choice

Trip Matrix Export

ABM outputs converted to origin-destination matrices

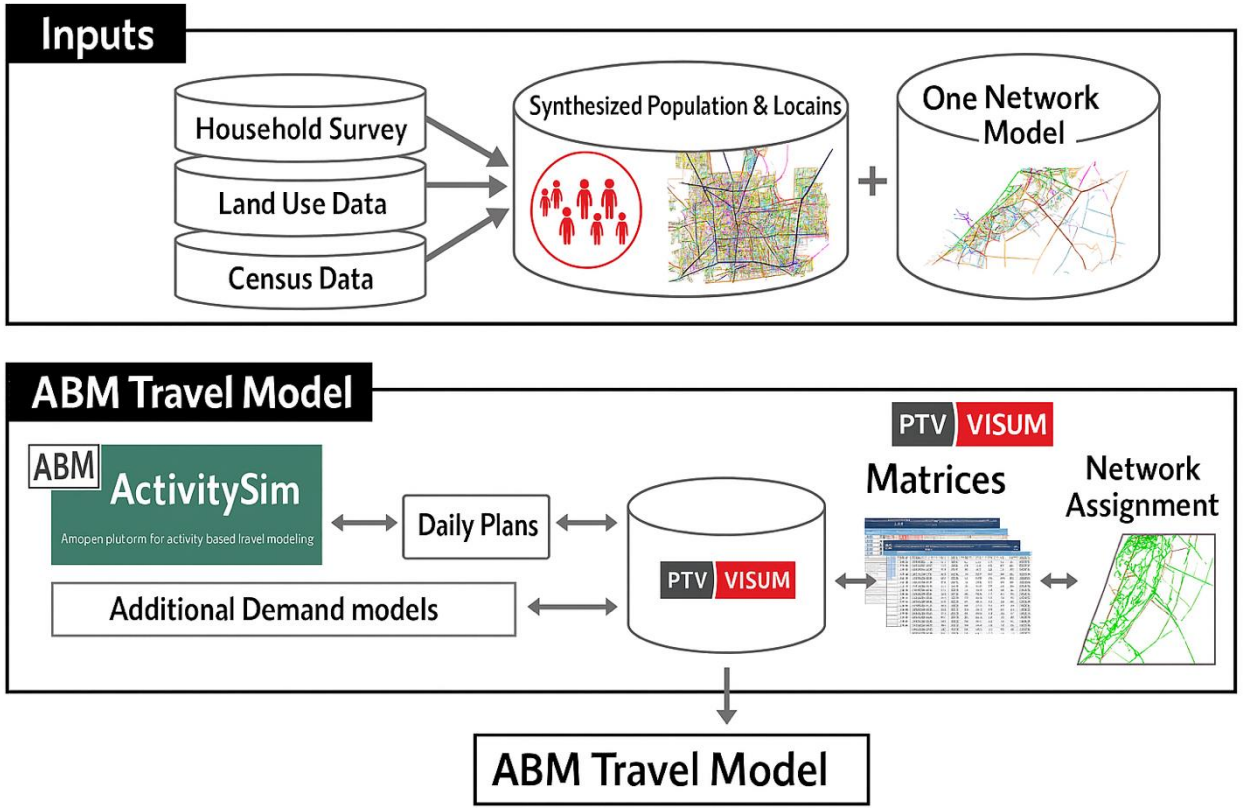
Network Assignment in Visum

Assigns trips to network using detailed skims and routing

Feedback Loop (-max)

Updated skims inform next ABM iteration

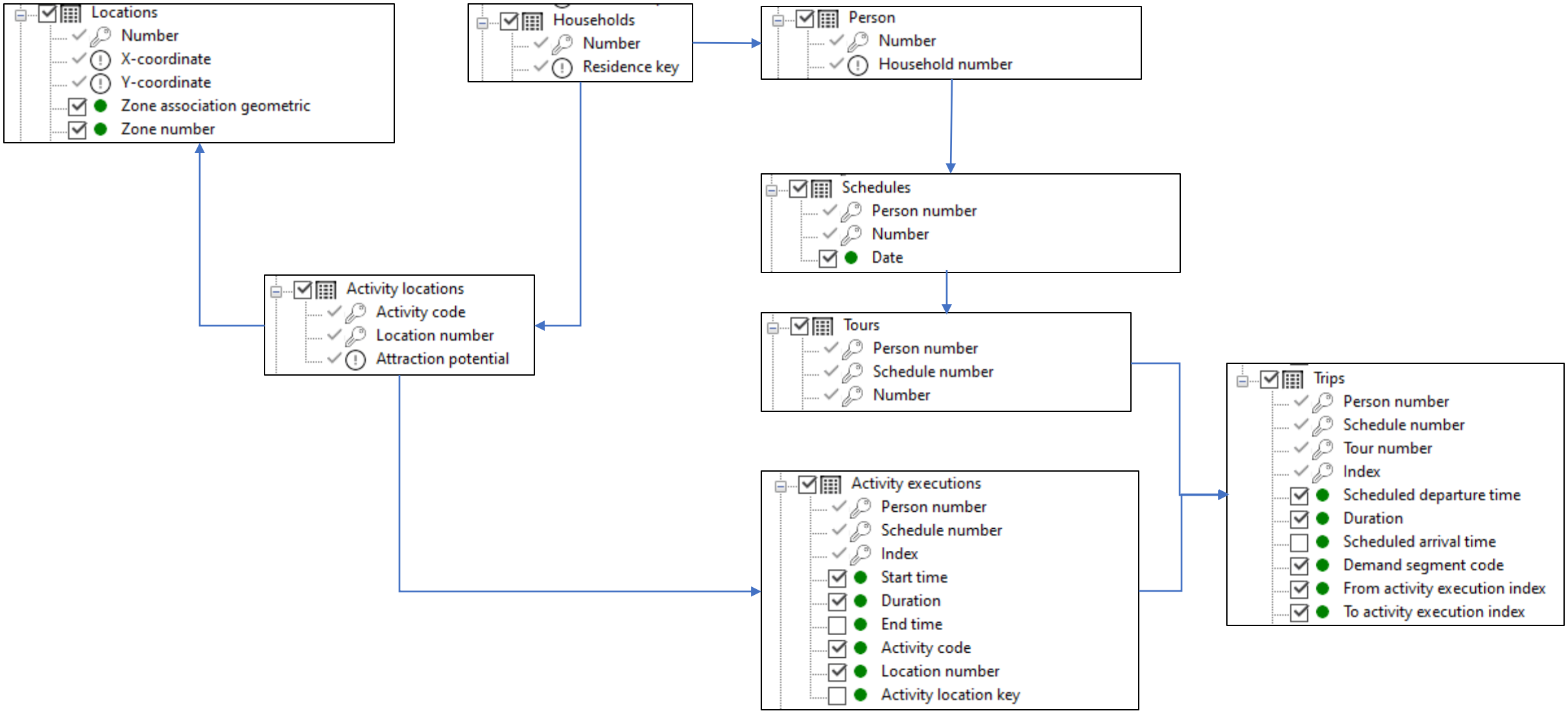
Interfaces with ABM - Overview



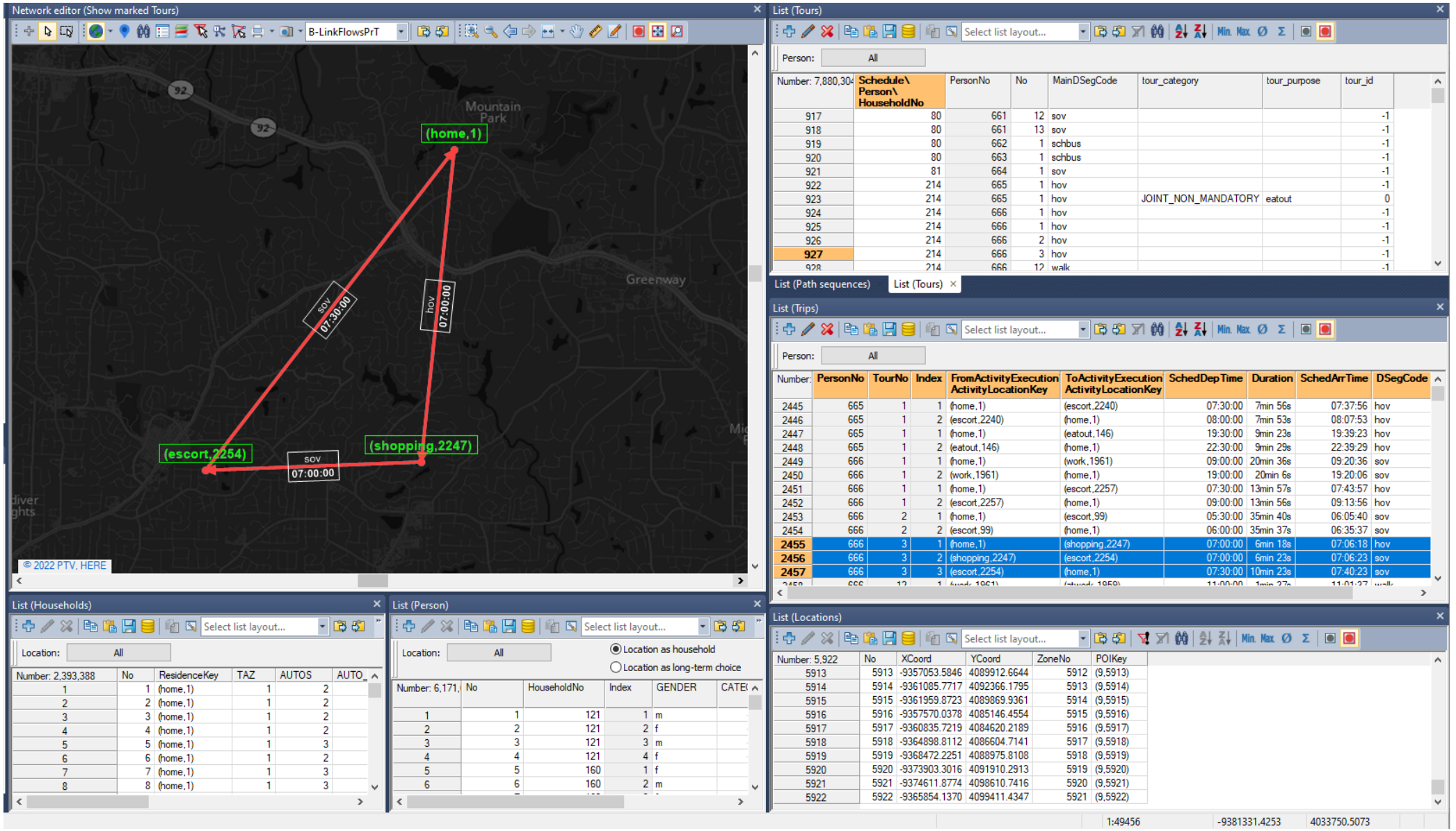
Several ABM Variants:

- Custom-made: SBB (Swiss National Model)
- CT-RAMP
- DaySim
- TourCast
- ActivitySim
- …

Generalized Relational ABM Data Structure

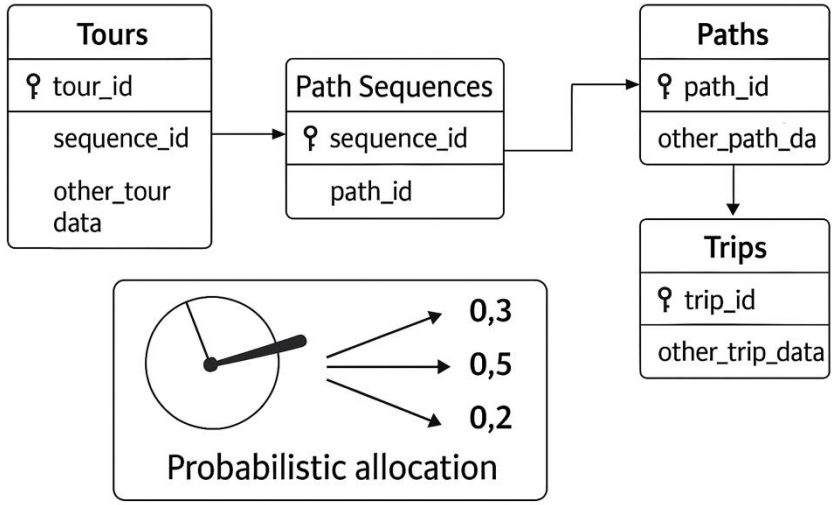


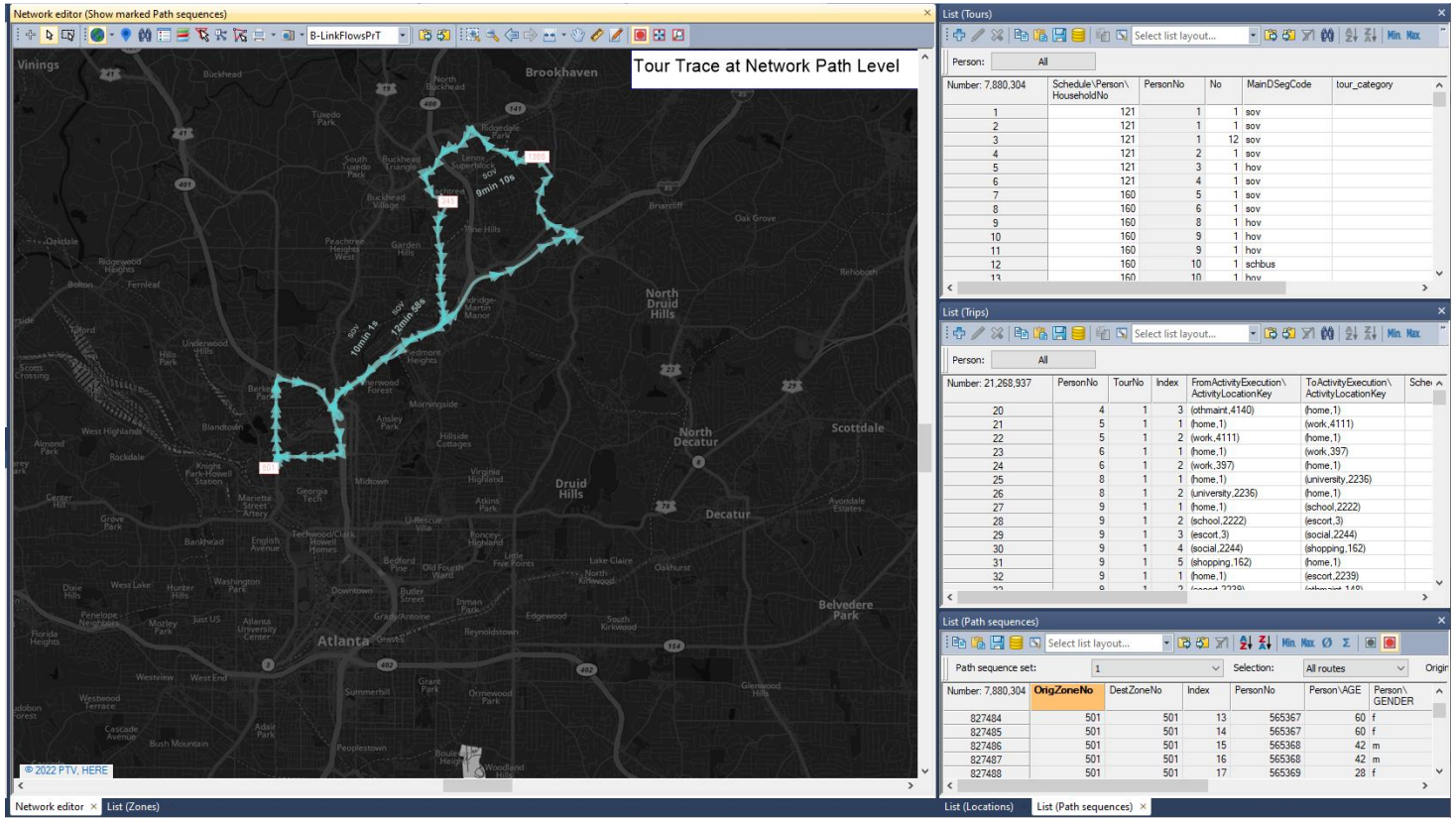
Generalized Relational ABM Data Structure



Data Model Extension to Connect Tour, Trips and Network Assignment

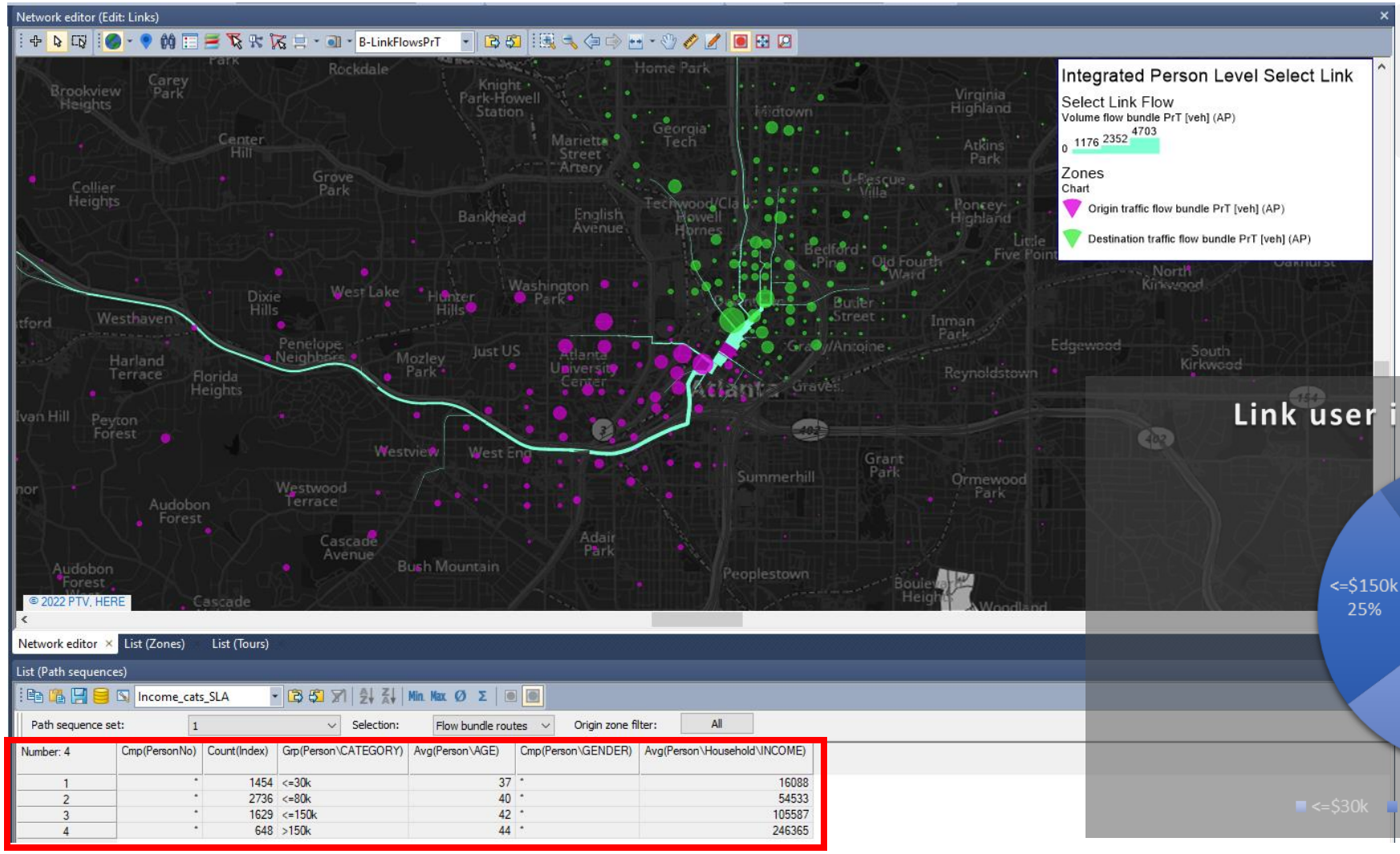
Extended Data Model for Path Analysis



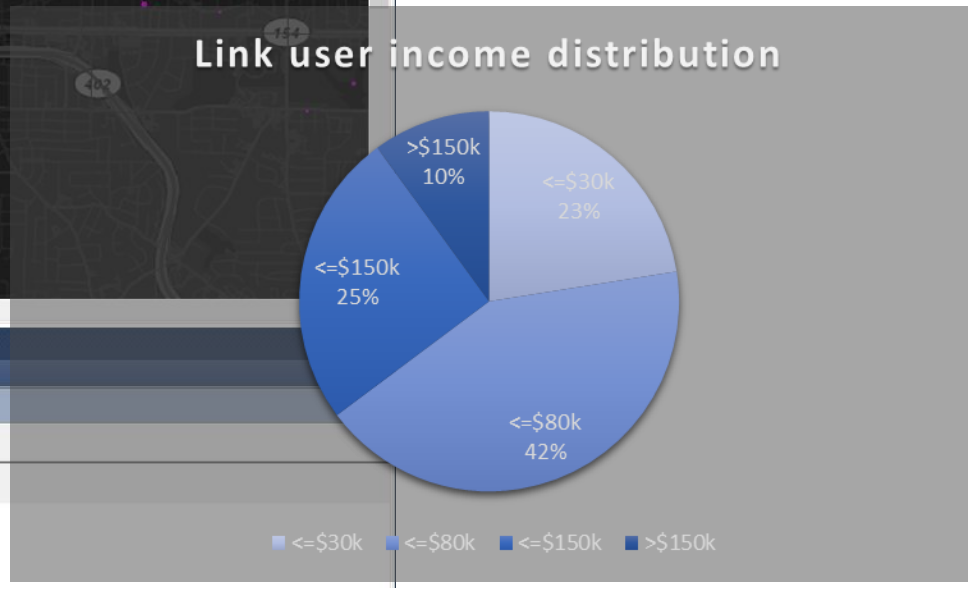


- Tour and Trip entities encode daily activity plans.
- Spatial links to Locations enable feature mapping.
- Path Sequences support select link analysis.
- Multimodal tours are structurally supported.

Path Tracing – Average Income Distribution (CT-RAMP)

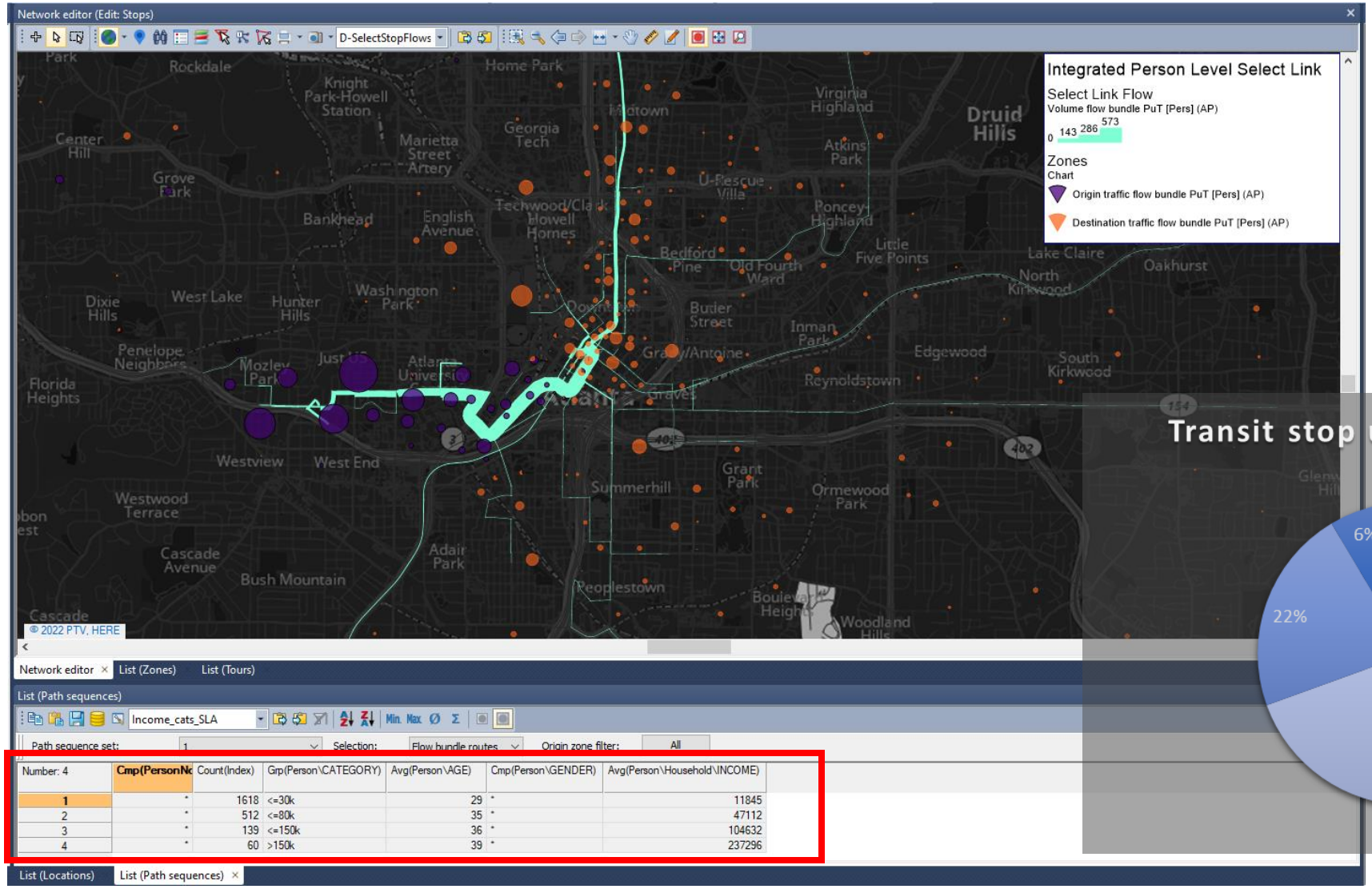


Number: 4	Cmp(PersonNo)	Count(Index)	Grp(Person\CATEGORY)	Avg(Person\AGE)	Cmp(Person\GENDER)	Avg(Person\Household\INCOME)
1	*	1454	<=30k	37	*	16088
2	*	2736	<=80k	40	*	54533
3	*	1629	<=150k	42	*	105587
4	*	648	>150k	44	*	246365



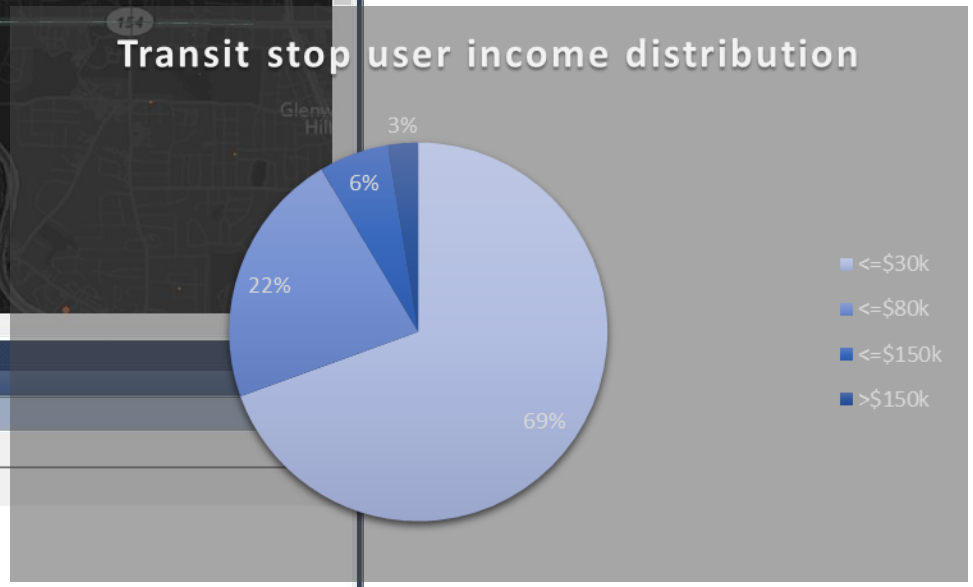
Query and analyze person level characteristics for path/select link analysis

Path Tracing – Average Income Distribution (CT-RAMP)



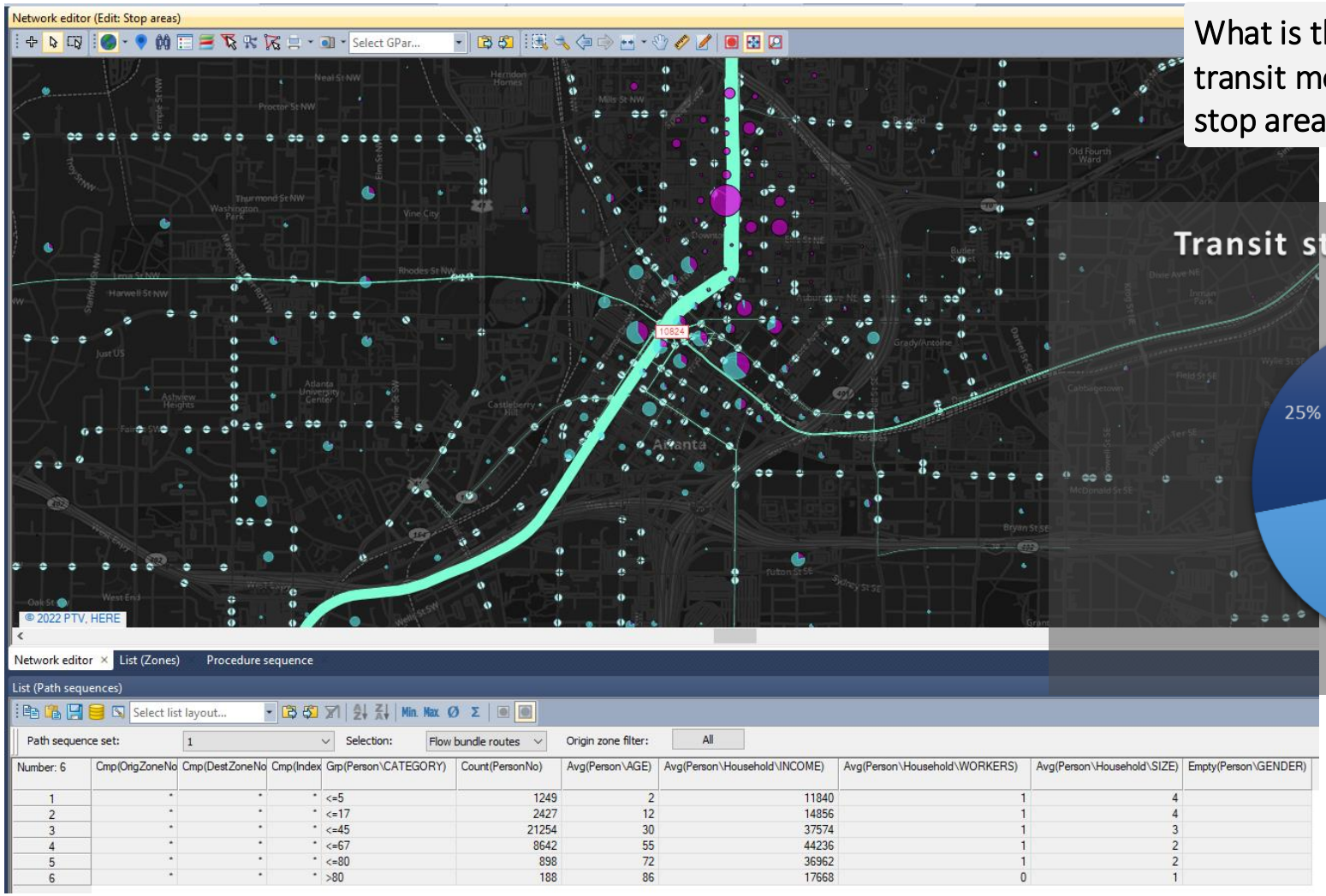
Select stop (link) path analysis:

PEACHTREE ST SW @ MITCHELL ST SW

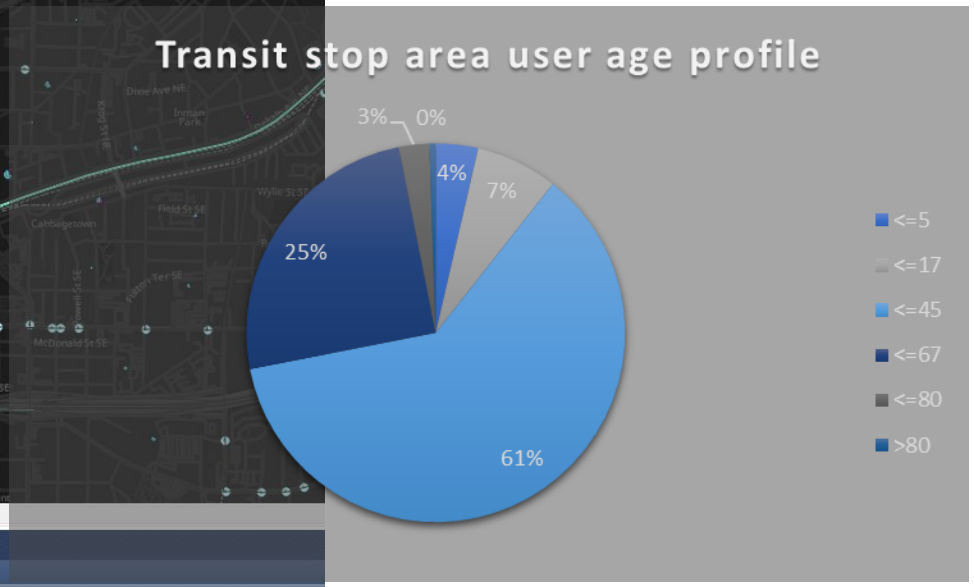


Path Tracing – Transit Rider Age Profile (CT-RAMP)

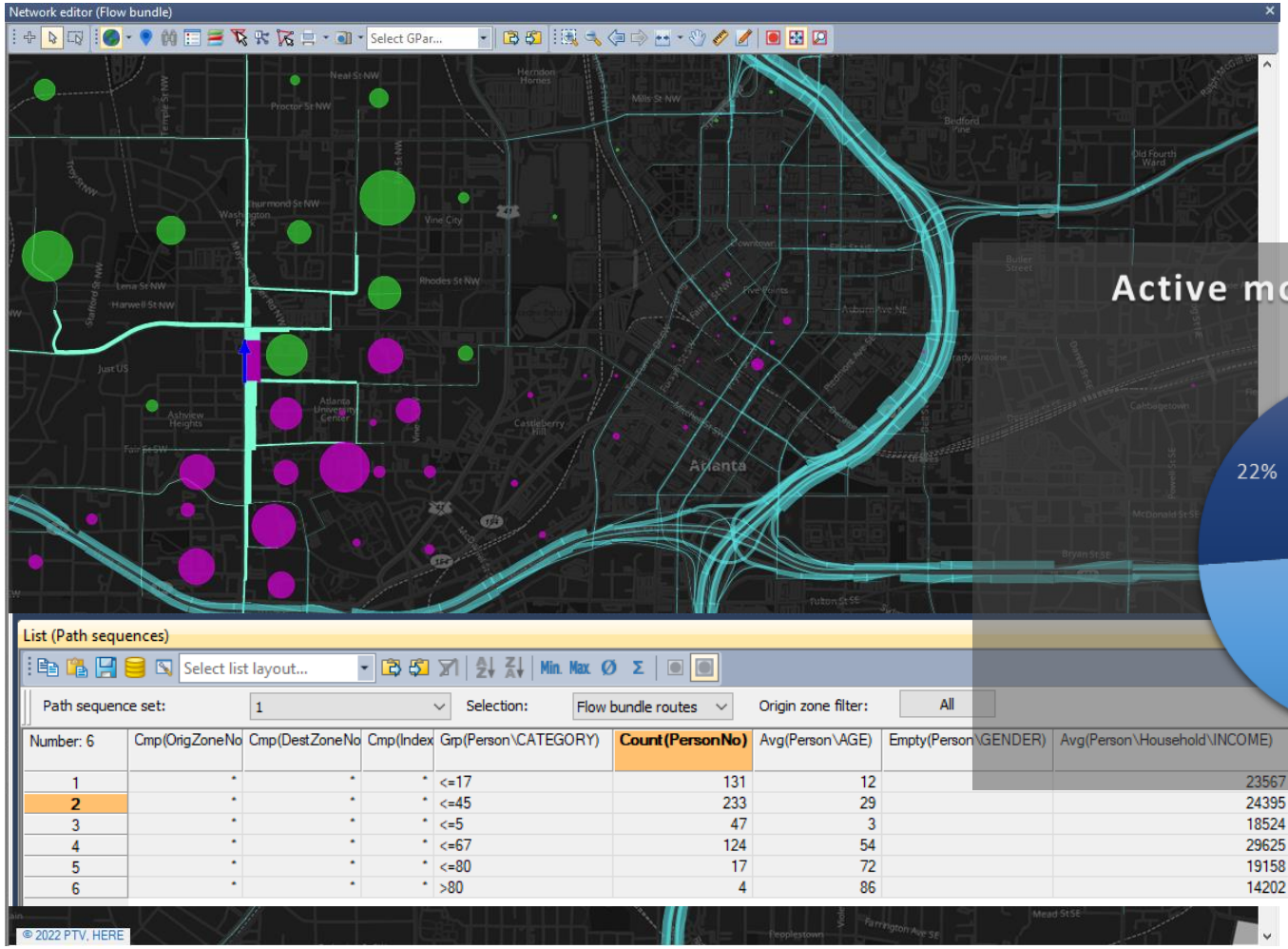
What is the age distribution of transit mode users…@ selected stop area – Five Points St. ?



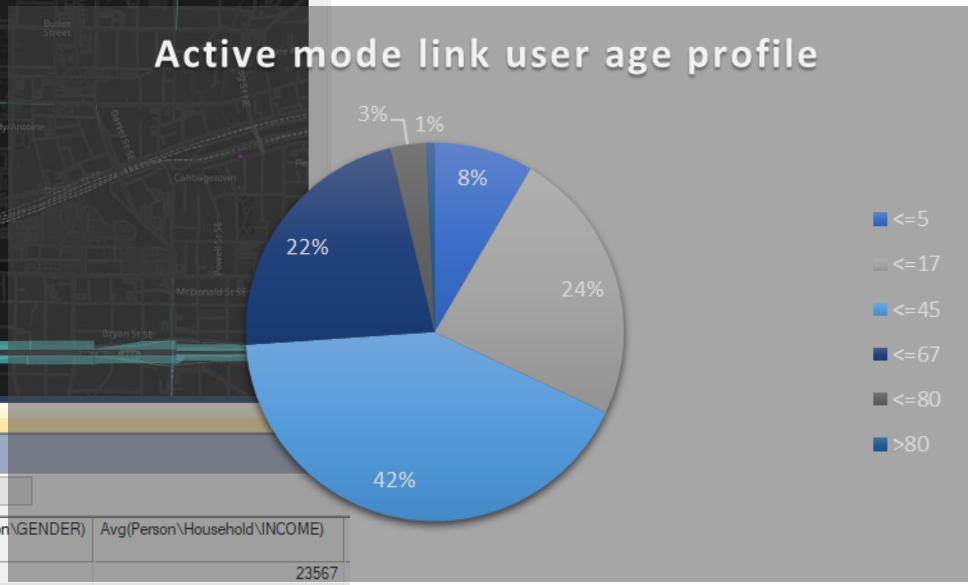
Number: 6	Cmp(OrigZoneNo	Cmp(DestZoneNo	Cmp(Index	Grp(Person\CATEGORY)	Count(PersonNo)	Avg(Person\AGE)	Avg(Person\Household\INCOME)	Avg(Person\Household\WORKERS)	Avg(Person\Household\SIZE)	Empty(Person\GENDER)
1	*	*	*	<=5	1249	2	11840	1	4	
2	*	*	*	<=17	2427	12	14856	1	4	
3	*	*	*	<=45	21254	30	37574	1	3	
4	*	*	*	<=67	8642	55	44236	1	2	
5	*	*	*	<=80	898	72	36962	1	2	
6	*	*	*	>80	188	86	17668	0	1	



Path Tracing – Active Mode Age Profile (CT-RAMP)



What is the age distribution of bike/walk mode users…@ selected link?



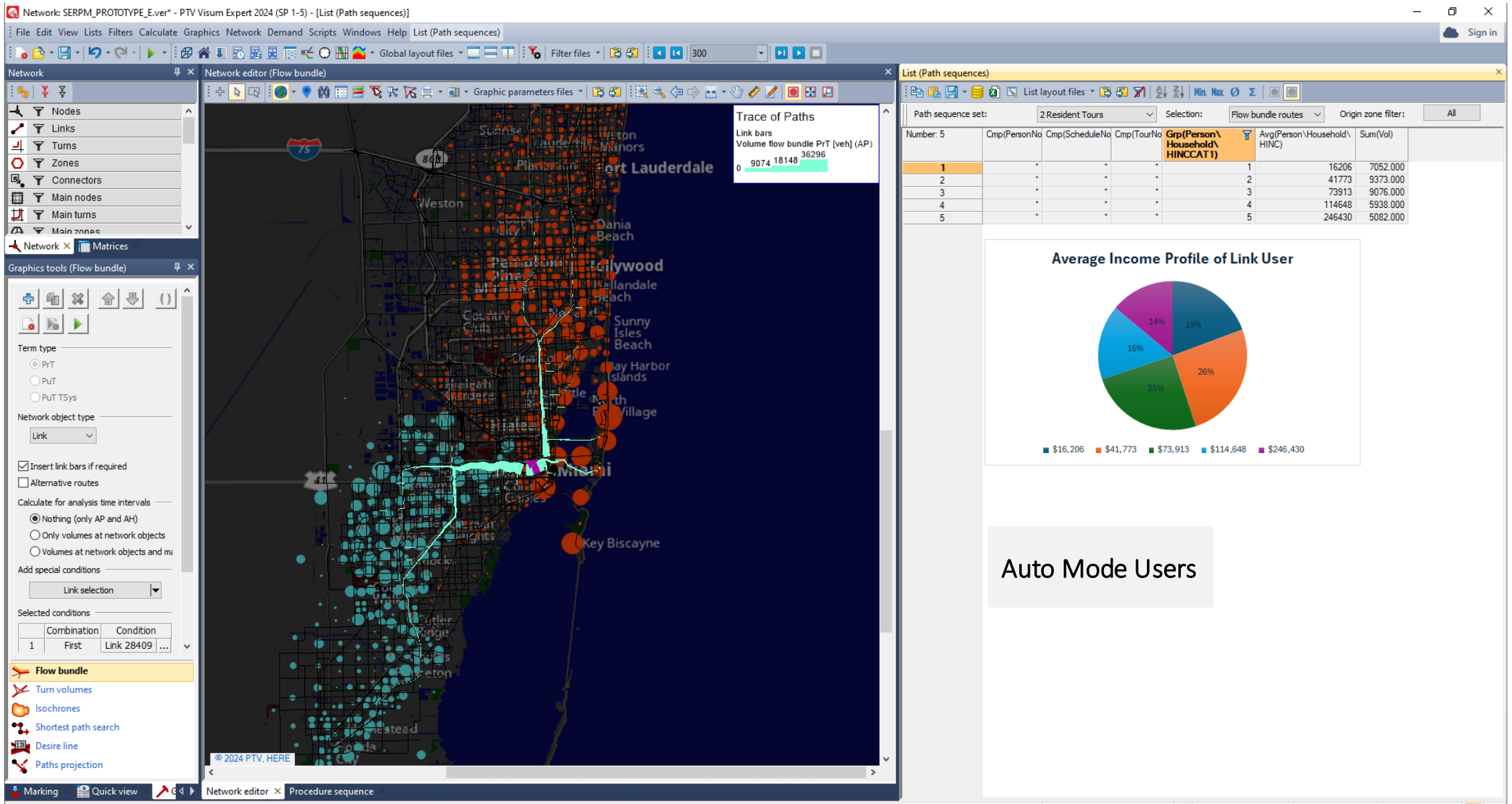
List (Path sequences)

Select list layout...

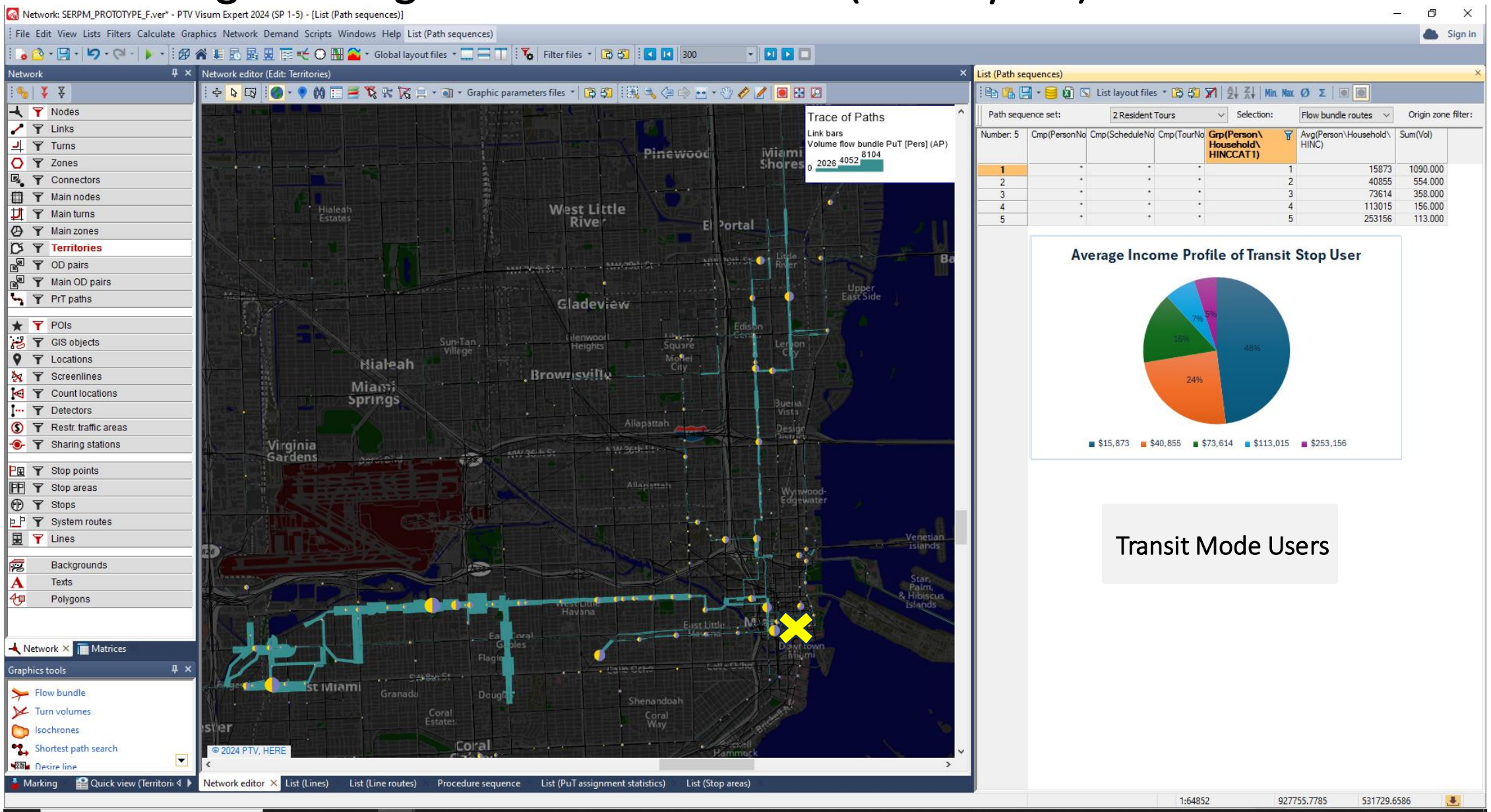
Path sequence set: 1 Selection: Flow bundle routes Origin zone filter: All

Number: 6	Cmp(OrigZoneNo	Cmp(DestZoneNo	Cmp(Index	Grp(Person\CATEGORY)	Count(PersonNo)	Avg(Person\AGE)	Empty(Person\GENDER)	Avg(Person\Household\INCOME)
1	*	*	*	<=17	131	12		23567
2	*	*	*	<=45	233	29		24395
3	*	*	*	<=5	47	3		18524
4	*	*	*	<=67	124	54		29625
5	*	*	*	<=80	17	72		19158
6	*	*	*	>80	4	86		14202

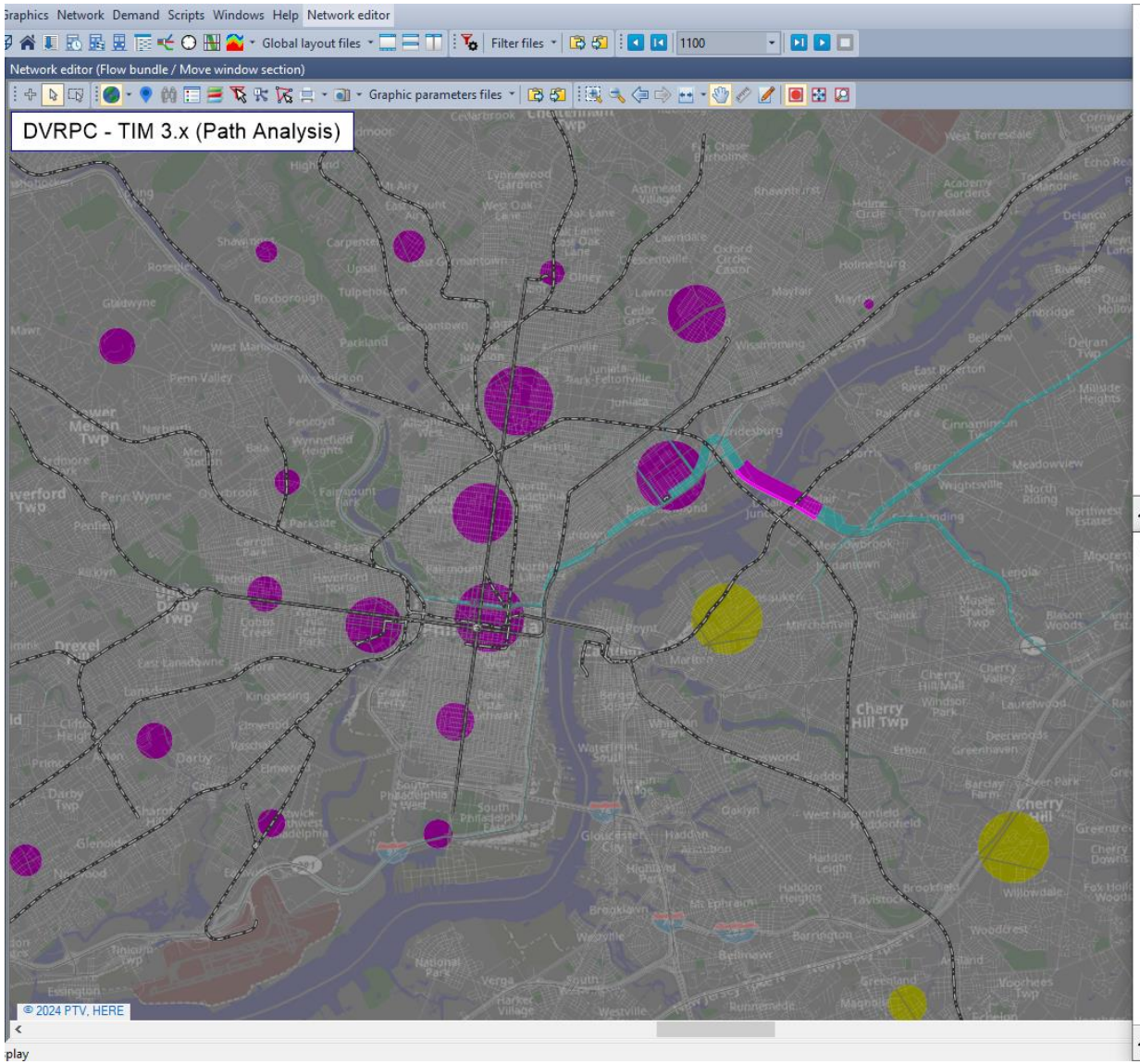
Path Tracing – Average Income Distribution (ActivitySim)

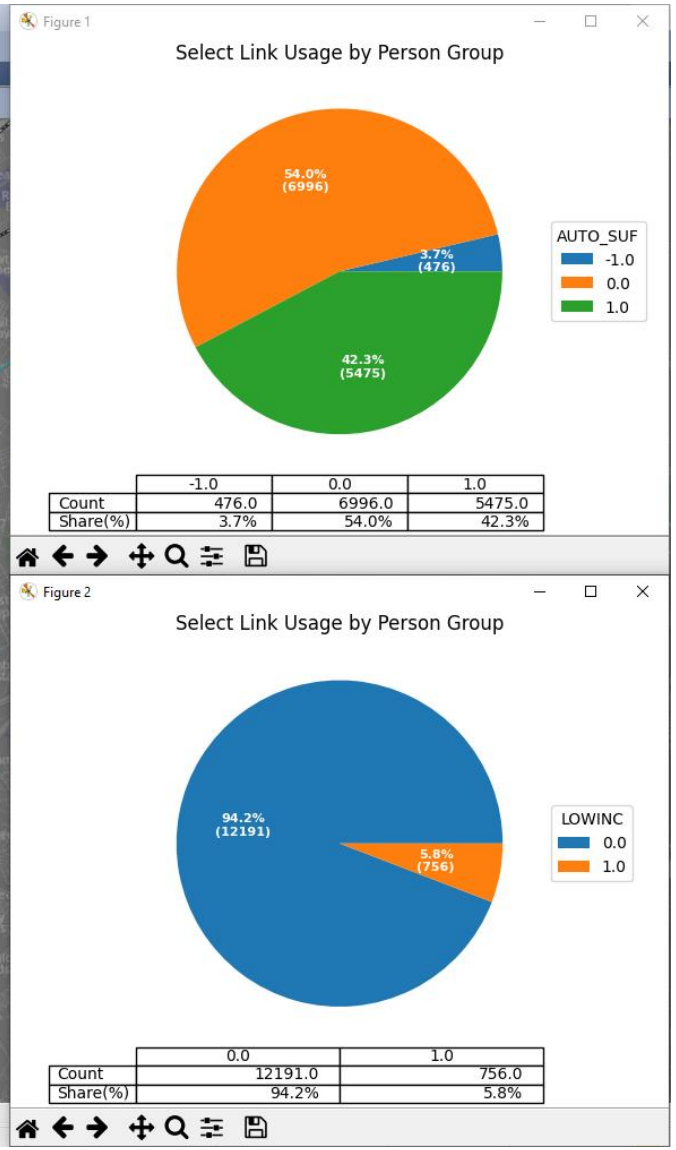


Path Tracing – Average Income Distribution (ActivitySim)

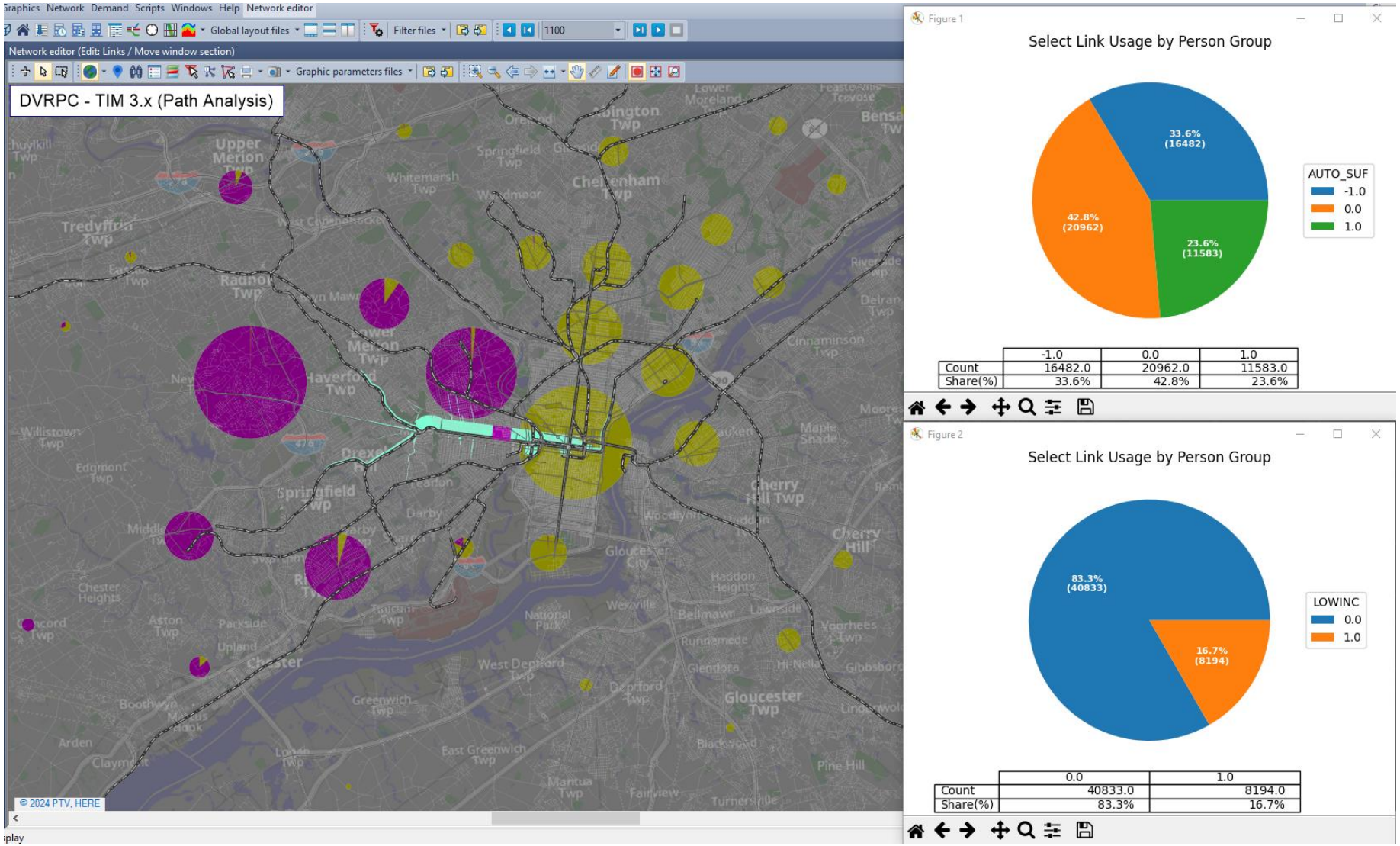


Path Tracing – Bridge Select Link User Profile (DaySim)

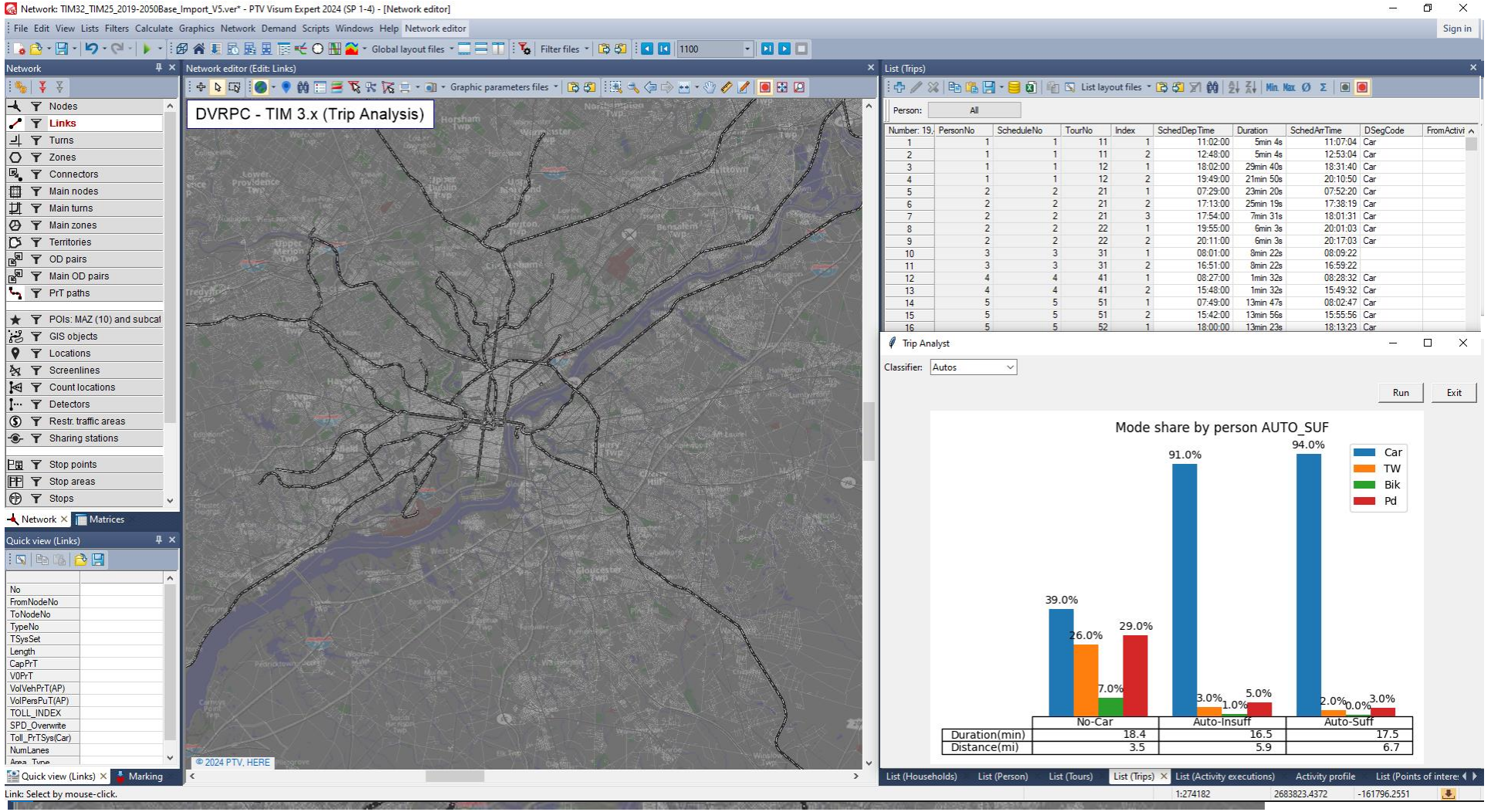




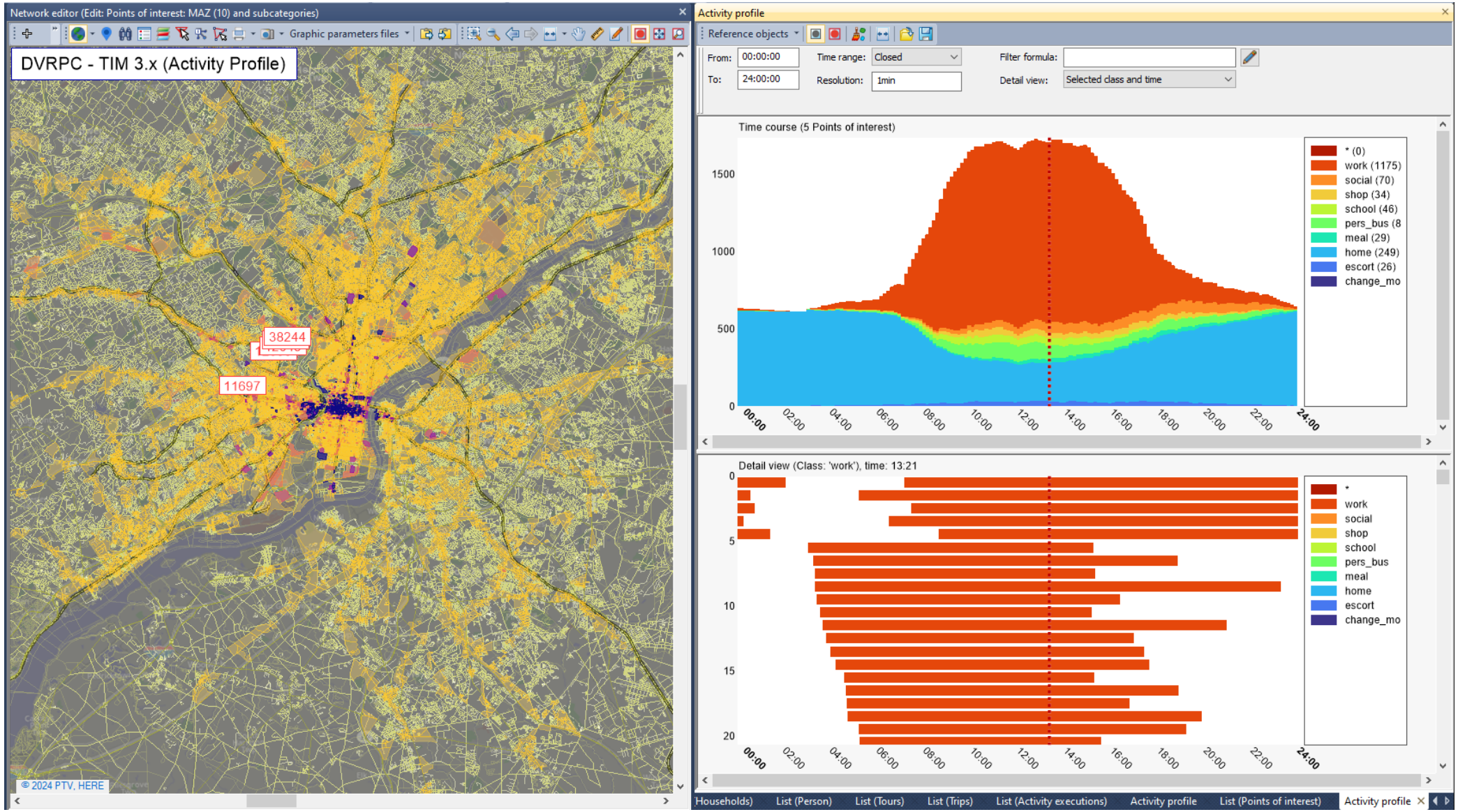
Path Tracing – Transit Rider Auto Sufficiency (DaySim)



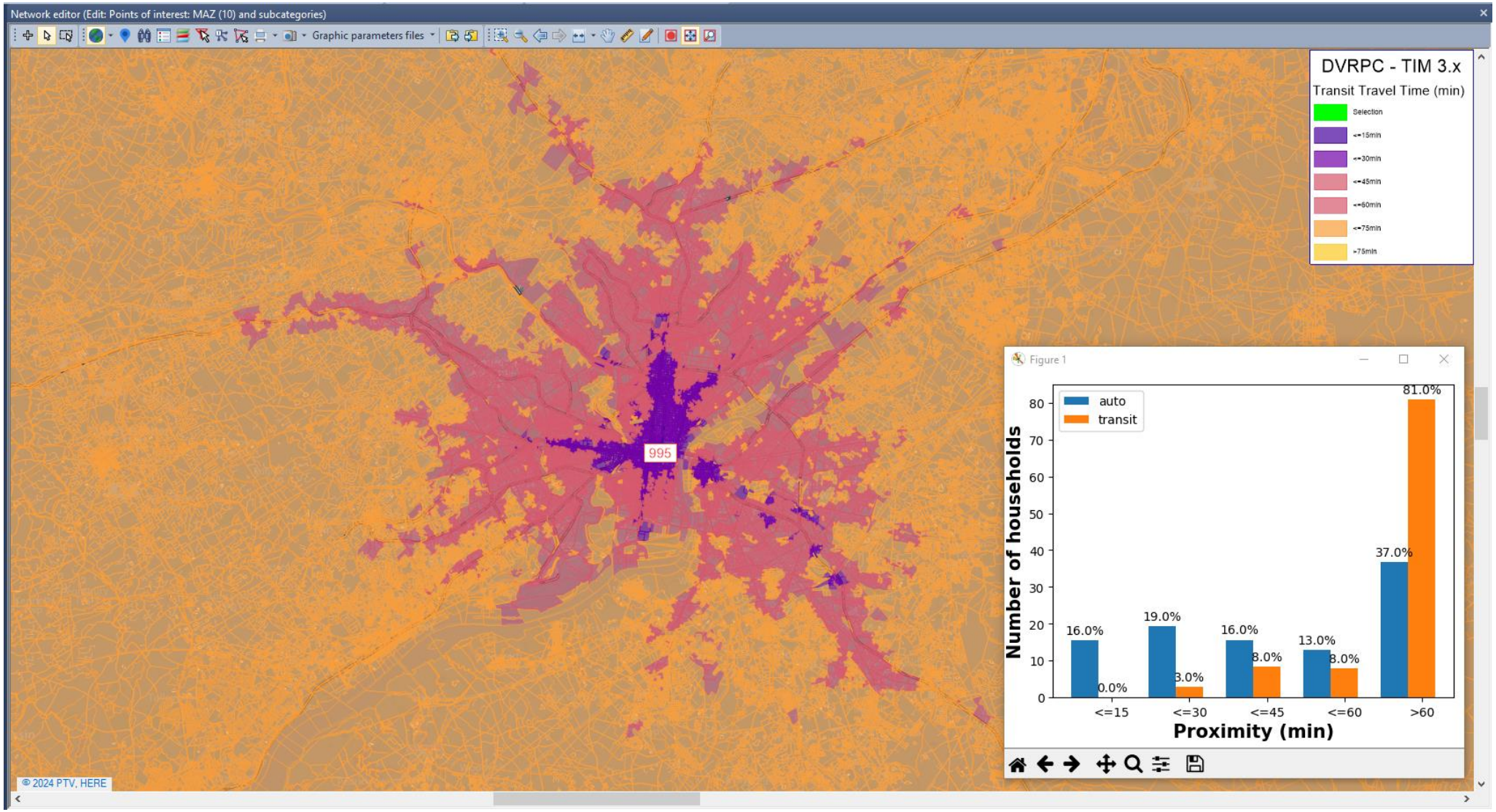
Extras – Trip Analysis(DaySim)



Extras – Activity and Time Use Profiles (DaySim)

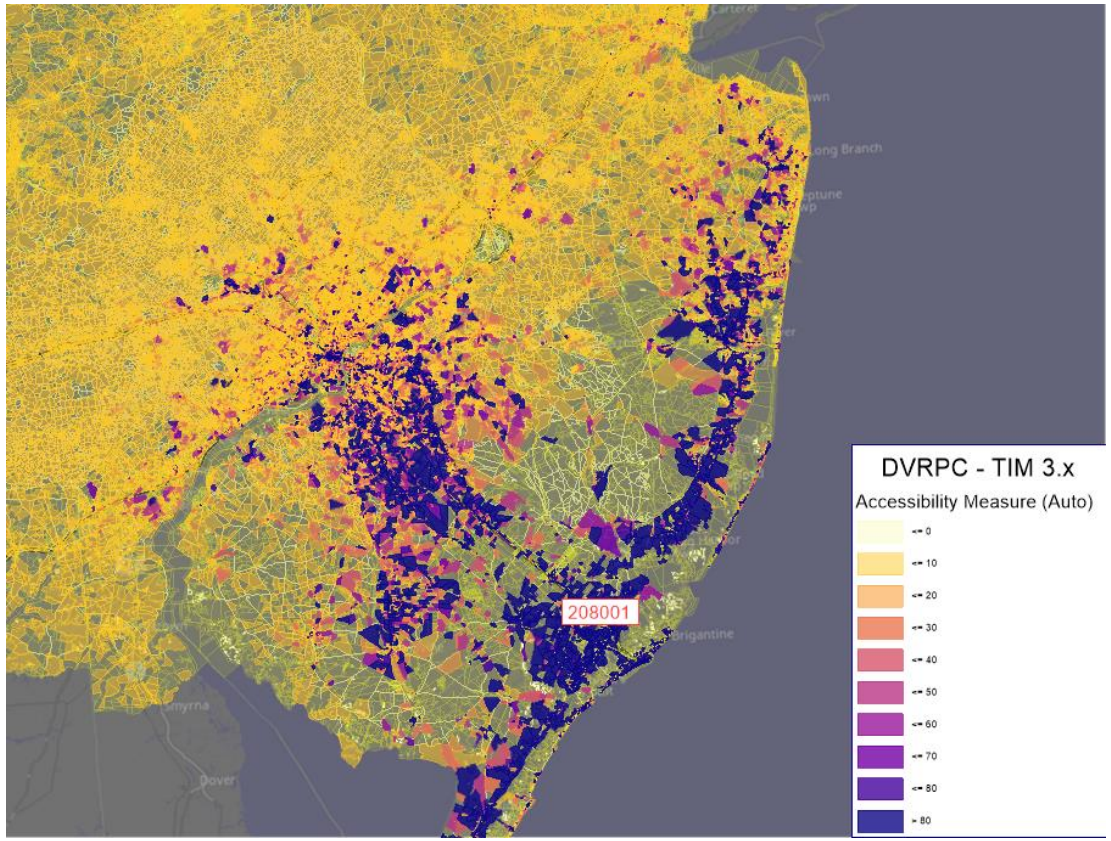


Extras – Comparative Proximity Analysis (DaySim)

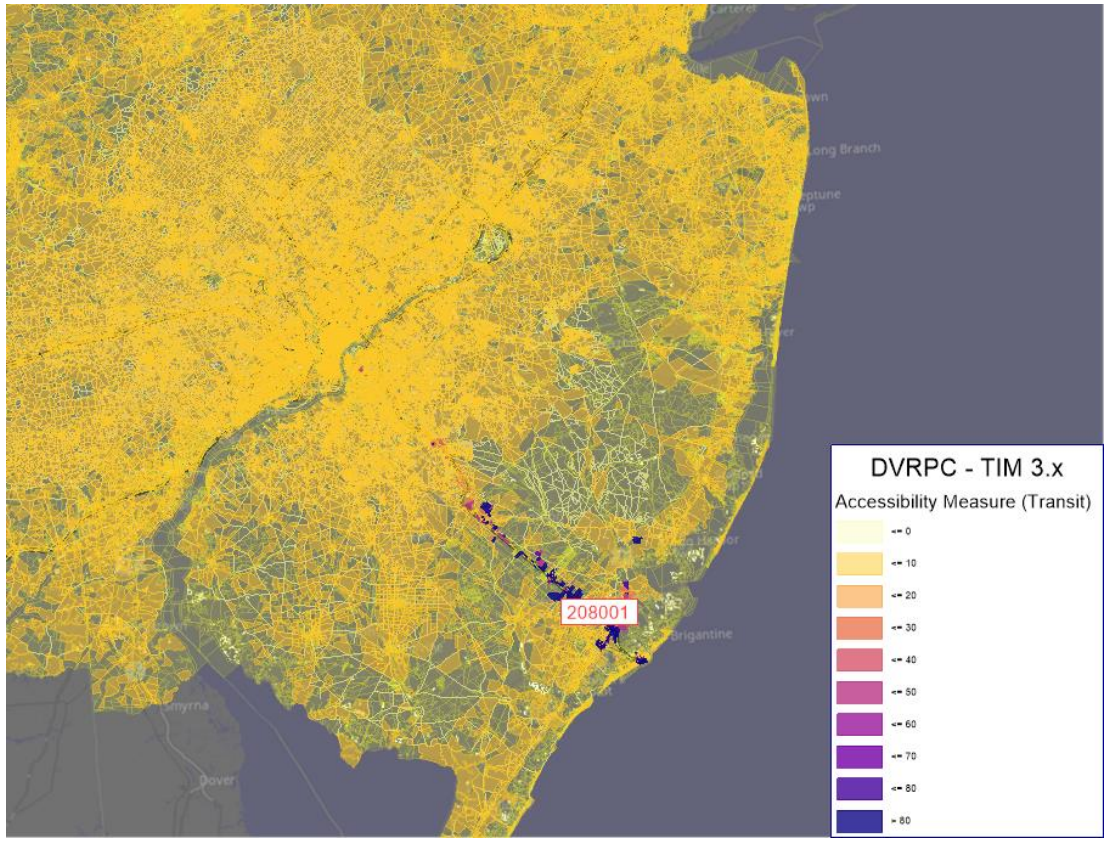


Extras – Comparative Resource {Jobs} Access (DaySim)

Auto



Transit



Some Challenges…

- Support for simultaneous analysis of multiple TOD
- I/O performance with batching large amount of text data
- Nested subtours need some special handling with Activity Executions

PTV GROUP

Discussion / Questions?

Thank you!

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