

# COG/TPB GEN3 TRAVEL MODEL

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## Status report

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Travel Forecasting Subcommittee  
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# Overview

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- Status of Gen3 Model, Phase 3, development, which is led by COG with on-call support from RSG and Baseline Mobility Group (BMG):
  - Model enhancements and bug fixes (status update)
  - Usability testing (status update)
- Next Steps



# Model Enhancements and Bug Fixes

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- Updated the Phase 2 Sensitivity Testing Report on the COG website to include the results from the extended the Autonomous Vehicle (AV) scenario analysis: **Done**
- Developed and tested a streamlined program to summarize ABM travel statistics for a user-defined subset of the representative population: **Done**
- Converted the template of the Gen3 Model User's Guide document to the TPB Report template: **Done**
- Streamlined the land use data processing, population synthesis, and school enrollment procedures in one batch script file: **Under Review**
- Investigating and fixing an issue associated with the mishandling of negative values in the synthetic population files: **Ongoing**



# Mishandling of Negative Values in Syn. Pop. Files

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- Staff noticed negative values in the synthetic population data files. For example,
  - Household income variable (“hhincadj”) contains some negative values, which, according to a subsequent investigation, are legitimate, as some households may report a net loss in annual income in ACS Public Use Microdata Sample (PUMS) data.
  - A negative value of -9 is used to indicate “no data” in both household and person files.
- However, staff found that some negative values were mishandled in the Gen3 Model:
  - Some household variables were specified in the setting.yaml file of ActivitySim as the “uint” (unsigned integer) data type.
  - The “uint” data type, which works with only non-negative values by design, converted those negative values to large positive values without issuing any warning.
  - Fortunately, the impact seemed to be very limited:
    - “hhincadj” is the only such variable that is used in the model.
    - Only 735 households (out of 2,790,357 households) and 1,478 people were affected.



# On-call Support from RSG to Fix the Issue

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- RSG acknowledged the mishandling of negative values in the Gen3 Model.
- Subsequently, RSG was tasked to fix the issue and evaluate the effects of this fix on modeling result.
- RSG fixed the issue by removing the “uint” field types on input files.
- RSG conducted a partial model run (I4 SFB Iteration Only) and compared the results before and after the fix. Based on the results that RSG shared on July 2, the effects of this fix were very limited.
- RSG also improved error trapping in RunABM.bat and fixed a typo in run\_model.bat.
- RSG successfully conducted a full model run with the above fixes and subsequently submitted a Pull Request (PR) in GitHub on July 5.
- COG staff conducted a full model run that replicated RSG’s results.
- COG staff are in the process of reviewing model results and will approve the PR and tag a model version after the review is complete.



# Effects of the Fix on Households

- Slightly fewer autos in affected households

Old Model Number of Autos	New Model Number of Autos				
	0	1	2	3	4
0	101	0	0	0	0
1	184	105	0	0	0
2	5	152	122	0	0
3	0	0	41	11	0
4	0	0	0	7	7



# Effects of the Fix on Highway

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- Slight decrease in auto trips:
  - An overall decrease of 297 auto trips from 12,858,852 trips
  - A decrease of 352 auto trips for affected households from 3,323 trips
- Slight increase in VMT primarily due to slightly longer trip lengths
- Small changes in screenline traffic volumes around Prince William, Loudon, and Fauquier Counties: No change greater than 0.5%



# Effects of the Fix on Transit

- Very slight decrease in total transit trips (linked)

Period	Old	New	Difference
AM	287,721	287,645	-76
MD	183,000	183,016	16
PM	329,715	329,682	-33
NT	173,260	173,277	17
Total	973,696	973,620	-76

- Very slight decrease in total transit ridership (unlinked)

	Old	New	Difference
All Bus	593,313	593,206	-106
Metrorail ( <u>without</u> transfers)	655,332	655,204	-128
Commuter Rail	54,370	54,367	-3
Total Unlinked	1,303,015	1,302,777	-237





# Phase 3 Development: Usability Testing

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- COG staff continued to assemble model inputs for the upcoming usability testing:
  - Staff ran Gen3 Model with the draft PT input files for the base transit network (2023) for QA/QC.
  - Modeling staff found PT network coding issues when reviewing the modeling results; Network staff fixed them in the network database.
  - Staff are in the process of developing highway and transit networks that will be used for both the Air Quality Conformity (AQC) analysis of 2025 LRTP (Visualize 2050) and the Gen3 Model usability testing.
  - Staff are also in the process of collecting the most up-to-date information on ICC toll rates and bus/Metrorail fares, which will be used to update the corresponding toll and transit fare inputs files.
    - Metrorail/Metrobus fares will reflect the fare changes effective June 30, 2024.



# Next Steps

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- COG is reviewing the GitHub Pull Request (PR) for the recent model updates that address the mishandling of negative values and will tag a new model version after approving the PR.
- COG staff will test the Gen3 Model with OpenPaths Cube that was recently rolled out by Bentley.
- After the transportation networks are developed for the AQC base year (2025), staff will conduct travel forecasting using the 2025 PT network input files for further QA/QC.
- Staff will update toll factor files and transit fare input files using the most recent information.
- After all the model inputs are prepared, COG staff will run the latest Gen3 Model side by side with Gen2/Version 2.4.6 Model for usability testing.



# Acknowledgement

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- Special thanks to the project team:
  - COG: Ray Ngo, Meseret Seifu, Bahar Shahverdi, Jim Yin, Wanda Owens, Jane Posey, Mark Moran, Dusan Vuksan, Nazneen, and others.
  - RSG/BMG: Andrew Rohne, Joel Freedman, and Mushtaq Rahman.



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