SCHOOL ENROLLMENT PROJECTION FOR GEN3, PHASE 2, MODEL

Proposed Methodologies

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Background

- While Gen2 Model lumps school related travel into Home-Based Other (HBO) trips, Gen3 Model explicitly models it in ActivitySim.
- Gen3 Model requires school enrollment by grade level (Grades K-8 and Grades 9-12) and by TAZ as input, which is used as the size term in the school location choice model as part of the modeling of school travel.
- For Phase 1 development, staff prepared base-year (2018) enrollment data from the Homeland Infrastructure Foundation-Level Data (HIFLD).
- For Phase 2, staff needed to prepare school enrollment projections that support the needs of Gen3 Model. Specifically, Gen3 Model needs to:
  - Provide long-term (up to 2045), TAZ-level school enrollment forecasts for the entire modeled area;
  - Predict new school locations and their enrollment which would affect school tour lengths and walk/bike tours, especially in “hotspot” areas; and
  - Project school enrollment (ideally) in a largely endogenous process based on land use forecasts and other modeling data.

Background

- Currently, COG/DCPS does not have an established process to forecast school enrollment.
- Staff did not find an existing process from other MPOs or planning agencies that can be immediately adopted by COG.
- Data from limited public sources do not meet the modeling needs:
  - National or state education/school planning agencies usually provide school enrollment projections at a coarse geographic resolution.
  - Only some local jurisdictions or school districts provide enrollment projections, and they are usually focused on near-term and existing schools.
  - Projections developed by different agencies are not necessarily consistent.
  - Enrollment forecast methods developed by school planning agencies consider factors that are difficult to capture in a regional travel model.
- COG/TPB staff had to develop its own approach to project school enrollment for the Gen3 modeling purposes.

Proposed Methodologies

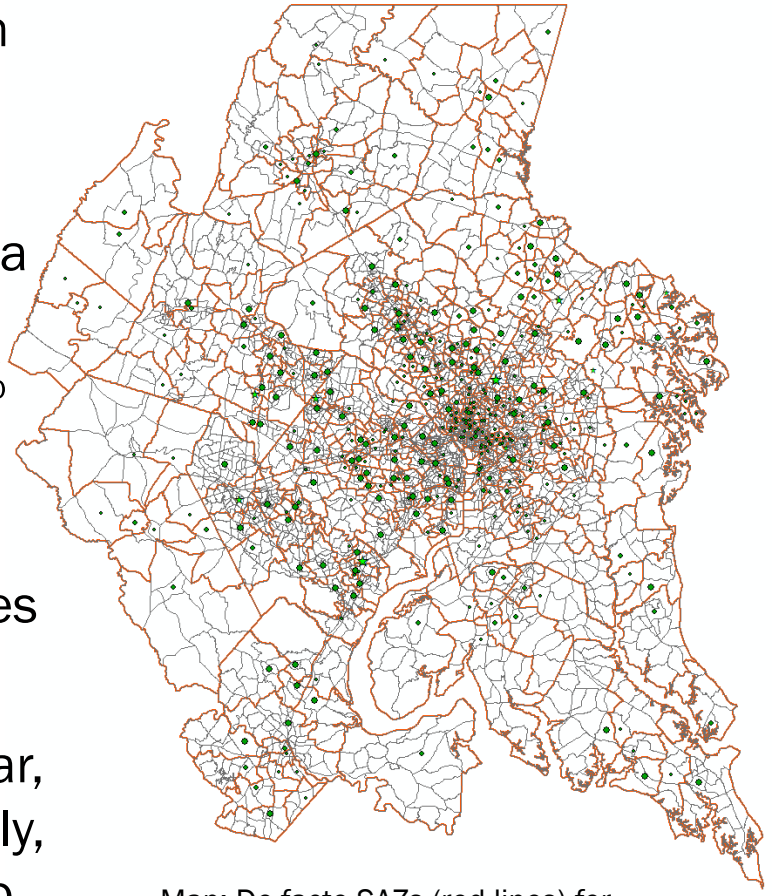
- Gen3 project team proposed the following four-step approach to **predict new school locations** and **scale enrollment** for both existing and prospective schools.
  - **Step 1**: Create a list of new school TAZs from an inventory of new schools proposed in local plans.
  - **Step 2**: Create de facto School Attendance Zones (SAZs), for Grades K-8 and Grades 9-12, by tagging TAZs to the nearest existing or new school TAZ.
  - **Step 3**: Calculate the percentage growth rates of school-age population by SAZ and grade level.
  - **Step 4**: Project the out-year school enrollment by applying the percentage growth rates to the base enrollment data at the TAZ level.
- Staff have implemented the proposed approach in a Python script.

Step 1. Create a List of New School TAZs

- Staff created an inventory of 62 new schools proposed in local Capital Improvement Plans (CIPs) and Educational Facility Master Plans (EFMPs).
  - Pro: Local agencies proposed and programmed new schools based on a comprehensive consideration of demographic growth, existing school utilization, school site availability, funding sources, etc.
  - Con: CIPs and EFMPs are focused on near-term (3-5 years) and mid-term (5-10 years) and they are subject to change in the future.
- Staff also extracted "new" schools that opened between 2018 and now from the HIFLD database.
- Geographic and enrollment information of the new schools were extracted from planning docs, news reports, workshop materials, etc.
  - Four schools with no site information were discarded.
  - If the projected enrollment at the opening year is not available, it is assumed to be 80% of the design capacity.
- Staff derived 27 new school TAZs based on the locations of new schools.

Step 2. Create de facto SAZs

- Staff proposed to scale school enrollment in proportion to school-age population within the same School Attendance Zone (SAZ).
- Private school students do not always go to a school in the residence SAZ, but private school enrollment accounts for only 10-15% of total enrollment.
- De facto SAZs were created in the TPB's 3722-TAZ system, as the real SAZ boundaries do not align with the TAZ boundaries.
- Two sets of SAZs were created in the out year, for Grades K-8 and Grades 9-12, respectively, by tagging TAZs with no school enrollment to the nearest existing or new school TAZs in the same jurisdiction.



Map: De facto SAZs (red lines) for Grades 9-12) created based on TAZs (gray lines)

Step 3. Calculate Growth Rate of School-age Population by SAZ and Grade Level

- During Phase 1, PopulationSim generated base-year and out-year synthetic populations with marginal controls from the Round 9.1a Cooperative Forecasts of Land Use data (e.g., households) and 2018 American Community Survey (ACS) data (e.g., persons by age group).
- School-age populations were derived from the PopulationSim person output files by SAZ and grade level (Grades K-8 and Grades 9-12).
- Growth rates of school-age populations were subsequently calculated:
  - For SAZs tagged to an existing school TAZ, growth rates were calculated between the base year and the out year.
  - For SAZs tagged to a new school TAZ, growth rates were calculated between the interim year when the new school opens and the out year (school-age populations for the interim year were interpolated).

Step 4. Project School Enrollment

- Out-year school enrollment was estimated at the TAZ level by applying the growth rates of school-age populations specific to SAZ and grade level.
  - For existing school TAZs, school enrollment was scaled between the base year and the out year, based on the base-year enrollment data.
  - For new school TAZs, school enrollment was scaled between the interim year and the out year, based on the projected enrollment data in the interim year when the new school opens.

Next Steps

- Staff are performing an internal review of the Python script and its outputs.
- Staff will use this script to develop estimated school enrollment data for the out year of 2045.
- Staff will conduct a 2045 model run in support of Gen3, Phase 2, Model development.

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