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GEORGIA MPO TRAVEL DEMAND MODELS

SOCIO-ECONOMIC DATA DEVELOPMENT GUIDE



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 GDOT
 Georgia Department
 of Transportation

Contents

1	INTRODUCTION	1
2	BASE YEAR DATA	2
2.1	Population and Households.....	2
2.2	Income.....	3
2.3	Employment by Type	3
2.3.1	Longitudinal Employer-Household Dynamics (LEHD)	4
2.3.2	Georgia Department of Labor (GDOL).....	4
2.3.3	Census Bureau.....	5
2.3.4	U.S. Department of Commerce Bureau of Economic Analysis (BEA).....	5
2.3.5	Methodology	5
2.4	School Enrollment (K-12)	7
2.5	University or College Enrollment	7
2.6	Acres.....	8
3	FUTURE YEAR FORECAST	8
3.1	Population and Households.....	9
3.2	Employment by Type	9
3.3	School Enrollment (K-12) and University/College Enrollment.....	9
4	PROCEDURES TO CHECK THE SE DATA.....	10
4.1	TAZ with No SE Data	10
4.2	Population per Household Ratio	10
4.3	Households (Occupied).....	10
4.4	Population per Acre.....	11
4.5	Households per Acre	11
4.6	Employment	11
4.7	Workforce Utilization	11
4.8	School Enrollment (K-12)	11
4.9	Student to Service Employment Ratio	12

i

4.10 SE Data Documentation and Review..... 12

Tables

Table 2-1. Socio-Economic and General Data Required by TAZ..... 2

Table 2-2. GDOT NAICS Employment Equivalency Table 6

Figures

Figure 1-1. Generalized Travel Model Socio-Economic Data Development Process..... 1

Figure 2-1. LEHD Data Download Web Page 4

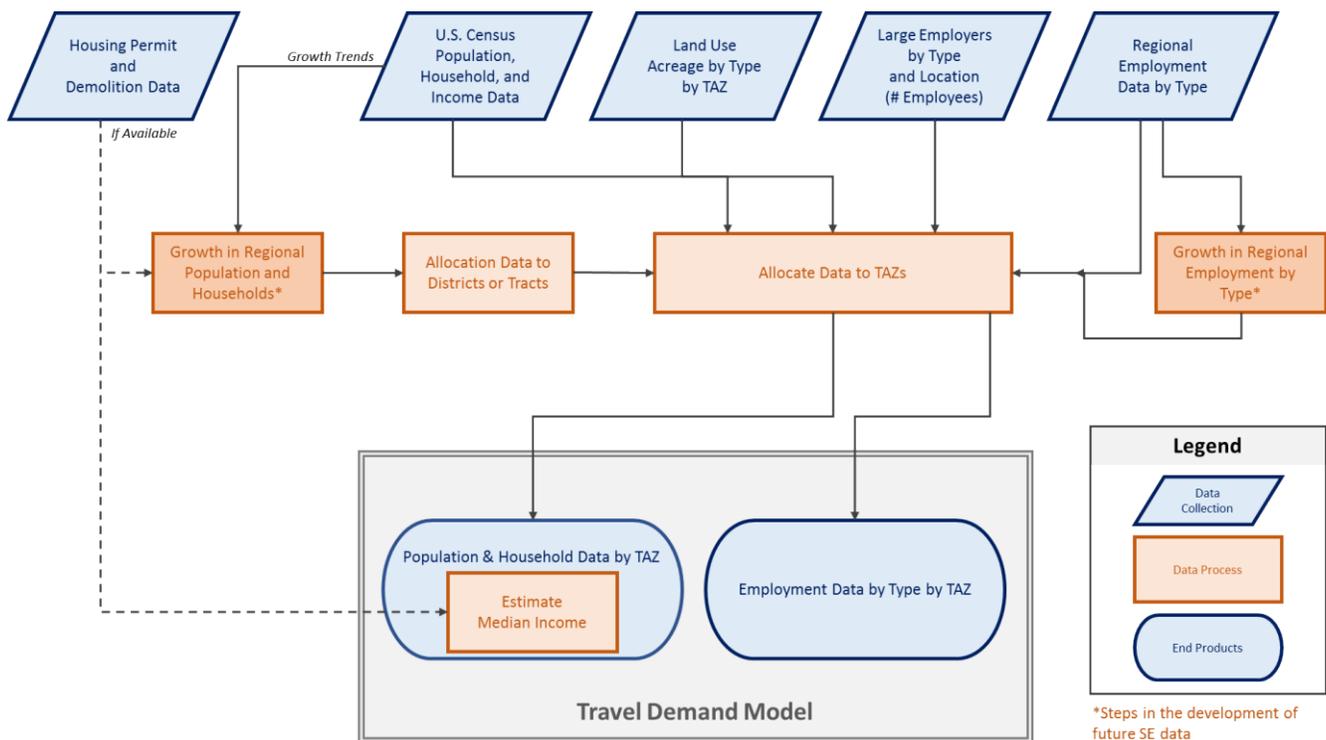
1 INTRODUCTION

The purpose of this document is to provide guidelines for preparing socio-economic (SE) data for Georgia's regional travel demand models (TDMs). This document is intended to assist consultants or Metropolitan Planning Organization (MPO) planners in establishing or revising current methodologies for SE data preparation for Georgia's regional TDMs. Base year SE data produced by MPOs is critical for the development and calibration of their regional TDMs. Future year SE data developed by MPOs serves as one of the major key model inputs and the primary driver of the model.

Figure 1-1 displays a generalized SE data development process recommended by the Georgia Department of Transportation (GDOT). This process can be applied in developing base year and future year data, although specific steps in the process may differ.

To support the development and review of SE data, a review panel (i.e., MPO's Transportation Coordinating Committee (TCC) and/or other local government technical personnel) should be formed. The panel will provide another level of review of the SE data for reasonableness.

Figure 1-1. Generalized Travel Model SE Data Development Process



2 BASE YEAR DATA

The data variables required for each Traffic Analysis Zone (TAZ) and potential data sources are shown in Table 2-1 below.

Table 2-1. Socio-Economic and General Data Required by TAZ

Data Variable	Potential Data Source
Population	U.S. Census tract level, block-group level and block level data (www.census.gov); local building and demolition permits
Households	
Median Income	
Total Employment	U.S. Census, Georgia Department of Labor (www.dol.state.ga.us), commercial sources (such as Dun & Bradstreet), local county building permit data, local employment data; and Bureau of Economic Analysis (www.bea.gov) Census Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES)
Retail Employment	
Service Employment	
Manufacturing Employment	
Wholesale Employment	
School Enrollment (K-12)	Georgia Department of Education, County/Municipalities Boards of Education, Georgia Independent Schools Association, local school systems, private schools, and Georgia Board of Regents
University/College Enrollment	Georgia Department of Education, university, or college
Acres	Geographic Information Systems

2.1 Population and Households

U.S. Census data is the primary source for developing population and household data at the TAZ level. Population and household (occupied housing unit) data are usually available at the Census block-level. Population and household units are collected every 10 years ending in zero, through the Decennial Census. TAZ boundaries should not cross Census block boundaries, so the population and household estimates could be directly aggregated from the Census block level data.

Currently, MPOs in Georgia will adopt their Metropolitan Transportation Plan (MTP) between 2023 to 2025. MPOs will use 2020 as the base year for their TDMs in this round of plan updates. It is recommended that MPO planners and consultants use the 2020 Decennial Census block-level population and household data and aggregate the data to the TAZ level.

All the referenced Census data, including 2020 Census data, can be found at www.census.gov.

Adjustments to population and households need to be made where group quarters exist. Common examples of this type of housing include prisons, hospitals, nursing homes and university dormitories. While these group quarters have a distinct population, residents do not make trips in a typical fashion. For these group quarters,

the population should be removed from the SE data used in the modeling process. It is recommended that MPOs contact local agencies or facilities (hospitals, medical centers, nursing homes, university dormitories, prisons or other correctional facilities) to obtain the facilities' population estimates. The population for group quarters should be compared to census block data that already includes group quarter population, to determine how much population should be removed. In other instances, a more representative population should be used to model the population utilizing the transportation network. In the examples mentioned above, the group quarters should also correspond to a certain level of employment, e.g., hospital staff. In the case of a hospital, this employment will generate trips to the TAZ that is more representative of true conditions.

2.2 Income

It is recommended that consultants and MPO planners use the American Community Survey (ACS) as the data source for income. The 2015-2019 ACS 5-year estimates at the block group level is available on the Census website. The 2016-2020 ACS 5-year estimates have been released in March 2022. TAZ income data can be estimated from the median income data of its associated census tracts or block groups. Income should be reported in 2020 dollars.

Income data can be downloaded using the following steps, using 2019 block-group-level data as an example:

- Go to <https://data.census.gov/cedsci/>.
- Click "Tables" on the upper right corner.
- In the search bar at the top of the page, type "income ACS" and search.
- Under "Find a Filter" to the left, click "Geography" and then choose "Block Group".
- Choose the state and county of interest, check the box at the top where it says "All Block Groups within * County, * State", and then click the "X" on the upper right corner.
- In the results, select the "B19013". Click the plus sign of "View All * Products" and choose the table for 2019. Click the "<<" sign to provide more space for the table display on the right side.
- On the right, if you see the corresponding income table showing up, click "Excel" in the top ribbon, and then click "EXPORT TO EXCEL" to download the xlsx format of the data. If you get a message that "Sorry, that table is too large to display", you can click "DOWNLOAD TABLE" and choose the desired year and format (CSV) before clicking "DOWNLOAD", or alternatively, you can click the "open the table" link after the text "To proceed with the table display anyway", and then click "Excel" and "EXPORT TO EXCEL" to download the xlsx format of the data.

2.3 Employment by Type

There are multiple sources of employment data available for MPOs to estimate their base year (2020) employment. The following section describe the various data sources and recommended methodology.

2.3.1 Longitudinal Employer-Household Dynamics (LEHD)

The 2019 employment data can be obtained from the Longitudinal Employer-Household Dynamics (LEHD) Origin-Destination Employment Statistics (LODES) product. LODES contains three types of data: Origin-Destination (OD), Residence Area Characteristics (RAC), and Workplace Area Characteristics (WAC). The WAC data contains the number of jobs by employment sectors, following the North American Industry Classification System (NAICS) code at the census block level. Please note that the data are enumerated with 2010 census blocks.

The LODES WAC data can be downloaded from the LEHD website using the following steps:

- Go to <https://lehd.ces.census.gov/data/>
- Scroll down to the “LEHD Origin-Destination Employment Statistics (LODES)” section and find the download options. In the “Version” dropdown menu, select “LODES7”, and in the “State/Territory” dropdown menu, select “Georgia”, and in the “Type” dropdown menu, select “Workplace Area Characteristics (WAC)”. Click “View Files”.

Figure 2-1. LEHD Data Download Web Page

LEHD Origin-Destination Employment Statistics (LODES)

LEHD Origin-Destination Employment Statistics (LODES) used by [OnTheMap](#) are available for download below. Version 7 of LODES was enumerated by 2010 census blocks. Previous versions of LODES were enumerated with 2000 census blocks.

Data files are state-based and organized into three types: Origin-Destination (OD), Residence Area Characteristics (RAC), and Workplace Area Characteristics (WAC), all at census block geographic detail. Data is available for most states for the years 2002–2018.

To browse the LODES data files in their directory structure or to access them with a FTP program (must be able to access HTTP), go to lehd.ces.census.gov/data/lodes/.

Download LODES data*:

Version: State/Territory: Type:

[Close](#)

- The files in the file list are named using the template “[ST]_wac_[SEG]_[TYPE]_[YEAR].csv.gz”. The “[ST]” refers to the name of the state. The “[SEG]” refers to the segment of the workforce and value “S000” refers to the total number of jobs. The “[TYPE]” refers to the job type and value “JT00” refers to all Jobs. The “[YEAR]” refers to the year of the data. For the dictionary of the codes used in the naming template, please refer to this documentation¹. To develop the employment data for the MPO travel demand model, the “ga_wac_S000_JT00_2019.csv.gz” file is recommended, which contains all jobs by the NAICS code at census block level.

2.3.2 Georgia Department of Labor (GDOL)

Georgia Department of Labor (GDOL) provides county profiles and other reports that include county employment totals by employment class. The instructions for downloading the data can be found here².

¹ <https://lehd.ces.census.gov/data/lodes/LODES7/LODESTechDoc7.5.pdf>

² <https://explorer.gdol.ga.gov/vosnet/analyzer/resultsNew.aspx?session=labforce> [Filter > State: Georgia > Geography Type: County > Area Name: select applicable counties > Select Time Period Type: Annual > Select Time Periods: 2019 > Under “Refine Results”, select the desired format to export]

2.3.3 Census Bureau

The U.S. Census Bureau produces County Business Patterns³ reports, which provide employment by type at the county level.

2.3.4 U.S. Department of Commerce Bureau of Economic Analysis (BEA)

The BEA produces county employment estimates by the NAICS categories that could be used as control totals or reference data for MPO models. County-level employment data can be downloaded from the BEA website. BEA is a good source for control totals because the estimates include employment for industries that are not covered, or not fully covered, by unemployment insurance programs, which are excluded from total employment in most other data sources. The instructions on downloading the data can be found here⁴.

2.3.5 Methodology

It is recommended that MPOs estimate their 2019 employment data and compare the total and the geographic distribution across different data sources. It is important for MPOs to confirm the accuracy of the data based on their local knowledge and observations.

Table 2-2 shows how NAICS employment data should be grouped to produce the required GDOT control totals for employment by type for the regional TDM development. The TDM categories include:

- 1) Agriculture, Mining and Construction
- 2) Manufacturing & Transportation, Communication, Utilities, and Warehousing (MTCUW)
- 3) Retail
- 4) Service

It is recommended that MPOs develop the 2020 TDM employment data by aggregating the data by the NAICS categories into the four categories based on Table 2-2 below.

³ <https://www.census.gov/programs-surveys/cbp.html>

⁴ <https://www.bea.gov/data/employment/employment-county-metro-and-other-areas> [Interactive Data > Interactive Tables: Employment by county and MSA> Personal Income and Employment by County and Metropolitan Area >> Total full-time and part-time employment by industry (CAEMP25) > NAICS (2001 forward) > County > Georgia > Select applicable counties > Unit of Measure: Levels > Statistic: All Statistics in table> Select year:2019 > then download]

Table 2-2. GDOT NAICS Employment Equivalency Table

NAICS Code	NAICS Category	TDM Category
11	Agriculture, forestry, fishing, and related activities	Agriculture, Mining & Construction
21	Mining	Agriculture, Mining & Construction
22	Utilities service employment	Manufacturing & Transportation, Communication, Utilities, and Warehousing (TCUW)
23	Construction	Agriculture, Mining & Construction
31-33	Manufacturing	Manufacturing & TCUW
42	Wholesale trade	Manufacturing & TCUW
44-45	Retail trade	Retail
48-49	Transportation and warehousing	Manufacturing & TCUW
51	Information	Service
52	Finance and insurance	Service
53	Real estate and rental and leasing	Service
54	Professional, scientific, and technical services	Service
55	Management of companies and enterprises	Service
56	Administration and waste services	Service
61	Educational services	Service
62	Health care and social assistance	Service
71	Arts, entertainment, and recreation	Service
72	Accommodation and food services	Service
81	Other services, except public administration	Service
92	Government and government enterprises	Service

If geocoded employment data (geocoded GDOL data or LEHD data) is available for a base year, it can be allocated to a TAZ using a Geographic Information System (GIS) tool such as ArcGIS. This is a good option for assigning employment to TAZs because it represents relatively accurate estimates of small-area employment by type and offers a systematic method to allocate employment to TAZs. Common issues with GDOL and LEHD data often include:

- Some employer headquarters may have an address outside of the county in which the employment is located, while the headquarter address may have the total number of their employment recorded.
- Some employer records are not geocoded.
- Some records may be grouped to an arbitrary location within the county when the address could not be geocoded.
- There may be duplicate records.

- GDOL data does not include sole proprietorships or other classes of employment that are not covered by unemployment compensation throughout the state.

The following list of variables should be included in the land use analysis for existing and future employment data development (if available):

- Total acres
- Existing commercial acres (including land for retail and service business)
- Existing residential acres (best if stratified into density classes)
- Existing industrial acres (including land for manufacturing & transportation, communication, utilities and warehousing)
- Existing rural/vacant developable acres (including land for agriculture)
- Undevelopable acres
- Future commercial acres
- Future residential acres (best if stratified into density classes)
- Future industrial acres
- Future rural /vacant developable acres

The county level employment data could serve as control totals or reference to check the total TAZ employment numbers aggregated to the county level. It is important to ensure that the difference between the two totals is within an acceptable range for the MPO. Instances where the total TAZ-level employment deviates significantly from the county totals, the TAZ-level employment can be adjusted proportionately.

2.4 School Enrollment (K-12)

It is recommended to obtain school enrollment totals for each school (elementary, middle, high school, and private schools) within the study area. If individual school enrollment totals are not available, system-wide enrollment totals by type of school can be used. When combined with a comprehensive list of schools, an average school size can be calculated and allocated equally to each school (by type). School enrollments should be available from school systems or by directly contacting individual schools. However, other data sources may exist, such as the State Board of Education⁵ and the State Board of Regents⁶.

2.5 University or College Enrollment

University or college enrollment should be separated from K-12 enrollment if the universities or colleges in a MPO study area have dormitories. In cases where university/college campuses and dormitory buildings are located in different TAZs, the university or college enrollment data should be allocated based on the dormitory

⁵ [State Board of Education \(gadoe.org\)](http://gadoe.org)

⁶ <https://georgia.gov/organization/board-regents-university-system-georgia>

locations. The population for dormitories should be compared to census block data that already includes group quarter population, to determine how much population should be removed. For University or college enrollment data should be available by directly contacting individual universities and colleges. The National Center for Education Statistics website provides estimates on university/college student population as well.⁷

2.6 Acres

TAZ acreage can be estimated best using GIS and cross-checked with published land-area data such as zoning maps. MPOs should each maintain a GIS layer for TAZ boundaries. A regularly maintained land use database would be helpful in developing consistency in SE data estimates. For MPOs receiving TAZs provided by GDOT, land area in acres will be included in the TAZs attribute table.

3 FUTURE YEAR FORECASTS

All MPOs are encouraged to consider future land use and development plans, county comprehensive plan, significant infrastructure changes (sewer extensions, new highway access, economic development plans, etc.), local knowledge, and other resources that could be accessed or purchased such as REMI and Woods & Poole, into future long-range SE forecasts.

GDOT could provide REMI data to the MPO for free. GDOT has expanded REMI data coverage from 43 regions to 169 regions, including one region for each of the 159 counties in Georgia.

The first step in developing future year forecast is to estimate total regional population growth. The estimated population control total serves as the base for projecting other variables including total employment and total school enrollment. For example, future total employment can be estimated by multiplying the base year ratio of employment and population to the projected population. The SE data committee could provide guidance on shifts in the employment base that may need to be applied to future employment totals by type (e.g., reflect national trends of shifting to a more service-oriented economy). Future school enrollment control totals (by type of school) can be estimated using the base year ratio of school enrollment and population. Average enrollments can then be allocated to schools by type.

Unless significant changes in unemployment rates and age distributions are expected, assuming employment and school enrollments follow the growth in population should be sufficient for transportation planning purposes.

There are many methods (and assumptions) for forecasting population. Each MPO is responsible for developing future population forecasts and ensuring that growth forecasts are reasonable. GDOT conducts reasonableness checks on the socio-economic data at the aggregated regional level and disaggregation into individual TAZs. After reviewing zonal socio-economic data, GDOT provides a review document that may include recommended adjustments.

⁷ <https://nces.ed.gov/collegenavigator/>

There are many approaches to developing future year SE data for TDMs. The following section provides standard approaches with descriptions for developing SE data.

3.1 Population and Households

Future year population and household forecast should be based on existing distribution, future region-wide growth, and specific land use development plans. The recommended methodology includes the following:

- Collect county growth projections from the Georgia Office of Planning and Budget (OPB) to use as a potential guide for MPO growth assumptions. OPB currently provides the population projections by county through 2060.
- Obtain the population forecast from other data sources such as REMI model data which includes population forecasts till 2060.
- At some MPOs, the SE data is reviewed by a local review panel. The review panel reviews the regional growth assumption developed by the MPO and recommends appropriate modifications.
- Develop and document the future regional forecast methodology.
- Allocate future population growth to TAZs.
- Submit future year data for developing the future year travel models to GDOT for review.

3.2 Employment by Type

Future year total employment and employment by type will be based on existing distribution and future region-wide growth assumptions, the county/city comprehensive plan, land use plans, and business permits. The recommended methodology includes the following:

- The future employment control totals could be calculated as a function of projected population growth and projected shifts in the economic base of the region. It could also use other data sources as reference, such as REMI data that includes employment forecasts till 2060.
- SE data review panel reviews employment forecast and recommends appropriate modifications.
- Allocate future employment growth to TAZs.

3.3 School Enrollment (K-12) and University/College Enrollment

Future K-12 school or university/college enrollment should be developed based on existing school or university/college enrollment, region-wide population growth, and future school or university/college addition or relocation plans. Primary data sources include local school boards, private schools, State Board of Education, State Board of Regents, the Georgia Department of Technical and Adult Education, County Comprehensive Plan, City Comprehensive Plans, University/College Plans, etc. If future school or university/college relocation or addition plans are available from the sources listed above, the following steps can be performed to obtain future school enrollment:

- Obtain school system total enrollments by type of school.
- Obtain lists of schools and assign each school to its appropriate TAZ.
- Assign the estimated or planned number of students to each school's TAZ.
- Ensure TAZ service employment is reasonable for zones with schools to account for employment at schools. There is typically one service employee to every 12 students. If the ratio is significantly higher than 12, those TAZs should be confirmed that unique or atypical schools exist or are planned.

4 PROCEDURES TO CHECK THE SE DATA

4.1 TAZ with No SE Data

- TAZs that has zero population, household, or employment should be rechecked and confirmed.
- This measurement should be checked at individual TAZ level.

4.2 Population per Household Ratio

- Population per household ratio normally is between 2-3 persons per household at the regional level.
- Population per household ratio normally does not exceed 7 persons per household at the individual TAZ level.
 - Areas with over 7 persons per household should be explainable by some form of group housing within the TAZ.
 - Do not include population in group quarters such as prisons, hospitals, nursing homes and university dormitories since the people who reside in these facilities are not making trips on the network. These populations should be removed from the TAZ. For these types of businesses, the employment alone will generate the trips associated with these facilities.
- Population per household ratio will decrease gradually over time, but not more than a few tenths of a percent per person. A drop of more than 0.5 persons per household over a 20-year span is significant.
- Population per household ratio is typically greater in suburban areas than in the center of a city.
- Population per household ratio should not be less than 1.0. This would correspond to a household that has no population, which by definition does not exist (household is an occupied household unit).
- These measurements should be checked at both regional and individual TAZ level.

4.3 Households (Occupied)

- **Do not decrease** from existing to future forecast without an explainable reason (e.g., redevelopment of a residential area into a commercial property, which is not a common occurrence).
- Change in households should show a similar pattern to change in population.

- This measurement should be checked at regional level.

4.4 Population per Acre

- The ratio of population to acres should not exceed 10. TAZs with persons per acre higher than 10 are generally identified as multi-family or group housing land use.
 - Population in group quarters such as prisons, hospitals, nursing homes and university dormitories should be removed from the TAZ.
- These measurements should be checked both at regional and TAZ level.

4.5 Households per Acre

- Over 4 households per acre would represent multifamily housing. Multifamily housing is typically located in a densely populated area (i.e., they are not generally located in rural or isolated areas).
- Over 6 households per acre would signify multistory buildings.
- This measurement should be checked both at regional and individual TAZ level.

4.6 Employment

- Use the following to check if the size of the new development is in line with the acreage of the available land for commercial or industrial development in a TAZ.
 - Office: 250 square feet per employee
 - Retail: 300 square feet per employee
 - Wholesale: 700 square feet per employee
 - Manufacturing: 700 square feet per employee
- This measurement should be checked at individual TAZ level.

4.7 Workforce Utilization

- The ratio of population to employees generally stays constant. There should not be a significant change.
- This measurement should be checked at regional level.

4.8 School Enrollment (K-12)

- K-12 School enrollment is generally around 20 percent of the total population.

- The ratio of K-12 school enrollment to population should remain relatively similar from the base year to the future year.
- This measurement should be checked at regional level.

4.9 Student to Service Employment Ratio

- In TAZs that contain schools, there is typically one service employee to every 12 students. If the ratio is significantly higher than 12, those TAZs should be confirmed that a unique or atypical school exists or is planned.
- This measurement should be checked at individual TAZ level.

4.10 SE Data Documentation and Review

It is recommended that MPOs document the base year and future year SE data development process and methodology. After the reasonableness check, it is recommended that MPOs submit the documentation to GDOT for review and comment. While GDOT is not responsible for developing the MPO's SE data, GDOT will review and provide comments on base year population and employment estimates control totals as well zonal distribution and growth assumptions based on the requirements and reasonableness from a TDM development perspective.

