Appendix C

Data Development Methodology Notes for:

- MATS 2010 Baseline Population and Employment Estimates
- MATS 2040 Population and Employment Forecasts
General Notes on MATS Preliminary 2010 Base Year Data Assembly

1. All GIS and data assembly tasks were performed using the following software packages:
   a. Spatial Analysis/GIS – ArcGIS 10.2.2, ArcINFO license
   b. Tabular data organization:
      i. Microsoft Access 2013
      ii. Microsoft Excel 2013

2. All GIS and Spatial Analysis tasks were standardized to the NAD 1983 Georgia State Plane West coordinate system. Measurement units are in Feet.

3. All variable names listed below are underlined

4. Contact information/questions regarding data development:

   Mike Greenwald
   Planning Director/MPO Technical Coordinator
   Macon-Bibb Co Planning & Zoning Commission
   682 Cherry Street, Suite 1000
   Macon, GA 31201
   478-751-7472; FAX 478-751-7467
   MGreenwald@mbpz.org
GIS Methodology

Census Blocks

Census blocks were assigned to a specific TAZ based on which TAZ the Census Block centroid fell within; centroids for convex polygons were assigned to a location inside the interior of the polygon boundary (using ArcGIS 10.2.2 Feature to Point tool, with “Inside” option selected.

Census blocks with multi-part polygons either had no households and no population associated with them (n=6), or were editing errors associated with neighboring counties not within the jurisdictional boundaries covered by this project (i.e., Crawford County blocks on the border with Bibb and/or Monroe County; Jasper and/or Putnam County blocks bordering Jones County; n=11)

Original Data Source: N=6,457 Census Blocks across Bibb, Jones and Monroe Counties

Final Dataset: N=5,277 Blocks, comprising 139 block groups across 495 Transportation Analysis Zones spanning all of Bibb County, all of Jones County, and the portion of Monroe County with TAZs in the MATS MPO jurisdiction.

Primary and Secondary Schools, Universities and Technical Colleges

Primary and secondary school locations were obtained from the Bibb County School District (private schools operating in Macon-Bibb County), Macon-Bibb County Planning & Zoning Department archives (public schools only), and the Middle Georgia Regional Commission (public schools only). According to the Jones County School District there were no private schools operating in Jones County in 2010. Only one private school was located in that portion of Monroe County covered by the MATS MPO jurisdiction, and that was identified through the data provided by the Bibb County School District.

Locations for private schools were geocoded using the multi-phasic composite geocoder maintained by the Macon-Bibb County GIS Manager. These results were then validated against Google Earth satellite imagery to ensure proper placement in the TAZ system. Jones County locations were similarly validated. Finally, all records were consolidated into a single, MPO region wide, school location point file. This master file was then edited to remove closed or ineligible sites, and then spatially joined to the TAZ system map layer.

Original Data Source: Macon-Bibb County Primary and Secondary Public School Archive (N = 58)
Macon-Bibb County Primary and Secondary Private School List (N = 25)
Jones County Public Schools (N = 11)

Final Data Set: N = 84 primary and secondary school locations (public and private) across Bibb, Jones and Monroe Counties (73 in Bibb County, 9 in Jones County (+1 additional site opening in 201516 school year), 1 in Monroe County)

University and technical college campuses were collected individually, and then geocoded using the same data assembly and spatial validation procedures as for primary and secondary schools.

Final Data Set: N = 8 university and technical college campuses across Bibb, Jones and Monroe Counties (7 in Bibb County, 1 in Jones County)
Variable Definitions

TAZ_NEW – The Transportation Analysis Zone for which the data is being collected. TAZ indexing reflects the zone system developed for mats_2040_Irtp_taz_Aug272015_New TAZ set, developed by GDOT and HNTB.

Acres – The total acreage of the TAZ, as provided by GDOT and HNTB.

TtlPop2010 – The total number of persons identified as living in the specific TAZ, as of April 1, 2010. Values are based on U.S. Census 2010 counts reported at the block group level of geography, summed up to the TAZ level.

TtlHh2010 – The total number of households identified as living in the specific TAZ, as of April 1, 2010. Values are based on U.S. Census 2010 counts reported at the block group level of geography, summed up to the TAZ level.

Household Income Data Source

Household income information was collected from the American Community Survey 5 Year Estimate data release for 2008-2012 (ACS0812), at the Census Block Group level of geographic detail. This data source and version release was chosen because:
1. American Community Survey replaces the Summary File 3 file in fulfilling the U.S. Census Bureau mission of providing local demographic data;
2. Census Block Group is the highest level of geographic detail (i.e., the smallest geographic area) at which household income estimates are provided;
3. The 2010 base year falls exactly in the middle of the 2008-2012 time period covered by the ACS0812 data release;
4. The 2008-2012 time period was a time of fairly constant economic activity in the region. Since the ACS dataset is a moving average over the 5 year period, a more constant level of economic activity would suggest inputs to the source data would have fewer outliers (i.e., extremely high or low values not consistent with the rest of the source data). Fewer outliers would result in more stable/accurate estimates.

Dollar values from the ACS0812 are reported in 2012 constant adjusted dollars. To adjust for inflation back to the 2010 base year, all ACS0812 estimates were adjusted using the U.S. Dept. of Labor, Bureau of Labor Statistics Consumer Price Index Report, Table 24: Historical Consumer Price Index for All Urban Consumers (CPI-U): U. S. city average, All Items (see http://www.bls.gov/cpi/cpid1507.pdf, pg. 68). These adjustments to the ACS0812 estimates were incorporated before any additional steps were applied to create the variables described below.

AvgHHlnC2010Adj – The average household income for the Census Block Groups covering the TAZ. Because TAZs and Census Block Groups are not necessarily fully encapsulated, the following rules were developed to estimate average household income:

1. If a TAZ has no households in 2010, the average household income assigned to it is $0;
2. If a TAZ is fully covered by a single Census Block Group, the average household income assigned to it is the average household income of the Census Block Group.

Block Group average household income is calculated by dividing the Aggregate Household
Income Estimate (ACS0812, Table B19025) by the Total Number of Households (ACS0812, Table B11001);

3. If a TAZ spans more than one Census Block Group, the average household income is assigned using the following formula

\[
\sum_{b=1}^{B} \frac{\text{Households in Specific Block Group and TAZ}}{\text{ALL Households in TAZ}} \times (\text{ACS0812 Block Group Household Avg. Income}) \times \Gamma
\]

where:
- \( B \) = set of all block groups intersecting a specific TAZ
- \( \Gamma \) = constant adjustment factor based on CPI-U to adjust ACS0812 Household Income values to 2010 constant dollars

**MOEAvgHhInc2010Adj** – The margin of error for the 90% confidence interval (i.e., 1.645 x Standard Error of the Estimate (aka Root Mean Squared Error)) surrounding the **AvgHhInc2010Adj** estimate. Because TAZs and Census Block Groups are not necessarily fully encapsulated, the following steps were applied:

1. Estimate margin of error for average household income for each block group, using the Aggregate Household Income (ACS0812, Table B19025) and Total Number of Households (ACS0812, Table B11001) as inputs to the recommended formula for calculation derived ratios described in the American Community Survey State and Local Government Handbook ([https://www.census.gov/content/dam/Census/library/publications/2009/acs/ACSstateLocal.pdf](https://www.census.gov/content/dam/Census/library/publications/2009/acs/ACSstateLocal.pdf), pg. A-15)

2. Estimate proportional contribution of each block group to household income Margin of Error squared using the following formula:

\[
\sum_{b=1}^{B} \left( \frac{\text{Households in Specific Block Group and TAZ}}{\text{ALL Households in TAZ}} \times (\text{ACS0812 Block Group Household Avg. Income}) \right) \times (\text{Margin of Error})^2
\]

where:
- \( B \) = set of all block groups intersecting a specific TAZ
- \( \Gamma \) = constant adjustment factor based on CPI-U to adjust ACS0812 Household Income values to 2010 constant dollars

3. Take square root of Step #2

**EstMedHhInc2010Adj** – The estimated median household income for the TAZ, as computed from ACS0812, Table B19001 and Table B19013. Because TAZs and Census Block Groups are not necessarily fully encapsulated, the following rules were developed to estimate average household income:

1. If a TAZ has no households in 2010, the median household income assigned to it is $0;

2. If a TAZ is fully covered by a single Census Block Group, the median household income assigned to it is the median household income of the Census Block Group. Block Group median household income is taken from ACS0812, Table B19013

3. If a TAZ is covered by multiple Census Block Groups, the median household income is estimated using the frequency distribution of all the composite Block Groups intersecting the TAZ.
Categorical frequencies for individual Block Groups are obtained from ACS0812, Table B19001. The method of TAZ median income estimation is as follows:

a. Aggregate the total number of households per income category, across all Census Block Groups intersecting the TAZ

b. From a.), use the following formula to estimate the median of the frequency distribution:

\[ L_{u-1} + \frac{(N/2 - F_{u-1})}{f_u} \times i \]

where:

- \( L_{u-1} \) = the upper limit of the category immediately prior to the one containing the median of the distribution (e.g., for a distribution with a median income between $20,000 - $29,999, this value would be $19,999);
- \( N/2 \) = the total number of aggregated households across all income categories and census block groups within the TAZ (i.e., the estimated position of the median for the TAZ specific income distribution);
- \( F_{u-1} \) = the cumulative frequency of households across all income categories and census block groups within the TAZ, up to the category immediately preceding the one containing the median observation;
- \( f_u \) = the number of observations in the category containing the median income value;
- \( i \) = the width of the category containing the median income (e.g., for a distribution with a median income between $20,000 - $29,999, the category width would be $9,999)

School2010 – The total primary and secondary school enrollment, as of Fall 2010, in the TAZ. Source data for enrollment values come from the Georgia Governor’s Office of Student Achievement (for public schools in Macon-Bibb County and Jones County), and the Macon-Bibb County School District (for private schools; according to Jones County Board of Education staff, no private primary or secondary schools existed in the Jones County area in 2010). The only school facility in the portion of Monroe County covered by the MATS MPO area was a private school with 10 students in 2010.

Employment Data Sources

All employment data for the 2010 base year are collected from the National Establishment Time-Series Database, 2012 Release (NETS 2012), produced by Walls & Associates. This data was obtained as part of a purchase through Dun & Bradstreet. The particular version of the NETS 2012 obtained covers all economic activities in Macon-Bibb, Jones, and Monroe counties from 1990 through 2012, and includes the total employment at the particular establishment, along with the 8 digit Standard Industrial Classification (SIC) Code (version 1987) for up to six economic activities at a particular establishment.

The SIC 1987 indexing system was replaced with the North American Industrial Classification System (NAICS) in the mid 1990s. Therefore, a translation table was provided by Dun & Bradstreet between the
SIC 1987 and the latest version of the NAICS (NAICS 20102). The NAICS 2012 translation table was joined to the core establishment location data before applying the GDOT economic activity categories to the source employment data (See Table 4-2 in General Summary of Recommended Travel Demand Model Development Procedures for Consultants, MPOs and Modelers, Atkins, May 2013).

Summary statistics for the NETS 2012 data are as follows:

<table>
<thead>
<tr>
<th>NETS 2012 Geospatial Data</th>
<th>NETS Employment Estimates</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total number of Establishments in MATS Counties: 42,240</td>
<td>Actual Employment Figure 21647</td>
</tr>
<tr>
<td>Within TAZs covering MATS MPO area: 32,999</td>
<td>Bottom of Range of Values (i.e., conservative estimate) 127</td>
</tr>
<tr>
<td>With valid Block or Street Level Geocoding: 27,971</td>
<td>Percent of business establishments in NETS 2012 within MPO boundary and having valid geocoding: 84.76%</td>
</tr>
<tr>
<td>Dun &amp; Bradstreet Estimate 4666</td>
<td>Walls &amp; Associates Estimate 1531</td>
</tr>
<tr>
<td>Total: 27,971</td>
<td></td>
</tr>
</tbody>
</table>

TtlEmp2010 – The total employment in the TAZ in 2010 identified in the NETS 2012 database, summed across all categories classified by GDOT.

UnclassifiedEmp10 – The amount of 2010 employment in the NETS 2012 database located in the TAZ that did not otherwise fall into one of the GDOT specified categories.

RetailEmp10 – The amount of 2010 employment in the NETS 2012 database located in the TAZ and categorized as Retail according to GDOT classification standards.

ServiceEmp10 – The amount of 2010 employment in the NETS 2012 database located in the TAZ and categorized as Service according to GDOT classification standards.

ManufEmp10 – The amount of 2010 employment in the NETS 2012 database located in the TAZ and categorized as Manufacturing according to GDOT classification standards.

WholeSaleEmp10 – The amount of 2010 employment in the NETS 2012 database located in the TAZ and categorized as Wholesale according to GDOT classification standards.

College Enrollment and On-Campus Housing Estimates

Estimates for university and technical college enrollments and on-campus housing estimates for Fall 2010 were collected by contacting the individual campus registrar offices. For the MATS MPO region, there were eight (8) institutions identified:

1. Central GA Technical College – Jones County Campus
2. Central GA Technical College – Macon Campus
3. Georgia College & State University Graduate Program (i.e., satellite of Milledgeville campus)
4. Macon State College (recently renamed/reclassified as Middle GA State University)
5. Mercer University
6. Mercer University Medical School
7. Mercer University Law School
8. Wesleyan College

Institutions were geocoded according to their respective campus addresses, verified with Google Earth satellite imagery, then joined to their respective TAZs. Special note should be taken of the following:

a. Estimates for Macon State College/Middle GA State University on campus housing are not fully validated. The 2010-11 academic year was the first year that campus housing was offered as an option, and the staff person in charge of keeping those records has since left the institution.

b. Mercer University Medical School is on the same campus as the main Mercer University campus. However, the entire campus has been segmented into 3 distinct TAZs.

**ColgEnrol2010** – The total college population across all undergraduate, graduate and/or professional programs attending classes at campuses located within the TAZ.

**OnCampSelfRept** – The total number of students living in on-campus housing (i.e., dormitories) in Fall 2010, as reported by the university or technical college.

*Special Note: For TAZ 158, the value is based on number of “cottage residents” for GA Academy for the Blind. This is NOT a university or technical college, so the ColgEnrol2010 value remains zero. The actual enrollment at this facility in 2010 is 111; that enrollment value has been incorporated into the School2010 value for TAZ 158*

**OnCampusCensus** – The total number of people living in dormitory group quarters according to the 2010 U.S. Census (U.S. Census 2010, Table P42-Group Quarters Population by Group Quarters Type). This number may be slightly different than the OnCampSelfRept value, due to the fact that U.S. Census 2010 asks where the individual was living as of April 1, 2010 (i.e., during the Spring 2010 semester).

**OffCampSelfRept** – An estimate of the number of college students across all undergraduate, graduate and/or professional programs not living in on campus housing, using the university/technical college self reported figures. This figure is calculated by the formula:

\[
\text{OffCampSelfRept} = \text{ColgEnrol2010} - \text{OnCampSelfRept}
\]

*Special Note: For TAZ 158, the value is based on number of “cottage residents” for GA Academy for the Blind. This is NOT a university or technical college. Because of the special nature of this facility, the formula for estimating the OffCampSelfRept value for TAZ 158 is:

\[
\text{GA Academy for the Blind Total Enrollment in 2010 - GA Academy for the Blind Cottage Residency} = 111 - 69 = 42
\]

**OffCampusCensus** - An estimate of the number of college students across all undergraduate, graduate and/or professional programs not living in on campus housing, using values reported by the U.S. 2010 Census. This figure is calculated by the formula:

\[
\text{OffCampCensus} = \text{ColgEnrol2010} - \text{OnCampCensus}
\]
List of Non Local Supplemental Data Sets Used

1. American Community Survey 2008-2012 5 Year Averages (Block Group Geography)
   a. Table B11001 – Household Type (Including Living Alone)
   b. Table B19001 - Household Income In The Past 12 Months (In 2012 Inflation Adjusted Dollars)
   c. Table B19013 – Median Household Income
   d. Table B19025 – Aggregate Household Income In The Past 12 Months (In 2012 Inflation Adjusted Dollars)
2. U.S. 2010 Census, Summary File 1, Table P42 - Group Quarters Population by Group Quarters Type

TAZ Errata and Future Year Conditions

1. Bibb County
   a. Attribution Errors for population and housing (i.e., population>0, but households=0):
      i. TAZ #46 – Topology rule misattributes 889 inmates from Law Enforcement Center to this TAZ. Jail inmates should be counted as group quarters residents in TAZ #56
      ii. TAZ #45 – Residents appear to be part of Dismas re-integration facility (i.e., halfway house).
      iii. TAZ 41 – Loaves & Fishes Ministry: Possible homeless shelter
      iv. TAZ 14 – Mulberry St. Methodist Church: Possible homeless shelter
      v. TAZ 2 – No residential structures in this area. Possible attribution error?
   b. New student housing opening in TAZ 80 in Fall 2015. Housing for approximately 1044 graduate students
   c. Mercer Medical School split between TAZ 67 and TAZ 66. Recommend re-drawing/consolidating this TAZ to avoid artificially splitting student allocations.

2. Jones County
   a. Gray Elementary School moves from TAZ 542 to TAZ 543 starting in 2015/16 school year
General Notes on MATS 2040 Forecast Year Data Assembly

1. All GIS and data assembly tasks were performed using the following software packages:
   a. Spatial Analysis/GIS – ArcGIS 10.2.2, ArcINFO license
   b. Tabular data organization:
      i. Microsoft Access 2013
      ii. Microsoft Excel 2013

2. All GIS and Spatial Analysis tasks were standardized to the NAD 1983 Georgia State Plane West coordinate system. Distance measurement units are in Feet.

3. All variable names listed below are underlined

4. Contact information/questions regarding data development:

   Mike Greenwald
   Planning Director/MPO Technical Coordinator
   Macon-Bibb Co Planning & Zoning Commission
   682 Cherry Street, Suite 1000
   Macon, GA 31201
   478-751-7472; FAX 478-751-7467
   MGreenwald@mbpz.org
Continuity with 2010 Base Year Data Assembly

This forecast data uses the same TAZ zone system and base year data as the 2010 Base Year data assembly for the Macon Area Transportation Study (MATS) 2040 Long Range Transportation Plan Update (2040 LRTP Update).

Estimates in this data set are expressed as marginal changes (i.e., increases or decreases) over the 2010 Base Year estimate. In many cases, the corresponding original 2010 Base Year estimate is included as a frame of reference. In those cases where the original 2010 Base Year is included in this data set, these base year values are the same (and therefore follow the same definitions and data assembly methodology) as those delivered on September 25, 2015. For full details on base year variables see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx, or contact Dr. Michael J. Greenwald, AICP at the Macon-Bibb County Planning and Zoning Commission (see contact information on previous page).

Sources for Population Growth Estimation

The jurisdiction of the MATS area covers the entirety of Bibb County, and portions of neighboring Jones and Monroe Counties (see orange outline in Fig. 1, below)
Population forecasts for Bibb, Jones and Monroe Counties were obtained from the Georgian Governor’s Office of Planning and Budget on 1/4/2016. Marginal changes for each county were calculated by the following formula:

\[
\text{Est. population growth 2010 through 2040} = \text{Est. County 2040 Population} - \text{2010 U.S. Census Population}
\]

Because Jones and Monroe County are only partially covered by the MATS service area, marginal population growth was apportioned based on the individual county proportion of population in the 2010 Census covered by the MATS boundaries. Table 1 provides an overview of the calculation steps:

**Table 1: Marginal Growth Apportionment for MATS Areas**

<table>
<thead>
<tr>
<th></th>
<th>Population 2010</th>
<th>Population 2040</th>
<th>Change 2010 through 2040</th>
<th>Pop Pct Within MATS Area 2010</th>
<th>Anticipated Pop Growth Within MATS Area</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bibb</td>
<td>155,547</td>
<td>160,526</td>
<td>4,979</td>
<td>100.00%</td>
<td>4,979</td>
</tr>
<tr>
<td>Jones</td>
<td>28,669</td>
<td>33,262</td>
<td>4,593</td>
<td>65.87%</td>
<td>3,026</td>
</tr>
<tr>
<td>Monroe</td>
<td>26,424</td>
<td>34,417</td>
<td>7,993</td>
<td>6.46%</td>
<td>517</td>
</tr>
</tbody>
</table>

Step by step calculations can be retraced/examined in the Excel spreadsheet *CensusPopulationCountsAndGAOPBEstimates19602040v02092016.xlsx*, attached to this documentation.

**Population Growth and Household Increase Apportionment**

Using the county marginal totals from Table 1 as upper limits of anticipated growth in each county, population was assigned to households based on the following rules:

1. TAZs where future growth is anticipated were identified by conversations with Macon-Bibb Planning & Zoning Commission Staff, and Jones County Planning & Zoning Director. Households were assigned to net available residential land, as identified in the latest land use plan for the county in question covering the period of time in question. By county, the calculation was:

   a. Bibb County – By future growth TAZ,

      \[
      \text{Dwelling Unit Density in 2010} = \frac{\text{Total Housing Units in 2010 Census (Table H3, U.S. Census 2010)}}{\text{Encumbered Acres in 2010}}
      \]

      Anticipated Net residential Acreage Available in 2040 for Macon-Bibb County
Vacancy Rate 2010 = \frac{Vacant Units in 2010 Census (Table H3, U.S. 2010 Census)}{Total Housing Units in 2010 Census (Table H3, U.S. Census 2010)}

New Households in TAZ 2040_{Macon-Bibb County} = \frac{Anticipated Net Residential Acreage Available in 2040}{\text{Dwelling Unit Density in TAZ in 2010}} \times (1 – \text{Vacancy Rate})

b. Jones County – By future growth TAZ,
   - All residential acreage in the Future Land Use Plan, v. 2007
   - Residential acres located in 100 Year Flood Plain
   - Residential Acres Already Encumbered in 2010 (determined by finding residential lots located in non-zero population Census Block)

Anticipated Net residential Acreage Available in 2040 for Jones County

Dwelling Unit Density in 2010 = \frac{Total Housing Units in 2010 Census (Table H3, U.S. Census 2010)}{Encumbered Acres in 2010}

Vacancy Rate 2010 = \frac{Vacant Units in 2010 Census (Table H3, U.S. 2010 Census)}{Total Housing Units in 2010 Census (Table H3, U.S. Census 2010)}

New Households in TAZ 2040_{Jones County} = \frac{Anticipated Net Residential Acreage Available in 2040}{\text{Dwelling Unit Density in TAZ in 2010}} \times (1 – \text{Vacancy Rate})

c. Monroe County – Conversations with Anita Cauthen in Monroe County Planning & Zoning Office indicated they anticipate the future marginal population increases in the three MATS TAZs located in Monroe County (i.e., TAZs 600, 601 and 602) to be allocated according to the proportions of 40%, 40% and 20%, respectively.

Using these proportions, the dwelling unit density recommended for the area by the Monroe County Planning & Zoning Office, and the average household size in the TAZ, future population and household estimates were applied to each TAZ.

2. Population was estimated for each TAZ by calculating the Average Household Size for each TAZ in 2010, and then multiplying that by the number of anticipated new households from Step 1. The calculation steps were as follows:
a. Census Block Population Size = \textbf{Average Hh Size for Occupied Housing Units (Table H12, US 2010 Census)} x Total Number of Occupied Housing Units (Table H4, US 2010 Census)

b. TAZ Population in Households in 2010 = \sum_{i=0}^{n} \text{Census Block Population Size}
where \( i \) = Index of all Census Block Groups within a particular TAZ

c. TAZ Occupied Housing Units in 2010 = \sum_{i=0}^{n} \text{Census Block Occupied Housing Units (Table H3, US 2010 Census)}
where \( i \) = Index of all Census Block Groups within a particular TAZ

d. Avg Household Size for TAZ in 2010 = \frac{\text{TAZ Population in Households in 2010}}{\text{TAZ Occupied Housing Units in 2010}}

e. Est. Population Growth for TAZ in 2040 = \frac{\text{Avg Household Size for TAZ in 2010}}{\text{New Households in TAZ 2040}}

\textbf{Employment Growth Apportionment}

Future year employment estimates were generated by Dun & Bradstreet, using a proprietary time series estimation model based on the updated 2014 version of the National Establishment Time-Series Database (NETS 2014), produced by Walls & Associates. For further details on the regional scope and properties of the NETS database used for the 2040 LRTP Update, please see the data documentation for the 2010 base year data set (LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx).

The model estimated future employment, by two digit SIC code, using existing individual establishments with non-zero employment for 2011 and 2012. The model assumes growth at existing establishments, as opposed to generation of new business entities at greenfield or infill locations. Therefore, while the total employment growth estimate is presumed to be accurate in the aggregate, the future location is subject to revisions.

\textbf{Public School Enrollment Changes, College/University Enrollments and On Campus Housing Growth}

All estimates of 2010 student enrollment and on-campus housing estimates are carried over from the 2010 base year data set; please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx for full details.

Student growth at the elementary and secondary levels were deconstructed into components based on:

a) how much growth could be anticipated from population growth; plus
b) how much change could be anticipated based on anticipated facility expansions and/or closures

School growth anticipated by population growth was estimated in a two step process:
1. Calculate the anticipated growth in school age population in each TAZ with anticipated growth, based on the following formula:

\[
\text{Total anticipated population growth} \\
\times \\
\text{Proportion of students that fell into elementary, middle or high school population brackets, based on 2010 Census proportions (as estimated from Table P14, U.S. 2010 Census)}
\]

2. Allocate students to destination TAZs, based individual student category (elementary, middle or high school) and appropriate school district service areas covering the TAZ growth areas.

Where more than one school option of a particular student grouping was available, the student growth was allocated to the corresponding TAZs according to the proportion of the latest enrollment in each destination TAZ (e.g., where more than two or more elementary schools were a viable option to serve given growth area, the proportion of new elementary school students assigned to each destination TAZ was based on the proportion of total elementary school enrollment across all candidate zones).

Changes in school facility expansions or closures were obtained by contacting the Bibb County School District, and the Jones County School District, then applying those figures to the associated TAZs.
Variable Definitions

TAZ_NEW – The Transportation Analysis Zone for which the data is being collected. TAZ indexing reflects the zone system developed for mats_2040_lrtp_taz_Aug272015_New TAZ set, developed by GDOT and HNTB. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx

GrowthPriority – An ordinal classification of which TAZs are anticipated for future development. A value of “0” indicates that the TAZ is not targeted for growth between the 2010 base year and the 2040 plan target year. This variable only applies within its respective county (e.g., A value of “1” in Macon-Bibb (TAZ<=499) does not correspond to contemporaneous development of a TAZ with a value of “1” in Jones (TAZ between 500 and 599, inclusive) or a TAZ with a value of “1” in Monroe County (TAZ 600,601,602)) and it does not indicate precise year for future development

TtlPop2010 – The total number of persons identified as living in the specific TAZ, as of April 1, 2010. Values are based on U.S. Census 2010 counts reported at the block group level of geography, summed up to the TAZ level. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx

PopGrowth2040 – The marginal change in population anticipated to occur in the TAZ between the 2010 base year and the 2040 plan year, based on the calculation methodologies described in the previous section.

TtlHh2010 – The total number of households identified as living in the specific TAZ, as of April 1, 2010. Values are based on U.S. Census 2010 counts reported at the block group level of geography, summed up to the TAZ level. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx

HhGrowth2040 – The marginal change in households anticipated to occur in the TAZ between the 2010 base year and the 2040 plan year, based on the calculation methodologies described in the previous section.

AvgHHInc2010Adj – The average household income for the Census Block Groups covering the TAZ, in 2010 constant dollars. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx

TtlEmp10 – The total employment in the TAZ in 2010 identified in the NETS 2012 database, summed across all categories classified by GDOT. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx
FrcstTtlEmp2040 – The total employment forecast for the TAZ in 2040, as estimated by Dun & Bradstreet (methods described in the previous section). This variable is the aggregate of the variables FrcstUnclassifiedEmp2040, FrcstManufEmp2040, FrcstWholesaleEmp2040, FrcstRetailEmp2040, and FrcstServiceEmp2040 (see descriptions below)

TtlEmpChg20102040 – The marginal change in total employment in the TAZ from the 2010 base year through the 2040 plan year. Calculated as FrcstTtlEmp2040 – TtlEmp10.

UnclassifiedEmp2010 – The amount of 2010 employment in the NETS 2012 database located in the TAZ that did not otherwise fall into one of the GDOT specified categories. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx

FrcstUnclassifiedEmp2040 – The amount of employment forecast for the TAZ in 2040, not otherwise fall into one of the GDOT specified categories, as estimated by Dun & Bradstreet (methods described in the previous section).

UnclassifiedEmpChg20102040 – The marginal change in employment in the TAZ, which did not otherwise fall into one of the GDOT specified categories, from the 2010 base year through the 2040 plan year. Calculated as FrcstUnclassifiedEmp2040 – UnclassifiedEmp2010.

ManufEmp2010 – The amount of 2010 employment in the NETS 2012 database located in the TAZ and categorized as Manufacturing according to GDOT classification standards. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx

FrcstManufEmp2040 – The amount of employment forecast for the TAZ in 2040, as estimated by Dun & Bradstreet (methods described in the previous section) classified as Manufacturing according to GDOT classification standards.

ManufEmpChg20102040 – The marginal change in employment in the TAZ from the 2010 base year through the 2040 plan year, classified as Manufacturing according to GDOT classification standards. Calculated as FrcstManufEmp2040 – ManufEmp2010.

WholesaleEmp2010 – The amount of 2010 employment in the NETS 2012 database located in the TAZ and categorized as Wholesale according to GDOT classification standards. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx

FrcstWholeSaleEmp2040 – The amount of employment forecast for the TAZ in 2040, as estimated by Dun & Bradstreet (methods described in the previous section) classified as Wholesale according to GDOT classification standards.

WholeSaleEmpChg20102040 – The marginal change in employment in the TAZ from the 2010 base year through the 2040 plan year, classified as Manufacturing according to GDOT classification standards. Calculated as FrcstWholeSaleEmp2040 – WholeSaleEmp2010.
RetailEmp2010 – The amount of 2010 employment in the NETS 2012 database located in the TAZ and categorized as Retail according to GDOT classification standards. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx.

FrcstRetailEmp2040 – The amount of employment forecast for the TAZ in 2040, classified as Retail according to GDOT classification standards, as estimated by Dun & Bradstreet (methods described in the previous section).

RetailEmpChg20102040 – The marginal change in employment in the TAZ, classified as Retail according to GDOT classification standards, from the 2010 base year through the 2040 plan year. Calculated as FrcstRetailEmp2040 – RetailEmp2010.

ServiceEmp2010 - The amount of 2010 employment in the NETS 2012 database located in the TAZ and categorized as Service according to GDOT classification standards. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx.

FrcstServiceEmp2040 – The amount of employment forecast for the TAZ in 2040, as estimated by Dun & Bradstreet (methods described in the previous section) classified as Service according to GDOT classification standards.

ServiceEmpChg20102040 – The marginal change in employment in the TAZ from the 2010 base year through the 2040 plan year, classified as Service according to GDOT classification standards. Calculated as FrcstServiceEmp2040 – ServiceEmp2010.

School2010 – The total primary and secondary school enrollment, as of Fall 2010, in the TAZ. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx.

TtlsSchoolChg20102040 – The total change in school enrollment attributable to each TAZ between the 2010 base year and the 2040 forecast year, based on anticipated population growth. Total values are segmented by the amount that is attributable to population growth, as compared to changes due known reallocation of existing school resources (i.e., openings, closures, consolidations of campuses).

SchoolDistReorgChg20102040 – The amount of change in student population growth attributable to school closures, openings and campus consolidations. Verified by contacting Bibb County School District and Jones County School District (no public schools or large educational institutions in Monroe County were identified in the MATS study area).

StudentGrowthChg20102040 - The amount of change in student population growth attributable to new residential development, based on formula described in previous section.

CollegeEnroll2010 - The total college population across all undergraduate, graduate and/or professional programs attending classes at campuses located within the TAZ. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx.
**OnCampSelfRept2010** - The total number of students living in on-campus housing (i.e., dormitories) in Fall 2010, as reported by the university or technical college. This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx

**OnCampusCensus2010** - The total number of people living in dormitory group quarters according to the 2010 U.S. Census (U.S. Census 2010, Table P42-Group Quarters Population by Group Quarters Type). This number may be slightly different than the OnCampSelfRept value, due to the fact that U.S. Census 2010 asks where the individual was living as of April 1, 2010 (i.e., during the Spring 2010 semester). This variable carries over from the 2010 Base Year file submitted on 9/25/2015. For specific details on how it was developed, please see LRTPBaseYear2010TAZDataDocumentationUPDATE09252015.docx

**OnCampusResGrowth** - The total change in group quarters housing associated with universities, attributable to each TAZ between the 2010 base year and the 2040 forecast year, based on anticipated growth in student enrollment. Values were obtained by contacting Mercer University, Wesleyan University and Middle Georgia State University campus housing departments.

### TAZ Errata and Future Year Conditions

1. Jones County
   
   a. MATS area growth population proportion was overestimated due to erroneous inclusion of TAZs neighboring MATS border area. Correct value of anticipated population growth is 1,891 persons.
      
      GDOT Office of Planning notified of error by e-mail on 1/9/2017. Based on subsequent telephone conversations with GDOT staff, decision was mutually reached between GDOT and MATS that error would result in no significant alterations or adjustments to future year network modeling.
      
      Corrected anticipated population growth totals for Jones County were applied to demographic forecasting, and have been incorporated into results presented in Chapter 3 of the MATS 2040 Long Range Transportation Plan Update.