

**An IPA Planning Services Report**

# **Demographic Multipliers in Delaware**

**June 2009**

*written by*  
Troy Mix  
*and*  
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Institute for Public Administration  
College of Human Services, Education & Public Policy  
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## **Preface**

As Director of the Institute for Public Administration (IPA) at the University of Delaware, I am pleased to provide the *Demographic Multipliers in Delaware* report. The Delaware Office of Management and Budget (OMB) funded this research through an ongoing partnership with OMB's Budget Development, Planning and Administration division and the Office of State Planning Coordination. By providing a profile of the occupants of residential and nonresidential development in Delaware, this report will inform state and local efforts to better understand the population, and ultimately the service and fiscal impacts, resulting from development.

For this project, IPA analyzed U.S. Census Bureau data to reveal the demographic characteristics of individuals occupying houses of various types and sizes in Delaware. Additionally, numerous data sources were used to provide information on the average number of employees who are associated with various types of nonresidential development. Whether referring to the average number of occupants in a house or the average number of employees for a nonresidential use, these figures are known as "demographic multipliers."

Chapter 1 provides an overview of the demographic multipliers for residential development in Delaware. Illustrative tables show the average number of people and school-aged children associated with various types and sizes of housing in Delaware. Chapter 2 reviews the demographic multipliers for nonresidential development—providing details on the average number of employees-per-square-foot for a variety of uses. Chapter 3 provides guidance for planners and analysts who may use these multipliers, stressing the need for periodic review and updating of Delaware's multipliers.

The appendices will be particularly useful for those who wish to use this report to forecast the impacts of particular developments. Appendix A lists bibliographic information for this report. Appendices B and C contain all the tables of residential and nonresidential multipliers produced from this research. The resource CD produced in tandem with this report should further aid in the application of multipliers. It contains the tables from appendices B and C in Microsoft Excel format and details the methodology used to calculate Delaware's residential multipliers.

Effectively dealing with growth is one of the major challenges facing state and local governments. I expect this report will provide Delaware's governments with clarification about the impacts of development—helping to ameliorate some of the "growing pains" often associated with growth and development.

Jerome R. Lewis, Ph.D.  
Director, Institute for Public Administration

## **Institute for Public Administration**

The Institute for Public Administration (IPA) prepared this report. A unit within the College of Human Services, Education & Public Policy at the University of Delaware, IPA links the research and resources of the University with the management and information needs of local, state, and regional governments in the Delaware Valley. IPA provides assistance to agencies and local governments through direct staff assistance and research projects as well as training programs and policy forums.

IPA Assistant Policy Scientist Troy Mix and graduate research assistant Xuan Jiang authored this report. Mr. Mix functioned as project manager—drafting selected portions of the report and supervising the overall research and publication effort. Ms. Jiang completed the research, and much of the writing, for this report.

### **Institute Director**

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## **Acknowledgments**

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## Executive Summary

This report summarizes research conducted to determine Delaware's demographic multipliers. The report defines demographic multipliers, lists and describes Delaware's residential and nonresidential multipliers, and provides guidance for using and updating multipliers. The appendices list all the multipliers calculated and collected for this report, and these data are also available in Microsoft Excel format to assist with future research and analysis.

### Defining Demographic Multipliers

Demographic multipliers can help state and local governments anticipate and plan for the increases in service and infrastructure demand that accompany growth. Residential multipliers estimate the average number and characteristics of inhabitants living in various housing types and sizes. Nonresidential multipliers estimate the average number of employees working in a variety of commercial, office, institutional, and industrial establishments. Collectively, demographic multipliers can help planners and analysts forecast items such as school enrollment, drinking-water and wastewater usage, and the demand for public safety services. From a government perspective, knowledge about likely service and infrastructure demands can aid in planning for future capital and operating expenditures.

### Residential Multipliers in Delaware

Delaware's residential multipliers vary by housing type, size, and location. For example, in 2000 the average number of school-age children per housing unit ranged from 0.205 for units in large, multi-family structures (i.e., five or more units in a structure) to 0.463 for single-family, detached housing units. Not surprisingly, the number of total residents and children tends to increase as house size increases, with single-family, detached homes with more than five bedrooms housing the most residents on average (3.131). Delaware's residential multipliers vary considerably by county. For example, as of the 2000 Census, an average of 2.732 residents occupied each single-family, detached home in New Castle County, while an average of 1.756 residents occupied the same housing type in Sussex County. Geographic differences in multipliers exist because of factors such as the relative presence of long- and short-term residents and the prevalence of vacation and seasonal properties. The large number of seasonal properties in Sussex County most likely contributes to the county's relatively small residential multipliers.

### Nonresidential Multipliers in Delaware

Delaware-specific nonresidential multipliers were not calculated for this support. However, there is considerable support for the idea that the number of employees per square foot of nonresidential space does not vary much based on location, due to standardization of technologies and worker productivity across companies within the same business sector. This report lists nonresidential multipliers from several national studies. The expectation is that these figures can be used as at least rough approximations of Delaware's likely employment characteristics. Suggested nonresidential multiplier ranges are provided for uses such as offices, retail stores, lodging establishments, healthcare facilities, schools, and manufacturing sites. On an employee-per-square-foot basis, lodging, school, and warehouse uses tend to be the least intensive uses, while office and restaurant uses tend to have the highest number of employees per square foot.

## Limitations of Multipliers

Planners and analysts should use demographic multipliers with a cautious awareness of the assumptions and limitations that characterize these figures. Multipliers reflect the average characteristics of existing housing and nonresidential units. Therefore, analyses using multipliers do not capture any future changes in household and employment characteristics. Sampling affects the accuracy of Delaware's residential multipliers. Since these figures are derived from subsamples of U.S. Census Bureau data, the confidence attributed to multipliers for individual housing unit types and/or sizes depends on the size of the subsample for the unit in question. For instance, the calculated multiplier for single-family, detached homes in Delaware can be relied upon with significant confidence due to a sample size of 10,273. The multiplier for one bedroom, single-family, detached homes in Delaware, with a sample size of only 179, cannot be relied upon with similar confidence. Multipliers are best used to estimate the characteristics of common, broadly-defined units—such as a single-family, detached home—and are less reliably used in cases where more narrowly defined units are concerned, such as a two bedroom townhome built in Kent County within the past five years.

## Using and Updating Multipliers

Potential applications of demographic multipliers include long-range-scenario planning and short- and intermediate-term impact analysis and budget planning. In the case of long-range planning, multipliers can be used to estimate the relative impacts of alternative-growth scenarios, thus informing the decision-making process. Multipliers can be useful for short- or intermediate-term applications that aim to assess the population, public service, and infrastructure impacts of development that has already been approved or planned. This type of application typically results in a fiscal-impact analysis that reports the net impact of development on government revenues and expenditures.

The nature of demographic multipliers requires that they be periodically updated. Changing birthrates, technologies, and settlement patterns have certainly impacted household and employment characteristics, and it is reasonable to assume that similar changes will continue into the future. This report recommends that Delaware's residential multipliers be updated at least every ten years to benefit from the large sample sizes of decennial census information. Periodic updating of the nonresidential multipliers will be more problematic since they do not rely upon data sources released on a regular schedule. The recommended approach for updating nonresidential multipliers is to investigate whether national nonresidential multipliers have been updated at the point when future researchers are updating residential multipliers.

The detailed methodology for calculating Delaware's residential multipliers appears on a resource CD produced with this report. Also on this CD are the multiplier tables in Microsoft Excel format and the code used to calculate multipliers in SAS, a statistical software package. The detailed methodology, with any needed amendments, should be followed to update the residential multipliers. Nonresidential multipliers should be updated through a literature search approach that requires no original data analysis.

## Chapter 1. Residential Multipliers in Delaware

This chapter presents a detailed discussion of residential multipliers in Delaware. First, the concept of a residential multiplier is introduced. Next, an explanation of the methodology for calculating Delaware's residential multipliers is provided. Finally, this chapter presents several illustrative examples to show how residential multipliers can be used.

### **1-1. What are Residential Multipliers?**

Residential multiplier refers to the average number of the persons inhabiting various categories of residential space (Listokin, eds. 2006). For the purposes of planners and analysts, residential multipliers are concerned with the demand for public infrastructure and services. Residential multipliers can be used to estimate the likely number of public infrastructure and service users, such as estimating total residents for utility services, school-age children for educational services, and elderly population for certain social services (Listokin, eds. 2006). If, for a specific type of housing unit the residential multipliers are 2 for household size (total residents), 0.8 for school-age children, and 0.5 for public school children, then this implies that 100 housing units of this type would likely contain about 200 residents, including 80 school-age children and 50 public school children.

For the purpose of residential multipliers, housing units can be categorized according to variables such as size (i.e., the number of bedrooms), type of structure (e.g., single-family, detached or multi-family building), year of construction, and tenure (i.e., owner- or renter-occupied). Categorizing housing units based on these characteristics allows for comparison among the residential multipliers of various types of housing units. For instance, it may be necessary to compare the average number of public school children living in a three-bedroom single-family, detached unit with the number living in a one-bedroom home in a multi-family building (Listokin, eds. 2006).

Residential multipliers are not constant and will be affected by factors such as population change and the fluctuation of housing supply (Listokin, eds. 2006). In general, residential multipliers in the U.S. are expected to decline in future decades, since the population is projected to increase at a rate slower than the increase in available residential space—creating more housing units per capita (Nelson, 2004). At the same time, urban planning policies might contribute to the change of residential multipliers. For instance, policies promoting more compact urban form may encourage the supply of multi-family buildings but limit the development of single-family houses—potentially resulting in changed multipliers for these units. Increases or decreases in the birthrate could also result in changed residential multipliers.

### **1-2. Methodology and Data Sources**

This section reviews the general methods and specific data sources used to derive Delaware's residential multipliers. Particular attention is also devoted to describing the format for presenting multipliers in this report. Finally, a description of the data statistics used to clarify the



significance of Delaware's multipliers is provided. A detailed elaboration of the methodology for calculating multipliers is available on a resource CD produced with this report.

## General Method and Data Sources

The general method for calculating Delaware's residential multipliers is to cross-tabulate population characteristics by housing-unit characteristics. The calculation of multipliers allows for the presentation of population and housing data in formats not made possible by the standard U.S. Census summary files. For example, multipliers can present information on the average household size inhabiting two-bedroom apartments or the average number of children present in a four-bedroom, single-family, detached home in New Castle County. Since residential multipliers calculate the average number of people in various types of housing units, accurate information about population and housing units are needed to derive Delaware's multipliers.

Population data of interest for calculating multipliers includes total residents, school-age children, and public school children. These data fields are defined as follows:

- *Total residents*—all individuals living in housing units.
- *School-age children*—individuals from age 5-17 years old.
- *Public school children*—individuals of school-age that are enrolled in a K-12 public school.

The categories of housing-unit variables necessary to calculate multipliers include structure type, size, year built, and location. The following list presents these housing categories and individual subcategories within each.

- *Structure Type*
  - Single-family, detached
  - Single-family, attached
  - Small multi-family (2-4 units in a structure)
  - Large multi-family (5 or more units in a structure)
  - Mobile home
- *Size*
  - 0 bedroom
  - 1 bedroom
  - 2 bedrooms
  - 3 bedrooms
  - 4 bedrooms
  - 5 or more bedrooms
- *Year Built*
  - Existing Housing Stock in 2000
  - Existing Housing Stock in 2006
  - Housing built between 2000 and 2006
- *Location*
  - State of Delaware
  - New Castle County
  - Kent County
  - Sussex County

Residential multipliers allow for Delaware's population to be understood according to a number of housing-unit dimensions. For example, the average household size of all three-bedroom housing units in Delaware could be examined. This examination could be further specified by looking at single-family, detached homes located in Kent County in 2006. The calculated results for Delaware's multipliers are organized according to the format presented in Table 1-1.

**Table 1-1. Template for Presenting Delaware's Residential Multipliers**

<b>STRUCTURE/SIZE</b>	<b>TOTAL RESIDENTS</b>	<b>SCHOOL-AGE CHILDREN</b>	<b>PUBLIC SCHOOL CHILDREN</b>
<b>Single-Family, Detached</b>			
0 BR			
1 BR			
2 BR			
3 BR			
4 BR			
5 or more BRs			
<b>Single-Family, Attached</b>			
0 BR			
1 BR			
2 BR			
3 BR			
4 BR			
5 or more BRs			
<b>Small Multi-Family</b>			
0 BR			
1 BR			
2 BR			
3 BR			
4 BR			
5 or more BRs			
<b>Large Multi-Family</b>			
0 BR			
1 BR			
2 BR			
3 BR			
4 BR			
5 or more BRs			
<b>Mobile Home</b>			
0 BR			
1 BR			
2 BR			
3 BR			
4 BR			
5 or more BRs			

### Specific Data Sources

Data for calculating Delaware’s residential multipliers comes from the Public Use Microdata Sample (PUMS) of the U.S. Census Bureau’s 2000 decennial census and 2006 American Community Survey (ACS). PUMS provides a full range of population and housing information through two basic records types—the housing-unit record and the person record. Housing-unit records contain housing information, such as structure type, size, year built, and location. Person records contain characteristics of individuals, such as age, education, school attendance, and gender. A unique identifier links the housing-unit record with its occupants. Therefore, PUMS permits the cross-tabulation of a variable about housing by a variable about people (American Community Survey Office, 2008).

PUMS data are available for either a one-percent or five-percent sample of the population. One-percent microdata are collected every year as part of the ACS. The smallest geographic unit for one-percent PUMS data is the state. Five-percent microdata is collected every ten years as part of the decennial census. The smallest geographic unit for five-percent PUMS is the county level (American Community Survey Office, 2008). In order to account for demographic differences among Delaware’s counties, five-percent PUMS was used to calculate the residential multipliers of Delaware and its three counties for the year 2000. One-percent PUMS was used to calculate statewide residential multipliers for the year 2006, and for housing units built between 2000 and 2006.

The residential multipliers of Delaware are grouped into six profiles as shown in Table 1-2. So that multiplier tables for these profiles can be located, the profile identifiers (e.g., B1) correspond to table numbering in Appendix B. For each of the six profiles, the residential multipliers are organized as depicted in Table 1-1. SAS, a statistical software package, was used to process the data and calculate residential multipliers. A detailed description of the method for measuring Delaware’s residential multipliers appears on the resource CD produced with this report.

**Table 1-2. Profiles for Organizing Delaware’s Residential Multipliers**

Delaware Statewide (2000)	New Castle Countywide (2000)	Kent Countywide (2000)	Sussex Countywide (2000)	Delaware Statewide (2006)	Delaware Statewide (2000-2006)
B1	B4	B5	B6	B2	B3

### Data Statistics

Since PUMS is a sample of a larger universe of data, relevant data statistics must be discussed. For the residential multipliers regarding total residents, school-age children, and public school children, it is necessary to discuss their sample sizes, standard errors, and confidence intervals. These terms are defined as follows:

- *Sample Size (N)* is the number of housing units from which total residents, school-age children, and public school children are calculated.
- *Standard Error (SE)* of a sample is the standard deviation of the sampling distribution. SE is important since it reflects the sampling fluctuation (Everitt, 2003). The greater the SE, the less reliable the sample is. Usually, smaller sample sizes yield larger SEs

(Listokin, eds. 2006). For Delaware’s multipliers, since the data sample for the whole state is relatively large, the county data samples have larger SEs than the statewide sample.

- *Confidence Interval (CI)* quantifies the uncertainty in measurement by providing a range of values from low to high that has a specified probability (e.g., 90% or 95%) of containing the true population value. A 95% CI was chosen for this report. Usually, data from a smaller sample will have greater uncertainty (i.e., a wider CI) than data from a larger sample (Listokin, eds. 2006). In Delaware, countywide multipliers are expected to have a wider CI than statewide multipliers.

Data statistics for residential multipliers are grouped into 18 profiles as depicted in Table 1-3. The profile identifiers (e.g., B1) in this table correspond to table numbering in Appendix B so that the data statistic tables can be referenced.

**Table 1-3. Profiles for Organizing the Data Statistics of Delaware’s Residential Multipliers**

	Delaware Statewide (2000)	New Castle Countywide (2000)	Kent Countywide (2000)	Sussex Countywide (2000)	Delaware Statewide (2006)	Delaware Statewide (2000-2006)
Total Persons	B7	B16	B19	B22	B10	B13
School-Age Children	B8	B17	B20	B23	B11	B14
Public School Children	B9	B18	B21	B24	B12	B15

### 1-3. Sample Residential Multipliers

The calculated results of Delaware’s residential multipliers are presented in tabular form in Appendix B. The data statistics for the residential multipliers also appear in Appendix B. This section presents illustrative examples of residential multipliers and relevant data statistics to show how results can be interpreted.

#### By Housing Type

*Example 1:* A comparison between the impacts of developing various types of housing units

The residential multipliers from Table B2 indicate the average number of total residents, school-age children, and public school children occupying a four-bedroom single-family, detached home and the number occupying a two-bedroom single-family, attached home in 2006. Table 1-5 provides a summary of Table B2.

**Table 1-5. Comparison Between Residential Multipliers for Housing Units with Different Structures**

DELAWARE STATEWIDE (2006)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
Single-Family, Detached			
4 BR	2.818	0.645	0.420
Single-Family, Attached			
4 BR	2.531	0.633	0.510

Source: Table B2

The calculated results indicate that building 100 four-bedroom single-family, detached homes will likely represent about 282 persons, of whom 65 will be school-age children and 42 will be public school children. The development of 100 four-bedroom single-family, attached homes will likely represent about 253 persons, of whom 63 will be school-age children and 51 will be public school children. These estimates forecast that the detached variety of housing in this comparison will result in larger household sizes, including more school-age and public school children.

## By Housing Size

*Example 2:* A comparison between the residential multipliers of housing units of the same type but different sizes

Not surprisingly, different sized housing units will generate different residential multipliers. Table 1-6 shows that single-family, detached homes with fewer bedrooms generate, on average, fewer residents and school-age children than those with more bedrooms. Using these figures, 100 single-family, detached homes with two bedrooms would represent about 154 total residents, including 11 school-age children and 11 public school children. 100 single-family, detached homes with four bedrooms would represent about 282 total residents, including 65 school-age children and 42 public school children.

**Table 1-6. Comparison Between Residential Multipliers for Housing Units of the Same Type and Different Size**

DELAWARE STATEWIDE (2006)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL AGE CHILDREN	PUBLIC SCHOOL CHILDREN
Single-Family, Detached			
2 BR	1.539	0.114	0.111
Single-Family, Detached			
3 BR	2.818	0.645	0.420

Source: Table B2

## By Year Built

*Example 3:* A comparison between the residential multipliers of housing units of the same type in different years

Table 1-7 shows that, for the same type of housing unit, residential multipliers vary from year to year. Based on Delaware's housing and population characteristics in 2000, building 100 three-bedroom single-family, detached homes would represent about 227 total residents, including 39 school-age and 30 public school children. However, based on characteristics in 2006, building 100 three-bedroom single-family, detached homes would represent about 208 residents, including 30 school-age and 23 public school children. This example shows that, at least for homes of this variety and size, residential multipliers in Delaware have decreased between 2000 and 2006.

**Table 1-7. Comparison Between Residential Multipliers for Housing Units in Different Years**

DELAWARE STATEWIDE (2000)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
Single-Family, Detached			
3 BR	2.265	0.386	0.302
DELAWARE STATEWIDE (2006)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
Single-Family, Detached			
3 BR	2.084	0.301	0.225

Source: Tables B1 and B2

## By Location

*Example 4:* A comparison between the residential multipliers of housing units located in different areas

The results in Table 1-8 show that, for the same type of housing unit, residential multipliers vary by geographic location. For instance, in New Castle County in 2000, 100 four-bedroom single-family, detached homes would represent roughly 308 residents, including 71 school-age and 44 public school children. For the same housing type, size, and year in Sussex County, building 100 homes would represent approximately 187 residents, including 42 school-age and 34 public school children. Therefore, at least in the year 2000, multipliers for total residents, school-age children, and public school children living in four-bedroom single-family, detached houses were higher for New Castle County than they were for Sussex County. The high prevalence of seasonal homes in Sussex County most likely contributes to Sussex's relatively low residential multipliers.

**Table 1-8. Comparison between Residential Multipliers for Housing Units in Different Locations**

NEW CASTLE COUNTY, DELAWARE (2000)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
Single-Family, Detached			
4 BR	3.077	0.704	0.444
SUSSEX COUNTY, DELAWARE (2000)			
Single-Family, Detached			
4 BR	1.869	0.424	0.343

Source: Tables B4 and B6

## Sample Size Considerations

*Example 5:* An illustration of sample size's impacts on the standard error (SE) and confidence interval (CI).

Table 1-9 shows that, for the same kind of housing unit, there is a difference between the data statistics of the statewide and countywide samples. For the total persons living in a four-bedroom single-family, detached home, the statewide sample is larger (3,045 vs. 658), SE is smaller (0.017 vs. 0.055), and CI is tighter (0.113 vs. 0.279). While countywide data has the advantage of generating results that are specific to sub-state geographies within Delaware, it has the disadvantage of generating results with higher SEs and wider CIs than data derived from a larger, statewide sample.

**Table 1-9. Comparison Between Data Statistics of Samples with Different Sizes**

DELAWARE STATEWIDE (2000)					
STRUCTURE/SIZE	TOTAL RESIDENTS	N	SE	CI-Low	CI-High
Single-Family, Detached					
4 BR	2.820	3045	0.017	2.763	2.876
SUSSEX COUNTY, DELAWARE (2000)					
Single-Family, Detached					
4 BR	1.869	658	0.052	1.730	2.009

Sources: Tables B7 and B22

## Chapter 2. Nonresidential Multipliers in Delaware

This chapter discusses nonresidential multipliers in Delaware. First, the concept of nonresidential multipliers is introduced. Next, the methodology and data sources for estimating nonresidential multipliers are discussed. The nonresidential multipliers of Delaware are not directly examined by this study. Instead, the results of multiple national studies have been adopted. Therefore, the section about methodology and data sources provides the justification for simply adopting the results from other studies. Finally, the summarized results of nonresidential multipliers are presented. The complete, detailed nonresidential multiplier tables appear in Appendix C.

### 2-1. What are Nonresidential Multipliers?

Nonresidential multipliers refer to the average number of employees per unit of various types of nonresidential land uses, such as offices, retails, factories, and schools. Nonresidential multipliers are expressed as the number of employees per 1,000 square feet (SF) of a particular type of nonresidential space. For example, 1,000 SF of office space may translate to an average of 3 employees, while 1,000 SF of manufacturing space may translate to an average of 2 employees. This square footage refers to gross floor area (GFA).

Similar to residential multipliers, nonresidential multipliers vary over time. In the United States, a variety of factors, including automation in manufacturing, suburbanization, and outsourcing, may contribute to these changes (Listokin, eds., 2006). As depicted in Table 2-1, nonresidential multipliers have been declining in recent decades.

**Table 2-1. National Nonresidential Multipliers (1942-2000)**

Year	Employees / 1,000 sq. ft. of Gross Floor Area	
	Office*	Manufacturing**
1942	9.09	N/A
1958	8.26	N/A
1961	N/A	2.57
1979	5.03	N/A
1980	4.78	N/A
1990	3.97	N/A
1991	N/A	2.02
2000***	3.57	1.83

Notes: \* Adapted from: Armstrong (1972); Building Owners and Managers Association International (1980); Price Waterhouse Real Estate Group (1991); NAIOP (1990).

\*\* Adapted from: Nez (1961, pp3-8) (for light industry); ITE (1991) (for light industry); NAIOP (1990) (for general manufacturing).

\*\*\* Extrapolation of trends

Source: Nelson, Arthur (2004).



## 2-2. Methodology and Data Sources

This section briefly reviews the methodology and data sources used to define nonresidential multipliers for this report.

### Methodology

Although the U.S. Census Bureau provides state-level data for the number of employees in each industrial sector, there is no standard data source for the gross floor areas of various types of nonresidential space. Further, no study to measure these spaces has been completed in Delaware. However, many studies have measured nonresidential multipliers across the United States.

These national studies calculate the average number of employees per 1,000 square feet of nonresidential space. Given the lack of Delaware-specific data, this report adopts the results from these studies as the best available data. Further supporting the use of national data, and as indicated in the *Planner's Estimating Guide*, the number of employees per unit of nonresidential space tends not to vary much by location (Nelson, 2004). This is due in large part to standardization of technologies and employee productivity within the same economic sector. For example, a study conducted by the National Association of Industrial and Office Properties (NAIOP) found that there is little variation among office employment regardless of where offices are located (1990). The NAIOP study found that per 1,000 SF there are about 4.37 employees in firms of large size (more than 250 employees) located within a Central Business District. This is only slightly greater than (< 20%) the average number of employees per 1,000 SF in firms of small size (fewer than five employees) located within rural areas—3.72. While this is a significant difference, it serves as evidence that the averages for employment by area are not wildly different from one another even when location and firm size are varied. Therefore, national figures can be expected to serve as a rough approximation of conditions in Delaware, even though these nonresidential multipliers are not specifically calculated for the state.

Although national-average figures can be used to estimate a state's nonresidential multipliers, there could still be regional variations in data. For example, offices for research and development tend to have slightly lower employment densities than do general offices. Therefore, a state with a relatively high proportion of research and development employment, such as New Jersey, might have fewer employees per 1,000 square feet of office space (Listokin, eds. 2006).

### Data Sources

Listokin collected the results from 14 national studies, reorganized the multipliers by types of uses, analyzed the data statistics (range, median, and mean) of the multipliers, and recommended appropriate ranges for multipliers (eds. 2006). This report adopts Listokin's structure for organizing nonresidential multipliers from the following 14 studies:

1. Commercial Buildings Energy Consumption Survey, Data for 1990 or Newer Construction. (U.S. Department of Energy, Energy Information Administration)
2. Energy Star Hospitality Industry Facts, 2006. (U.S. Environmental Protection Agency)
3. Industrial Employment Densities, 1997. (American Real Estate Society)
4. Industrial Land Supply and Demand in the Central Puget Sound Region, 1998. (State of Washington, Puget Sound Regional Council)

5. Metro Employment Density Study, 1999. (Portland, Oregon: Growth Management Services Department)
6. Office Space Utilization Rates, 1996. (Building Owners and Managers Association)
7. Pacific Gas & Electric Survey 1996. (California Department of Energy)
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### **2-3. Sample Nonresidential Multipliers**

The nonresidential multipliers are categorized based on type of land uses. The three generalized land-use categories are commercial, industrial, and hospitality and other. The following list details subcategories within each of the general categories:

- *Commercial*
  - Office
  - Retail
  - Eating and Drinking
- *Industrial*
  - Warehouse
  - Manufacturing
- *Hospitality and Other*
  - Lodging
  - Health
  - Schools

All the nonresidential multipliers, as calculated by national studies, are listed in Appendix C. Listokin reviewed the results from the 14 studies and put forward the suggested ranges for nonresidential multipliers shown in Table 2-2 (eds. 2006).

**Table 2-2. Suggested Nonresidential Multiplier Ranges**

<b>Nonresidential Uses</b>	<b>Nonresidential Multipliers (Employees / 1,000 sq. ft. of Gross Floor Area)</b>
I. Commercial	
1. Office	3.0 - 4.0
2. Retail	1.0 - 2.0
3. Eating and Drinking	3.0 - 4.0
II. Industrial	
1. Warehouse	0.2 - 0.8
2. Manufacturing	1.0 - 2.0
III. Hospitality and Other	
1. Lodging	0.5 - 1.0
2. Health	2.0 - 3.0
3. Schools	0.8 - 1.2

Source: Listokin, David; Voicu, Loan; Dolphin, William; and Camp, Matthew. (November, 2006).

## Chapter 3. Guidance for Using and Updating Multipliers

The use of demographic multipliers is not an exact science. Multipliers are not appropriate for every planning application. Further, an understanding of the primary assumptions undergirding multipliers is needed so that any calculated impacts can be interpreted properly. Household and employment characteristics also change over time, requiring that multipliers be updated on a periodic basis. This final chapter provides guidance on using, interpreting, and updating demographic multipliers in Delaware.

### 3-1. Using Demographic Multipliers

This section reviews the key assumptions and limitations that should inform the use of demographic multipliers in Delaware. Additionally, several potential applications of demographic multipliers are briefly discussed.

#### Key Assumptions and Limitations

Familiarity with the following four assumptions and limitations of demographic multipliers can help analysts more appropriately use and interpret the output from analyses employing multipliers.

1. *Multipliers Project More of the Same, Not Change:* Demographic multipliers do not project any change in household or employment characteristics. Instead, multipliers operate under the assumption that existing characteristics serve as the best available predictor of future conditions. Using multipliers, an area with an existing average household size of 2.5 could expect 250 new residents if 100 new homes were to be built. As addressed in section 3-2, this assumption creates the need to regularly update demographic multipliers to reflect the dynamics of household and employment characteristics.
2. *Multipliers Rely Upon Accurate Estimates of Future Growth:* Without proper consideration of the likely timing and extent of future growth, demographic multipliers can present a distorted picture of the future population, and attendant service and infrastructure demands, expected for an area. For example, a town's plan may call for the development of 500 housing units, but prevailing market conditions might make the construction of the majority or even some of these units highly unlikely in the short term.

To address the possibility of a disconnect between planned development and market realities, multipliers should be used in concert with population projections. This will help to ensure that impacts from multipliers reflect the likely pace of development, rather than an arbitrary notion of build-out. Population projections further strengthen the application of multipliers by adding a time component that specifies when new service and infrastructure demands from additional population are likely to occur.

3. *Sample Size Limits Accuracy:* Sample data from the U.S. Census Bureau were used to derive demographic multipliers in Delaware. Although they may be quite accurate in many cases, none of Delaware's multipliers should be considered absolutely representative of either the existing or future population. In a few instances, actual population values likely deviate

substantially from the derived multipliers. This tends to occur in cases when a relatively small sample is used to estimate the parameters for a population. In general, demographic multipliers are best used to estimate the characteristics of broadly defined classes of housing that are quite common. Single-family, detached housing is a common, broadly-defined type, while a five-bedroom townhome built within the past ten years is a narrowly defined type whose characteristics would be difficult to accurately reflect with multipliers.

4. *Multipliers Best Reflect the “Average,” Not the “Exact”*: Multipliers can be used at a variety of scales, including the site, jurisdiction, and regional levels. At the site level, multipliers are likely to miss characteristics that might increase the probability for certain developments to deviate from the norm in terms of household size and age of inhabitants. This does not mean that demographic multipliers cannot be used at the site level, only that the analyst should be aware that unique characteristics of a particular development may not be captured by multipliers.

For developments with obviously unique household characteristics, such as retirement communities, a case-study approach would likely be a more accurate way to reflect the population and service impacts. As the scale of analysis becomes larger, a demographic-multiplier approach will have a higher likelihood of capturing overall population characteristics since significant variations from the norm should be smoothed out.

## Potential Applications

Two general applications of demographic multipliers—long-range scenario planning and short- and intermediate-term impact analysis and budget planning—should be of interest to planners and analysts in Delaware. A brief discussion of these potential applications follows.

1. *Long-Range Scenario Planning*: Demographic multipliers can be used during the long-range planning process to assess the likely population, public service, and infrastructure impacts of alternative development scenarios. An application of this type would proceed by identifying various options for growth and then estimating the impacts with the aid of multipliers. The results of this analysis could serve to inform the process of deciding between growth scenarios. Alternatively, multipliers could be used to prepare a long-range forecast of operating and capital expenditures resulting from the agreed-upon development plan. This type of application could be used for a variety of state, local, and regional purposes.
2. *Short- and Intermediate-Term Impact Analysis and Budget Planning*: Demographic multipliers can also be used to assess the population, public service, and infrastructure impacts of development that has already been approved or planned. This application differs from long-range scenario planning, primarily because of its immediacy. In this instance analysts can use multipliers to estimate the short- and intermediate-term impacts of pending development on public services, infrastructure, and, ultimately, government expenditures for capital and operating purposes. This type of application would typically result in a fiscal-impact analysis that reports the net impact of development on government revenues and expenditures. Multipliers are critical to this process since they allow for the systematic translation of proposed development to increases in population and, ultimately, demand for services and infrastructure, which effect changes in government expenditures. The projection

of future government revenues and expenditures means that this type of application could be particularly useful for budget-planning purposes. Again, this type of application could be used by planners and analysts to investigate impacts at state, local, and regional levels.

Within these sets of general applications, the use of demographic multipliers might be valuable to address the following specific topics:

- Projecting drinking water and wastewater demand
- School-enrollment projections
- Demand for social services, in general, and age-dependent social services, in particular
- Demand for public safety services

### **3-2. Updating Demographic Multipliers**

As stated earlier in this chapter, the nature of demographic multipliers requires that they be periodically updated. Changing birthrates, technologies, and settlement patterns have certainly impacted household and employment characteristics, and it is reasonable to assume that similar changes will continue into the future. The remainder of this section provides guidance on the suggested timing and mechanics for updating demographic multipliers in Delaware.

#### **Timing for Multiplier Updates**

Delaware's residential multipliers should be updated at least every ten years. A ten-year update period allows for the use of decennial census information, which benefits from large sample sizes. Based on the timing of this report, an update of the residential multipliers should be initiated as soon as Public Use Microdata Sample (PUMS) files are available for the 2010 Census. After that time, a ten-year update cycle would be sufficient. More frequent multiplier studies could be completed to identify emerging trends, but these would rely on smaller sample sizes and thus be less robust and accurate than decennial updates.

Periodic updating of the nonresidential multipliers will be more problematic since they do not rely upon data sources released on a regular schedule. One potential solution would be to regularly invest in a Delaware-specific research project to estimate the average number of employees per square foot of commercial development. However, this solution would likely be costly, and it disregards the finding that the number of employees per square foot does not tend to vary much based on location. Instead, at the point when future researchers are updating residential multipliers, they should investigate whether national nonresidential multipliers have been updated.

#### **Mechanics of Multiplier Updates**

The detailed methodology for calculating Delaware's residential multipliers appears on a resource CD produced with this report. Also on this CD is code used to calculate the multipliers in SAS, a statistical software package. The detailed methodology, with any needed amendments, should be followed to update the residential multipliers. The primary data requirement for this update will be access to future versions of the PUMS files. This is necessary so that the characteristics of household inhabitants (e.g., number and age of individuals) can be cross-tabulated with the characteristics of housing units (e.g., type of structure and year built). The

primary requirement of researchers updating the multipliers is that they have access to and knowledge of a statistical software package, such as SAS. A literature-search approach is recommended to update the nonresidential multipliers, requiring fewer technical qualifications for researchers updating these multipliers.

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Table B1. Residential Multipliers in Delaware (2000)

DELAWARE STATEWIDE (2000)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
<b>Single-Family, Detached</b>	<b>2.404</b>	<b>0.463</b>	<b>0.337</b>
0 BR	2.438	0.563	0.375
1 BR	1.905	0.246	0.207
2 BR	1.754	0.167	0.125
3 BR	2.265	0.386	0.302
4 BR	2.820	0.657	0.452
5 or more BRs	3.131	0.926	0.589
<b>Single-Family, Attached</b>	<b>2.182</b>	<b>0.438</b>	<b>0.357</b>
0 BR	2.500	0.417	0.333
1 BR	1.963	0.327	0.271
2 BR	1.817	0.273	0.216
3 BR	2.276	0.478	0.393
4 BR	2.794	0.760	0.617
5 or more BRs	2.512	0.561	0.415
<b>Small Multi-Family</b>	<b>1.834</b>	<b>0.320</b>	<b>0.270</b>
0 BR	1.320	0.040	0.040
1 BR	1.579	0.175	0.139
2 BR	1.964	0.350	0.298
3 BR	2.087	0.524	0.447
4 BR	2.263	0.737	0.658
5 or more BRs	1.667	0.500	0.333
<b>Large Multi-Family</b>	<b>1.563</b>	<b>0.205</b>	<b>0.171</b>
0 BR	1.130	0.037	0.028
1 BR	1.301	0.089	0.073
2 BR	1.718	0.240	0.202
3 BR	2.092	0.613	0.520
4 BR	2.000	0.500	0.364
5 or more BRs			
<b>Mobile Home</b>	<b>1.948</b>	<b>0.343</b>	<b>0.308</b>
0 BR	1.000	0.000	0.000
1 BR	1.697	0.182	0.182
2 BR	1.524	0.171	0.157
3 BR	2.331	0.498	0.443
4 BR	3.357	1.000	0.857
5 or more BRs	10.000	4.000	4.000

Table B2. Residential Multipliers in Delaware (2006)

DELAWARE STATEWIDE (2006)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
<b>Single-Family, Detached</b>	<b>2.282</b>	<b>0.406</b>	<b>0.280</b>
0 BR	0.000	0.000	0.000
1 BR	1.056	0.000	0.000
2 BR	1.539	0.114	0.111
3 BR	2.084	0.301	0.225
4 BR	2.818	0.645	0.420
5 or more BRs	2.760	0.664	0.377
<b>Single-Family, Attached</b>	<b>1.970</b>	<b>0.349</b>	<b>0.289</b>
0 BR	2.000	0.000	0.000
1 BR	1.300	0.200	0.200
2 BR	1.703	0.188	0.158
3 BR	1.981	0.374	0.313
4 BR	2.531	0.633	0.510
5 or more BRs	2.333	0.111	0.000
<b>Small Multi-Family</b>	<b>1.500</b>	<b>0.264</b>	<b>0.243</b>
0 BR			
1 BR	0.857	0.000	0.000
2 BR	1.661	0.373	0.356
3 BR	2.192	0.577	0.500
4 BR	1.333	0.000	0.000
5 or more BRs	3.000	0.000	0.000
<b>Large Multi-Family</b>	<b>1.371</b>	<b>0.106</b>	<b>0.099</b>
0 BR	0.750	0.000	0.000
1 BR	1.102	0.006	0.006
2 BR	1.587	0.141	0.136
3 BR	1.767	0.467	0.400
4 BR	0.667	0.000	0.000
5 or more BRs	1.000	0.000	0.000
<b>Mobile Home</b>	<b>1.649</b>	<b>0.226</b>	<b>0.191</b>
0 BR			
1 BR	0.895	0.000	0.000
2 BR	1.407	0.192	0.130
3 BR	1.727	0.200	0.186
4 BR	3.400	0.900	0.850
5 or more BRs	3.333	1.000	1.000

Table B3. Residential Multipliers in Delaware (2000-2006)

DELAWARE STATEWIDE (2000-2006)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
<b>Single-Family, Detached</b>	<b>2.426</b>	<b>0.481</b>	<b>0.379</b>
0 BR			
1 BR	2.000	0.000	0.000
2 BR	1.526	0.105	0.105
3 BR	2.064	0.316	0.251
4 BR	2.904	0.669	0.510
5 or more BRs	2.541	0.649	0.568
<b>Single-Family, Attached</b>	<b>1.746</b>	<b>0.270</b>	<b>0.190</b>
0 BR			
1 BR	1.000	0.000	0.000
2 BR	1.636	0.000	0.000
3 BR	1.773	0.295	0.182
4 BR	1.857	0.571	0.571
5 or more BRs			
<b>Small Multi-Family</b>	<b>1.467</b>	<b>0.333</b>	<b>0.333</b>
0 BR			
1 BR	2.000	0.000	0.000
2 BR	2.167	0.500	0.500
3 BR	0.833	0.333	0.333
4 BR	0.000	0.000	0.000
5 or more BRs	2.000	0.000	0.000
<b>Large Multi-Family</b>	<b>1.018</b>	<b>0.073</b>	<b>0.055</b>
0 BR	2.000	0.000	0.000
1 BR	0.800	0.000	0.000
2 BR	1.417	0.042	0.000
3 BR	0.667	0.250	0.250
4 BR	0.000	0.000	0.000
5 or more BRs			
<b>Mobile Home</b>	<b>2.210</b>	<b>0.323</b>	<b>0.226</b>
0 BR			
1 BR	0.000	0.000	0.000
2 BR	2.455	0.727	0.273
3 BR	2.049	0.146	0.146
4 BR	2.889	0.667	0.556
5 or more BRs			

Table B4. Residential Multipliers in New Castle County (2000)

NEW CASTLE COUNTY, DELAWARE (2000)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
<b>Single-Family, Detached</b>	<b>2.732</b>	<b>0.539</b>	<b>0.355</b>
0 BR	2.800	0.700	0.600
1 BR	2.435	0.449	0.362
2 BR	1.988	0.199	0.134
3 BR	2.497	0.413	0.293
4 BR	3.077	0.704	0.444
5 or more BRs	3.615	1.042	0.608
<b>Single-Family, Attached</b>	<b>2.391</b>	<b>0.485</b>	<b>0.390</b>
0 BR	2.625	0.375	0.250
1 BR	2.108	0.365	0.311
2 BR	1.996	0.306	0.236
3 BR	2.453	0.524	0.427
4 BR	3.314	0.810	0.653
5 or more BRs	3.185	0.852	0.630
<b>Small Multi-Family</b>	<b>1.989</b>	<b>0.369</b>	<b>0.319</b>
0 BR	1.333	0.056	0.056
1 BR	1.578	0.198	0.161
2 BR	2.183	0.442	0.386
3 BR	2.825	0.750	0.700
4 BR	3.231	1.000	0.846
5 or more BRs	5.000	1.000	0.000
<b>Large Multi-Family</b>	<b>1.744</b>	<b>0.208</b>	<b>0.170</b>
0 BR	1.144	0.044	0.033
1 BR	1.353	0.083	0.066
2 BR	2.007	0.256	0.212
3 BR	3.013	0.910	0.756
4 BR	4.000	0.800	0.400
5 or more BRs			
<b>Mobile Home</b>	<b>2.178</b>	<b>0.303</b>	<b>0.260</b>
0 BR	0.000	0.000	0.000
1 BR	1.538	0.000	0.000
2 BR	1.780	0.138	0.119
3 BR	2.718	0.577	0.487
4 BR	2.667	0.333	0.333
5 or more BRs	11.000	1.000	1.000

Table B5. Residential Multipliers in Kent County (2000)

KENT COUNTY, DELAWARE (2000)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
<b>Single-Family, Detached</b>	<b>2.647</b>	<b>0.547</b>	<b>0.455</b>
0 BR	2.250	0.500	0.000
1 BR	1.959	0.184	0.163
2 BR	1.965	0.208	0.168
3 BR	2.550	0.481	0.423
4 BR	3.106	0.805	0.663
5 or more BRs	4.172	1.391	0.875
<b>Single-Family, Attached</b>	<b>2.590</b>	<b>0.601</b>	<b>0.503</b>
0 BR	2.000	0.500	0.500
1 BR	1.750	0.083	0.000
2 BR	2.111	0.370	0.315
3 BR	2.639	0.546	0.464
4 BR	4.929	2.500	2.071
5 or more BRs	2.500	0.000	0.000
<b>Small Multi-Family</b>	<b>2.056</b>	<b>0.324</b>	<b>0.259</b>
0 BR	1.500	0.000	0.000
1 BR	1.652	0.152	0.109
2 BR	1.842	0.237	0.184
3 BR	3.267	0.867	0.667
4 BR	4.200	1.200	1.200
5 or more BRs			
<b>Large Multi-Family</b>	<b>1.864</b>	<b>0.285</b>	<b>0.240</b>
0 BR	0.625	0.000	0.000
1 BR	1.244	0.089	0.078
2 BR	2.070	0.320	0.260
3 BR	3.600	0.950	0.800
4 BR	5.333	1.333	1.333
5 or more BRs			
<b>Mobile Home</b>	<b>2.373</b>	<b>0.485</b>	<b>0.436</b>
0 BR	2.000	0.000	0.000
1 BR	2.391	0.304	0.304
2 BR	1.858	0.226	0.213
3 BR	2.788	0.718	0.639
4 BR	4.154	1.308	1.077
5 or more BRs			

Table B6. Residential Multipliers in Sussex County (2000)

SUSSEX COUNTY, DELAWARE (2000)			
STRUCTURE/SIZE	TOTAL RESIDENTS	SCHOOL-AGE CHILDREN	PUBLIC SCHOOL CHILDREN
<b>Single-Family, Detached</b>	<b>1.756</b>	<b>0.300</b>	<b>0.249</b>
0 BR	1.000	0.000	0.000
1 BR	1.262	0.066	0.066
2 BR	1.501	0.127	0.100
3 BR	1.802	0.299	0.253
4 BR	1.869	0.424	0.343
5 or more BRs	1.847	0.527	0.420
<b>Single-Family, Attached</b>	<b>0.830</b>	<b>0.099</b>	<b>0.093</b>
0 BR	2.500	0.500	0.500
1 BR	1.571	0.333	0.286
2 BR	0.885	0.077	0.077
3 BR	0.769	0.109	0.102
4 BR	0.475	0.000	0.000
5 or more BRs	0.700	0.000	0.000
<b>Small Multi-Family</b>	<b>1.382</b>	<b>0.212</b>	<b>0.170</b>
0 BR	1.000	0.000	0.000
1 BR	1.500	0.095	0.071
2 BR	1.553	0.202	0.160
3 BR	1.104	0.229	0.167
4 BR	1.150	0.450	0.400
5 or more BRs	1.000	0.400	0.400
<b>Large Multi-Family</b>	<b>0.813</b>	<b>0.156</b>	<b>0.140</b>
0 BR	1.400	0.000	0.000
1 BR	1.070	0.122	0.104
2 BR	0.703	0.157	0.144
3 BR	0.733	0.213	0.200
4 BR	0.571	0.214	0.143
5 or more BRs			
<b>Mobile Home</b>	<b>1.663</b>	<b>0.274</b>	<b>0.248</b>
0 BR	0.000	0.000	0.000
1 BR	1.233	0.167	0.167
2 BR	1.289	0.151	0.136
3 BR	2.002	0.360	0.325
4 BR	3.087	1.000	0.870
5 or more BRs	9.000	7.000	7.000



Table B7. Data Statistics: Residential Multipliers for Total Residents in Delaware (2000)

DELAWARE STATEWIDE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	TOTAL RESIDENTS	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>2.404</b>	<b>10273</b>	<b>0.010</b>	<b>2.374</b>	<b>2.434</b>
0 BR	2.438	16	0.320	1.372	3.503
1 BR	1.905	179	0.080	1.687	2.123
2 BR	1.754	1187	0.028	1.680	1.828
3 BR	2.265	5372	0.013	2.227	2.302
4 BR	2.820	3045	0.017	2.763	2.876
5 or more BRs	3.131	474	0.059	2.927	3.334
<b>Single-Family, Attached</b>	<b>2.182</b>	<b>2249</b>	<b>0.022</b>	<b>2.118</b>	<b>2.247</b>
0 BR	2.500	12	0.316	1.400	3.600
1 BR	1.963	107	0.101	1.682	2.244
2 BR	1.817	612	0.038	1.716	1.918
3 BR	2.276	1302	0.028	2.192	2.361
4 BR	2.794	175	0.092	2.492	3.097
5 or more BRs	2.512	41	0.200	1.873	3.152
<b>Small Multi-Family</b>	<b>1.834</b>	<b>781</b>	<b>0.041</b>	<b>1.724</b>	<b>1.943</b>
0 BR	1.320	25	0.140	0.989	1.651
1 BR	1.579	280	0.060	1.431	1.726
2 BR	1.964	329	0.061	1.796	2.131
3 BR	2.087	103	0.135	1.701	2.474
4 BR	2.263	38	0.240	1.531	2.995
5 or more BRs	1.667	6	0.817	-1.043	4.376
<b>Large Multi-Family</b>	<b>1.563</b>	<b>2168</b>	<b>0.022</b>	<b>1.509</b>	<b>1.618</b>
0 BR	1.130	108	0.061	1.002	1.258
1 BR	1.301	823	0.028	1.239	1.364
2 BR	1.718	1042	0.032	1.634	1.801
3 BR	2.092	173	0.104	1.794	2.391
4 BR	2.000	22	0.354	0.958	3.042
5 or more BRs		0			
<b>Mobile Home</b>	<b>1.948</b>	<b>1666</b>	<b>0.027</b>	<b>1.874</b>	<b>2.022</b>
0 BR	1.000	4	0.578	-0.837	2.837
1 BR	1.697	66	0.117	1.392	2.002
2 BR	1.524	805	0.037	1.436	1.613
3 BR	2.331	747	0.038	2.217	2.445
4 BR	3.357	42	0.182	2.683	4.031
5 or more BRs	10.000	2	0.316	-2.706	22.706

Table B8. Data Statistics: Residential Multipliers for School-Age Children in Delaware (2000)

DELAWARE STATEWIDE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	SCHOOL-AGE CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.463</b>	<b>10273</b>	<b>0.013</b>	<b>0.447</b>	<b>0.480</b>
0 BR	0.563	16	0.344	0.013	1.112
1 BR	0.246	179	0.091	0.157	0.335
2 BR	0.167	1187	0.037	0.137	0.196
3 BR	0.386	5372	0.017	0.365	0.406
4 BR	0.657	3045	0.022	0.621	0.693
5 or more BRs	0.926	474	0.063	0.806	1.046
<b>Single-Family, Attached</b>	<b>0.438</b>	<b>2249</b>	<b>0.027</b>	<b>0.403</b>	<b>0.474</b>
0 BR	0.417	12	0.299	-0.008	0.841
1 BR	0.327	107	0.122	0.188	0.466
2 BR	0.273	612	0.049	0.223	0.323
3 BR	0.478	1302	0.034	0.432	0.525
4 BR	0.760	175	0.109	0.572	0.948
5 or more BRs	0.561	41	0.229	0.215	0.907
<b>Small Multi-Family</b>	<b>0.320</b>	<b>781</b>	<b>0.050</b>	<b>0.265</b>	<b>0.375</b>
0 BR	0.040	25	0.200	-0.043	0.123
1 BR	0.175	280	0.095	0.096	0.254
2 BR	0.350	329	0.069	0.269	0.430
3 BR	0.524	103	0.135	0.331	0.717
4 BR	0.737	38	0.227	0.342	1.132
5 or more BRs	0.500	6	0.483	-0.378	1.378
<b>Large Multi-Family</b>	<b>0.205</b>	<b>2168</b>	<b>0.027</b>	<b>0.181</b>	<b>0.229</b>
0 BR	0.037	108	0.117	-0.008	0.082
1 BR	0.089	823	0.042	0.064	0.113
2 BR	0.240	1042	0.038	0.204	0.276
3 BR	0.613	173	0.097	0.462	0.763
4 BR	0.500	22	0.291	0.073	0.927
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.343</b>	<b>1666</b>	<b>0.032</b>	<b>0.307</b>	<b>0.380</b>
0 BR	0.000	4			
1 BR	0.182	66	0.159	0.046	0.318
2 BR	0.171	805	0.044	0.136	0.207
3 BR	0.498	747	0.045	0.436	0.560
4 BR	1.000	42	0.190	0.617	1.383
5 or more BRs	4.000	2	1.500	-34.119	42.119

Table B9. Data Statistics: Residential Multipliers for Public School Children in Delaware (2000)

DELAWARE STATEWIDE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	PUBLIC SCHOOL CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.337</b>	<b>10273</b>	<b>0.013</b>	<b>0.323</b>	<b>0.352</b>
0 BR	0.375	16	0.329	-0.055	0.805
1 BR	0.207	179	0.093	0.123	0.290
2 BR	0.125	1187	0.036	0.100	0.149
3 BR	0.302	5372	0.017	0.284	0.321
4 BR	0.452	3045	0.023	0.421	0.482
5 or more BRs	0.589	474	0.065	0.487	0.682
<b>Single-Family, Attached</b>	<b>0.357</b>	<b>2249</b>	<b>0.028</b>	<b>0.324</b>	<b>0.389</b>
0 BR	0.333	12	0.246	0.020	0.646
1 BR	0.271	107	0.126	0.141	0.402
2 BR	0.216	612	0.050	0.170	0.262
3 BR	0.393	1302	0.035	0.350	0.437
4 BR	0.617	175	0.116	0.437	0.797
5 or more BRs	0.415	41	0.230	0.115	0.714
<b>Small Multi-Family</b>	<b>0.270</b>	<b>781</b>	<b>0.049</b>	<b>0.220</b>	<b>0.320</b>
0 BR	0.040	25	0.200	-0.043	0.123
1 BR	0.139	280	0.095	0.070	0.209
2 BR	0.298	329	0.067	0.226	0.369
3 BR	0.447	103	0.138	0.264	0.630
4 BR	0.658	38	0.219	0.297	1.019
5 or more BRs	0.333	6	0.577	-0.524	1.190
<b>Large Multi-Family</b>	<b>0.171</b>	<b>2168</b>	<b>0.027</b>	<b>0.149</b>	<b>0.193</b>
0 BR	0.028	108	0.124	-0.013	0.069
1 BR	0.073	823	0.043	0.050	0.096
2 BR	0.202	1042	0.038	0.168	0.235
3 BR	0.520	173	0.096	0.384	0.656
4 BR	0.364	22	0.279	0.014	0.714
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.308</b>	<b>1666</b>	<b>0.032</b>	<b>0.273</b>	<b>0.342</b>
0 BR	0.000	4			
1 BR	0.182	66	0.159	0.046	0.318
2 BR	0.157	805	0.044	0.122	0.191
3 BR	0.443	747	0.045	0.385	0.501
4 BR	0.857	42	0.197	0.489	1.225
5 or more BRs	4.000	2	1.500	-34.119	42.119

Table B10. Data Statistics: Residential Multipliers for Total Residents in Delaware (2006)

DELAWARE STATEWIDE (2006) - SAMPLING STATISTICS					
STRUCTURE/SIZE	TOTAL RESIDENTS	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>2.282</b>	<b>2429</b>	<b>0.020</b>	<b>2.222</b>	<b>2.343</b>
0 BR	0.000	1			
1 BR	1.056	18	0.166	0.695	1.416
2 BR	1.539	280	0.049	1.419	1.660
3 BR	2.084	1226	0.026	2.011	2.157
4 BR	2.818	758	0.035	2.704	2.932
5 or more BRs	2.760	146	0.110	2.400	3.120
<b>Single-Family, Attached</b>	<b>1.970</b>	<b>436</b>	<b>0.049</b>	<b>1.835</b>	<b>2.105</b>
0 BR	2.000	2	0.707	-10.706	14.706
1 BR	1.300	10	0.414	0.231	2.369
2 BR	1.703	101	0.077	1.503	1.903
3 BR	1.981	265	0.061	1.812	2.150
4 BR	2.531	49	0.173	1.977	3.084
5 or more BRs	2.333	9	0.534	0.450	4.216
<b>Small Multi-Family</b>	<b>1.500</b>	<b>140</b>	<b>0.105</b>	<b>1.245</b>	<b>1.755</b>
0 BR		0			
1 BR	0.857	49	0.100	0.672	1.043
2 BR	1.661	59	0.148	1.278	2.044
3 BR	2.192	26	0.265	1.384	3.000
4 BR	1.333	3	1.155	-4.404	7.070
5 or more BRs	3.000	3	1.202	-5.957	11.957
<b>Large Multi-Family</b>	<b>1.371</b>	<b>385</b>	<b>0.045</b>	<b>1.269</b>	<b>1.474</b>
0 BR	0.750	4	0.553	-0.773	2.273
1 BR	1.102	157	0.046	1.007	1.197
2 BR	1.587	184	0.062	1.434	1.740
3 BR	1.767	30	0.246	1.097	2.437
4 BR	0.667	9	0.577	-0.420	1.754
5 or more BRs	1.000	1	0.000		
<b>Mobile Home</b>	<b>1.649</b>	<b>439</b>	<b>0.055</b>	<b>1.511</b>	<b>1.787</b>
0 BR		0			
1 BR	0.895	19	0.196	0.505	1.285
2 BR	1.407	177	0.082	1.214	1.599
3 BR	1.727	220	0.072	1.540	1.915
4 BR	3.400	20	0.265	2.377	4.423
5 or more BRs	3.333	3	0.913	-3.838	10.504

Table B11. Data Statistics: Residential Multipliers for School-Age Children in Delaware (2006)

DELAWARE STATEWIDE (2006) - SAMPLING STATISTICS					
STRUCTURE/SIZE	SCHOOL AGE CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.406</b>	<b>2429</b>	<b>0.026</b>	<b>0.373</b>	<b>0.439</b>
0 BR	0.000	1			
1 BR	0.000	18			
2 BR	0.114	280	0.069	0.068	0.160
3 BR	0.301	1226	0.036	0.262	0.340
4 BR	0.645	758	0.045	0.574	0.717
5 or more BRs	0.664	146	0.113	0.482	0.847
<b>Single-Family, Attached</b>	<b>0.349</b>	<b>436</b>	<b>0.064</b>	<b>0.274</b>	<b>0.423</b>
0 BR	0.000	2			
1 BR	0.200	10	0.447	-0.252	0.652
2 BR	0.188	101	0.106	0.097	0.279
3 BR	0.374	265	0.079	0.279	0.468
4 BR	0.633	49	0.231	0.263	1.002
5 or more BRs	0.111	9	0.333	-0.145	0.367
<b>Small Multi-Family</b>	<b>0.264</b>	<b>140</b>	<b>0.113</b>	<b>0.150</b>	<b>0.379</b>
0 BR		0			
1 BR	0.000	49			
2 BR	0.373	59	0.168	0.168	0.578
3 BR	0.577	26	0.244	0.195	0.959
4 BR	0.000	3			
5 or more BRs	0.000	3			
<b>Large Multi-Family</b>	<b>0.106</b>	<b>385</b>	<b>0.065</b>	<b>0.065</b>	<b>0.148</b>
0 BR	0.000	4			
1 BR	0.006	157	0.080	-0.006	0.019
2 BR	0.141	184	0.085	0.078	0.204
3 BR	0.467	30	0.250	0.117	0.817
4 BR	0.000	9			
5 or more BRs	0.000	1			
<b>Mobile Home</b>	<b>0.226</b>	<b>439</b>	<b>0.065</b>	<b>0.165</b>	<b>0.286</b>
0 BR		0			
1 BR	0.000	19			
2 BR	0.192	177	0.105	0.102	0.283
3 BR	0.200	220	0.085	0.125	0.275
4 BR	0.900	20	0.305	0.295	1.505
5 or more BRs	1.000	3	0.577	-1.484	3.484

Table B12. Data Statistics: Residential Multipliers for Public School Children in Delaware (2006)

DELAWARE STATEWIDE (2006) - SAMPLING STATISTICS					
STRUCTURE/SIZE	PUBLIC SCHOOL CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.280</b>	<b>2429</b>	<b>0.026</b>	<b>0.253</b>	<b>0.307</b>
0 BR	0.000	1			
1 BR	0.000	18			
2 BR	0.111	280	0.069	0.065	0.156
3 BR	0.225	1226	0.035	0.192	0.258
4 BR	0.420	758	0.048	0.359	0.480
5 or more BRs	0.377	146	0.103	0.252	0.501
<b>Single-Family, Attached</b>	<b>0.289</b>	<b>436</b>	<b>0.066</b>	<b>0.220</b>	<b>0.358</b>
0 BR	0.000	2			
1 BR	0.200	10	0.447	-0.252	0.652
2 BR	0.158	101	0.105	0.076	0.241
3 BR	0.313	265	0.079	0.226	0.400
4 BR	0.510	49	0.245	0.158	0.863
5 or more BRs	0.000	9			
<b>Small Multi-Family</b>	<b>0.243</b>	<b>140</b>	<b>0.111</b>	<b>0.135</b>	<b>0.351</b>
0 BR		0			
1 BR	0.000	49			
2 BR	0.356	59	0.171	0.152	0.560
3 BR	0.500	26	0.225	0.172	0.828
4 BR	0.000	3			
5 or more BRs	0.000	3			
<b>Large Multi-Family</b>	<b>0.099</b>	<b>385</b>	<b>0.063</b>	<b>0.060</b>	<b>0.138</b>
0 BR	0.000	4			
1 BR	0.006	157	0.080	-0.006	0.019
2 BR	0.136	184	0.086	0.074	0.198
3 BR	0.400	30	0.235	0.096	0.704
4 BR	0.000	9			
5 or more BRs	0.000	1			
<b>Mobile Home</b>	<b>0.191</b>	<b>439</b>	<b>0.061</b>	<b>0.139</b>	<b>0.244</b>
0 BR		0	0.000		
1 BR	0.000	19			
2 BR	0.130	177	0.080	0.073	0.187
3 BR	0.186	220	0.085	0.114	0.259
4 BR	0.850	20	0.308	0.257	1.443
5 or more BRs	1.000	3	0.577	-1.484	3.484

Table B13. Data Statistics: Residential Multipliers for Total Residents in Delaware (2000-2006)

DELAWARE STATEWIDE (2000-2006) - SAMPLING STATISTICS					
STRUCTURE/SIZE	TOTAL RESIDENTS	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>2.426</b>	<b>385</b>	<b>0.053</b>	<b>2.265</b>	<b>2.587</b>
0 BR		0			
1 BR	2.000	1	0.000		
2 BR	1.526	19	0.179	1.062	1.991
3 BR	2.064	171	0.075	1.852	2.277
4 BR	2.904	157	0.079	2.639	3.170
5 or more BRs	2.541	37	0.194	1.914	3.167
<b>Single-Family, Attached</b>	<b>1.746</b>	<b>63</b>	<b>0.138</b>	<b>1.381</b>	<b>2.111</b>
0 BR		0			
1 BR	1.000	1	0.000		
2 BR	1.636	11	0.284	0.826	2.447
3 BR	1.773	44	0.158	1.348	2.197
4 BR	1.857	7	0.629	-0.240	3.954
5 or more BRs		0			
<b>Small Multi-Family</b>	<b>1.467</b>	<b>15</b>	<b>0.289</b>	<b>0.716</b>	<b>2.217</b>
0 BR		0			
1 BR	2.000	1	0.000		
2 BR	2.167	6	0.369	0.772	3.562
3 BR	0.833	6	0.594	-0.562	2.228
4 BR	0.000	1			
5 or more BRs	2.000	1			
<b>Large Multi-Family</b>	<b>1.018</b>	<b>55</b>	<b>0.151</b>	<b>0.713</b>	<b>1.324</b>
0 BR	2.000	1	0.000		
1 BR	0.800	15	0.224	0.371	1.229
2 BR	1.417	24	0.214	0.890	1.944
3 BR	0.667	12	0.408	-0.067	1.400
4 BR	0.000	3			
5 or more BRs		0			
<b>Mobile Home</b>	<b>2.210</b>	<b>62</b>	<b>0.142</b>	<b>1.788</b>	<b>2.631</b>
0 BR		0			
1 BR	0.000	1			
2 BR	2.455	11	0.450	0.883	4.026
3 BR	2.049	41	0.136	1.656	2.441
4 BR	2.889	9	0.443	1.151	4.627
5 or more BRs		0			

Table B14. Data Statistics: Residential Multipliers for School-Age Children in Delaware (2000-2006)

DELAWARE STATEWIDE (2000-2006) - SAMPLING STATISTICS					
STRUCTURE/SIZE	SCHOOL-AGE CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.481</b>	<b>385</b>	<b>0.066</b>	<b>0.390</b>	<b>0.571</b>
0 BR		0			
1 BR	0.000	1			
2 BR	0.105	19	0.223	-0.047	0.257
3 BR	0.316	171	0.104	0.201	0.431
4 BR	0.669	157	0.099	0.509	0.829
5 or more BRs	0.649	37	0.211	0.304	0.993
<b>Single-Family, Attached</b>	<b>0.270</b>	<b>63</b>	<b>0.181</b>	<b>0.082</b>	<b>0.457</b>
0 BR		0			
1 BR	0.000	1			
2 BR	0.000	11			
3 BR	0.295	44	0.212	0.063	0.528
4 BR	0.571	7	0.567	-0.477	1.620
5 or more BRs		0			
<b>Small Multi-Family</b>	<b>0.333</b>	<b>15</b>	<b>0.324</b>	<b>-0.067</b>	<b>0.734</b>
0 BR		0			
1 BR	0.000	1			
2 BR	0.500	6	0.483	-0.378	1.378
3 BR	0.333	6	0.577	-0.524	1.190
4 BR	0.000	1			
5 or more BRs	0.000	1			
<b>Large Multi-Family</b>	<b>0.073</b>	<b>55</b>	<b>0.163</b>	<b>-0.015</b>	<b>0.161</b>
0 BR	0.000	1			
1 BR	0.000	15			
2 BR	0.042	24	0.204	-0.045	0.128
3 BR	0.250	12	0.359	-0.145	0.645
4 BR	0.000	3			
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.323</b>	<b>62</b>	<b>0.205</b>	<b>0.089</b>	<b>0.556</b>
0 BR		0			
1 BR	0.000	1			
2 BR	0.727	11	0.634	-0.478	1.932
3 BR	0.146	41	0.172	0.013	0.280
4 BR	0.667	9	0.408	-0.102	1.435
5 or more BRs		0			



Table B15. Data Statistics: Residential Multipliers for Public School Children in Delaware (2000-2006)

DELAWARE STATEWIDE (2000-2006) - SAMPLING STATISTICS					
STRUCTURE/SIZE	PUBLIC SCHOOL CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.379</b>	<b>385</b>	<b>0.067</b>	<b>0.299</b>	<b>0.460</b>
0 BR		0			
1 BR	0.000	1			
2 BR	0.105	19	0.223	-0.047	0.257
3 BR	0.251	171	0.094	0.159	0.344
4 BR	0.510	157	0.106	0.360	0.660
5 or more BRs	0.568	37	0.209	0.248	0.887
<b>Single-Family, Attached</b>	<b>0.190</b>	<b>63</b>	<b>0.163</b>	<b>0.048</b>	<b>0.332</b>
0 BR		0			
1 BR	0.000	1			
2 BR	0.000	11			
3 BR	0.182	44	0.175	0.031	0.332
4 BR	0.571	7	0.567	-0.477	1.620
5 or more BRs		0			
<b>Small Multi-Family</b>	<b>0.333</b>	<b>15</b>	<b>0.324</b>	<b>-0.067</b>	<b>0.734</b>
0 BR		0			
1 BR	0.000	1			
2 BR	0.500	6	0.483	-0.378	1.378
3 BR	0.333	6	0.577	-0.524	1.190
4 BR	0.000	1			
5 or more BRs	0.000	1			
<b>Large Multi-Family</b>	<b>0.055</b>	<b>55</b>	<b>0.173</b>	<b>-0.026</b>	<b>0.135</b>
0 BR	0.000	1			
1 BR	0.000	15			
2 BR	0.000	24			
3 BR	0.250	12	0.359	-0.145	0.645
4 BR	0.000	3			
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.226</b>	<b>62</b>	<b>0.140</b>	<b>0.092</b>	<b>0.359</b>
0 BR		0			
1 BR	0.000	1			
2 BR	0.273	11	0.270	-0.041	0.587
3 BR	0.146	41	0.172	0.013	0.280
4 BR	0.556	9	0.394	-0.122	1.233
5 or more BRs		0			

Table B16. Data Statistics: Residential Multipliers for Total Residents in New Castle County (2000)

NEW CASTLE COUNTY, DELAWARE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	TOTAL RESIDENTS	N	Std Err	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>2.732</b>	<b>5255</b>	<b>0.012</b>	<b>2.694</b>	<b>2.770</b>
0 BR	2.800	10	0.396	1.299	4.301
1 BR	2.435	69	0.125	2.045	2.824
2 BR	1.988	402	0.041	1.873	2.102
3 BR	2.497	2533	0.016	2.447	2.547
4 BR	3.077	1981	0.018	3.015	3.139
5 or more BRs	3.615	260	0.055	3.408	3.823
<b>Single-Family, Attached</b>	<b>2.391</b>	<b>1742</b>	<b>0.023</b>	<b>2.322</b>	<b>2.460</b>
0 BR	2.625	8	0.436	0.957	4.293
1 BR	2.108	74	0.119	1.764	2.452
2 BR	1.996	454	0.040	1.886	2.105
3 BR	2.453	1058	0.029	2.363	2.542
4 BR	3.314	121	0.085	3.008	3.621
5 or more BRs	3.185	27	0.194	2.474	3.897
<b>Small Multi-Family</b>	<b>1.989</b>	<b>461</b>	<b>0.048</b>	<b>1.855</b>	<b>2.123</b>
0 BR	1.333	18	0.171	0.916	1.751
1 BR	1.578	192	0.071	1.403	1.753
2 BR	2.183	197	0.067	1.989	2.377
3 BR	2.825	40	0.188	2.186	3.464
4 BR	3.231	13	0.334	1.922	4.540
5 or more BRs	5.000	1	0.000		
<b>Large Multi-Family</b>	<b>1.744</b>	<b>1497</b>	<b>0.024</b>	<b>1.683</b>	<b>1.805</b>
0 BR	1.144	90	0.060	1.017	1.272
1 BR	1.353	618	0.029	1.286	1.419
2 BR	2.007	706	0.034	1.912	2.102
3 BR	3.013	78	0.110	2.633	3.393
4 BR	4.000	5	0.387	1.849	6.150
5 or more BRs		0			
<b>Mobile Home</b>	<b>2.178</b>	<b>208</b>	<b>0.062</b>	<b>1.999</b>	<b>2.357</b>
0 BR	0.000	1			
1 BR	1.538	13	0.116	1.225	1.852
2 BR	1.780	109	0.064	1.610	1.950
3 BR	2.718	78	0.088	2.427	3.008
4 BR	2.667	6	0.342	1.233	4.100
5 or more BRs	11.000	1	0.000		

Table B17. Data Statistics: Residential Multipliers for School-Age Children in New Castle County (2000)

NEW CASTLE COUNTY, DELAWARE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	SCHOOL-AGE CHILDREN	N	Std Err	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.539</b>	<b>5255</b>	<b>0.017</b>	<b>0.514</b>	<b>0.563</b>
0 BR	0.700	10	0.438	-0.129	1.529
1 BR	0.449	69	0.143	0.258	0.640
2 BR	0.199	402	0.062	0.144	0.254
3 BR	0.413	2533	0.024	0.383	0.444
4 BR	0.704	1981	0.027	0.660	0.748
5 or more BRs	1.042	260	0.079	0.883	1.201
<b>Single-Family, Attached</b>	<b>0.485</b>	<b>1742</b>	<b>0.030</b>	<b>0.443</b>	<b>0.526</b>
0 BR	0.375	8	0.430	-0.247	0.997
1 BR	0.365	74	0.148	0.187	0.543
2 BR	0.306	454	0.054	0.247	0.365
3 BR	0.524	1058	0.038	0.470	0.577
4 BR	0.810	121	0.130	0.578	1.041
5 or more BRs	0.852	27	0.263	0.353	1.351
<b>Small Multi-Family</b>	<b>0.369</b>	<b>461</b>	<b>0.064</b>	<b>0.292</b>	<b>0.445</b>
0 BR	0.056	18	0.236	-0.062	0.173
1 BR	0.198	192	0.121	0.092	0.304
2 BR	0.442	197	0.087	0.328	0.555
3 BR	0.750	40	0.197	0.405	1.095
4 BR	1.000	13	0.376	0.182	1.818
5 or more BRs	1.000	1	0.000		
<b>Large Multi-Family</b>	<b>0.208</b>	<b>1497</b>	<b>0.032</b>	<b>0.179</b>	<b>0.237</b>
0 BR	0.044	90	0.128	-0.009	0.098
1 BR	0.083	618	0.046	0.057	0.109
2 BR	0.256	706	0.045	0.212	0.301
3 BR	0.910	78	0.137	0.650	1.170
4 BR	0.800	5	0.419	-0.239	1.839
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.303</b>	<b>208</b>	<b>0.082</b>	<b>0.214</b>	<b>0.392</b>
0 BR	0.000	1			
1 BR	0.000	13			
2 BR	0.138	109	0.114	0.054	0.221
3 BR	0.577	78	0.124	0.390	0.764
4 BR	0.333	6	0.577	-0.524	1.190
5 or more BRs	1.000	1	0.000		

Table B18. Data Statistics: Residential Multipliers for Public School Children in New Castle County (2000)

NEW CASTLE COUNTY, DELAWARE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	PUBLIC SCHOOL CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.355</b>	<b>5255</b>	<b>0.018</b>	<b>0.334</b>	<b>0.375</b>
0 BR	0.600	10	0.394	-0.091	1.291
1 BR	0.362	69	0.149	0.183	0.542
2 BR	0.134	402	0.060	0.091	0.178
3 BR	0.293	2533	0.025	0.267	0.319
4 BR	0.444	1981	0.028	0.408	0.481
5 or more BRs	0.608	260	0.086	0.475	0.740
<b>Single-Family, Attached</b>	<b>0.390</b>	<b>1742</b>	<b>0.031</b>	<b>0.352</b>	<b>0.429</b>
0 BR	0.250	8	0.327	-0.137	0.637
1 BR	0.311	74	0.154	0.140	0.482
2 BR	0.236	454	0.056	0.182	0.289
3 BR	0.427	1058	0.039	0.377	0.477
4 BR	0.653	121	0.142	0.426	0.880
5 or more BRs	0.630	27	0.270	0.189	1.071
<b>Small Multi-Family</b>	<b>0.319</b>	<b>461</b>	<b>0.063</b>	<b>0.249</b>	<b>0.389</b>
0 BR	0.056	18	0.236	-0.062	0.173
1 BR	0.161	192	0.119	0.067	0.256
2 BR	0.386	197	0.085	0.282	0.489
3 BR	0.700	40	0.202	0.359	1.041
4 BR	0.846	13	0.366	0.112	1.580
5 or more BRs	0.000	1			
<b>Large Multi-Family</b>	<b>0.170</b>	<b>1497</b>	<b>0.032</b>	<b>0.144</b>	<b>0.196</b>
0 BR	0.033	90	0.136	-0.016	0.082
1 BR	0.066	618	0.047	0.042	0.090
2 BR	0.212	706	0.045	0.172	0.253
3 BR	0.756	78	0.138	0.518	0.995
4 BR	0.400	5	0.387	-0.280	1.080
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.260</b>	<b>208</b>	<b>0.081</b>	<b>0.178</b>	<b>0.341</b>
0 BR	0.000	1			
1 BR	0.000	13			
2 BR	0.119	109	0.111	0.043	0.196
3 BR	0.487	78	0.125	0.314	0.660
4 BR	0.333	6	0.577	-0.524	1.190
5 or more BRs	1.000	1	0.000		

Table B19. Data Statistics: Residential Multipliers for Total Residents in Kent County (2000)

KENT COUNTY, DELAWARE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	TOTAL RESIDENTS	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>2.647</b>	<b>1716</b>	<b>0.022</b>	<b>2.578</b>	<b>2.717</b>
0 BR	2.250	4	0.687	-1.030	5.530
1 BR	1.959	49	0.138	1.570	2.348
2 BR	1.965	226	0.053	1.817	2.112
3 BR	2.550	967	0.026	2.469	2.631
4 BR	3.106	406	0.042	2.959	3.253
5 or more BRs	4.172	64	0.154	3.543	4.801
<b>Single-Family, Attached</b>	<b>2.590</b>	<b>183</b>	<b>0.070</b>	<b>2.369</b>	<b>2.811</b>
0 BR	2.000	2	0.000		
1 BR	1.750	12	0.211	1.137	2.363
2 BR	2.111	54	0.122	1.757	2.465
3 BR	2.639	97	0.089	2.354	2.924
4 BR	4.929	14	0.137	4.270	5.587
5 or more BRs	2.500	4	0.606	-0.547	5.547
<b>Small Multi-Family</b>	<b>2.056</b>	<b>108</b>	<b>0.096</b>	<b>1.783</b>	<b>2.328</b>
0 BR	1.500	4	0.408	-0.091	3.091
1 BR	1.652	46	0.121	1.338	1.967
2 BR	1.842	38	0.158	1.406	2.278
3 BR	3.267	15	0.238	2.343	4.190
4 BR	4.200	5	0.239	2.840	5.560
5 or more BRs		0			
<b>Large Multi-Family</b>	<b>1.864</b>	<b>221</b>	<b>0.065</b>	<b>1.690</b>	<b>2.038</b>
0 BR	0.625	8	0.232	0.192	1.058
1 BR	1.244	90	0.071	1.086	1.402
2 BR	2.070	100	0.079	1.844	2.296
3 BR	3.600	20	0.189	2.850	4.350
4 BR	5.333	3	0.289	2.465	8.202
5 or more BRs		0			
<b>Mobile Home</b>	<b>2.373</b>	<b>518</b>	<b>0.041</b>	<b>2.248</b>	<b>2.498</b>
0 BR	2.000	2			
1 BR	2.391	23	0.171	1.842	2.940
2 BR	1.858	239	0.057	1.705	2.010
3 BR	2.788	241	0.056	2.603	2.974
4 BR	4.154	13	0.271	2.949	5.359
5 or more BRs		0			

Table B20. Data Statistics: Residential Multipliers for School-Age Children in Kent County (2000)

KENT COUNTY, DELAWARE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	SCHOOL-AGE CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.547</b>	<b>1716</b>	<b>0.031</b>	<b>0.502</b>	<b>0.592</b>
0 BR	0.500	4	0.707	-1.091	2.091
1 BR	0.184	49	0.147	0.057	0.310
2 BR	0.208	226	0.094	0.124	0.292
3 BR	0.481	967	0.039	0.428	0.534
4 BR	0.805	406	0.061	0.698	0.913
5 or more BRs	1.391	64	0.171	0.989	1.793
<b>Single-Family, Attached</b>	<b>0.601</b>	<b>183</b>	<b>0.094</b>	<b>0.458</b>	<b>0.744</b>
0 BR	0.500	2	0.707	-5.853	6.853
1 BR	0.083	12	0.289	-0.100	0.267
2 BR	0.370	54	0.191	0.137	0.603
3 BR	0.546	97	0.114	0.379	0.714
4 BR	2.500	14	0.159	1.957	3.043
5 or more BRs	0.000	4			
<b>Small Multi-Family</b>	<b>0.324</b>	<b>108</b>	<b>0.136</b>	<b>0.170</b>	<b>0.478</b>
0 BR	0.000	4			
1 BR	0.152	46	0.159	0.027	0.277
2 BR	0.237	38	0.211	0.028	0.445
3 BR	0.867	15	0.361	0.146	1.588
4 BR	1.200	5	0.730	-1.021	3.421
5 or more BRs		0			
<b>Large Multi-Family</b>	<b>0.285</b>	<b>221</b>	<b>0.088</b>	<b>0.193</b>	<b>0.378</b>
0 BR	0.000	8			
1 BR	0.089	90	0.156	-0.003	0.181
2 BR	0.320	100	0.123	0.182	0.458
3 BR	0.950	20	0.241	0.459	1.441
4 BR	1.333	3	0.764	-2.461	5.128
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.485</b>	<b>518</b>	<b>0.053</b>	<b>0.412</b>	<b>0.558</b>
0 BR	0.000	2			
1 BR	0.304	23	0.266	0.000	0.608
2 BR	0.226	239	0.072	0.159	0.293
3 BR	0.718	241	0.075	0.592	0.843
4 BR	1.308	13	0.303	0.552	2.063
5 or more BRs		0			

Table B21. Data Statistics: Residential Multipliers for Public School Children in Kent County (2000)

KENT COUNTY, DELAWARE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	PUBLIC SCHOOL CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.455</b>	<b>1716</b>	<b>0.030</b>	<b>0.414</b>	<b>0.495</b>
0 BR	0.000	4			
1 BR	0.163	49	0.151	0.041	0.286
2 BR	0.168	226	0.086	0.098	0.238
3 BR	0.423	967	0.039	0.373	0.473
4 BR	0.663	406	0.062	0.563	0.762
5 or more BRs	0.875	64	0.164	0.568	1.182
<b>Single-Family, Attached</b>	<b>0.503</b>	<b>183</b>	<b>0.096</b>	<b>0.368</b>	<b>0.638</b>
0 BR	0.500	2	0.707	-5.853	6.853
1 BR	0.000	12			
2 BR	0.315	54	0.204	0.085	0.545
3 BR	0.464	97	0.118	0.304	0.623
4 BR	2.071	14	0.212	1.413	2.730
5 or more BRs	0.000	4			
<b>Small Multi-Family</b>	<b>0.259</b>	<b>108</b>	<b>0.138</b>	<b>0.120</b>	<b>0.398</b>
0 BR	0.000	4			
1 BR	0.109	46	0.141	0.015	0.202
2 BR	0.184	38	0.194	0.016	0.353
3 BR	0.667	15	0.390	-0.017	1.350
4 BR	1.200	5	0.730	-1.021	3.421
5 or more BRs		0			
<b>Large Multi-Family</b>	<b>0.240</b>	<b>221</b>	<b>0.089</b>	<b>0.154</b>	<b>0.326</b>
0 BR	0.000	8			
1 BR	0.078	90	0.152	-0.007	0.162
2 BR	0.260	100	0.130	0.129	0.391
3 BR	0.800	20	0.238	0.355	1.245
4 BR	1.333	3	0.764	-2.461	5.128
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.436</b>	<b>518</b>	<b>0.053</b>	<b>0.367</b>	<b>0.505</b>
0 BR	0.000	2			
1 BR	0.304	23	0.266	0.000	0.608
2 BR	0.213	239	0.070	0.149	0.277
3 BR	0.639	241	0.075	0.520	0.758
4 BR	1.077	13	0.353	0.279	1.875
5 or more BRs		0			

Table B22. Data Statistics: Residential Multipliers for Total Residents in Sussex County (2000)

SUSSEX COUNTY, DELAWARE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	TOTAL RESIDENTS	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>1.756</b>	<b>3302</b>	<b>0.021</b>	<b>1.702</b>	<b>1.811</b>
0 BR	1.000	2	1.000	-11.706	13.706
1 BR	1.262	61	0.130	0.971	1.554
2 BR	1.501	559	0.048	1.385	1.617
3 BR	1.802	1872	0.026	1.735	1.870
4 BR	1.869	658	0.052	1.730	2.009
5 or more BRs	1.847	150	0.146	1.454	2.240
<b>Single-Family, Attached</b>	<b>0.830</b>	<b>324</b>	<b>0.078</b>	<b>0.691</b>	<b>0.969</b>
0 BR	2.500	2	0.949	-16.559	21.559
1 BR	1.571	21	0.278	0.844	2.299
2 BR	0.885	104	0.128	0.646	1.123
3 BR	0.769	147	0.117	0.566	0.972
4 BR	0.475	40	0.232	0.151	0.799
5 or more BRs	0.700	10	0.618	-0.471	1.871
<b>Small Multi-Family</b>	<b>1.382</b>	<b>212</b>	<b>0.101</b>	<b>1.149</b>	<b>1.615</b>
0 BR	1.000	3	0.000		
1 BR	1.500	42	0.197	1.012	1.988
2 BR	1.553	94	0.152	1.176	1.930
3 BR	1.104	48	0.214	0.651	1.557
4 BR	1.150	20	0.390	0.274	2.026
5 or more BRs	1.000	5	1.000	-1.776	3.776
<b>Large Multi-Family</b>	<b>0.813</b>	<b>450</b>	<b>0.068</b>	<b>0.693</b>	<b>0.933</b>
0 BR	1.400	10	0.287	0.631	2.169
1 BR	1.070	115	0.117	0.829	1.310
2 BR	0.703	236	0.095	0.546	0.861
3 BR	0.733	75	0.199	0.394	1.072
4 BR	0.571	14	0.432	-0.134	1.277
5 or more BRs		0			
<b>Mobile Home</b>	<b>1.663</b>	<b>940</b>	<b>0.040</b>	<b>1.562</b>	<b>1.764</b>
0 BR	0.000	1			
1 BR	1.233	30	0.201	0.777	1.690
2 BR	1.289	457	0.056	1.165	1.413
3 BR	2.002	428	0.056	1.848	2.157
4 BR	3.087	23	0.279	2.069	4.105
5 or more BRs	9.000	1	0.000		



Table B23. Data Statistics: Residential Multipliers for School-Age Children in Sussex County (2000)

SUSSEX COUNTY, DELAWARE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	SCHOOL-AGE CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.300</b>	<b>3302</b>	<b>0.023</b>	<b>0.275</b>	<b>0.326</b>
0 BR	0.000	2			
1 BR	0.066	61	0.180	-0.026	0.158
2 BR	0.127	559	0.051	0.091	0.163
3 BR	0.299	1872	0.030	0.267	0.330
4 BR	0.424	658	0.055	0.354	0.494
5 or more BRs	0.527	150	0.128	0.343	0.710
<b>Single-Family, Attached</b>	<b>0.099</b>	<b>324</b>	<b>0.075</b>	<b>0.052</b>	<b>0.145</b>
0 BR	0.500	2	0.707	-5.853	6.853
1 BR	0.333	21	0.276	0.001	0.666
2 BR	0.077	104	0.117	0.012	0.142
3 BR	0.109	147	0.121	0.030	0.188
4 BR	0.000	40			
5 or more BRs	0.000	10			
<b>Small Multi-Family</b>	<b>0.212</b>	<b>212</b>	<b>0.094</b>	<b>0.127</b>	<b>0.297</b>
0 BR	0.000	3			
1 BR	0.095	42	0.242	-0.056	0.246
2 BR	0.202	94	0.133	0.084	0.321
3 BR	0.229	48	0.209	0.028	0.430
4 BR	0.450	20	0.296	0.035	0.865
5 or more BRs	0.400	5	0.632	-0.711	1.511
<b>Large Multi-Family</b>	<b>0.156</b>	<b>450</b>	<b>0.062</b>	<b>0.108</b>	<b>0.203</b>
0 BR	0.000	10			
1 BR	0.122	115	0.118	0.040	0.203
2 BR	0.157	236	0.083	0.092	0.221
3 BR	0.213	75	0.156	0.070	0.356
4 BR	0.214	14	0.463	-0.249	0.677
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.274</b>	<b>940</b>	<b>0.045</b>	<b>0.228</b>	<b>0.320</b>
0 BR	0.000	1			
1 BR	0.167	30	0.237	-0.031	0.365
2 BR	0.151	457	0.063	0.103	0.199
3 BR	0.360	428	0.061	0.288	0.432
4 BR	1.000	23	0.267	0.447	1.553
5 or more BRs	7.000	1	0.000		

Table B24. Data Statistics: Residential Multipliers for Public School Children in Sussex County (2000)

SUSSEX COUNTY, DELAWARE (2000) - SAMPLING STATISTICS					
STRUCTURE/SIZE	PUBLIC SCHOOL CHILDREN	N	Std. Err.	CI-Low	CI-High
<b>Single-Family, Detached</b>	<b>0.249</b>	<b>3302</b>	<b>0.023</b>	<b>0.226</b>	<b>0.272</b>
0 BR	0.000	2			
1 BR	0.066	61	0.180	-0.026	0.158
2 BR	0.100	559	0.051	0.067	0.132
3 BR	0.253	1872	0.030	0.223	0.282
4 BR	0.343	658	0.056	0.279	0.408
5 or more BRs	0.420	150	0.123	0.262	0.578
<b>Single-Family, Attached</b>	<b>0.093</b>	<b>324</b>	<b>0.074</b>	<b>0.048</b>	<b>0.137</b>
0 BR	0.500	2	0.707	-5.853	6.853
1 BR	0.286	21	0.263	-0.007	0.579
2 BR	0.077	104	0.117	0.012	0.142
3 BR	0.102	147	0.120	0.026	0.178
4 BR	0.000	40			
5 or more BRs	0.000	10			
<b>Small Multi-Family</b>	<b>0.170</b>	<b>212</b>	<b>0.092</b>	<b>0.095</b>	<b>0.244</b>
0 BR	0.000	3			
1 BR	0.071	42	0.267	-0.073	0.216
2 BR	0.160	94	0.127	0.059	0.261
3 BR	0.167	48	0.210	-0.006	0.340
4 BR	0.400	20	0.267	0.047	0.753
5 or more BRs	0.400	5	0.632	-0.711	1.511
<b>Large Multi-Family</b>	<b>0.140</b>	<b>450</b>	<b>0.060</b>	<b>0.096</b>	<b>0.184</b>
0 BR	0.000	10			
1 BR	0.104	115	0.123	0.026	0.183
2 BR	0.144	236	0.081	0.083	0.205
3 BR	0.200	75	0.147	0.069	0.331
4 BR	0.143	14	0.378	-0.166	0.451
5 or more BRs		0			
<b>Mobile Home</b>	<b>0.248</b>	<b>940</b>	<b>0.045</b>	<b>0.204</b>	<b>0.292</b>
0 BR	0.000	1			
1 BR	0.167	30	0.237	-0.031	0.365
2 BR	0.136	457	0.066	0.088	0.183
3 BR	0.325	428	0.061	0.256	0.393
4 BR	0.870	23	0.264	0.359	1.380
5 or more BRs	7.000	1	0.000		

## Appendix C. Nonresidential Multipliers

### Summary of Statistics Derived from National Studies on Nonresidential Multipliers

Nonresidential Use	A. Source and Employees per 1,000 square feet		B. Statistics on Employees per 1,000 square feet			C. Recommended Range of Employees per 1,000 square feet
			Minimum-Maximum Range	Median	Mean	
<b>I. Commercial</b>						
<b>A. Office</b>	ITE Parking (1987)	2.68	2.56 - 4.27	3.25	3.26	3.0-4.0 (This figure should be 3 or less in areas with larger amounts of R & D space. The type and amenity of the space, such as "corporate" versus "back" office, will also affect office worker density.)
	ITE Trip Generation (1991)	3.30				
	CA Dept. Energy (1996)					
	Large Office	2.56				
	Small Office	3.58				
	ITE Trip Generation (1997)	4.00				
	BOMA (1997)	3.55				
	State of Washington (1998)	3.07				
	Portland OR Survey (1999)	3.64				
	San Diego Survey (2001)	3.21				
	CBECS (NE Data) (2001)	2.99				
Planners Estimating (2004)	3.05					
Rutgers Regional (2004)	4.27					
<b>B. Retail</b>	CA Dept. Energy (1996)	1.70	0.57 - 2.48	1.71	1.5	1.0 to 2.0 (Figure will be closer to 1 in full time equivalent (FTE) employee basis and in areas experiencing "big box" development, smaller stores and "high end" retailers tend to have a higher worker density.)
	Census of Retail (1997)	2.44				
	ITE Trip Generation (1997)	2.00				
	State of Washington (1998)	0.57				
	Portland OR Survey (1999)	1.67				
	CBECS (NE Data) (2001)	1.72				
	San Diego Survey (2001)	1.70				
Planners Estimating (2004)	2.48					
<b>C. Eating and Drinking</b>	CA Dept. Energy (1996)	4.90	0.38 - 14.29	6.26	1.33	3.0 to 4.0 (This figure clearly ranges significantly depending on type of eating establishment such as "fast food" or "sit down"; the indicated 3 to 4 range is a starting parameter that must be refined on a case by case basis.)
	ITE Trip Generation (1991)					
	Restaurant	8.70				
	Fast Food	14.29				
	CA Dept. Energy (1996)	4.90				
CBECS (NE Data) (2001)	0.38					
<b>II. Industrial</b>						
<b>A. Warehouse</b>	ITE Parking (1987)	0.46	0.02 - 1.58	0.85	.59	0.2 to 0.8 (This figure varies tremendously; it will be higher for facilities that combine office and warehouse use, such as "flex space", and will be lower for "pure" storage use.)
	ITE Trip Generation (1991)	1.28				
	CA Dept. Energy (1996)	0.70				
	ARES Study (1997)	1.58				
	ITE Trip Generation (1997)	1.28				
	Portland OR Survey (1999)	0.59				
	CBECS (NE Data) (2001)	1.11				
	Rutgers (2006)	0.20				
<b>B. Manufacturing</b>	ITE Parking (1987)	2.42	1.70 - 4.76	1.98	1.87	1.0 to 2.0 (The figure varies significantly by type of manufacturing, degree of mechanization, and other influences.)
	ITE Trip Generation (1991)	1.96				
	ARES Study (1997)	2.61				
	ITE Trip Generation (1997)	1.82				
	State of Washington (1998)	1.70				
	Portland OR Survey (1999)	1.43				
	San Diego Survey (2001)	3.40				
	Planners Estimating (2004)	4.76				
<b>III. Hospitality and Others</b>						
<b>A. Lodging</b>	CA Dept. Energy (1996)	0.79	0.43 - 1.1	0.66	0.64	0.5 to 1.0 (This figure is higher for lodging with more amenities, and facilities with restaurant and convention space, and lower for budget accommodations.)
	Portland OR Survey (1999)	0.67				
	CGECS (2001)	0.43				
	San Diego Survey (2001)	1.10				
	Energy Star Hosp. (2002)	0.57				
<b>B. Health</b>	CA Dept. Energy (1996)	2.99	2.00 - 3.25	2.62	2.47	2.0 to 3.0 (Figure varies by specific health application which can range tremendously. Medical office space is shown under the "office" category in the table.)
	ITE Trip Generation (1997)	3.25				
	State of Washington (1998)	2.00				
	Portland OR Survey (1999)	2.00-				
	2.86					
	CBECS (2001)	2.18				
Planners Estimating (2004)	2.62					
<b>C. Schools</b>	CA Dept. Energy (1996)	1.19	0.77 - 1.19	0.92	0.96	0.8 to 1.2 (Reflects indicated range. A limited number of studies challenge knowledge on the subject.)
	ITE Trip Generation (1997)	0.92				
	CBECS (NE Education) (2001)	0.77				

Source: Listokin, David; Voicu, Loan; Dolphin, William; and Camp, Matthew (November, 2006)



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