City of Smyrna
Transit Analysis and Feasibility Study

Technical Memorandum #2

Transit Needs & Market Analysis

Draft

SMYRNA *Connects*

January 2020

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Section 1: Introduction

Using information from the extensive data collection and analysis efforts conducted to date for the *Smyrna Connects* Transit Access and Feasibility study, this second technical memorandum provides an overview of the existing and potential transit markets in the city of Smyrna and the surrounding area and presents findings from a market analysis to identify service gaps and mobility needs. The market analysis was integrated into input received from the public and stakeholders from *Smyrna Connects* outreach activities to ensure inclusion of the perspectives of the local community.

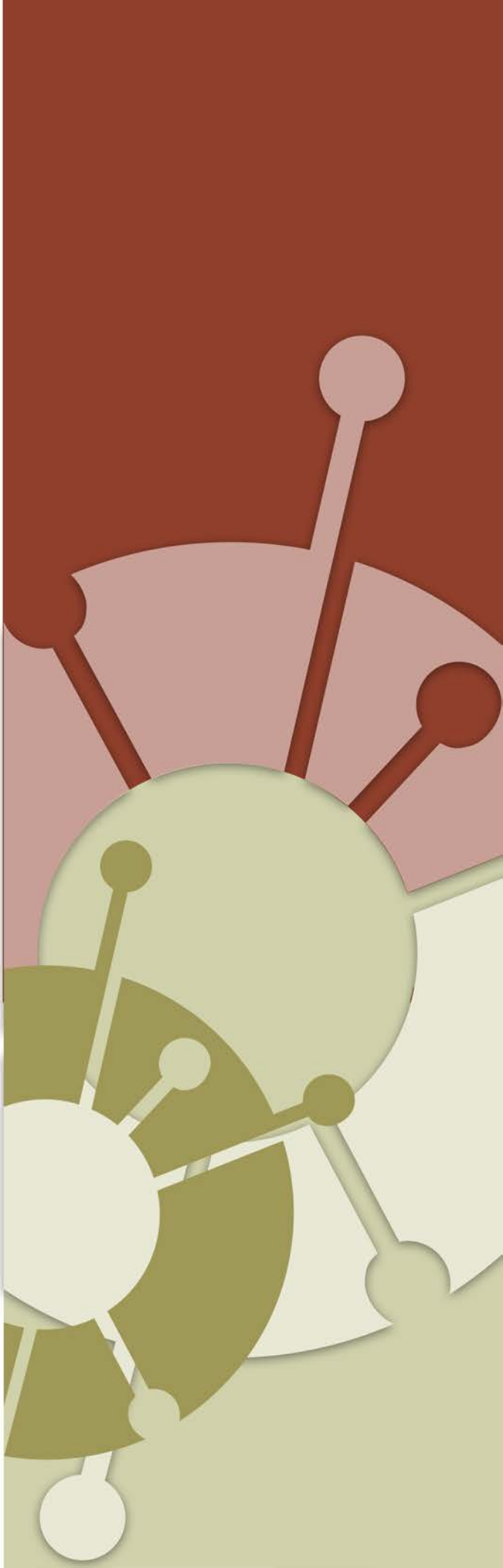
Based on findings from the analysis, key input from the public and stakeholders, and plan/policy directions from the City and region, a set of needs was developed. Understanding of these needs is based on population demographics, the nature of trip-making in Smyrna and the area, and patterns of development and land use.

A set of key needs, presented and summarized at the conclusion of this report, provides the basis for developing a toolbox of improvement strategies for public transit in Smyrna for the next 20 years.

Overview of Report

This report is organized into four major sections, including this Introduction.

Section 2 presents the **Transit Market Analysis**, which summarizes the various demand and mobility needs assessments conducted for this study. The local and internal market assessment includes an examination of potential service gaps and latent demand using GIS-based tools and industry standards. This section also explores travel flow for internal and regional/commuter markets.



Section 3 summarizes the **Gap Analysis** for the study area, which assesses potential connectivity gaps to ensure access to key areas in the city. Hot spots of high transit demand were identified as part of the internal-local and external-regional market analyses. Following the identification of potential gaps in both traditional and choice markets, transit opportunities are discussed.

Section 4 presents the **Transit Needs.** This summarizes the process used to develop a set of key needs for the next 20 years for Smyrna. These needs were developed without consideration of funding constraints and are intended to provide a solid platform and foundation for developing the necessary improvement strategies to connect Smyrna within and beyond its borders to the larger region.

Section 2: Transit Market Analysis

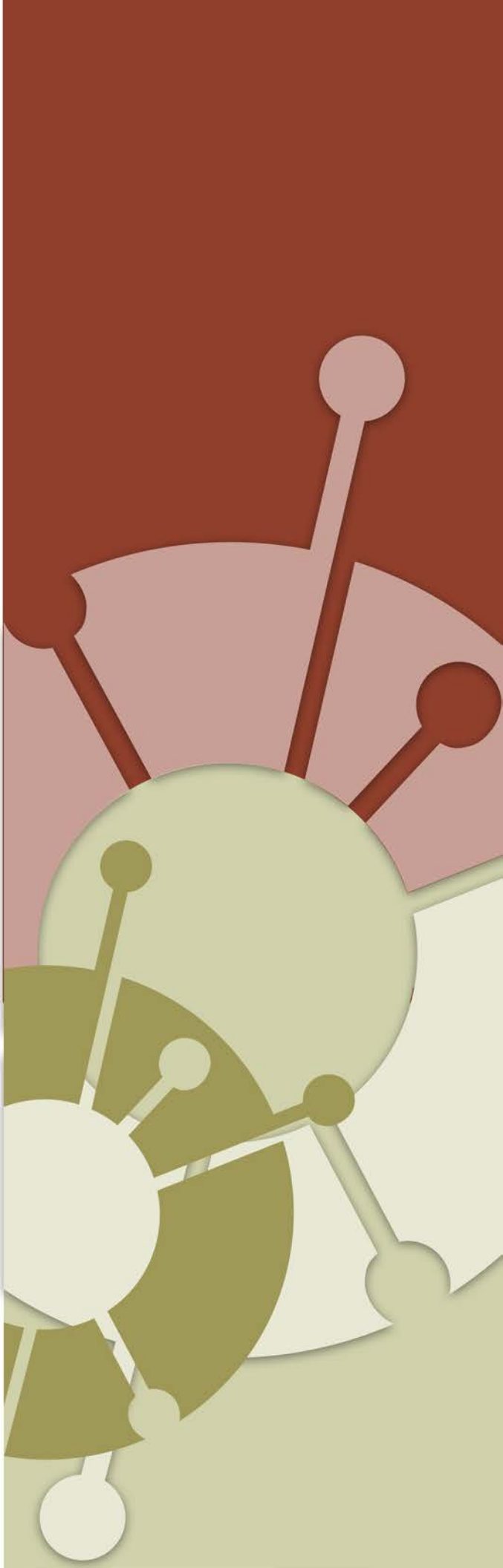
An important aspect of any transit planning process is to ensure that the resulting future vision for transit accommodates areas within the operating environment that are not served (or are underserved) but have latent ridership demand for transit services. To address the possibility of unserved/underserved demand, a latent demand analysis was completed that also serves as a continuation of other data collection and analyses performed for this study, as presented in Technical Memorandum #1, "Existing and Future Conditions."

The demand analysis conducted for *Smyrna Connects* included several innovative and transit-specific planning strategies and market analysis tools that assisted in identifying transit-supportive populations and travel markets. These tools were used to analyze the latent demand from two key travel markets for Smyrna, including:

- Local/internal travel markets
- Regional/commuter travel markets

Local/Internal Markets

Demand from specific transit markets within the study area was carefully analyzed to identify the potential need for public transportation services. Data show that a significant portion of transit trips in Smyrna are used for non-work purposes such as recreation and shopping. This may indicate that users take shorter trips than lengthier commute trips that may take riders out of the study area. To identify these travel markets in the study area, an internal market analysis was conducted that included an evaluation of the study area from three perspectives. The traditional and choice rider markets—the two predominant ridership markets for transit service—and the internal travel market were identified and analyzed using the travel flow data between various areas of the study area. These markets are described as follows:



- ***Traditional rider markets*** are population segments that historically have had a higher propensity to use transit or are dependent on public transit for their transportation needs. Traditional transit users typically include older adults, youth, and households that are low-income or have zero vehicles for use. Analytical tools that uses spreadsheet models and GIS were used to assess this market.
- ***Choice rider markets*** are potential riders living in higher-density areas that may choose to use transit as a commuting or transportation alternative. The analysis conducted used industry-standard density thresholds to identify the areas within the study area that exhibit transit-supportive residential and employee density levels today as well as in the future.
- ***Internal travel markets*** are Smyrna residents and visitors traveling within the city. Trip tables/matrices from the regional travel model, prepared for forecasting all key modes of travel in the region, were used to identify travel patterns by different population groups.

These tools were used to determine whether existing transit routes are serving areas considered to be transit-supportive for the corresponding transit market.

Traditional Transit Market

The traditional rider market includes population segments that historically have had a higher propensity to use transit or are dependent on public transit for their transportation needs. For some individuals, the ability to drive is greatly diminished with age, so they must rely on others for their transportation needs. Likewise, younger persons not yet of driving age but who need to travel to school, employment, or for leisure may rely more on public transportation until they reach driving age. For lower-income households, transportation costs are particularly burdensome, as a greater proportion of income is used for transportation-related expenses than for higher-income households. Households with restricted income may be without an operable vehicle and are more likely to rely on public transportation.

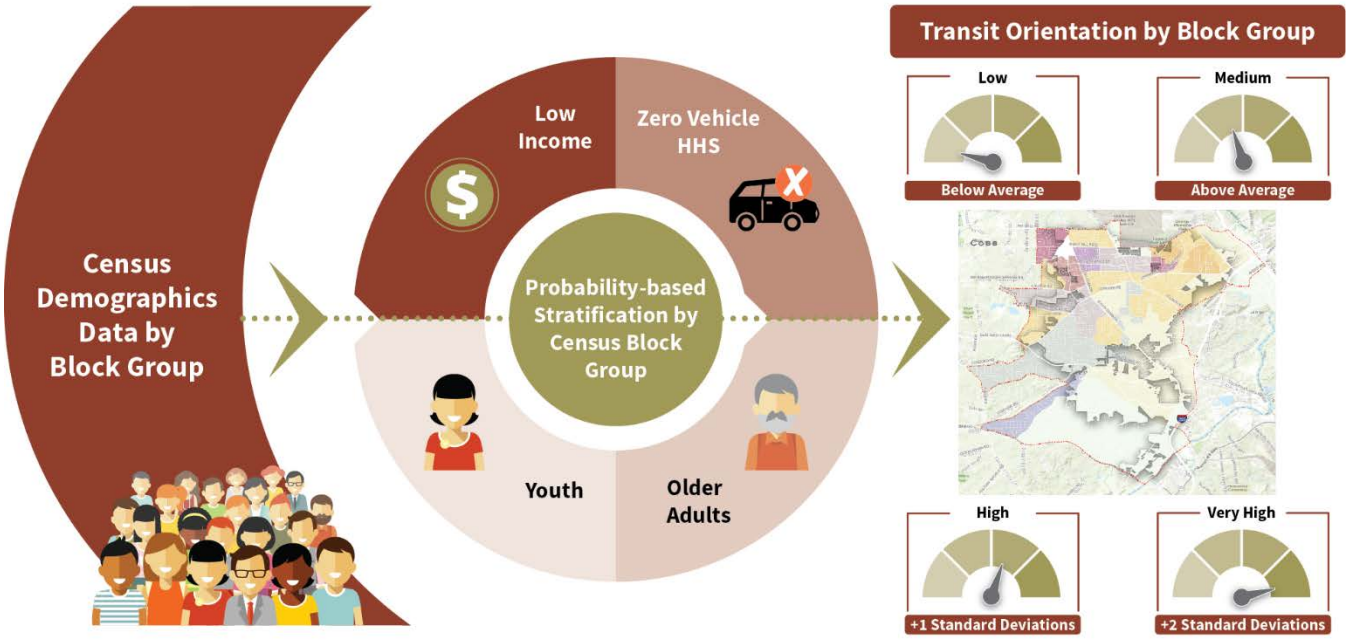
The demographic segments identified as traditional transit users include:

- Youth – population age 14 and under
- Low-income – population in a four-person household with a combined annual income of $25,000 or less
- Zero-vehicle households
- Older adults – population age 65 and over

Transit Orientation Index (TOI) Development Methodology

A Transit Orientation Index (TOI) was developed to assist in identifying residential areas of the city where traditional rider markets exist. To create the TOI for this analysis, demographic data from the American Community Survey (ACS) 5-Year Estimates (2013–2017) were analyzed at the block group level for the selected demographic variables. The methodology and benchmarks are shown in Figure 2-1 and discussed in detail thereafter.

Figure 2-1: TOI Methodology and Benchmarks



Census block groups representing the study area were selected, and the percent distributions for each demographic characteristic previously identified were compiled for each. These proportions were then ranked in descending order. Using the TOI methodology, an average proportion and standard deviation for each demographic characteristic was computed. (A standard deviation measures the extent to which the actual percent values for each block group vary from the average percent value. With a normal "bell-shaped" distribution, approximately 68 percent of the values will be within one standard deviation of the average percent and 95 percent will be within two standard deviations of the average.) The proportions were stratified into three segments—average percent, average percent plus 1 standard deviation, and average percent plus 2 standard deviations.

The resulting percent values for each block group were placed into one of four categories for each demographic characteristic—Below Average (Low), Above Average but within 1 Standard Deviation (Medium), Above Average but between 1 and 2 Standard Deviations (High), and Above Average but more than 2 Standard Deviations (Very High). The scores were assigned using a comparative probability distribution methodology by first estimating the probability that a block group would be within a given category for a given demographic characteristic.

All individual category scores were summed to obtain a composite score for each block group, and the block groups were ranked by composite score. Block groups with the highest scores were indicated as having a "Very High" orientation for transit use based on the four demographic characteristics. Other categories were indicated as having "High," "Medium," and "Low" orientations, respectively. Using this composite ranking, each study area Census block group was ranked as "Very High," "High," "Medium," or "Low" in their levels of transit orientation.

Understanding the intensity of population density also is important when considering transit service for a block group with orientation towards transit. If a block group has a high orientation towards transit but is very low in population density, a transit agency may find it difficult to justify allocating its limited resources to serve that area. Likewise, an agency can benefit if it knows a certain area that is very highly oriented towards transit also is highly dense in population. As a result, TOI categories were cross-tabulated with area density to maximize the effectiveness of the TOI developed for the study area. In addition, a "Very Low" TOI category was created to identify the lowest-density areas from this analysis.

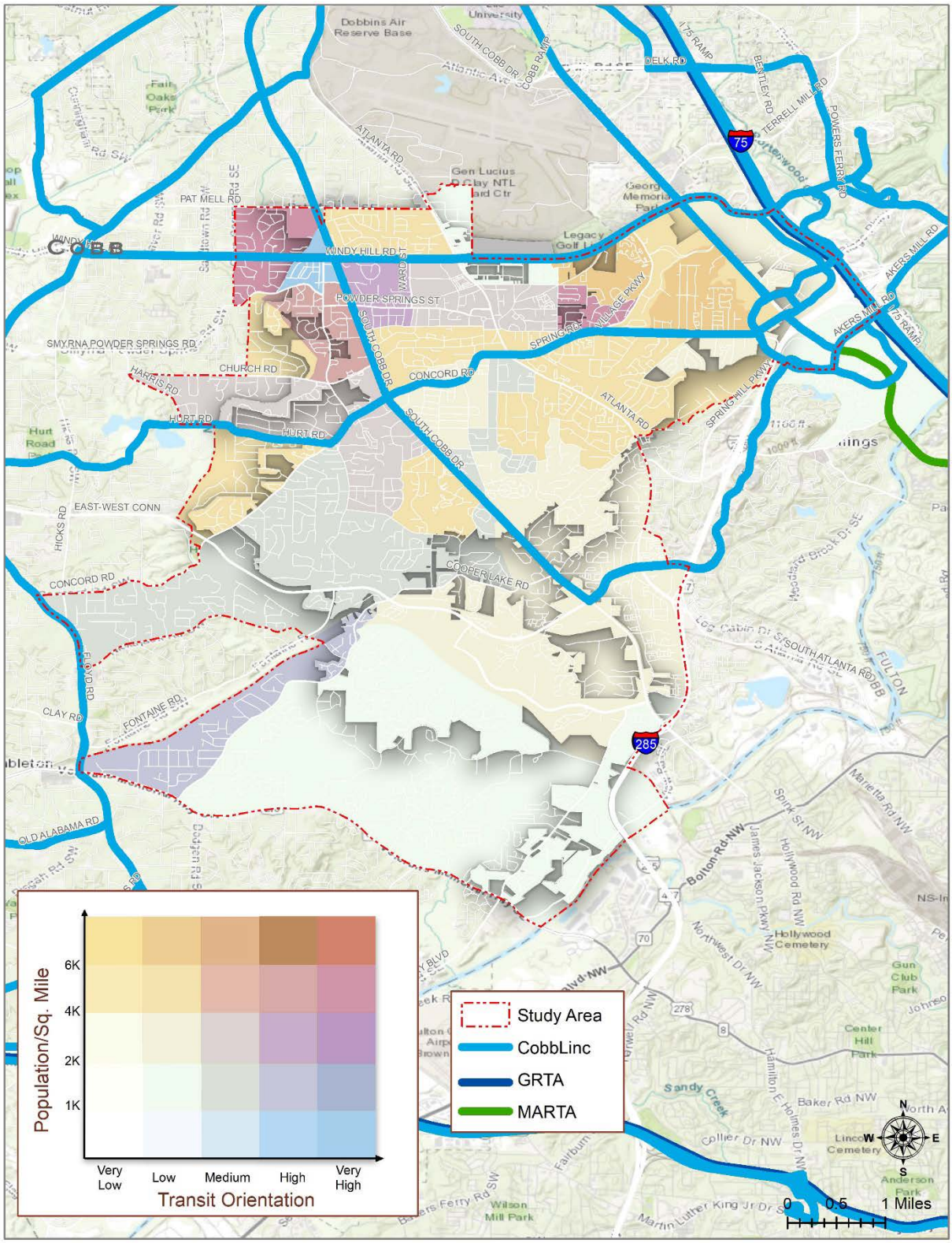
Map 2-1 illustrates the 2017 TOI in terms of population density, reflecting areas throughout the city with varying traditional market potential. Transit orientation maps for each demographic category also were developed and are provided in Appendix A.

Traditional Market Summary

Results from the traditional transit market analysis are as follows:

- **Traditional Market Demand North of Concord/Spring Road**
  - Most areas with a high or very high orientation towards transit live in the northern parts of the city along major roadways and are served by existing transit services.
  - Block groups identified as having a high orientation towards transit are along South Cobb Drive and in two neighboring block groups, south of Windy Hill Road and north of Church Road.
  - Two block groups with a very high orientation towards transit and a high population density are served by existing transit services—the area between Spring Road and Village Parkway south of Windy Hills Road, served by Route 25, and the area west of South Cobb Drive on the north and south sides of Windy Hill Road, served by Routes 15 and 20.
- **Market Demand South of Concord/Spring Road**
  - No areas south of Concord/Spring Road have a very high orientation towards transit.
  - Most areas of block groups that have a medium orientation towards transit along Concord/Spring Road and South Cobb Drive are served by multiple existing routes.
  - Only one block group in the southwestern part of the study area has a high orientation, the area adjacent to Cooper Lake Road. Most of this block group is outside the City limits and generally is not served by existing transit services.

Map 2-1:Traditional Markets and Transit Orientation Benchmarks



Data Source: CobbLinc and 2017 ACS 5-Year Estimates.

Choice Rider Markets

The choice rider market includes potential riders living and/or working in higher-density areas that may choose to use transit as a commuting or transportation alternative. A Density Threshold Assessment (DTA) was conducted, which uses industry-standard density thresholds to identify areas within the study area that exhibit transit-supportive residential and employee density levels today as well as in the future. Socioeconomic data for the study area, including dwelling unit and employment data developed for the regional travel demand model, were used to conduct the DTA.

Density Threshold Assessment Methodology

Regionally-developed socioeconomic data, including dwelling unit and employment data at the Traffic Analysis Zone (TAZ) level, were obtained for the analysis. Using these data variables through a process of interpolation, existing (2020) and future (2040) dwelling unit and employment data were derived and analyzed.

Three density thresholds, developed based on industry standards/research, were used to indicate whether an area is characterized by enough density to sustain some level of fixed-route transit operations:

- ***Minimum investment*** reflects minimum dwelling unit or employment densities to consider basic fixed-route transit services (i.e., hourly local fixed-route bus service).
- ***High investment*** reflects increased dwelling unit or employment densities that may be able to support higher levels of transit investment (i.e., increased frequencies, express bus, premium transit) than areas meeting only the minimum-density threshold.
- ***Very high investment*** reflects very high dwelling unit or employment densities that may be able to support more significant levels of transit investment (i.e., very high frequency services, high-capacity premium transit services, etc.) than areas meeting the minimum or high-density thresholds.

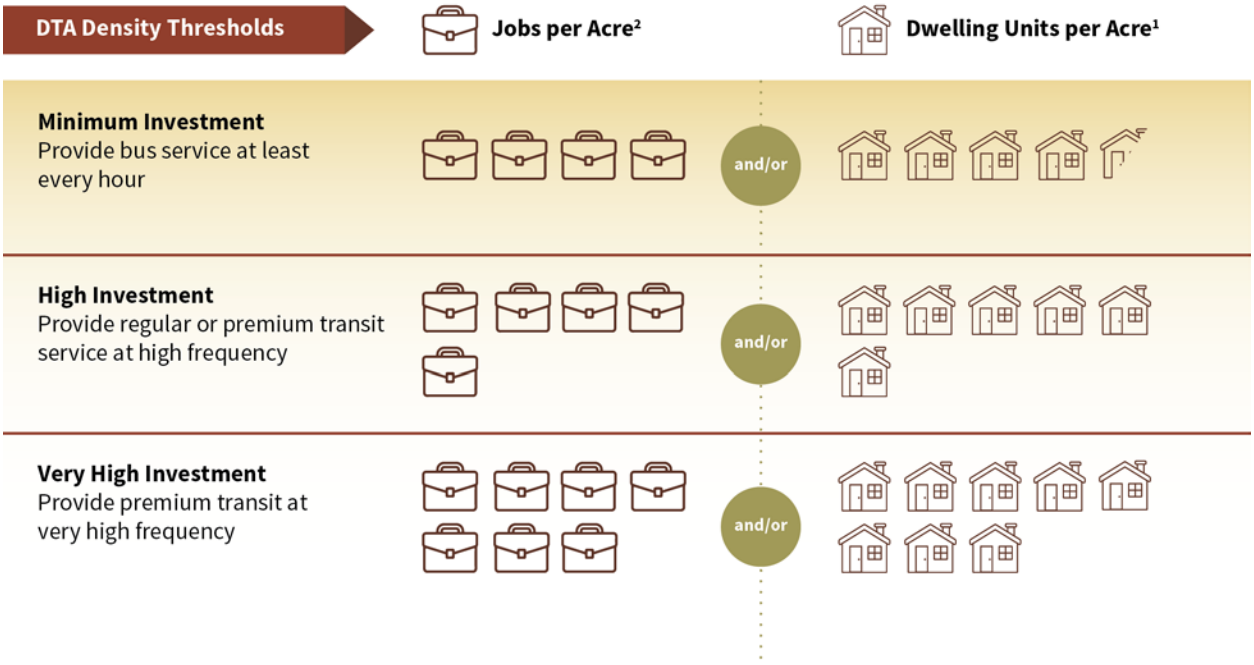
Table 2-1 summarizes and Figure 2-2 illustrates the dwelling unit and employment density thresholds associated with each transit investment.

Table 2-1: DTA Density Thresholds

Level of Transit Investment	Dwelling Unit Density Minimum /Threshold[1]	Employment Density Minimum/Threshold[2]
Minimum Investment	4.5–5 dwelling units/acre	4 employees/acre
High Investment	6–7 dwelling units/acre	5–6 employees/acre
Very High Investment	≥8 dwelling units/acre	≥7 employees/acre

[1] TRB, National Research Council, TCRP Report 16, Volume 1 (1996), "Transit and Land Use Form," November 2002, MTC Resolution 3434 TOD Policy for Regional Transit Expansion Projects.
[2] Based on review of research on relationship between transit technology and employment densities.

Figure 2-2: DTA Density Thresholds



[1] TRB, National Research Council, TCRP Report 16, Volume 1 (1996), "Transit and Land Use Form," November 2002, MTC Resolution 3434 TOD Policy for Regional Transit Expansion Projects.
[2] Based on review of research on relationship between transit technology and employment densities.

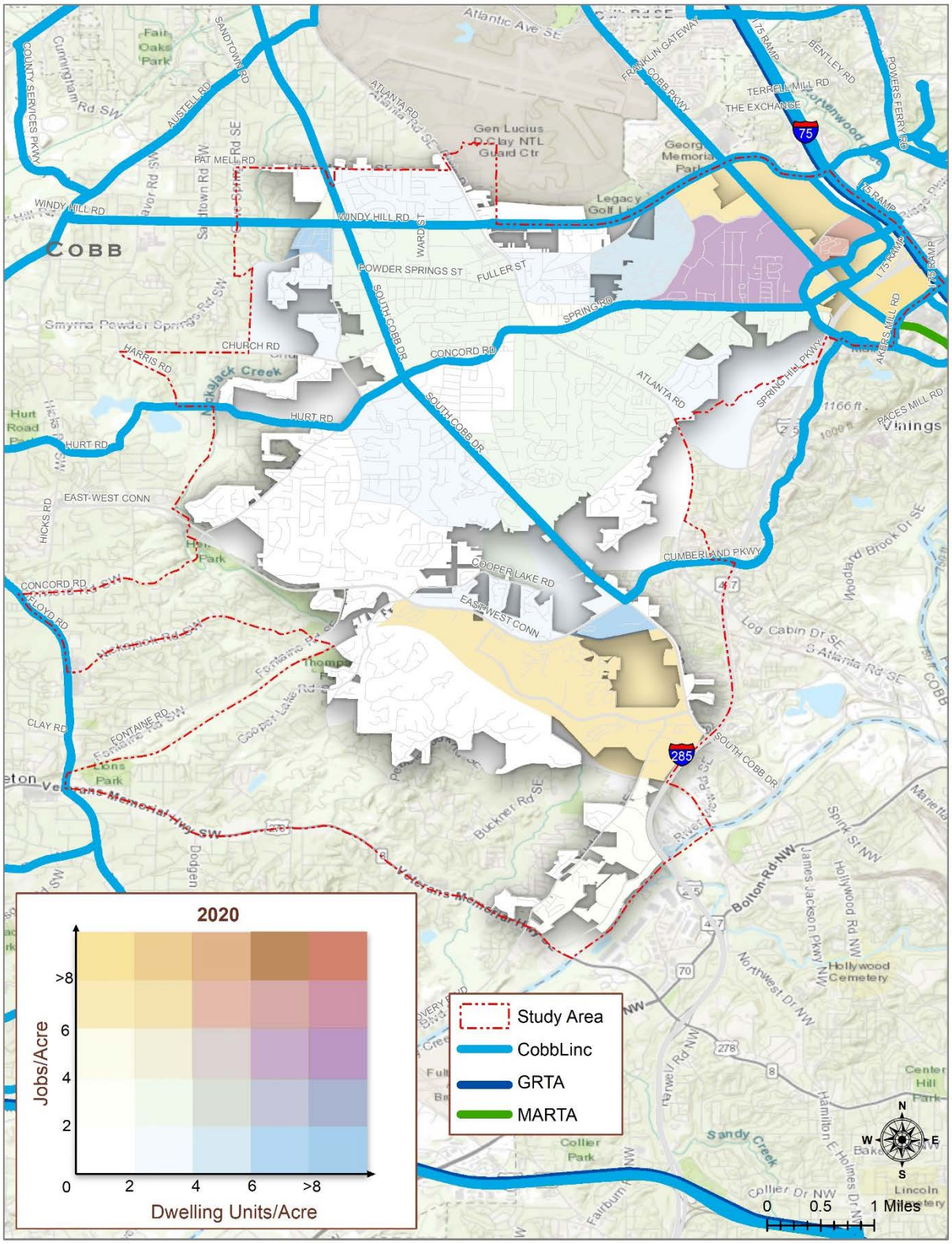
Density Threshold Assessment Summary

Maps 2-2 and 2-3 illustrate the results of the 2020 and 2040 DTA analyses conducted for the study area, identifying areas that support different levels of transit investment based on existing and projected dwelling unit and employment densities. As shown, the difference between the 2020 and 2040 employment and population density threshold maps are minimal, except for the Cumberland Community Improvement District (CID) area, where job and dwelling density increases by 2040, as expected. These maps also show the existing transit network to gauge how well current transit services cover the areas of the study area that are considered supportive of at least a minimum level of transit investment.

The DTA analysis indicates that the choice transit markets in Smyrna are clustered primarily in the Cumberland area where there are high employment densities. The findings are summarized as follows:

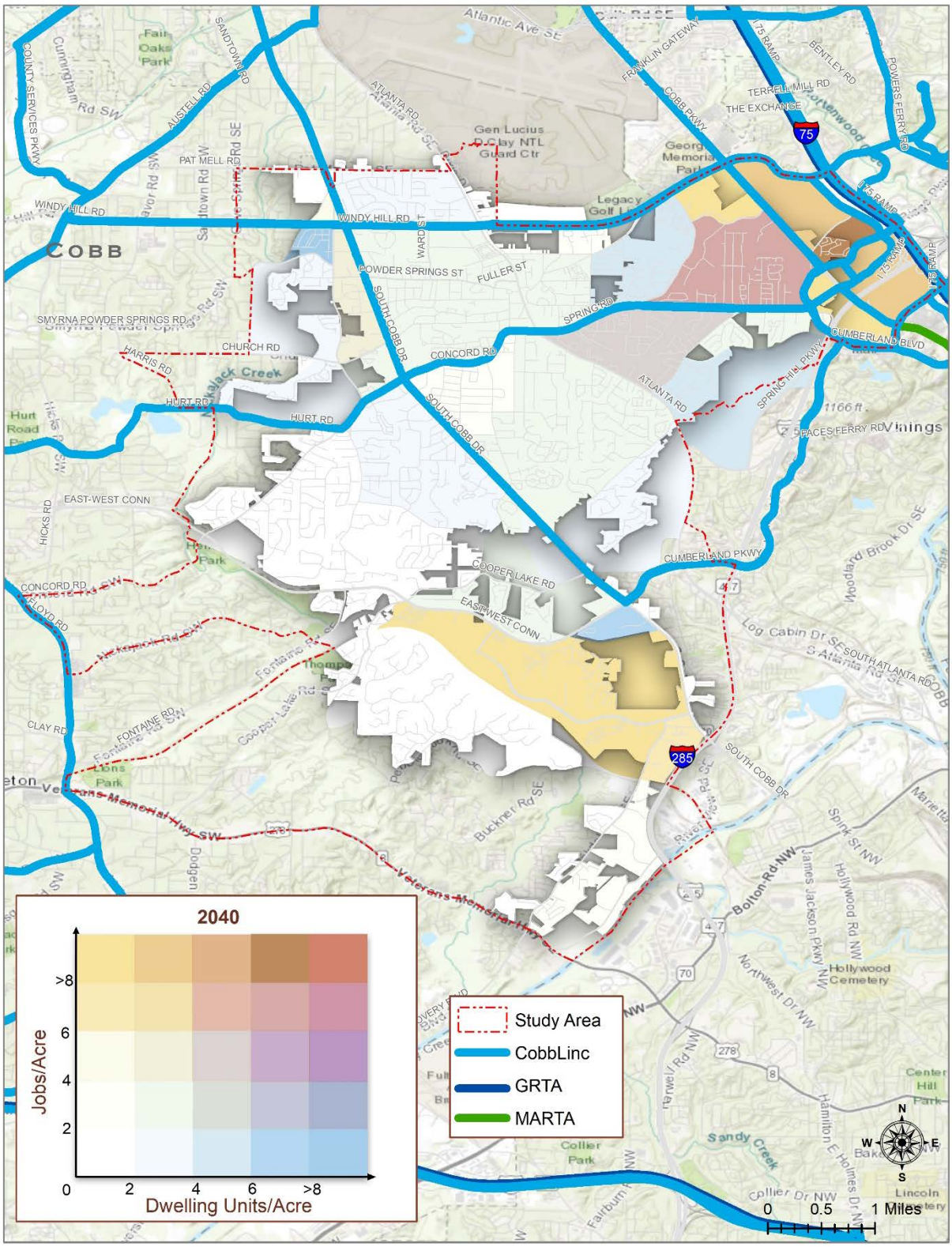
- **Choice Market Demand North of Spring Road/Concord Road**
  - Areas with higher levels of dwelling unit density in 2020 and 2040 are located in between the East-West Connector and South Cobb Drive, adjacent to Windy Hill Road and South Cobb Drive, and between Windy Hill Road and Spring Road. Many parts of these areas that meet dwelling unit density thresholds for high and very high transit investment are already served by existing transit services.

Map 2-2: Choice Markets and Density Thresholds, 2020



Data Source: CobbLinc and ARC Activity Based Demand Model

Map 2-3: Choice Markets and Density Thresholds, 2040



Data Source: CobbLinc and ARC Activity Based Demand Model

- Areas that meet the “high” or “very high” employment density thresholds are located east of the Cobb Parkway between Windy Hill Road, Circle 75 Parkway, and Aker Mills Road in the Cumberland/Galleria area. The areas that meet the “high” or “very high” dwelling unit thresholds are located north of Spring Road between Village Parkway and Cobb Parkway and south of Windy Hill Road west of South Cobb Drive.
- Current areas that are considered “high” or “very high” for both dwelling unit thresholds and employment thresholds for transit investments are contiguous and located adjacent to Spring Road and Cobb Parkway and between Cobb Parkway and Circle 75 Parkway.
- Based on the 2040 DTA, the above area would remain at the “high” and “very high” employment and dwelling unit thresholds. The areas that will experience the most growth in both employment and dwelling unit density are located east of Village Parkway on Spring Road and in the Cumberland/Galleria area.

- **Choice Market Demand South of Spring/Concord Road**
  - Areas that meet the “high” or “very high” employment thresholds are located adjacent to I-285 and South Cobb Drive along the East-West Connector.
  - Areas that meet the “high” or “very high” dwelling unit thresholds are located between the East-West Connector and South Cobb Drive.

Based on the 2040 DTA, these areas remain at the “high” and “very high” employment and dwelling unit thresholds. New areas in 2040 that will meet the minimums for employment or dwelling unit density are located south of Spring Road, adjacent to Atlanta Road, and adjacent to I-285 and Atlanta Road.

Internal Travel Markets

An understanding of travel flows is important for identifying origin and destination (OD) pairs with potential for new or increased transit services. The Internal Travel Markets analysis builds on the analysis of key activity centers and travel patterns documented in Technical Memorandum #1 by identifying overall travel flows for the study area and flows for the following specific market segments.

- ***Low-income populations*** are travelers with low incomes who have no vehicles available or who live in a household with more workers than available vehicles.
- ***Full-time workers*** are travelers who commute to full-time jobs on a regular basis.
- ***Part-time workers*** are travelers who commute to part-time jobs and may work irregular hours and schedules.
- ***University students*** are travelers enrolled in colleges and universities that travel to campus and may have irregular schedules.
- ***Retirees*** are travelers who no longer commute to full- or part-time employment and may have irregular schedules.

Each transit market segment identified above has different travel needs and desires that affect their preferences about transit services. The purpose of a travel flow analysis is to identify OD pairs with high travel demand for each market segment to inform the needs/gap analysis and ultimately provide a basis for recommending transit service strategies and improvements.

Methodology and Data

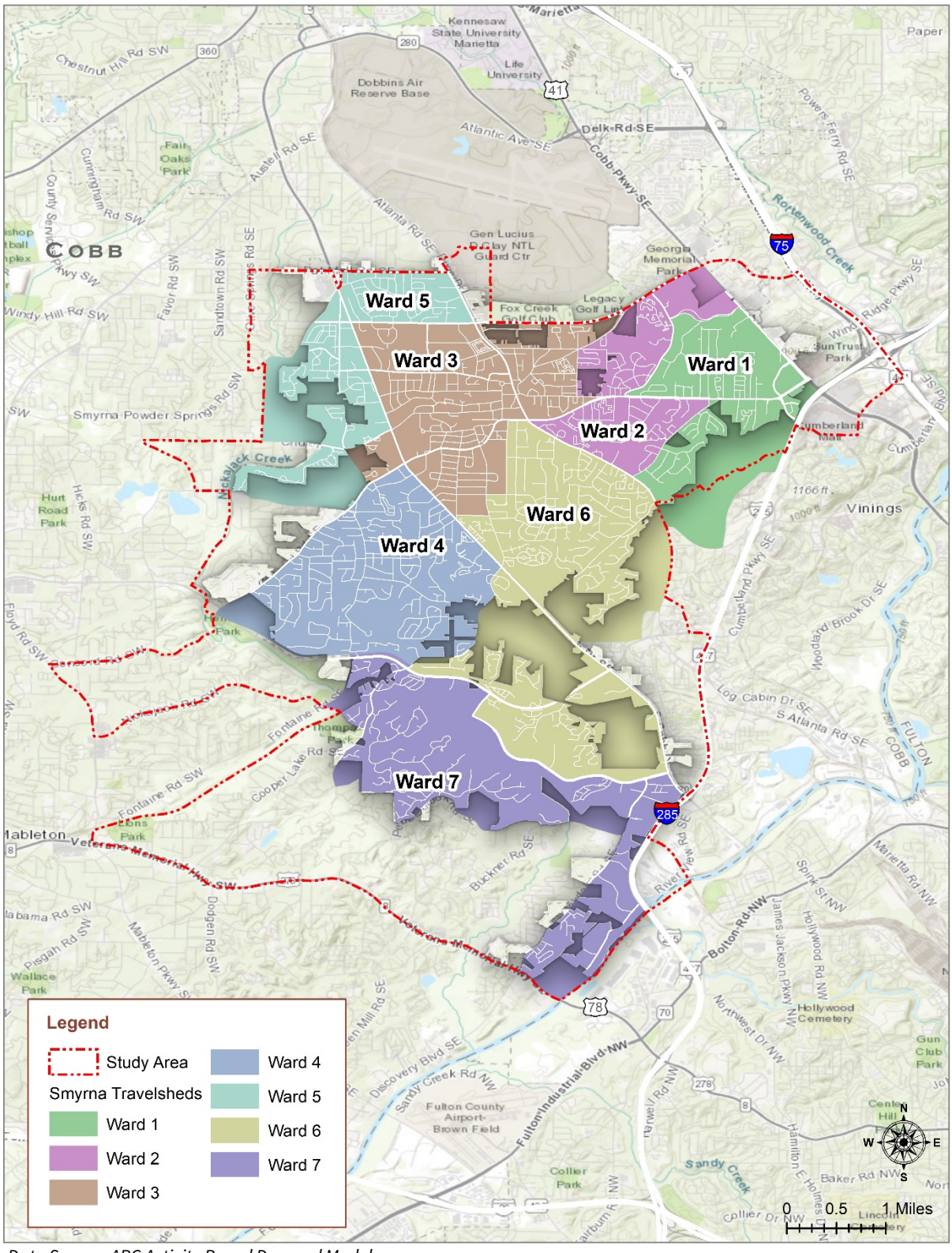
The data and discussions in this section are based on information derived from the Atlanta Regional Commission (ARC) Activity-Based Model (ABM) platform (often referred to as "the regional model"). Model runs for future conditions are for 2040 and include the existing transportation network plus the improvements included in ARC's Regional Transportation Plan (RTP) for which funding has been identified. This analysis takes advantage of increased demographic detail available through the ABM to identify targeted groups of travelers and provide a better understanding of how different market segments of the population move within the study area.

As defined in Technical Memorandum #1, City ward-based travelsheds were used for this analysis. This City ward designation is a convenient and easily-identifiable method to accumulate trip-making characteristics for each travelshed within the city. There are seven distinct travelsheds, as defined by the City ward boundaries for this process and shown on Map 2-4.

Overall Internal Travel Flows

Prior to analyzing market segments, travel OD data for all trips were used to develop an overall understanding of forecasted travel within Smyrna. Table 2-2 shows the top 10 forecasted travel pairs within Smyrna for all trips. Key findings for travel within Smyrna include the following:

Map 2-4: Smyrna Travelsheds



Data Source: ARC Activity Based Demand Model

- Six of the top 10 travel pairs are internal to the wards, showing a strong demand for short trips and circulation within Smyrna.
- Travel from Ward 5 to Ward 3 is the sixth-highest flow and is likely driven by the mix of residential and commercial destinations in each ward as well as the proximity of the wards to each other.
- The seventh-highest flow is from Ward 2 to Ward 1, both of which have a mix of commercial and residential destinations like Wards 5 and 3.
- Ward 6 to Ward 1 is the eighth-highest flow, likely caused by residents traveling to employment opportunities in the commercial areas in Ward 1.

Table 2-2: Total Top Travel Pairs within Smyrna (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 6	Ward 6	4,310
Ward 1	Ward 1	2,880
Ward 3	Ward 3	2,390
Ward 5	Ward 5	1,330
Ward 2	Ward 2	1,240
Ward 5	Ward 3	1,240
Ward 2	Ward 1	1,100
Ward 6	Ward 1	1,010
Ward 1	Ward 2	960
Ward 4	Ward 4	920

Source: ARC Activity-Based Travel Demand Model, VHB.

Low-Income Market Segment

Table 2-3 shows the top 10 forecasted travel pairs for travelers within Smyrna who have low incomes, have zero available vehicles, or live in a household with more workers than available vehicles. Key travel flow insights for the low-income travel market within Smyrna include the following:

- The highest travel flows are internal to Ward 6, which includes industrial land uses around Highlands Parkway and South Cobb Parkway as well as single- and multi-family homes throughout the travelshed.
- The second- and third-highest flows are internal to Ward 1 and Ward 3, both of which have significant commercial land uses as well as single- and multi-family homes.
- The fourth-highest travel flows are internal to Ward 5, which has a mix of commercial and residential uses like Wards 1 and 3.
- Ward 5 to Ward 3 is the fifth-highest travel flow, and both travelsheds have a mix of commercial and residential uses.

Table 2-3: Low-Income Transit Market Top Travel Pairs within Smyrna (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 6	Ward 6	950
Ward 1	Ward 1	870
Ward 3	Ward 3	790
Ward 5	Ward 5	370
Ward 5	Ward 3	340
Ward 2	Ward 2	330
Ward 2	Ward 1	310
Ward 1	Ward 2	300
Ward 3	Ward 2	240
Ward 6	Ward 1	230

Source: ARC Activity-Based Travel Demand Model, VHB.

Full-time Worker Market Segment

Table 2-4 shows the top 10 forecasted travel pairs for commuters with full-time jobs in Smyrna. Key travel flow insights for this segment include the following:

- Like the low-income transit market, the top three travel flows are internal to Wards 6, 1, and 3.
- The third- and fourth-highest flows are internal to Wards 2 and 7, respectively.
- All top 10 full-time worker flows that are not internal to wards are between adjacent wards, indicating short trip lengths.

Table 2-4: Full-time Worker Market Top Travel Pairs within Smyrna (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 6	Ward 6	2,490
Ward 1	Ward 1	1,160
Ward 3	Ward 3	910
Ward 2	Ward 2	620
Ward 7	Ward 7	600
Ward 6	Ward 7	540
Ward 2	Ward 1	480
Ward 5	Ward 5	460
Ward 7	Ward 6	440
Ward 5	Ward 3	420

Source: ARC Activity-Based Travel Demand Model, VHB

Part-time worker Market Segment

Table 2-5 shows the top 10 forecasted travel pairs for commuters with part-time jobs. Key travel flow insights for this market include the following:

- The top three trip pairs for the part-time worker market are the same as those for the low-income transit market and full-time worker market, and the fourth-highest trip pair for the part- time worker market is the same as the low-income transit market.

Table 2-5: Part-time Worker Market Top Travel Pairs within Smyrna (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 6	Ward 6	570
Ward 1	Ward 1	310
Ward 3	Ward 3	270
Ward 5	Ward 5	160
Ward 5	Ward 3	150
Ward 2	Ward 1	140
Ward 2	Ward 2	140
Ward 1	Ward 2	110
Ward 4	Ward 4	110
Ward 7	Ward 7	90

Source: ARC Activity-Based Travel Demand Model, VHB

University Student Market Segment

Table 2-6 shows the top 10 forecasted travel pairs for university students in Smyrna. Key travel flow insights for this segment include the following:

- The university student market segment was the smallest in terms of daily trip numbers, and all top 10 trips for this segment are internal to the wards or between adjacent wards.
- Like the low-income and full-and part-time worker markets, the top three travel flows are internal to Wards 6, 1, and 3.

Table 2-6: University Student Market Top Travel Pairs within Smyrna (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 6	Ward 6	110
Ward 1	Ward 1	100
Ward 3	Ward 3	80
Ward 1	Ward 2	50
Ward 2	Ward 2	40
Ward 5	Ward 5	40
Ward 3	Ward 2	30
Ward 5	Ward 3	30
Ward 2	Ward 1	30
Ward 4	Ward 4	20

Source: ARC Activity-Based Travel Demand Model, VHB

Retiree Market Segment

Table 2-7 shows the top 10 forecasted travel pairs for retirees. Key travel flow insights for this segment include the following:

- The number of retiree market trips is just below that of the part-time worker market.
- Like the low-income and full-and part-time worker markets, the top three travel flows are internal to Wards 6 and 1.
-

Table 2-7: Retiree Market Segment Top Travel Pairs within Smyrna (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 6	Ward 6	470
Ward 1	Ward 1	400
Ward 3	Ward 3	210
Ward 5	Ward 5	180
Ward 4	Ward 4	140
Ward 2	Ward 1	140
Ward 2	Ward 2	130
Ward 5	Ward 3	130
Ward 6	Ward 1	110
Ward 1	Ward 2	90

Source: ARC Activity-Based Travel Demand Model, VHB

Regional/Commuter Markets

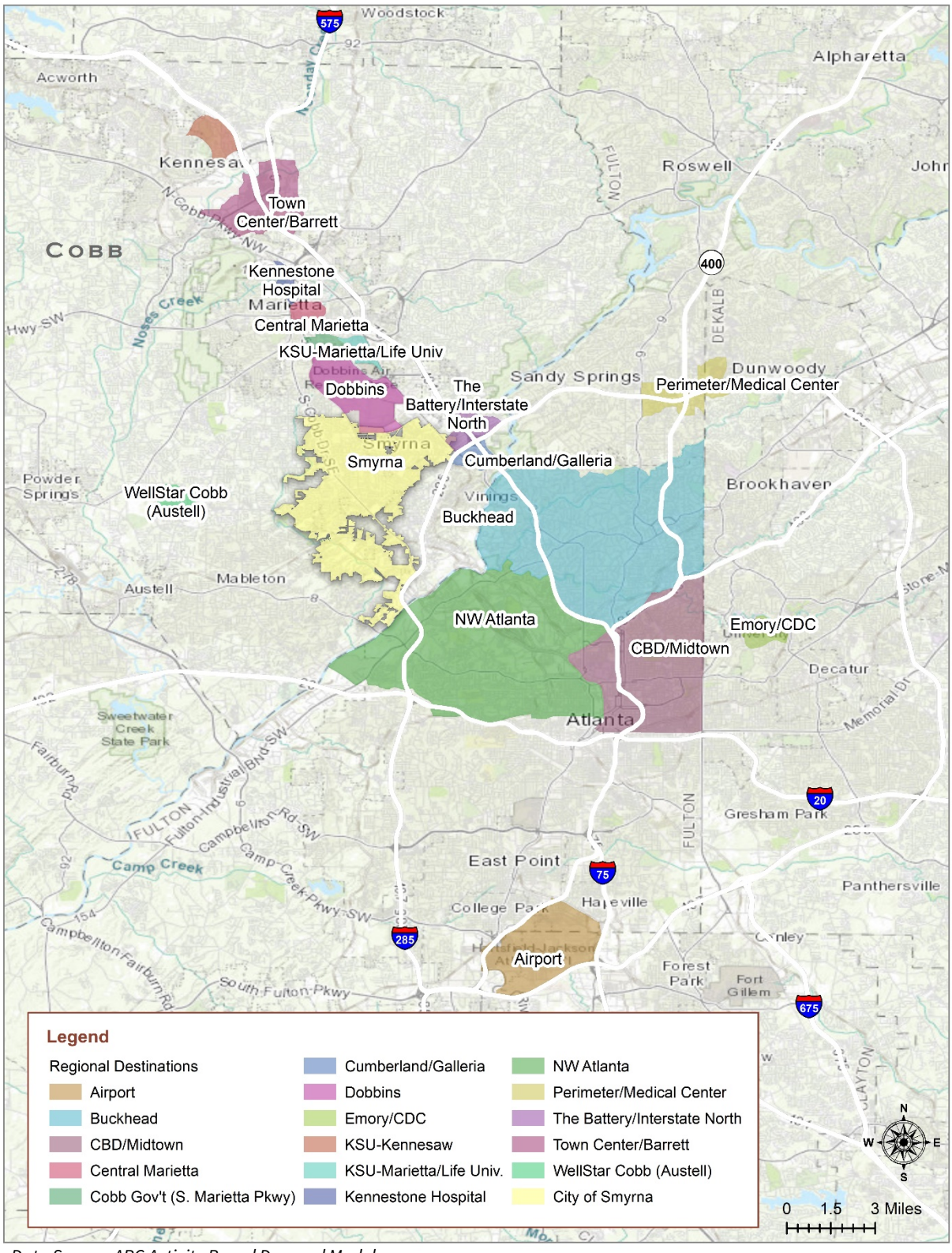
Because Smyrna is an integral part of the larger metropolitan Atlanta region, travel flows between Smyrna and key regional destinations also were identified and analyzed. An understanding of regional trip flows is important for determining the most popular travel pairs and coordinating with partner transit agencies such as MARTA and SRTA/GRTA to increase regional connectivity.

Regional Activity Centers/Destinations

Regional destinations are defined as traditional downtown areas and major employment centers such as the Cumberland/Galleria area or the Central Perimeter. For this analysis, 16 regional destinations were identified, as listed below. Map 2-5 shows the locations of these regional destinations/activity centers.

- The Battery/Interstate North
- Cumberland/Galleria
- Town Center/Barrett Parkway
- Central Marietta
- KSU-Marietta/Life University
- KSU-Kennesaw
- Cobb County Government (South Marietta Pkwy)
- Dobbins Airforce Base
- Downtown/Midtown Atlanta
- Northwest Atlanta
- Buckhead
- Perimeter Center/Medical Center
- Hartsfield-Jackson Atlanta International Airport
- Kennestone Hospital
- WellStar Cobb (Austell)
- Emory/CDC

Map 2-5: Regional Activity Centers/Destinations



Data Source: ARC Activity Based Demand Model

Total Regional Travel Flows

Prior to dividing the regional travel flows into sub-markets, total trips between Smyrna and regional activity centers were analyzed to gain an understanding of overall trip patterns. Table 2-8 shows the top 10 origins and destinations for all regional trips. Key insights from the analysis of regional travel flows include the following:

- The highest travel flow from Smyrna to the region is from Ward 1 to The Battery/Interstate North Parkway, likely for employment opportunities in the commercial and office developments in The Battery/Interstate North Parkway travelshed.
- The second-highest flow is from Ward 1 to Cumberland/Galleria, which is adjacent to The Battery/Interstate North Parkway, which also has high density commercial land uses.
- Travel from The Battery/Interstate North Parkway to Ward 1 is the third-highest flow and the reverse of the top travel flow, indicating strong trip demand in both directions between these two travelsheds. The residential component of the mixed-use developments in The Battery/Interstate North Parkway traveling to commercial areas in Ward 1 likely drive this flow.
- Ward 6 has substantial trip flows to CBD/Midtown, Buckhead, and Northwest Atlanta, indicating a strong flow to employment destinations in Atlanta from Smyrna.

Table 2-8: Total Top Regional Travel Pairs (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 1	The Battery/Interstate North	1,620
Ward 1	Cumberland/Galleria	1,440
The Battery/Interstate North	Ward 1	1,110
Ward 6	CBD/Midtown	1,080
Ward 6	Buckhead	1,060
Ward 6	NW Atlanta	1,050
NW Atlanta	Ward 6	940
Ward 1	Buckhead	920
Cumberland/Galleria	Ward 1	880
Ward 5	Cobb Govt (S Marietta Pkwy)	870

Source: ARC Activity-Based Travel Demand Model, VHB.

Low-Income Market Segment

Travel pairs between Smyrna and key regional activity centers for the low-income transit market were analyzed, and the results are shown in Table 2-9. Key findings from this analysis of trips between Smyrna and the region include the following:

- Ward 1 to The Battery/Interstate North has the highest travel flow between Smyrna and the regional activity centers and likely is comprised of residents in the single- and multi-family developments in Ward 1 traveling to employment opportunities in The Battery and along Interstate North Parkway.

- Northwest Atlanta to Ward 6 is the second-highest travel flow and likely is driven by the industrial and commercial land uses in Ward 6 attracting workers living in Northwest Atlanta.
- Ward 1 to Cumberland/Galleria is a similar travel pattern to The Battery/Interstate North and is the third-highest travel flow.
- The fourth- and fifth-highest flows are the reverse of the Ward 1 to The Battery/Interstate North and Cumberland/Galleria flows.

Table 2-9: Low-Income Transit Market Top Travel Pairs between Smyrna and Region (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 1	The Battery/Interstate North	430
NW Atlanta	Ward 6	400
Ward 1	Cumberland/Galleria	330
The Battery/Interstate North	Ward 1	270
Cumberland/Galleria	Ward 1	230
Ward 5	Cobb Govt (S Marietta Pkwy)	220
NW Atlanta	Ward 7	210
Ward 1	Buckhead	210
Ward 1	CBD/Midtown	180
Ward 3	Cobb Govt (S Marietta Pkwy)	150

Source: ARC Activity-Based Travel Demand Model, VHB

Full-time Worker Market Segment

For the full-time worker transit market, travel pairs between Smyrna and key regional activity centers were analyzed, and the results are shown in Table 2-10. Key findings from the analysis of full-time worker trip flows between Smyrna and the region include the following:

- The highest flow is Ward 1 to The Battery/Interstate North. Conversely, the fourth-highest flow is from The Battery/Interstate North to Ward 1, indicating a strong travel demand in both directions for full-time workers.
- The second-highest flow is from Ward 1 to Cumberland/Galleria, which is adjacent to The Battery/Interstate North.
- The third-highest flow is from Ward 6 to the Central Business District (CBD)/Midtown, and the sixth-highest flow is from Ward 1, which is adjacent to Ward 6, and CBD/Midtown, indicating a strong flow from Smyrna to employment opportunities in the core of the region.
- The fifth-highest flow is from Ward 6 to Northwest Atlanta, which extends west to Fulton Industrial Boulevard.

Table 2-10: Full-time Worker Market Top Travel Pairs between Smyrna and Region (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 1	The Battery/Interstate North	850
Ward 1	Cumberland/Galleria	840
Ward 6	CBD/Midtown	760
The Battery/Interstate North	Ward 1	660
Ward 6	NW Atlanta	650
Ward 1	CBD/Midtown	620
Ward 6	Buckhead	600
Cumberland/Galleria	Ward 1	520
Ward 1	Buckhead	480
NW Atlanta	Ward 6	470

Source: ARC Activity-Based Travel Demand Model, VHB

Part-time Worker Market Segment

Travel flows between Smyrna and key regional activity centers were analyzed for the part-time worker market. Table 2-11 shows the results of this analysis. Key findings regarding part-time worker trips between Smyrna and the region include the following:

- The highest travel flow for the part-time worker market from Ward 1 to Cumberland Galleria is the same as for the full-time worker market, indicating a strong connection between residential areas in Ward 1 and employment opportunities in the Cumberland/Galleria activity center.
- The third-highest flow is from Northwest Atlanta to Ward 6, which also has a high trip flow for the low-income market, indicating this may be a reverse commute flow.
- The fourth-highest trip is from Ward 6 to NW Atlanta, showing strong two-way travel demand.

Table 2-11: Part-time Worker Market Top Travel Pairs between Smyrna and Region (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 1	The Battery/Interstate North	200
Ward 1	Cumberland/Galleria	170
NW Atlanta	Ward 6	150
Ward 6	NW Atlanta	120
The Battery/Interstate North	Ward 1	110
Cumberland/Galleria	Ward 1	100
Ward 6	CBD/Midtown	100
Ward 1	CBD/Midtown	100
Ward 1	Buckhead	100
Ward 2	Cumberland/Galleria	90

Source: ARC Activity-Based Travel Demand Model, VHB

University Student Market Segment

For the university student market, travel pairs between Smyrna and key regional activity centers were analyzed, and the results are shown in Table 2-12. Key findings include the following:

- The highest travel flow is from Ward 1 to KSU-Marietta/Life University, and the sixth-highest flow is from Ward 2 to the same destination.
- The second-highest flow is forecasted to be from Ward 6 to CBD/Midtown, and the third-highest flow is from Ward 1, which is adjacent to Ward 6, to CBD/Midtown.
- Ward 1 to The Battery/Interstate North and Cumberland/Galleria are the fourth- and fifth-highest flows.

Table 2-12: University Student Market Top Travel Pairs between Smyrna and Region (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 1	KSU-Marietta/Life Univ	60
Ward 6	CBD/Midtown	60
Ward 1	CBD/Midtown	50
Ward 1	The Battery/Interstate North	50
Ward 1	Cumberland/Galleria	50
Ward 2	KSU-Marietta/Life Univ	40
Ward 6	KSU-Marietta/Life Univ	40
Ward 6	NW Atlanta	30
Ward 6	KSU-Kennesaw	30
Ward 3	KSU-Marietta/Life Univ	30

Source: ARC Activity-Based Travel Demand Model, VHB

Retiree Market Segment

As shown in Table 2-13, trip activity for travel pairs between Smyrna and regional activity centers for the retiree market were analyzed. Key findings from this analysis include the following:

- The highest travel flow is from Ward 1 to Cumberland Galleria and the second-highest is from Ward 1 to The Battery/Interstate North Parkway, indicating high demand between Ward 1 and these adjacent activity centers.
- Conversely, the fourth-highest flow is from The Battery/Interstate North Parkway, which mirrors the second-highest flow and can potentially increase transit service productivity.
- The third-highest flow is between Northwest Atlanta and Ward 6.

Table 2-13: Retiree Market Top Travel Pairs between Smyrna and Region (Daily, 2040)

Origin Travelshed	Destination Travelshed	Daily Trips
Ward 1	Cumberland/Galleria	220
Ward 1	The Battery/Interstate North	180
NW Atlanta	Ward 6	110
The Battery/Interstate North	Ward 1	100
Ward 6	Buckhead	100
Ward 2	The Battery/Interstate North	80
Ward 6	NW Atlanta	80
Ward 2	Cumberland/Galleria	80
NW Atlanta	Ward 7	70
Ward 1	Buckhead	70

Source: ARC Activity-Based Travel Demand Model, VHB.

Section 3: **Gap Analysis**

Most transit agencies strive to ensure appropriate coverage of their routes and services for essential community services such as employment, affordable housing, educational facilities, and medical/social service facilities, among others. However, it often is the case that connectivity gaps occur as underlying demand and travel patterns change in reaction to the continuing evolution of a community's growth and development patterns.

As such, it is important to continue to assess potential connectivity gaps to ensure access to major origins and destinations, both internally and regionally. To this end, criteria-based methods were developed with appropriate locally-adjusted thresholds to assess connectivity to essential travel hot spots.

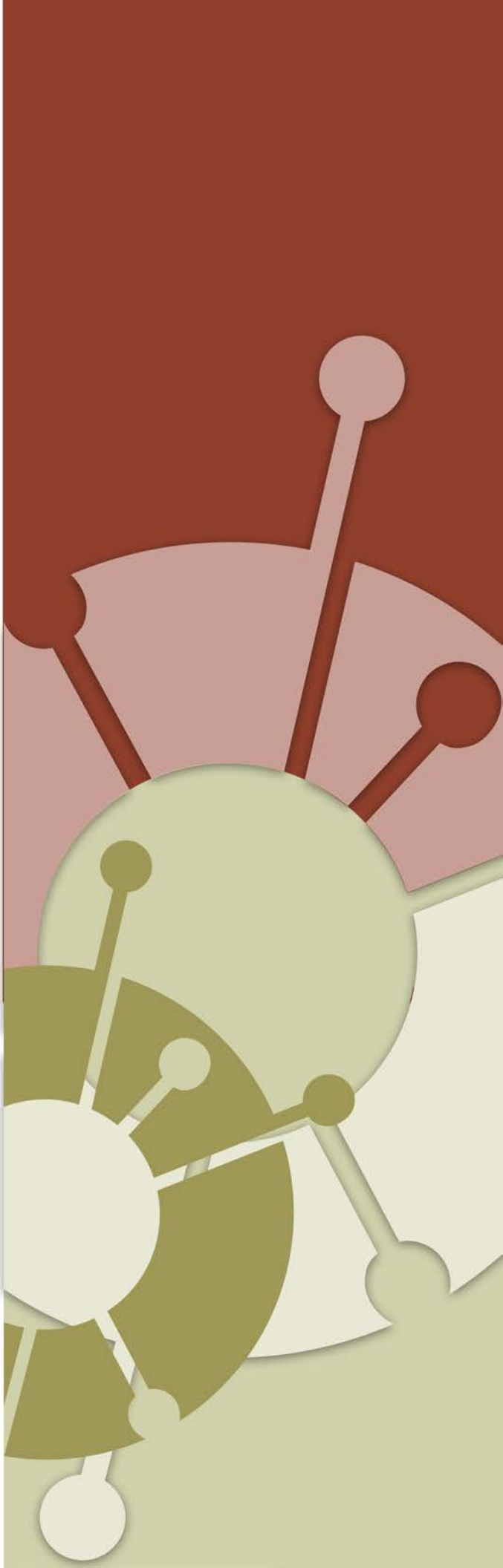
A service gap analysis was conducted for the two main travel markets, local (internal) and regional (external), identified previously. This was done to ensure that the study clearly identifies the connectivity gaps internal to the study area apart from gauging regional connectivity gaps. Regional/external gaps were analyzed using a different methodology that may not capture local needs.

Local/Internal Gap Analysis

Local gap analysis focused on gaps in service within the study area, mainly including Smyrna and some selected key areas adjacent to the city. Although this area is currently served mainly by the County's bus operator, CobbLinc, and by MARTA to some extent, there may be spatial or temporal needs that either are not served or are underserved that should be considered for service.

A key objective of this part of the study was to identify these local gaps of service so improvement strategies can be developed in the next steps to meet internal connectivity needs today and in the future.

The local gap analysis used GIS-based tools and criteria/methodologies to identify the gaps in the traditional and choice rider markets in the city and the surroundings areas.



Traditional Rider Market Gaps

It is important for any suburban transit system to adequately serve its traditional rider market, which includes low-income, older-adult, and youth populations and zero-car households, as they are the "base" ridership upon which most suburban and rural transit systems can depend. As this market traditionally provides a higher percentage of riders than choice markets in rural and/or suburban areas such as Smyrna, identifying where these current and potential riders are located and connecting them to their desired destination is key to capturing this base ridership.

A methodology that uses selected levels of traditional market intensity and existing services was used to identify the gaps in service in traditional transit market, as summarized below.

Traditional Market Gap Analysis Methodology

The TOI, which identified the locations of traditional transit markets, was used to support the gap analysis. To prioritize and emphasize areas that may have the most demand, only areas with "high" and "very high" transit orientation were used for this analysis.

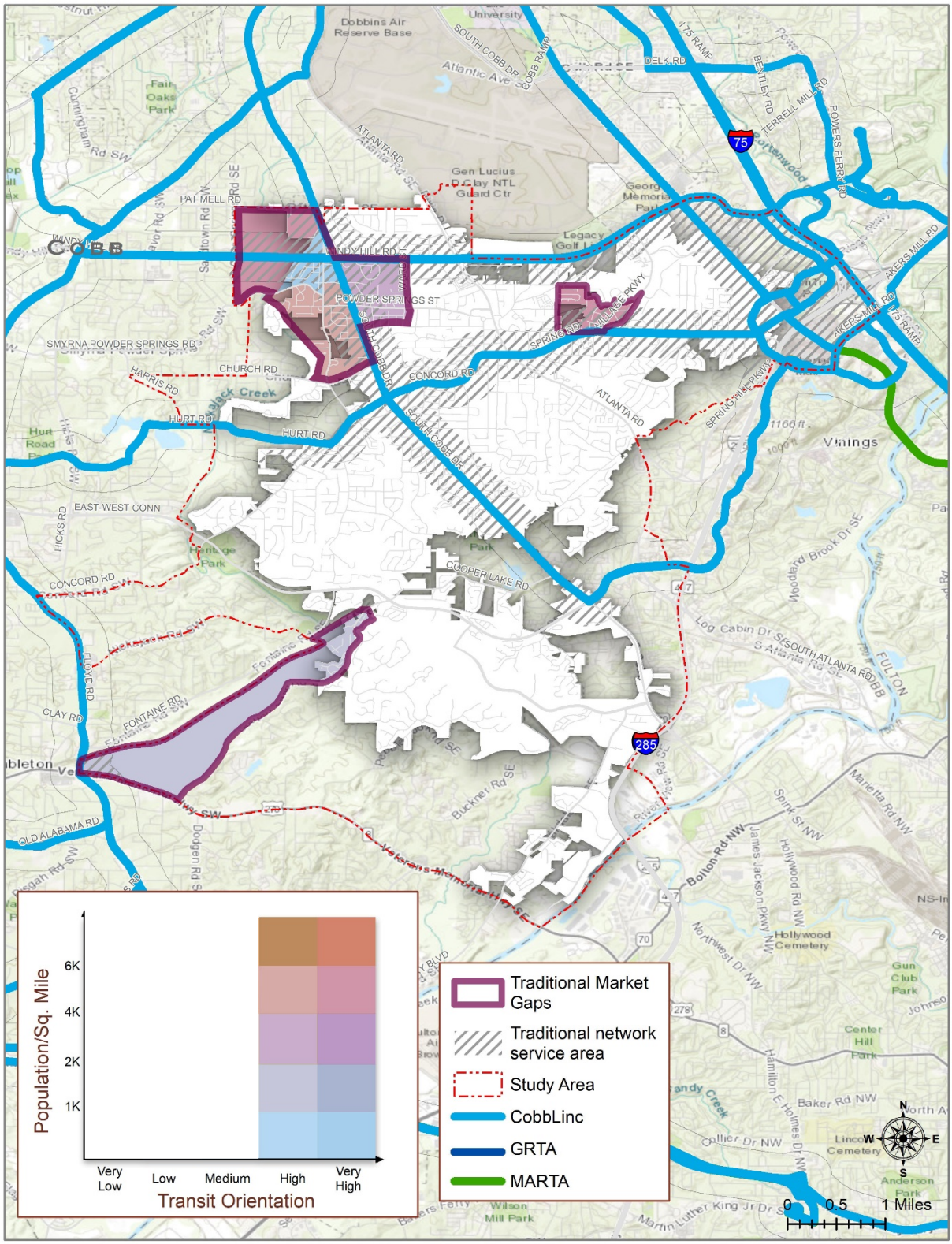
A review of the current services also was conducted, and any fixed-route bus service that provides 60-minute or better service frequency was considered as meeting the minimum traditional market needs. Using GIS, all current CobbLinc and MARTA services that operate in the study area and meet the criteria for serving traditional markets (areas with "very high" and "high" transit orientation) are assumed to be served by transit today. All routes currently operating in the city, including CobbLinc routes 10, 15, 20, 25, and Rapid 10 and the two circulators, meet these criteria.

The service area for the routes was defined as a ¼-mile buffer around each route and included only the areas with walk access to transit. The resulting traditional market areas (areas currently not served or underserved) were flagged for further analysis.

After analysis of the whole study area, each gap in service was analyzed to identify the underlying demand generators that may indicate need for new transit or more transit. This allowed for understanding the demographic category or categories needing service in these areas. For example, is it an area with very high older-adult population or an area with a combination of two or more traditional markets? Distinguishing this information can help to better meet their needs.

Results of the analysis are illustrated in Map 3-1 and summarized thereafter.

Map 3-1: Gaps in Traditional Markets



Data Source: CobbLinc and 2017 ACS 5-Year Estimates.

Traditional Market Gap Analysis Results

Findings from this analysis are summarized as follows.

- **Gaps North of Concord/Spring Road**
  - Four block groups north of Concord/Spring Road are considered to have a "high" or "very high" orientation towards transit, and three are clustered near the Windy Hill Road and South Cobb Drive, making that area a potential candidate for a circulator/flex-type transit service as a feeder to the existing arterial transit services.
  - A block group south of Windy Hill Road and on South Cobb Drive is considered to have a "high" orientation, primarily due to a higher percentage of zero-vehicle households and a significant percentage of older adults in that area. This block group also has a population density of 2,000–4,000 persons per square mile. Currently, 30-minute frequency service is accessible to a majority of this block group via South Cobb Drive or Windy Hill Road.
  - Adjacent to the previous block group on the western side of South Cobb Drive and south of Windy Hill Road is a block group considered to have a "high" orientation towards transit with a population density of 4,000–6,000 persons per square mile. This block group, intersected by Powder Springs Street, has a higher percentage of youth and a significant number of zero-vehicle households. Approximately only half of this block group has access to existing transit services (30-minute frequency service) via South Cobb Drive.
  - A northern block group intersected by Windy Hill Road and west of South Cobb Drive is considered to have a "very high" orientation towards transit with a population density of 4,000–6,000 persons per square mile. The gap is composed of a higher percentage of older adults and zero-vehicle households and even higher percentage of households in poverty. A majority of this block group has access to existing services via South Cobb Drive or Windy Hill Road that are higher frequency.
  - The block group north of Spring Road and west of Village Parkway is considered to have a "very high" orientation towards transit due to a high percentage of youth and a significant number of zero-vehicle households. The block group has a population density of 4,000-6,000 persons per square mile and has access to existing transit services via Spring Road at a lower frequency of 60 minutes.
- **Gaps South of Concord/Spring Road**
  - Only one area south of Concord/Spring Road corridor is considered to have a "high" or a "very high" orientation towards transit. This block group is located south of the East-West Connector and adjacent to Fontaine Road and Veteran Memorial Highway and has a relatively low population density of 1,000–2,000 persons per square mile but a higher older-adult population and a significant number of zero-vehicle households. Transit is not accessible to a majority of this block group except on the western portion via Floyd Road; this area may be a candidate for on-demand flex-route-type transit.

Choice Market Gaps

Whereas identifying latent demand from traditional rider populations may be key to attracting and building the base ridership for a transit service, service growth and attractiveness usually relies on expanding ridership to include choice riders. These riders not only help a transit system set higher ridership goals and improve farebox proceeds, but they are a key tool to breaking down some negative perceptions about transit and its use and role in the community. Attracting the choice market is key to improving transit's impact on business and economic development and making transit a viable alternative to auto travel in Smyrna.

The choice market gap analysis methodology, as summarized below, used the findings from the DTA assessment previously described in combination with transit service data for the city and its immediate surroundings.

Methodology for Redefining Choice Markets

Although the DTA defined any area with 4.5 dwelling units or 4 jobs as transit-supportive, this minimum threshold was adjusted for this analysis to 6 dwelling units and/or 6 jobs to be considered a choice transit market for this gap analysis. This adjustment was made because transit service in To be attractive to choice riders, transit services will need to provide service more frequent than a bus coming every 60 minutes.

A threshold of 4.5 dwelling units or 4 jobs corresponds to hourly service, and 8 dwelling units or 7 jobs corresponds to a very high transit investment such as exclusive-lane BRT or light rail with 15-minute or more frequency. For this analysis, areas with at least 6 dwelling units and/or 6 jobs were identified as choice market areas needing at least 30-minute service.

Once these adjusted thresholds were set, areas meeting these density threshold for job and dwelling units in the 2040 DTA were defined as choice markets and used for the analysis. The 2040 DTA was used instead of 2020 DTA to ensure that *Smyrna Connects* plans for future conditions.

Methodology for Defining Choice Network

Like the traditional market gap analysis, a review of current services in the study area was conducted to determine the bus service network applicable to the choice market. However, as the needs and habits of the choice markets can be different, the following transit factors were considered before determining the criteria that meet the choice market needs:

- ***Service Frequency*** – Choice riders are generally more sensitive to service quality, especially frequency. For the purpose of this analysis, routes with service frequencies of 15 minutes or better, at least during AM and PM peak hours, were considered as attractive to draw choice riders. In addition, routes with 30-minute frequency also were included. Lower-frequency routes were excluded, as choice riders have alternative mobility options available.
- ***Accessibility, Amenities, and Wait Times*** – Transit industry research has shown that regardless of the market a transit system serves, use increases as bus stops become more accessible and wait times are lower. Although it is common sense that longer wait times at

bus stops discourage transit use, past research into elasticities of demand for public transit also has shown that passenger demand increases with increases in accessibility and decreases in waiting time. Therefore, these factors also were considered to determine the route network that meets the needs of the choice riders in Smyrna.

- *Wait Times* – Assuming that CobbLinc's real-time bus tracking app technologies have minimized the wait time at bus stops and made transit more attractive, routes with 30-minute frequency were considered to draw choice riders in the study area.
- *Accessibility and Amenities* – Bus stop data were analyzed to gauge the level of accessibility and available amenities by route frequency. The data show that 40 percent of bus stops in Smyrna served by routes with 30-minute or better frequency have a bus shelter and more than 80 percent have sidewalk access.

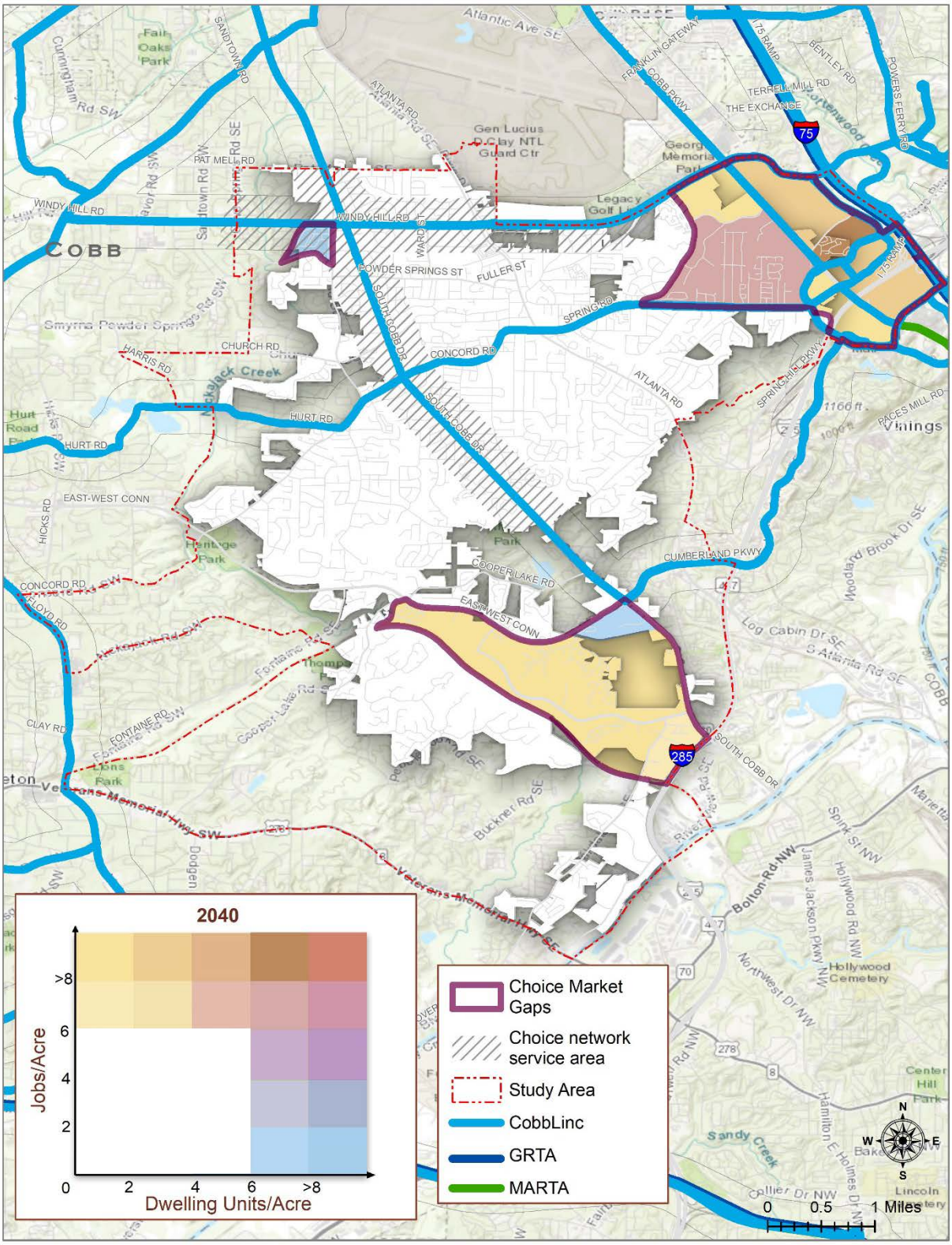
Based on these factors and a review of current transit services in the study area, CobbLinc routes 10, 15, 20, and Rapid 10, and the Cumberland Circulators were selected as the network that meets choice market needs. These routes and their ¼-mile walk access service area buffers were overlaid to determine the choice markets meeting the above criteria that are currently served by transit, and the resulting choice market gaps were flagged. Map 3-2 presents the results for the choice market gap analysis.

Choice Market Gap Analysis Results

Results of the Choice Market Gap Analysis include the following:

- **Gaps North of Concord/Spring Road**
  - The area west of South Cobb Drive and south of Windy Hill Road has more than 8 dwelling units per acre, but fewer than 2 jobs per acre. A vast majority of this area has access to transit service that is every 30 minutes or better.
  - To the east of Atlanta Road, north of Spring Road, and adjacent to Cobb Parkway are nine TAZ areas with a high density of jobs, mainly in the Cumberland/Galleria area. To the east of the Cobb Parkway and adjacent to Circle 75 Parkway is an area that has more than 8 jobs per acre and 6–8 dwelling units per acre. Adjacent to the previously mentioned area is another high-density area containing 6–8 dwelling units and jobs per acre.
  - All other immediate areas in the Cumberland/Galleria area have more than 6 jobs per acre but fewer than 6 dwelling units per acre. A substantial number of these areas has access to transit with headways of 30 minutes or less. High-frequency service (every 15 minutes during peak hours) is available via Cobb Parkway. However, most of the area north of Spring Road and west of the Cobb Parkway does not have access to high-frequency service. This area may be a candidate for circulator or on-demand shared-ride service; whatever the option, it should have high-frequency service to serve this choice rider market.

Map 3-2: Gaps in Choice Transit Markets



Data Source: CobbLinc and ARC Activity Based Demand Model

- **Gaps South of Concord/Spring Road**
  - Five TAZ areas south of Concord/Spring Road have a high density of jobs or dwelling units (6 or more per acre). Between South Cobb Drive and the East-West Connector is an area with low employment density but more than 6 dwelling units per acre. Along the East-West Connector between South Cobb Drive and I-285 are areas with more than 8 jobs per acre but low dwelling unit density. Most of these areas do not have high-frequency service, which may be necessary to attract choice riders. The most-southern areas with a very high density of jobs but lower density dwelling units have no access to transit services. These areas may be candidates for high-frequency circulator or on-demand shared-ride service.

Local/Internal Travel Market Gaps

Daily travel flows within Smyrna can provide an understanding of internal, short-distance travel needs. Therefore, low-income population, full-time and part time workers, university students, and retiree transit markets in Smyrna were further analyzed and mapped to identify the internal short distance travel needs of each market. Mapped travel flows were compared to existing transit coverage and frequencies to identify potential gaps in service coverage.

Overall Internal Flows

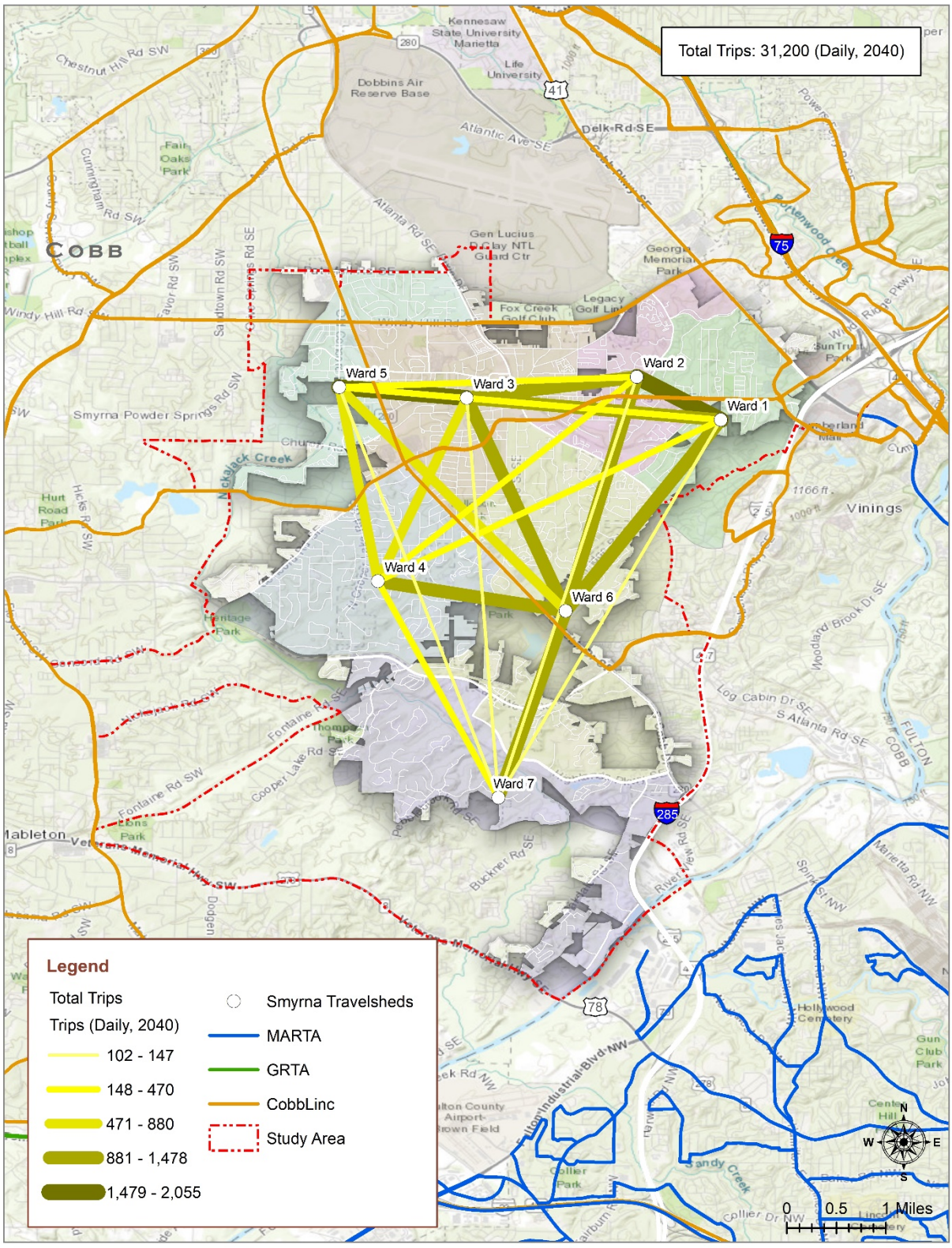
Travel flows for all ward-to-ward trips in Smyrna were mapped, as shown in Map 3-3. The northern part of Smyrna has high trip flows, which indicate potential for east-west transit due to significant travel demand. Additionally, flows to Ward 6 from Wards 1, 2, 3, 4, and 7 show potential for a mobility hub.

- Travel flows tend to be short, either within travelsheds or to adjacent travelsheds or activity centers.
- An opportunity may exist for circulator or flex-style transit service that makes short trips connecting employment and shopping opportunities with residential areas based on the high demand between adjacent travelsheds.

Based on the analysis of top internal travel flows, key findings are as follows:

- Current east-west service is provided by routes 15 and 25, which operate in the northern part of Smyrna. Route 15 frequency is currently 30 minutes, and Route 25 is 60 minutes. North-south service is provided along SR-280 (South Cobb Parkway) with a 30-minute headway, but no direct transit connection exists between the southern parts of Wards 6 and Ward 1.

Map 3-3: Overall Internal Travel Flows within Smyrna (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

Low-Income Transit Market Segment

Travel flows for the low-income transit markets were mapped, as shown in Map 3-4. High trip flows in this market between wards in the northern part of Smyrna indicate potential for east-west transit. Additionally, flows to Ward 6 from Wards 1 and 3 show potential for north-south transit connections.

Based on the analysis of top internal travel flows for the traditional transit market, key findings are as follows:

- Travel flows for the low-income transit market tend to be short, either within travelsheds or to adjacent travelsheds or activity centers.
- The low-income transit market represents an opportunity for circulator or flex style transit service making short trips that connects employment and shopping opportunities with residential areas.
- High trip flows for the low-income transit market between Wards 1, 2, 3, and 5 indicate demand for an east-west transit connection in the northern part of Smyrna.

Current east-west service is provided by Routes 15 and 25, which operate in the northern part of Smyrna. The frequency of Route 15 is currently 30 minutes, and Route 25 is 60 minutes. North-south service is provided along SR-280 (South Cobb Parkway) with a 30-minute headway, but there is no direct transit connection between southern parts of Wards 6 and Ward 1.

Full-time Worker Market Segment

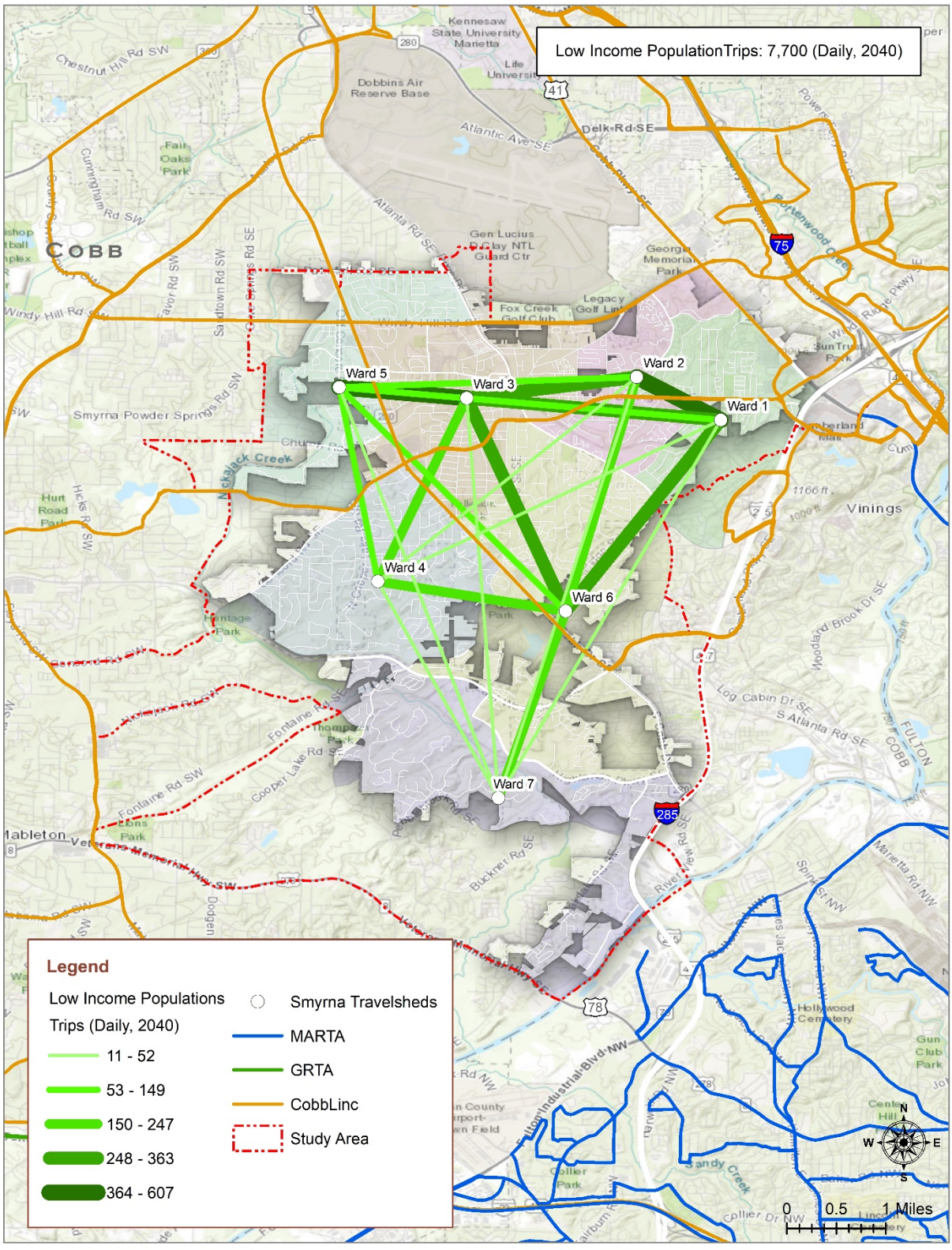
Travel flows for the full-time worker market segment were mapped, as shown in Map 3-5. High trip-flow patterns between wards indicate potential for improved north-south transit service. Additionally, Ward 6 has high travel flows to Wards 1, 3, 4, and 7, which may make it a natural location for another major transfer center (in Smyrna).

Based on the analysis of top internal travel flows for the full-time worker market, key findings are as follows:

- All top 10 full-time worker flows that are not internal to wards are between adjacent wards, indicating short trip lengths.
- The top full-time worker travel flows are shorter trips that could be served by a high-frequency service that can attract these short trips.

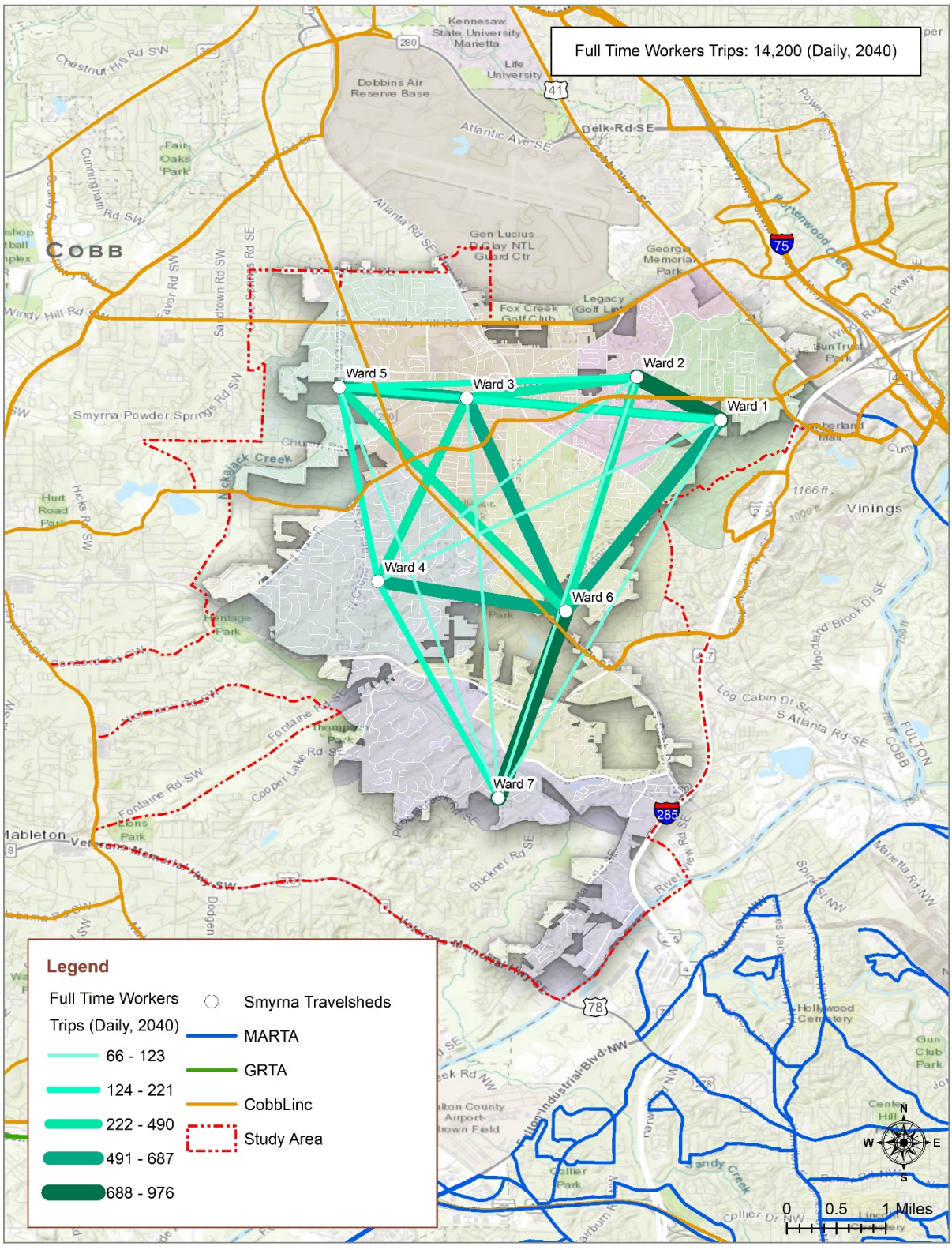
Current east-west service is provided by routes 15 and 25, which operate in the northern part of Smyrna. Route 15 frequency is currently 30 minutes, and Route 25 is 60 minutes. Route 25 frequency is likely too low to serve workers traveling between Wards 1 and 2. North-south service is provided along SR-280 (South Cobb Parkway) with a 30-minute headway, but there is no direct transit connection between Wards 6 and 7.

Map 3-4: Low-Income Transit Market Travel Flows within Smyrna (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

Map 3-5: Full-time Worker Market Travel Flows within Smyrna (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

Part-time Worker Market Segment

Travel flows for the part-time worker market were mapped, as shown in Map 3-6. These trip flows are similar to both the traditional transit and the full-time worker market flows and indicate potential for east-west and north-south transit service in Smyrna.

Based on the analysis of top internal travel flows for the part-time worker market, key findings are as follows:

- Total number of trips made by the part-time worker market is less than for the full-time worker and low-income markets.
- The top three trip pairs for the part-time worker market are the same as for the traditional transit and full-time worker markets.
- The fourth-highest trip pair for the part-time worker market is the same as for the traditional transit market.
- Based on the overlap in trip pairs between the part-time worker, full-time worker, and traditional transit markets, there is opportunity for transit routes to serve all three markets; however, hours of service and frequency may need to be expanded/adjusted to accommodate non-traditional schedules of the part-time worker market.

Current east-west service provided by Route 25 is likely too low to serve part-time workers traveling between Wards 1 and 2. Additionally, part-time worker travel demand between Wards 3 and 5 is likely not well-served by Route 25 due to its low frequency. In addition, as noted, there is no direct transit connection between Wards 6 and 7.

University Student Market Segment

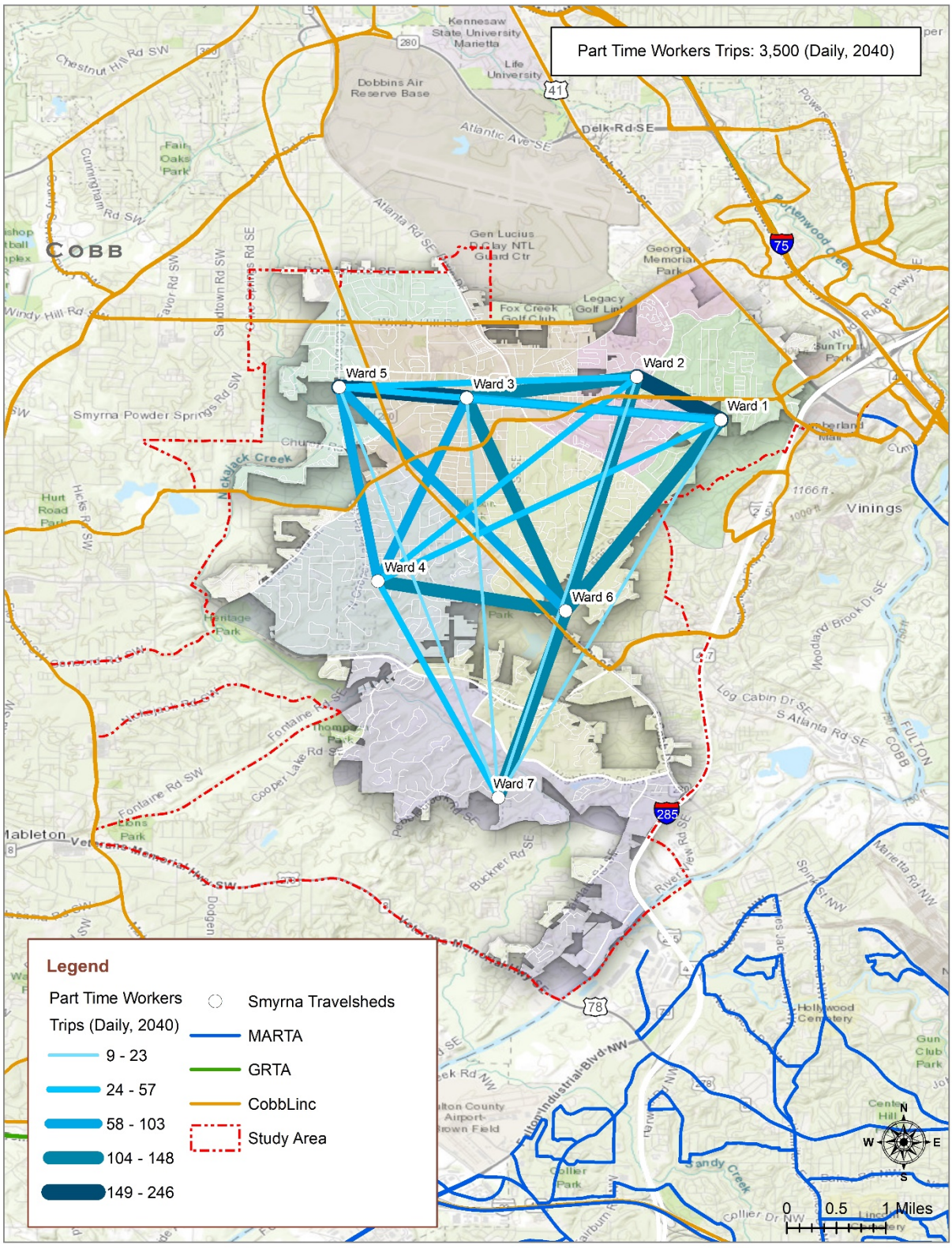
Map 3-7 shows the travel flows for university students. High trip flows in the university student market between wards in the northern part of Smyrna may indicate the need for more attractive east-west transit. Additionally, flows to Ward 6 from Wards 3 show potential use on a north-south transit connection.

Based on the analysis of internal travel flows for the university student market, key findings are as follows:

- The strongest internal trip pair for university students is between Wards 1 and 2.
- University student travel desired between Wards 2 and 3, 2 and 6, and 3 and 6 is also high.

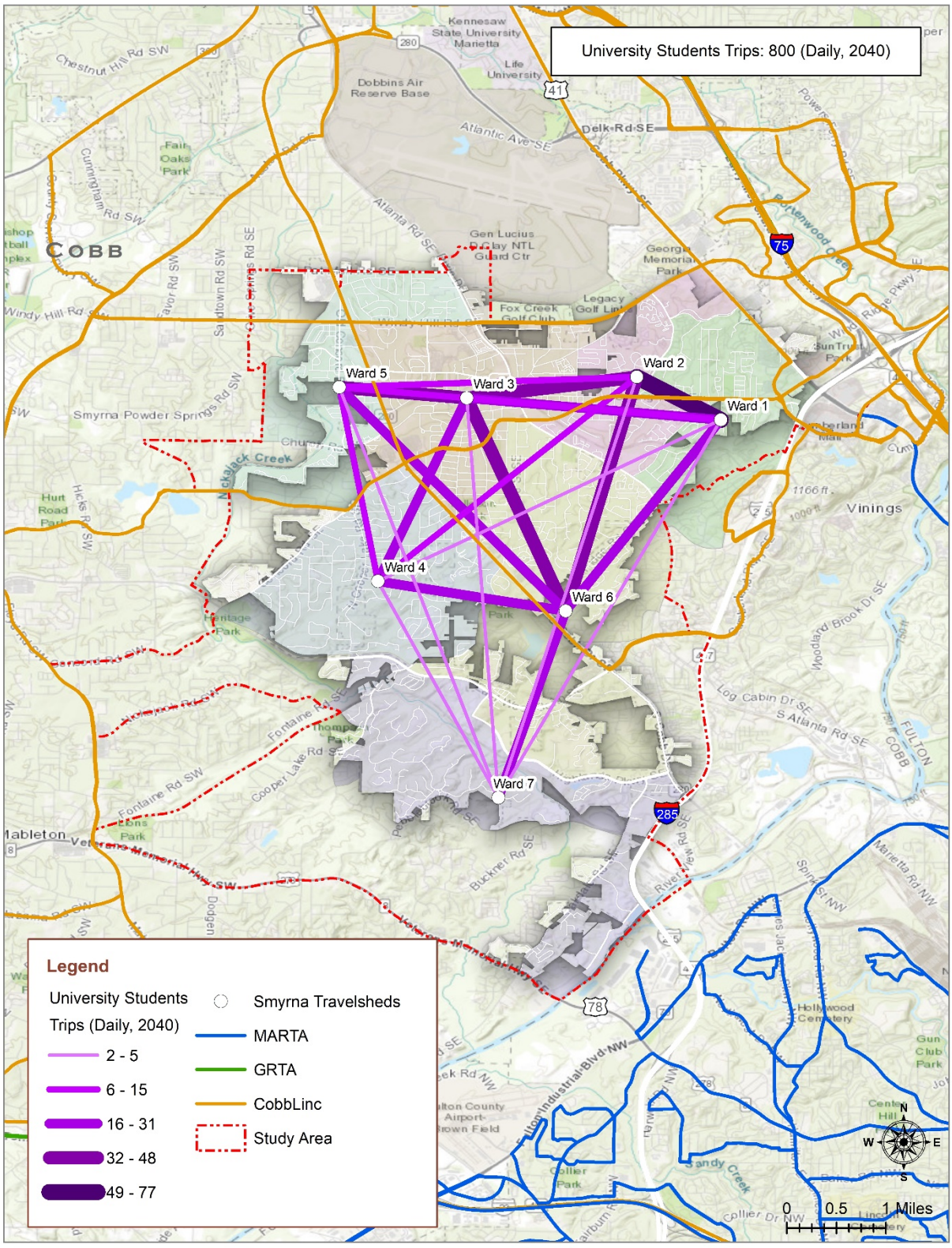
Current east-west service on Route 25 may not be attractive to university students traveling between Wards 1 and 2. University student travel demand between Wards 3 and 5 is also likely not well-served by Route 25 at current levels.

Map 3-6: Part-time Worker Market Travel Flows within Smyrna (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

Map 3-7: University Student Market Travel Flows within Smyrna (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

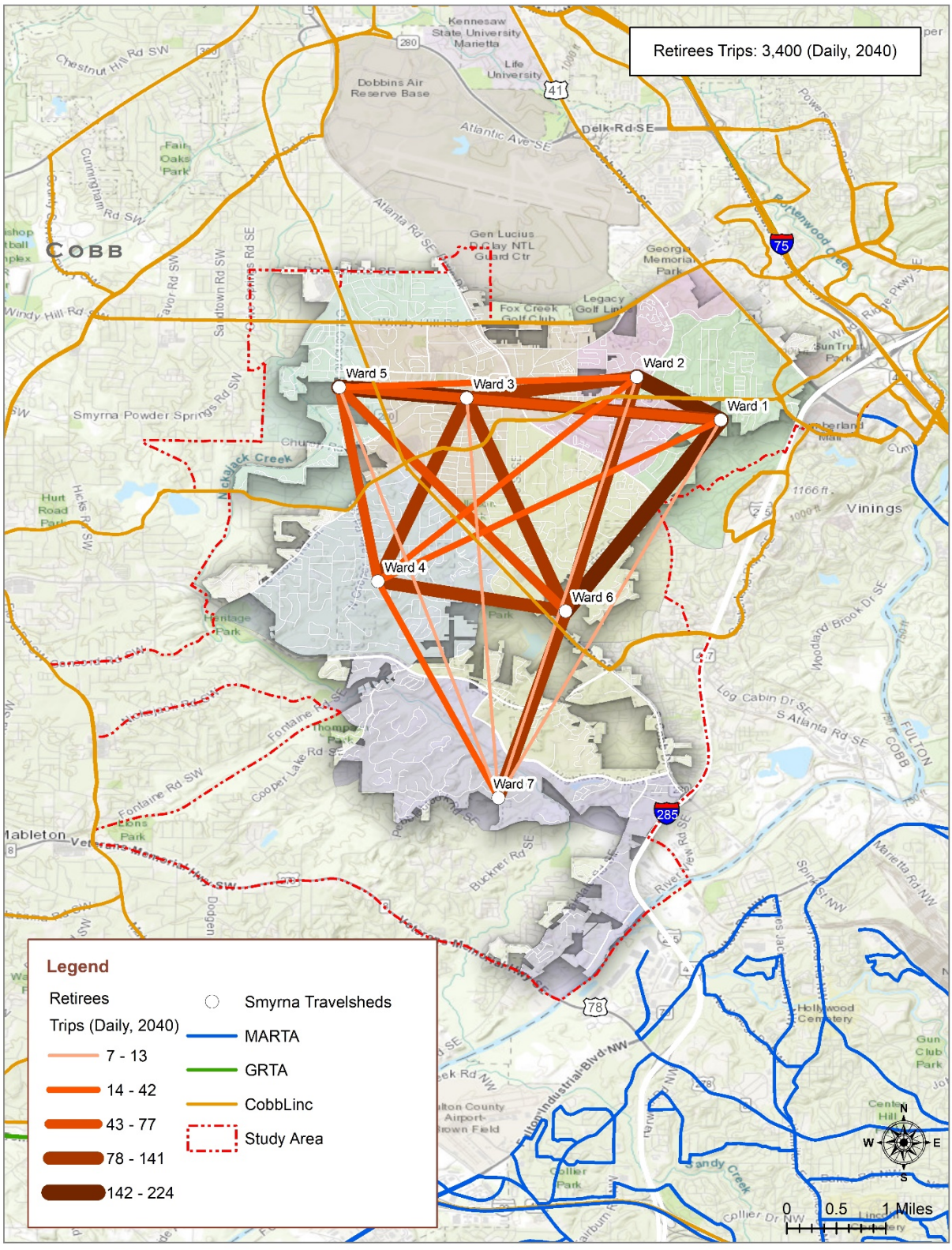
Retiree Market Segment

Travel flows for the retiree market were mapped, as shown in Map 3-8. In contrast to the other market segments that show distinct top-tier patterns, retiree travel flows are much more diverse, indicating a need for transit service throughout the city for this market. However, the retiree market does show strong travel demand across the northern part of the city and along the eastern part, similar to other market segments.

Based on the analysis of internal travel flows for the retiree market, key findings are as follows:

- The total number of retiree market trips is just below that of the part-time worker market.
- All top 10 travel flows for the retiree market are either within travelsheds or to adjacent travelsheds or activity centers, indicating potential for a flex/circulator or on-demand shared-ride service to serve this market segment.

Map 3-8: Retiree Market Travel Flows within Smyrna (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

Regional Gap Analysis

Travel demand to destinations in the northwest Atlanta region from Smyrna were analyzed to identify the interregional gaps in transit services and facilities. The analysis is summarized below.

Total Regional Travel Flows

Desire line maps showing total travel flows between Smyrna and key regional activity centers were created to identify the most important travel patterns. Map 3-9 shows the travel flows between Smyrna and the regional activity centers. The following common travel patterns emerged:

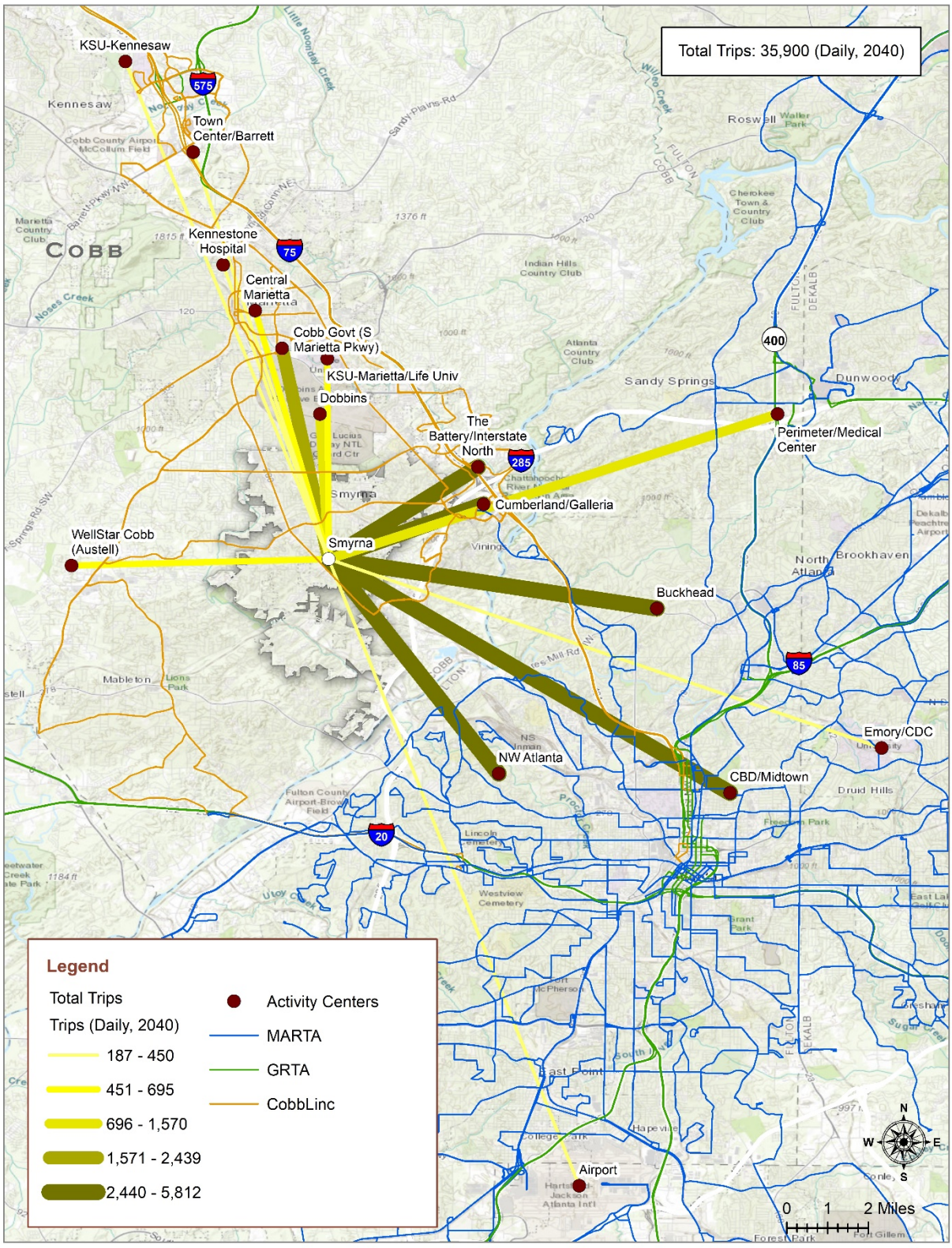
- The highest flows are between Smyrna and The Battery/Interstate North Parkway.
- Buckhead has the second-highest total trip flow.
- Cumberland/Galleria is adjacent to The Battery/Interstate North Parkway and has the third-highest trip flows.
- The connection between northwest Atlanta and Smyrna has the fourth-highest trip flows.
- CBD/Midtown has the fifth-highest travel flows.
- The second tier of travel flows is between Smyrna and Dobbins, Cobb Government (South Marietta Parkway), and Perimeter/Medical Center.
- Limited trip flows are forecasted to Atlanta International Airport, Emory/CDC, and KSU-Kennesaw from Smyrna.
- Regional connections to the Cumberland area (Galleria, The Battery, and Interstate North) account for more than 11,000 total trips and should be maintained or improved to continue driving economic growth in and around Smyrna.
- Atlanta is a key regional destination for Smyrna, with many residents likely traveling to jobs in Buckhead, Northwest Atlanta, and CBD/Midtown.

Low-Income Market Segment

To provide more detailed insight into travel patterns between each ward and the regional activity centers, desire lines showing the travel flows for the low-income transit market were mapped and are shown in Map 3-10. Although the strongest trip flows varied by ward, the following common themes emerged for the low-income transit market:

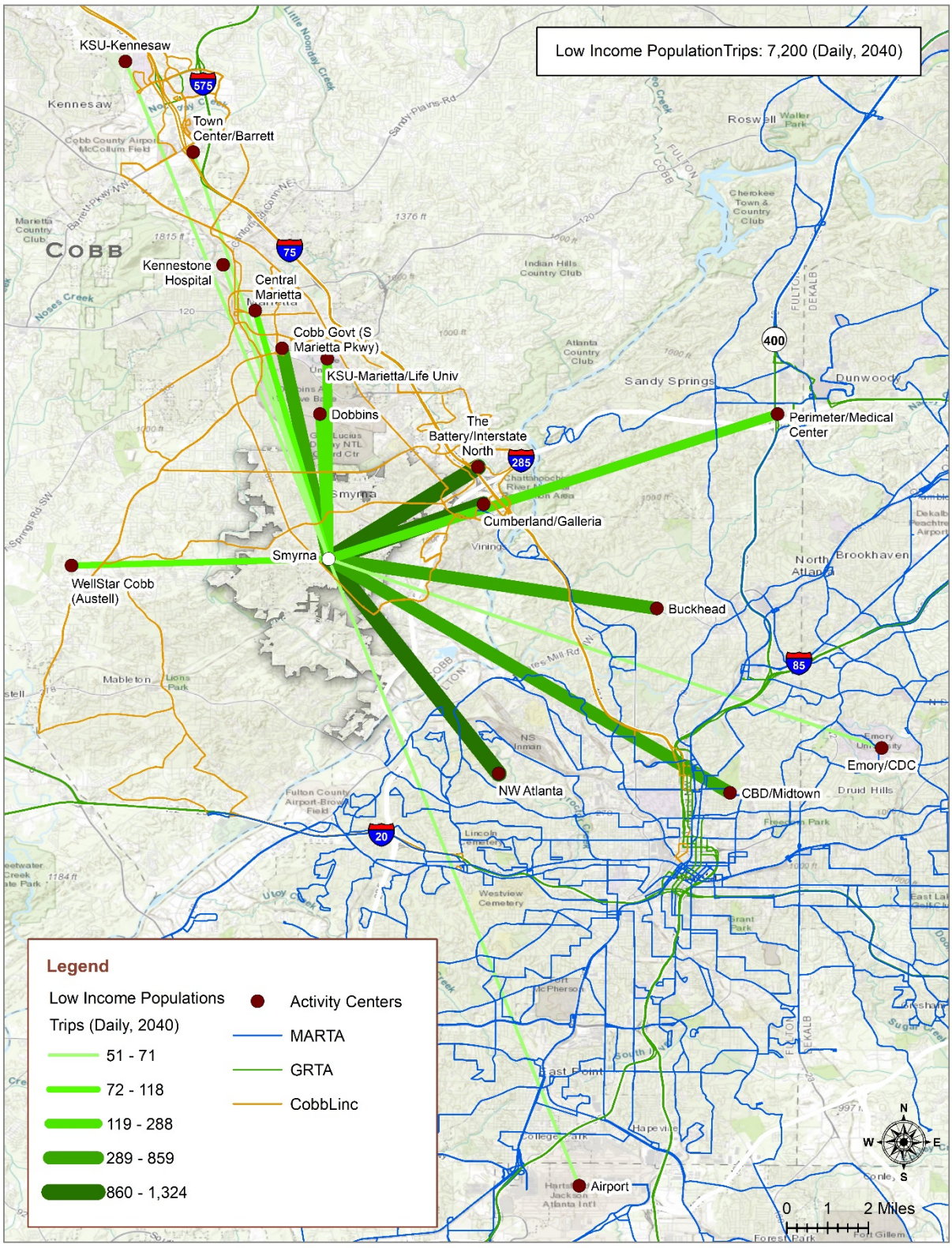
- The highest flows are between Smyrna and The Battery/Interstate North Parkway, Cumberland/Galleria, and Northwest Atlanta.
- The second tier of travel flows is between Smyrna and Dobbins, Buckhead, CBD/Midtown, and Cobb Government (South Marietta Parkway).
- The third tier includes Perimeter/Medical Center and KSU-Marietta/Life University.
- Limited trip flows are forecasted to the Atlanta International Airport and Emory/CDC.
- Regional connections to the Cumberland area (Galleria, The Battery, and Interstate North) should be maintained or improved to continue attracting this market segment.

Map 3-9: Total Regional Travel Flows (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

Map 3-10: Low-Income Market Trip Flows between Smyrna and Region (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

Full-time Worker Market Segment

A desire line map showing travel flows for the full-time worker market between Smyrna and key regional activity centers was created to identify the most important travel patterns, as shown in Map 3-11. Although each ward was slightly different, the following common travel patterns emerged for the full-time worker market:

- The highest travel flows are to The Battery/Interstate North Parkway, Cumberland Galleria, Buckhead, CBD/Midtown, and Northwest Atlanta.
- The second tier of travel flows are to Dobbins, Perimeter Center/Medical Center, and Cobb Government (South Marietta Parkway), and the third tier includes Central Marietta, Kennestone Hospital, Town Center/Barrett Parkway, WellStar Cobb (Austell), and Atlanta International Airport. KSU-Kennesaw and Emory/CDC had limited trip flows.
- The full-time worker market is key to increasing choice ridership, so improved connections to The Battery/Interstate North Parkway and Cumberland Galleria are needed. In addition, connections to Buckhead, CBD/Midtown, and Northwest Atlanta need to be improved with enhanced modes and frequencies to attract more regional riders.

Part-time Worker Market Segment

A desire line map showing travel flows for the part-time worker market was created and is shown in Map 3-12. Like the other markets, the strongest trip flows varied by ward, but the following common themes that are similar to the full-time worker market emerged from the analysis:

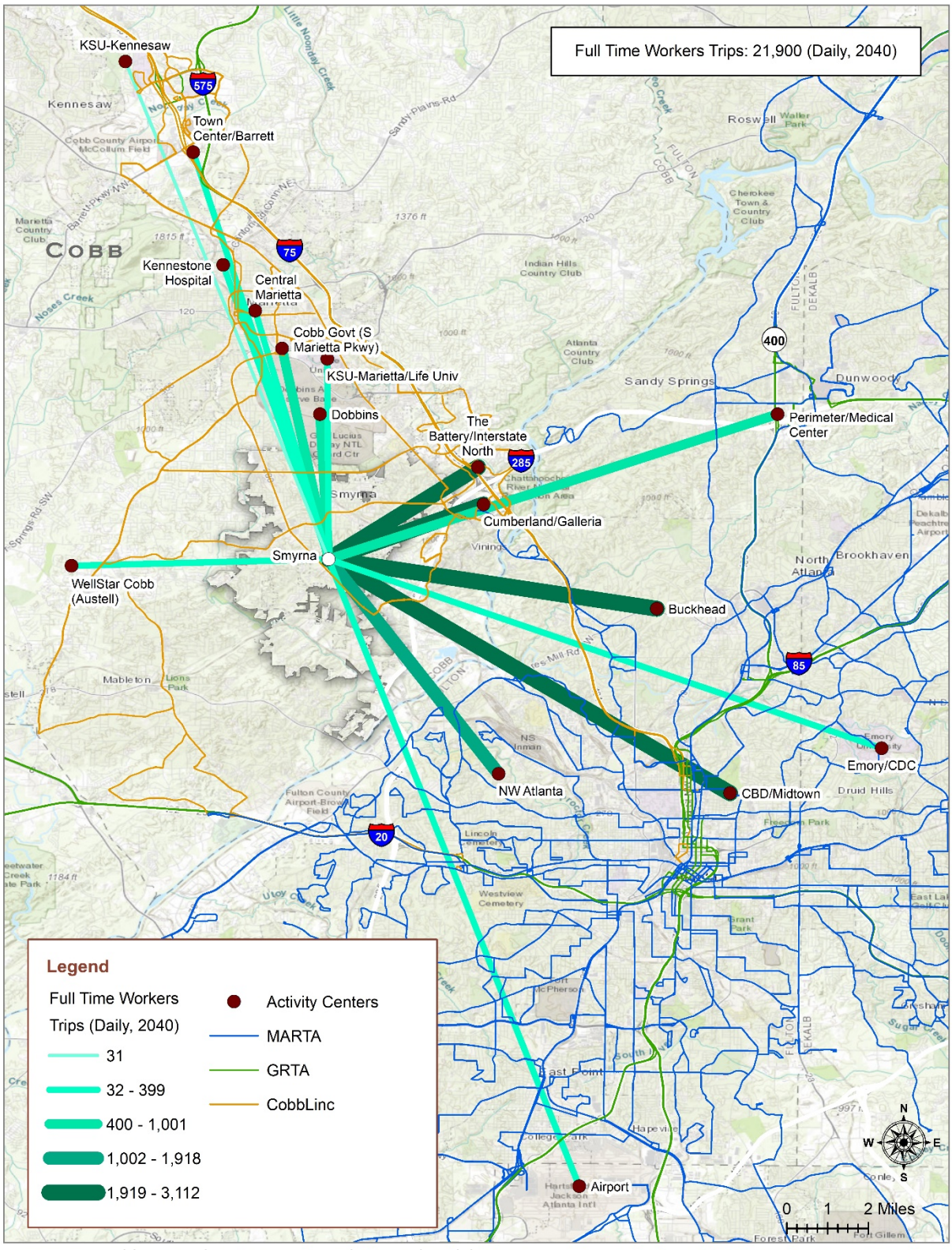
- The highest travel flows are to The Battery/Interstate North Parkway, Cumberland Galleria, Buckhead, and Northwest Atlanta, and the second tier of travel flows are to CBD/Midtown, WellStar Cobb (Austell), Dobbins, Perimeter Center/Medical Center, and Cobb Government offices (South Marietta Parkway)
- The third tier includes Central Marietta and Atlanta International Airport; KSU-Kennesaw and Emory/CDC had limited trip flows.

University Student Market Segment

A desire line map showing travel demand between Smyrna and regional activity centers for the university student market was created to provide insight into key travel flows, as shown in Map 3-13. Key findings include the following:

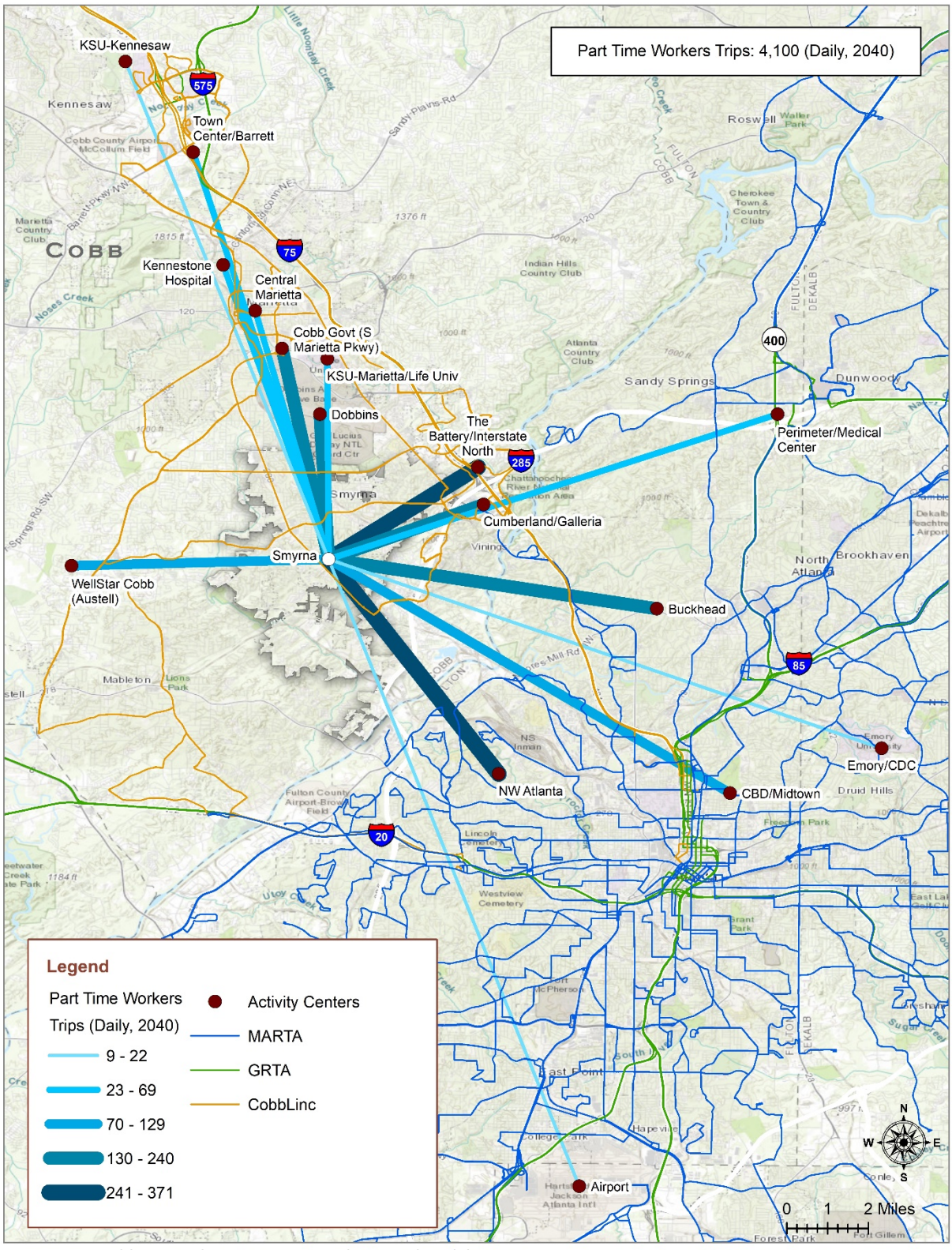
- KSU-Marietta/Life University and CBD/Midtown comprise the top tier of regional destinations for the university student market.
- KSU- Kennesaw and Northwest Atlanta are second-tier destinations.

Map 3-11: Full-time Worker Market Trip Flows between Smyrna and Region (Daily, 2040)



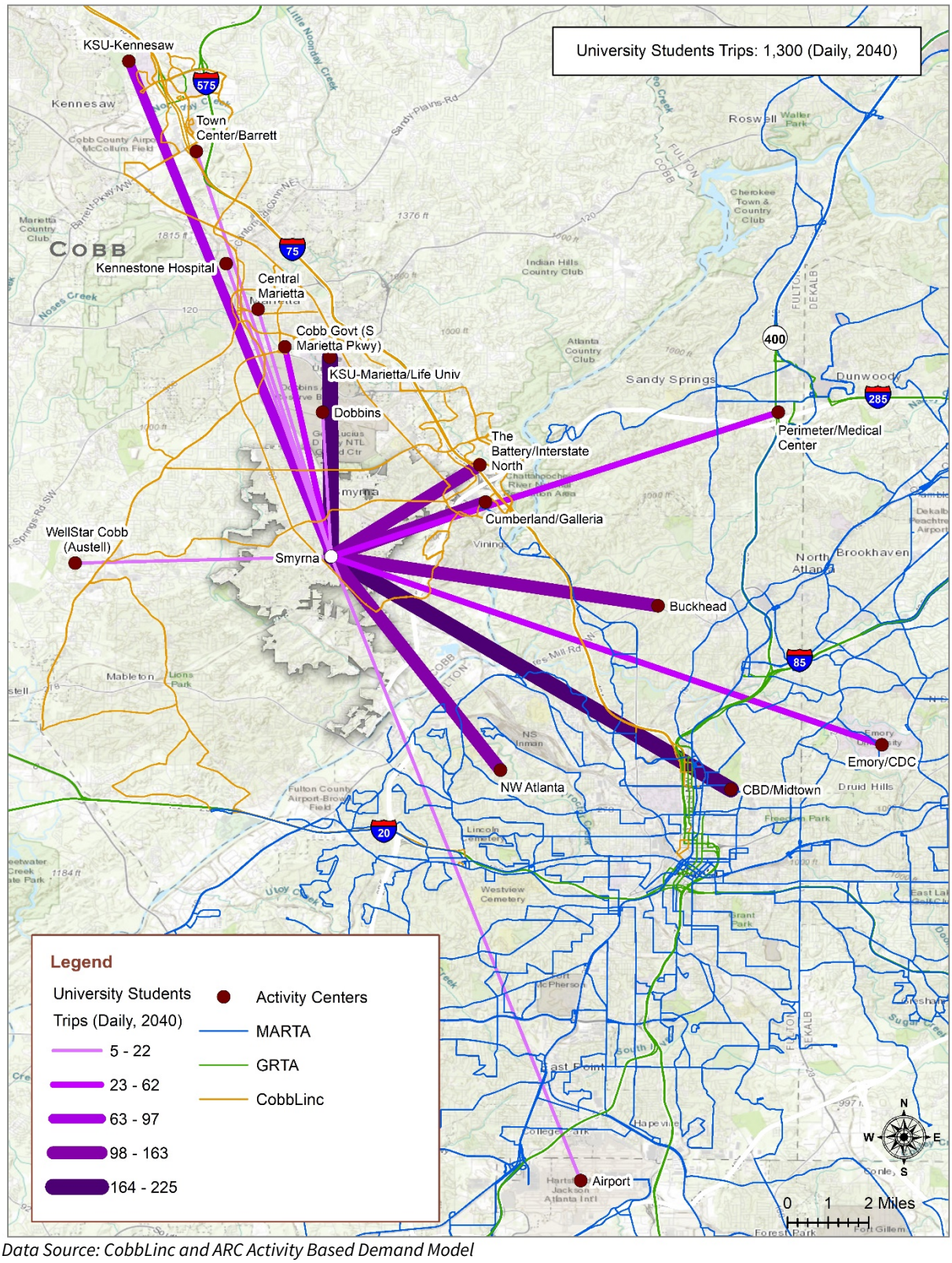
Data Source: CobbLinc and ARC Activity Based Demand Model

Map 3-12: Part-time Worker Market Travel Desire between Smyrna and Region (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

Map 3-13: University Student Market Travel Desire between Smyrna and Region (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

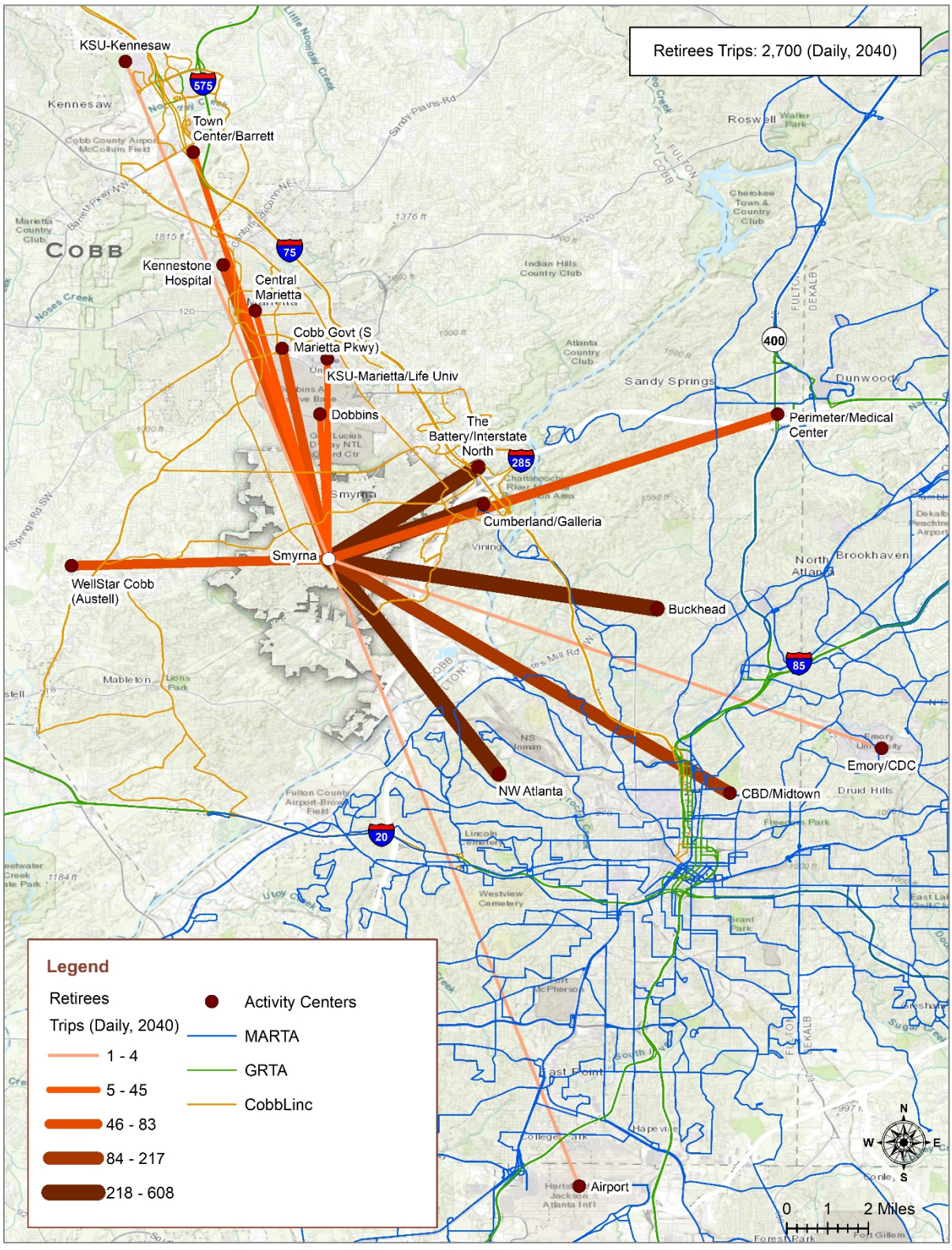
Retiree Market Segment

Regional travel for the retiree market was analyzed, and a desire line map was created, as shown in Map 3-14. Although travel flows varied by ward, the following common patterns emerged for the retiree market:

- Northwest Atlanta, Buckhead, Cumberland/Galleria, and The Battery/Interstate North Parkway are the top tier destinations.
- The CBD/Midtown is the only second tier destination for retirees.
- Third tier destinations are WellStar Cobb (Austell), Kennestone Hospital, Cobb Government offices (South Marietta Parkway), and Perimeter/Medical Center.
- Atlanta International Airport, Emory/CDC, and KSU-Kennesaw all have limited trip demand from the retiree market segment.

In addition to total regional travel flows for the city, regional travel flows for each ward also were mapped for each of these travel markets, as included in Appendix B.

Map 3-14: Retiree Market Travel Desire between Smyrna and Region (Daily, 2040)



Data Source: CobbLinc and ARC Activity Based Demand Model

Transforming Gaps to Opportunities

Even with its limited operating budget, CobbLinc has strived to ensure continued coverage of services in Smyrna. However, it often is the case that connectivity gaps, both spatial and temporal, occur as underlying demand and travel patterns change in reaction to the continuing evolution of a community's needs, growth, and development patterns.

The gap analyses assessed these potential connectivity gaps. However, these gaps can be transformed into opportunities that ensure improved transit access internally within the city as well as regionally.

Transit Opportunity Framework

Prior to the development of needs, a transit opportunity framework was used to identify the transit opportunities in Smyrna and to support the incremental development of a transit vision for the city. This framework is illustrated in Figure 4-1 and summarized thereafter. The framework is based on the functions that various transit services and technologies serve in relation to the mobility and accessibility needs of a community and how these services and technologies come together in a vision to connect Smyrna internally and with the region.

Figure 4-1 depicts an inverse relationship between mobility and accessibility—as a transit technology provides increased mobility, it inherently provides less accessibility, and vice versa. To ensure an understanding of the framework, definitions of mobility and accessibility are as follows:

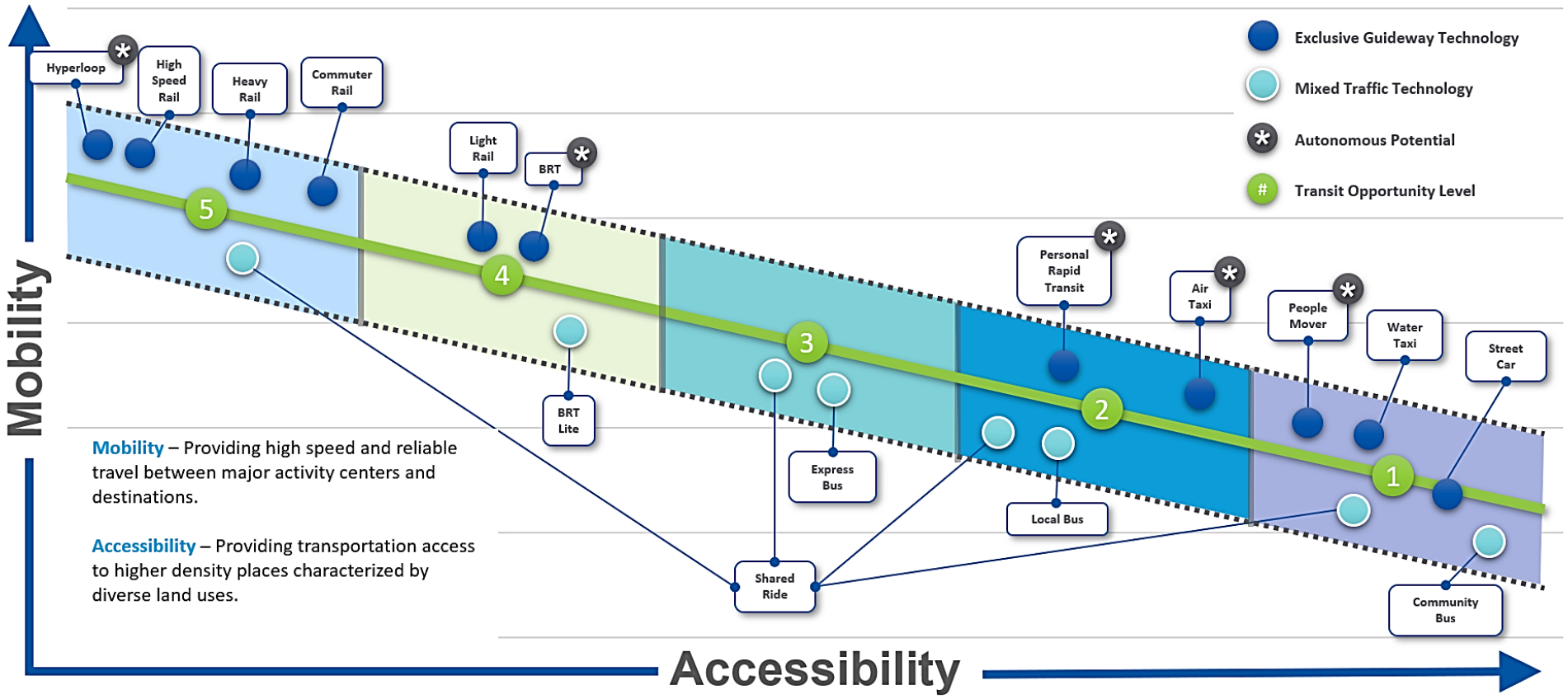
- ***Mobility*** – Providing high-speed and reliable travel between major activity centers and destinations; the focus is to get from one place to another as quickly as possible and typically is characterized by longer trips.
- ***Accessibility*** – Providing access to and circulation within higher-density places that are characterized by diverse land uses; the focus is to provide convenient connections to land uses and typically is characterized by shorter trips and circulation within activity centers.

The framework for *Smyrna Connects* defines five levels of transit opportunity, with each level derived from a different mix of mobility and accessibility, as summarized below.

Level 1 Transit Opportunity

Service/technology gaps are characterized by the need for very low mobility and very high accessibility/circulation. This may include areas or corridors with low population and/or employment density but very high traditional rider market density. Modes considered for meeting these needs include community circulators and trolley/streetcar service that serve at low frequencies. Some level of shared-ride options may also be included.

Figure 3-1: Transit Opportunity Framework: Mobility vs. Accessibility



Level 2 Transit Opportunity

Service/technology gaps are characterized by the need for low mobility and high accessibility. This may include areas or corridors with low population and/or employment density and high traditional rider market density. Additional modes, such as local fixed-route bus, are expected to meet the needs of this opportunity level.

Level 3 Transit Opportunity

Service/technology gaps are characterized by the need for a balance of mobility and accessibility. This may include areas or corridors with medium population and/or employment density and medium traditional rider market density. In addition, this may also include regional destinations with a high number of commute trips. At this opportunity level, express buses may be added as well as enhanced shared-ride options.

Level 4 Transit Opportunity

Service/technology gaps are characterized by the need for high mobility and low accessibility. This may include areas or corridors with high population and/or employment density and low traditional rider market density. This may also include regional destinations with a very high number of commute trips. Addition of premium transit such as bus rapid transit (BRT) (in mixed traffic or exclusive lane) and light rail may be considered at this level of transit opportunity.

Level 5 Transit Opportunity

Service/technology gaps are characterized by the need for very high mobility and very low accessibility. This may include areas or corridors with high population and/or employment density and low traditional rider market density. In addition, this may include regional locations with the highest number of commute trips. Exclusive-lane BRT and high-capacity premium transit such as commuter rail, heavy rail, or high-speed rail may be considered at this level of transit opportunity.

Transit Opportunities for Smyrna

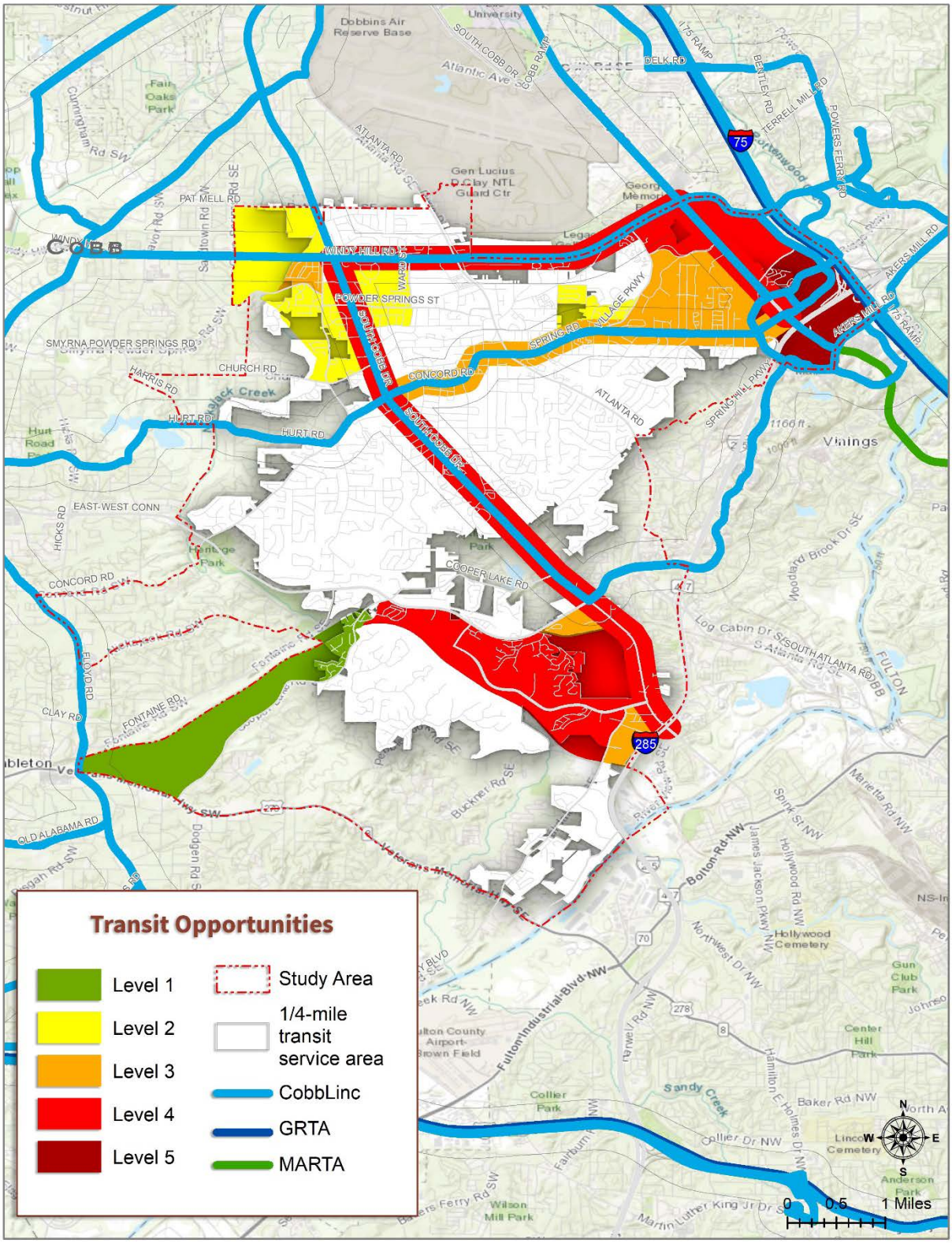
Using the results of the inter-local and intra-regional gap analyses and the transit opportunity framework, opportunities for improving transit in the study area were identified. These opportunities are expected to assist the City in identifying the necessary transit technologies/modes in addition to areas for transit spatial improvements (such as adding new coverage areas) and temporal improvements (such as adding service frequencies and span) to already-existing services. In addition, and even more important, these opportunities will help develop a roadmap for improving transit in Smyrna and its immediate surroundings so resources can be allocated where and when needed.

Internal and Adjacent Area Opportunities

After analyzing traditional and choice markets, internal travel markets, and other relevant data, the resulting areas within the study area, which includes Smyrna and key adjacent areas such as the Galleria and The Battery, were classified by levels of opportunity. Map 3-15 shows these internal and adjacent transit opportunities:

- **Level 1 Transit Opportunity Areas (*green*)**
  - The service gap on the southwest side of the city adjacent to Veterans Memorial Highway and Floyd Road is classified as Level 1 due to its very high accessibility need and its high percentage of older adults and zero-vehicle households. This high traditional market but low population density area should be considered for low-frequency service, potentially for on-demand/flex-route transit or shared-ride options.
- **Level 2 Transit Opportunity Areas (*yellow*)**
  - A cluster of areas around South Cobb Drive and the Windy Hill intersection is identified for Level 2 transit opportunities. These areas comprise high levels of traditional markets such as households in poverty, older adults, and zero-vehicle households, while also having a high population density. These areas provide an opportunity for a transit circulator service that can also serve as a feeder to shuttle riders for the 30-minute service that operates on South Cobb Drive and Windy Hill Road. In addition, app-based shared-ride transit could be considered to serve this area.
- **Level 3 Transit Opportunity Areas/Corridors (*orange*)**
  - Areas mostly located in the north part of the study area have a high density of dwelling units but a low density of employment. The area west of Village Parkway on Spring Road to the Cumberland area provides an opportunity for a high-frequency circulator that may also serve the Cumberland area, including the Galleria and The Battery.
  - The corridor of Concord Road/Spring Road from South Cobb Drive to Cobb Parkway could serve as an east-west connector, quickly linking west of Smyrna and Cobb County to the Cumberland area. Route 25 provides service on this corridor but only once per hour.
  - Other small pockets on the south side of the City could be covered as part of more higher-level opportunities in that area.
- **Level 4 Transit Opportunity Areas/Corridors *(red)***
  - Using Level 4 service and technology opportunities for Smyrna may provide the best opportunity for making transit a truly viable mode. Several areas and corridors are identified in the next 20 years.
  - Areas in the Cumberland CID with very high job density offer an opportunity for premium transit such as BRT, fed by very high frequency circulators operating in that area, which may have the potential to be operated by autonomous transit vehicles.
  - The South Cobb Drive corridor provides the most practical and feasible opportunity for BRT service in the future. As a State road with ample right-of-way, there is potential for fully-exclusive-lane BRT which, at a minimum, should be considered for segments between Windy Hill and Concord and the segment south of East West Connector to I-285.

Map 3-15: Smyrna Internal and Adjacent Transit Opportunities



- With roadway improvements planned under the 2016 Special Purpose Local Option Sales Tax (SPLOST), Windy Hill Road also provides an option for a high-frequency transit service, premium or otherwise. SPLOST improvements will make the segment from South Cobb to Atlanta Road an uninterrupted flow, making this corridor an excellent option to connect Level 2 opportunity areas quickly to the Cumberland area or to any future BRT on Cobb Parkway.
- The area in the southern portion—south of the East-West Connector and west of South Cobb Drive—also provides an opportunity for a technology-based high-frequency feeder/ circulator service that would connect area residents and jobs to potential high-frequency services on South Cobb Drive.
- South Cobb Drive in this area, located closer to I-285 future managed lanes, may be a candidate for establishing a major transfer facility that could also be served by a park-and-ride facility. The city currently has no park-and-ride facilities; the closest is in Mableton, southwest of Smyrna.

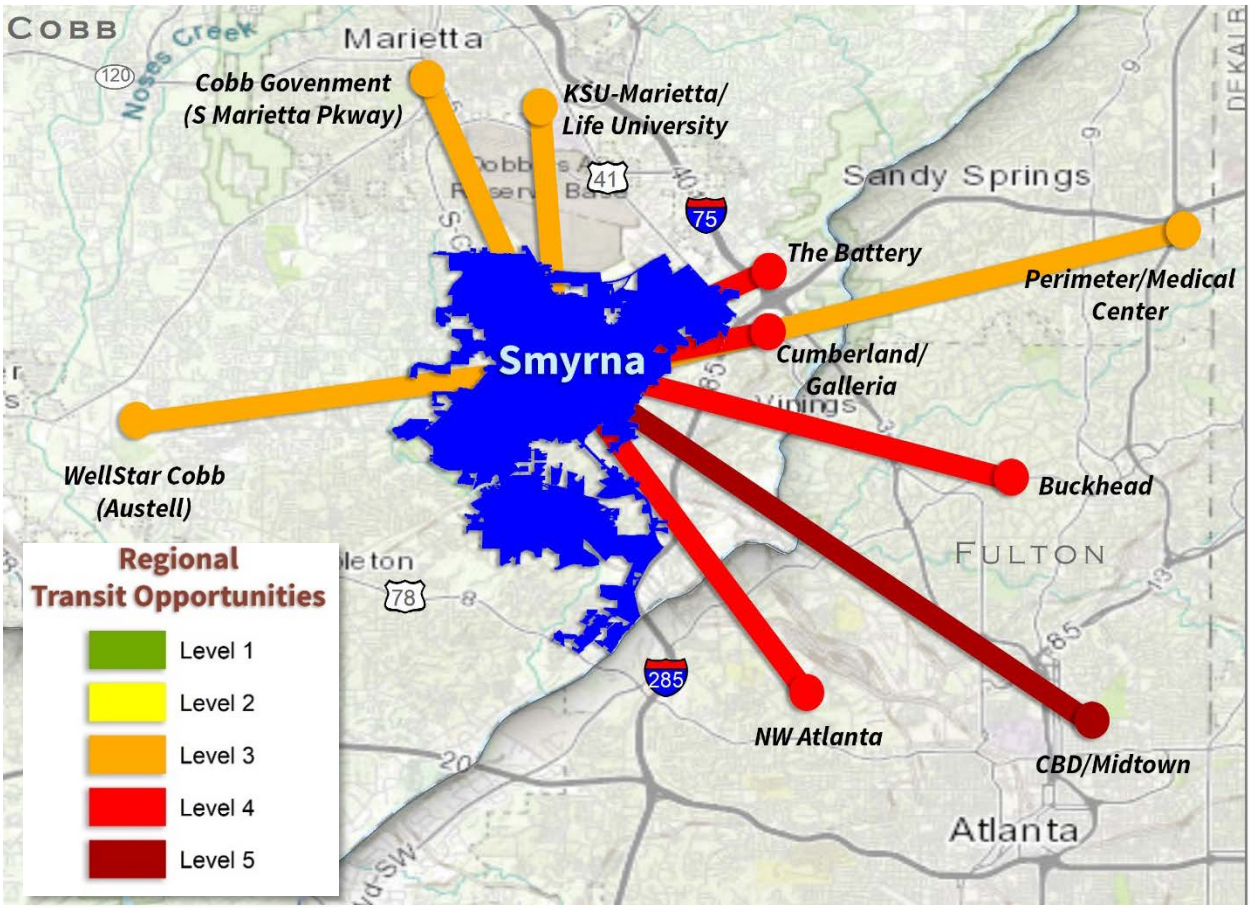
- **Level 5 Transit Opportunity Areas/Corridors**
  - This highest level of transit opportunity warrants high-capacity premium transit such as commuter rail or heavy rail. Areas identified in the Cumberland CID as Level 5 opportunity areas include very high job density and significant dwelling density that may support high-capacity transit. However, although rail may be supported by public outreach and data analyses, it continues to be a challenging policy decision due to its cost and the need for substantial regional and Federal support. Nonetheless, this plan identifies the opportunity for such service in/to Smyrna, as the attractiveness that rail provides as a transit mode is unmatched. A regional rail connection would link people to jobs in this area and provide an attractive travel alternative to the many visitors to SunTrust Park, The Battery, and the Galleria.

Regional Opportunities

Providing good and abundant regional connections is an important part of making transit a desirable option in Smyrna. Commute flow data for Smyrna indicate a high flow of regional travel from and to the city, highlighting the need for regional transit connections. Regional opportunities that should be considered as part of improving transit in Smyrna are identified in Map 3-16 and summarized below. (It should be noted that there are no Level 1 or 2 opportunities identified, as the focus is providing services that are truly regional in nature—services that are fast, stop less, are direct/less circuitous, and are commuter market-based).

- **Level 3 Transit Opportunity Areas/Corridors**
  - Connect Smyrna to the Perimeter/Medical Center, WellStar Cobb in Austell, Cobb Government offices on South Marietta Parkway, and KSU Marietta/Life University.

Map 3-16: Regional Transit Opportunities for Smyrna



Note: No Level 1 or 2 regional connection opportunities were identified for Smyrna.

- Currently, there are existing transit services that serve WellStar Cobb, Cobb Government offices, and KSU Marietta/Life University. CobbLinc routes 10 and the Rapid 10 serve KSU-Marietta/Life University and Cobb Government offices; Route 25 connects Smyrna to WellStar Cobb.
- No transit services that serve the Perimeter/Medical Center exist. As there is a high number of commuter trips to these areas, express buses may be considered, or current connections should be enhanced to promote using transit to these locations.

- **Level 4 Transit Opportunity Areas/Corridors**
  - Regional connections to Northwest Atlanta, Buckhead, the Cumberland/Galleria area, and The Battery areas are identified as Level 4 transit opportunities.
  - Although geographically regional, the Galleria area and The Battery are identified as internal/adjacent opportunities due to their very close proximity to Smyrna. Although several CobbLinc routes regionally connect this area, with service ranging from 15- to 60-

minute frequency, no premium transit is available. A regional BRT service is planned for Cobb Parkway, but the timeline remains uncertain.

  - Other areas that the city may benefit from regional connection include the Northwest Atlanta and Buckhead areas. A high number of commute trips are made to these areas, so premium options such as BRT, in mixed traffic or in an exclusive lane, may help attract a portion of these trips.

- **Level 5 Transit Opportunity Areas/Corridors**
  - If rail can made available for Smyrna and the northwest region, it should link the CBD/Midtown of Atlanta due to the large number of daily commuter trips. Although a mix of regular transit options connect this area directly to Smyrna, the attractiveness of a high-capacity premium transit technology such as rail may be the best connection if affordable in the future.

Identification of these transit internal and external connection opportunities provides a stable foundation for identifying and developing the future transit needs in Smyrna. These needs, identified in the next section, may assist the city in becoming a driver to promote viable transit in the northwest quadrant of the Atlanta region.

Section 4: **Transit Needs**

A wide spectrum of transit needs was developed for Smyrna to ensure the preparation of a practical, implementable, and "living" plan that truly reflects a vision for the city's growth and improvement over time.

As a strategic plan, a transit vision plan should strive to identify needs in an unconstrained fashion and accommodate service recommendations for which currently there is no funding. However, it also should acknowledge local and regional fiscal realities for the growth and development of transit services over the course of the 20-year plan horizon. Therefore, mode technologies such as rail, although publicly-supported and certain to attract far more riders, may need to be reconsidered for inclusion as a mobility solution. With these factors in mind, a set of needs was developed for Smyrna, as summarized in the remainder of this section.

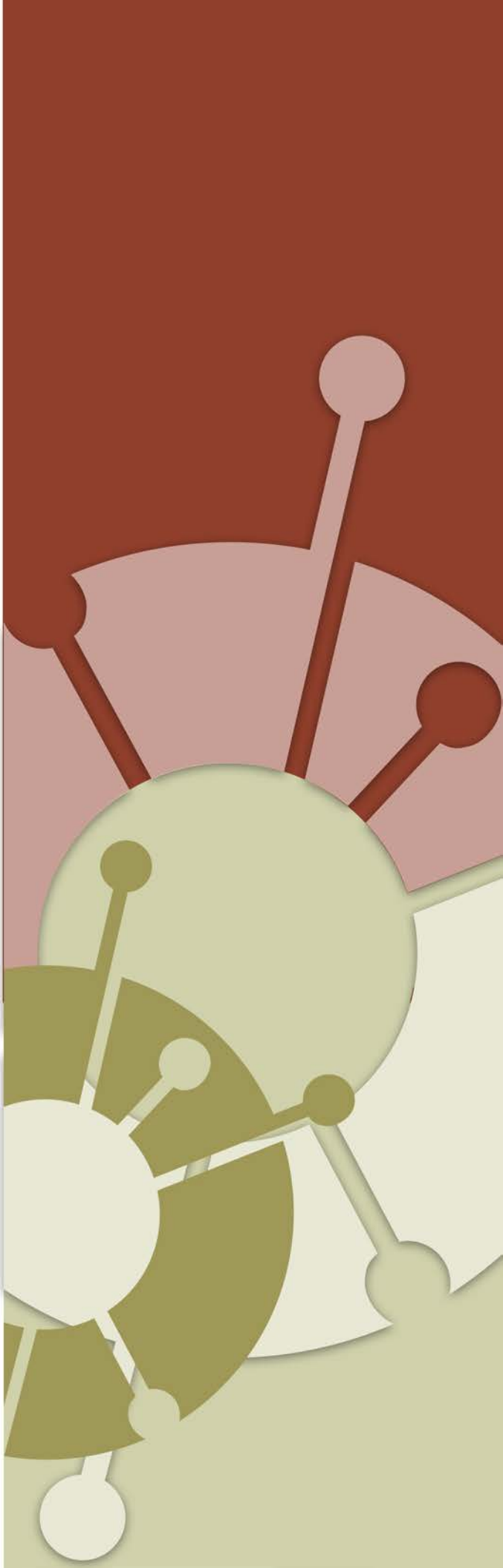
Guiding Goals and Objectives

The goal of this effort is developing a truly implementable transit plan for Smyrna that is tailored primarily to the needs of the study area and, at the same time, considering the needs of the emerging regional transit system envisioned by the Atlanta-Region Transit Link Authority (ATL).

The key objectives outlined by the City of Smyrna for this study are as follows:

- Develop a consensus-driven transit vision.
- Reinforce the City's broader objectives, including sustainability, economic development, growth management, traffic mitigation, livable communities & corridors, and connected & walkable communities.
- Communicate the City's transit vision to Cobb County and the ATL.

The transit needs identified in the remainder of this section were developed with this goal and objectives in mind and with understanding of the City's current



conditions and its desire for a consensus-driven transit vision.

Developing Transit Needs

This section summarizes the process used to develop transit needs for the City of Smyrna for the next 20 years. It should be noted that these needs were developed without consideration of funding constraints to reflect the true needs of the community.

Each technique used to develop these needs is summarized below, followed by the list of needs.

Community Needs & Vision – Many direct and indirect public outreach techniques were used to obtain public input on transit vision and corresponding needs throughout the *Smyrna Connects* planning process. Local and regional stakeholder interviews, public input surveys, open house public workshops, and web-based communications, including a project website and social media efforts, were conducted to gather input from the community. In addition, a set of more focused outreach efforts was conducted with selected groups, including moderated group discussions with the business community, social services agencies, and riders who live in and/or visit Smyrna.

Guiding Committee Feedback– Input from the Technical Advisory Committee that was formed to help the City guide *Smyrna Connects* also was key to identifying the transit needs for Smyrna. As regional leaders who guide the transit planning process and policy, the committee's perspective and direction will continue to fine-tune these needs and the resulting strategies to address these needs.

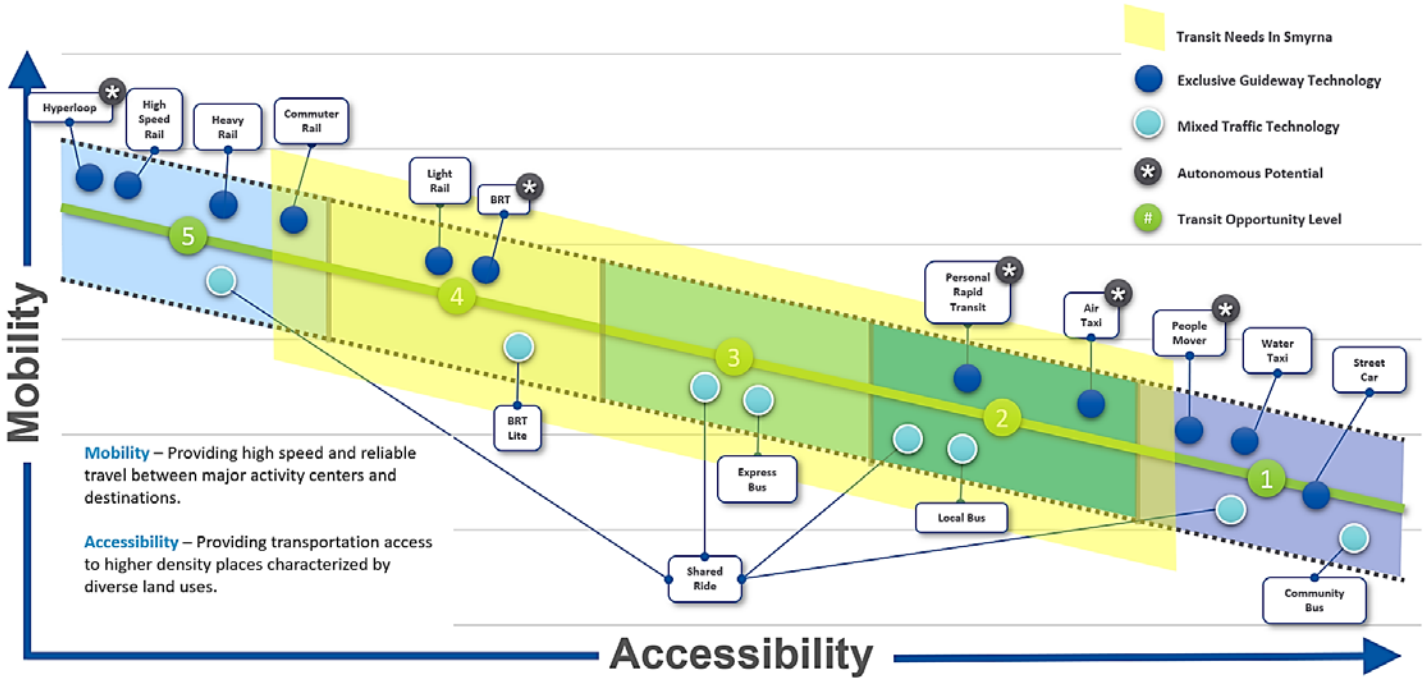
City and Regional Policy Direction – Policy direction often provides insight into transit needs within a community or a region and the potential means to meet them. Whereas support related to scale, technology, or timing may not always be the same, the clear goal of the City and its regional partners is to make transit a desirable mode of travel to connect its communities locally and with each other. These and other goals/policy direction from key local and regional policy makers were reviewed and considered.

Transit Demand/Gaps/Opportunities Assessment – Findings from the transit demand assessment conducted for *Smyrna Connects* were used, including the use of various GIS-based analytical tools and methodologies to analyze demographic data that are conducive to transit and regional travel/commuter data. These findings, together with the baseline conditions assessment and performance reviews, helped identify the areas with transit-supportive characteristics and the scale of needs in Smyrna.

20-Year Transit Needs

The needs identified in the remainder of this section will set the foundation for preparing a comprehensive set of transit strategy solutions to meet the wide variety of mobility needs throughout the city. This will result in a set of practical and implementable mode/technology strategies from most categories of the transit opportunity spectrum, as shown in Figure 4-1.

Figure 4-1: Transit Opportunities and Needs for Smyrna



Transit needs for Smyrna were developed within this framework but without consideration of funding constraints. These needs aim to realize the local and regional vision for an attractive and well-connected transit network and are summarized below.

Develop a High-Frequency Commuter Network

Develop a network of high-frequency routes throughout high-ridership/high density-corridors in the city at every 15 minutes or less. This network of premium and regular transit routes should connect to a regional network of premium/express transit services and facilities.

Rationale and Implications – This need was frequently requested by stakeholders and supported by the public input survey, discussion groups, and regional plans. Significant percentages of outreach respondents wanted to reach their destinations quickly and said transit would be more appealing if a bus came every 10–15 minutes instead of every 30–60 minutes. Feedback from discussion groups

echoed this sentiment. Stakeholders also repeatedly mentioned that frequency would attract riders, citing the Rapid 10 as an example of service to which the community has been responsive. Local and regional plans also support developing a commuter network through high-density corridors to and from activity centers.

Services and Technology Targets – Implement high-frequency bus service on key arterials in the short term, connecting Smyrna within and to the Atlanta region to the south and Marietta to the north. In the mid and long terms, implement premium transit on supportive corridors with BRT technology on both exclusive-lane and mixed traffic, depending on the feasibility. Autonomous BRT should be considered in the long term. For mix-traffic BRT, deploy bus preferential treatment technologies as applicable.

Establish Rapid Internal and Adjacent Hub Connectivity

Establish a new "SmyGo" branded shuttle/van service with fast connectivity for intra-city travel and to the Galleria and The Battery.

Rationale and Implications – Forming an internal network of direct and fast connectivity within key areas in Smyrna and quick links to the Galleria/The Battery areas were often cited as a priority by stakeholders, in the public survey, and in the discussion groups. The gap analysis echoes the need for internal connectivity within Smyrna. Public input indicated the need for more direct connections with smaller loops within the city. The gap analysis also illustrated areas that are underserved or not connected to the current grid of services. Bridging these gaps may increase ridership on a high-frequency arterial transit network while helping to reduce traffic and parking issues in addition to the City's efforts to make it a more walkable public space.

Services and Technology Targets – Implement medium- to high-frequency transit service to connect Smyrna residents/visitors on short/quick trips. Establish app-based micro-transit with smaller, non-transit-looking vehicles as feeders to major line-hail services and provide first/last-mile service where needed. Much lower demand areas may be served by on-demand flex-type services. Where applicable, autonomous transit technology should be considered in the mid and long term.

Improve Transit Infrastructure/Capital Facilities

Relocate the current Cumberland Transfer Center to provide an easy, convenient, and safe transfer experience. In addition, establish a new transfer/park-and-ride facility on the South Cobb Drive/I-285 interchange area and improve transit infrastructure across Smyrna.

Rationale and Implications – A growing need was identified to enhance the transfer experience at the current Cumberland Transfer Center, which serves as the key hub for routes serving Smyrna. Safety to access the facility has become an issue. The current location also creates operational challenges, as its bus bays are directed eastbound, requiring westbound buses to travel through Cumberland Mall, thereby creating travel time delays for most routes. In addition, public outreach indicated there is need for more transfer facilities in the city in addition to park-and-ride facilities that are accessible to Smyrna residents to help connect to regional transit services more conveniently.

Services and Technology Targets – Implement state-of-the-art transfer hubs that are located strategically and offer amenities and that use new technologies for smoother local/regional transfers. Establish availability of park-and-ride facilities and better amenities and bus stops located to also connect with the city's popular trails network.

Implement an "All Hands on Deck" Transit Marketing Campaign

A carefully-coordinated marketing strategy that includes participation of various stakeholders in the city will promote the value and benefits of using transit to travel within Smyrna and connect regionally.

Rationale and Implications – Lack of awareness of available local transit services was mentioned repeatedly by *Smyrna Connects* stakeholders. During discussion groups, both business and social services agency representatives agreed that many residents are not aware of or know only a little about transit services that are available to them. Public outreach also revealed that people do not understand how to use the services, so more education may be needed. However, any marketing/awareness campaign by the City must be a collaborative effort with all key regional partners. With regional collaboration, its strategic location regionally, and its unique demographic and socioeconomic diverse population, Smyrna has an opportunity to promote transit as a truly viable option locally and in the region.

Develop a TNC-Based Program for After/Later Hour Rides

A voucher program for using ride-hailing services from transportation network companies (TNCs) should be developed to get around when regular service is not available. The feasibility of this approach is being explored by Cobb County.

Rationale and Implications – Input from *Smyrna Connects* survey, discussion groups, and local and regional stakeholders indicated the need for travel options for transit users after regular bus service hours, especially on weekends. Even if a program that provides TNC-based travel options after bus service hours is not used heavily, as most CobbLinc routes operate past 12:00 midnight on most days, such a program would make transit an option that is available 24/7 for city residents and visitors.

Next – Developing Improvement Strategies

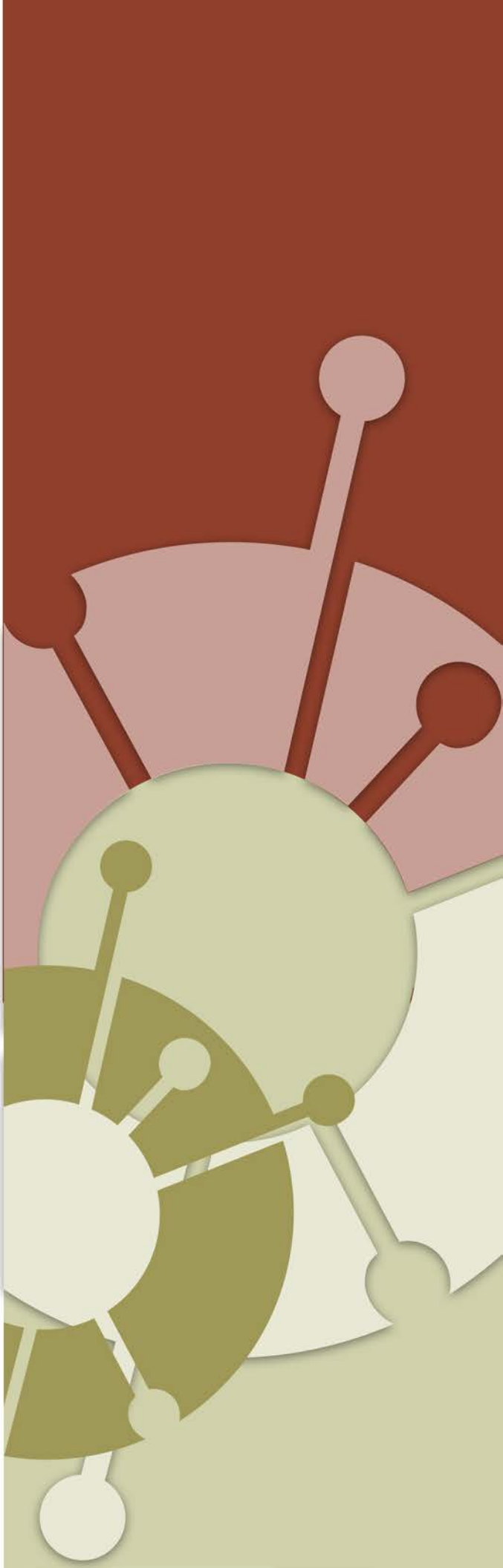
Transit is seen as a practical and cleaner remedy to mitigate the traffic gridlock that is becoming increasingly worse in the region every year. However, local and regional guidance is clear—transit strategies that incorporate new and advanced modes/technologies but are affordable and appealing are needed. The needs identified herein provide the basis for developing those necessary strategies, which will be presented in the next technical memorandum.

Appendix A:

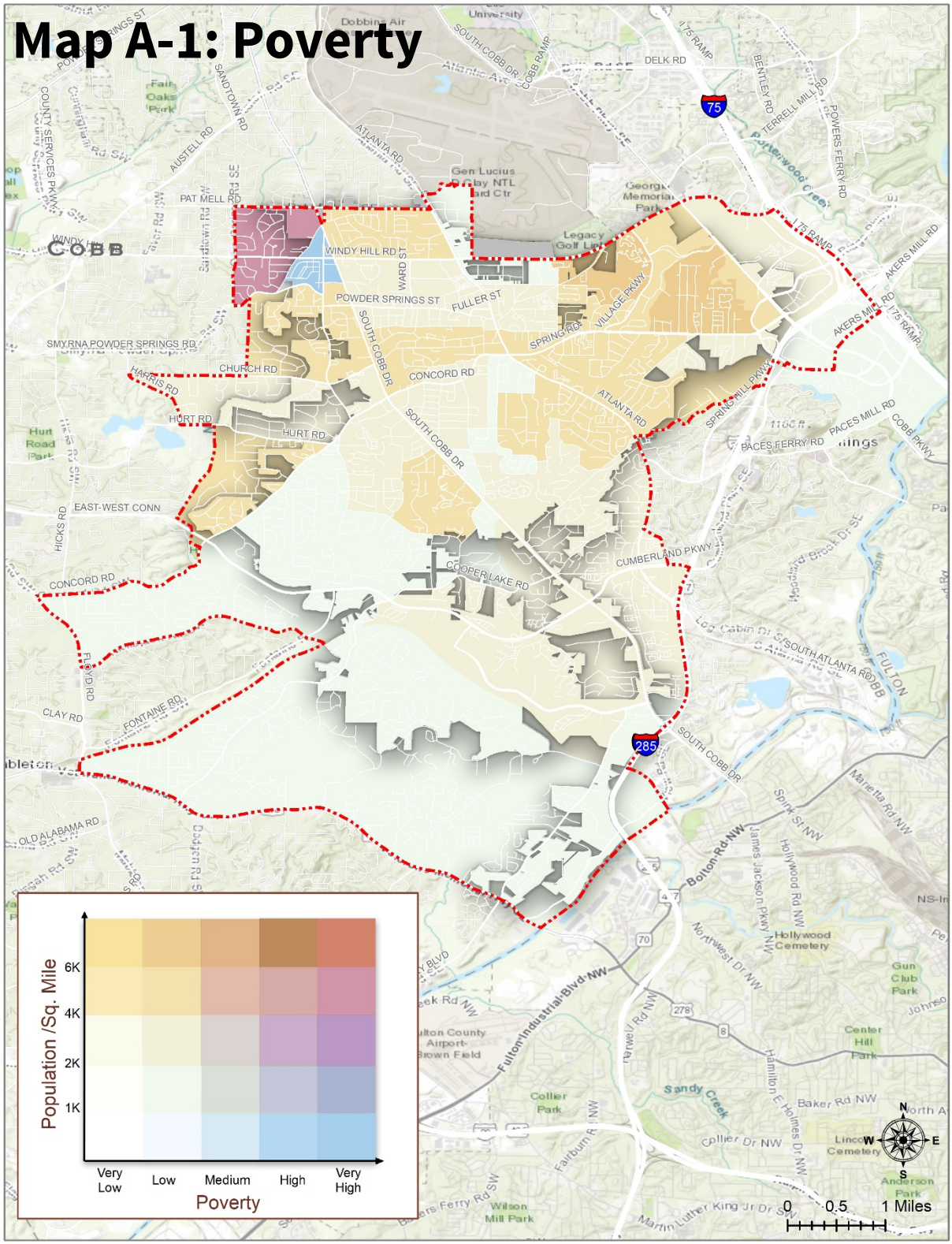
Transit Orientation by Demographic Variable

These maps show the demographic data analysis to develop the Transit Orientation Index for the Study Area.

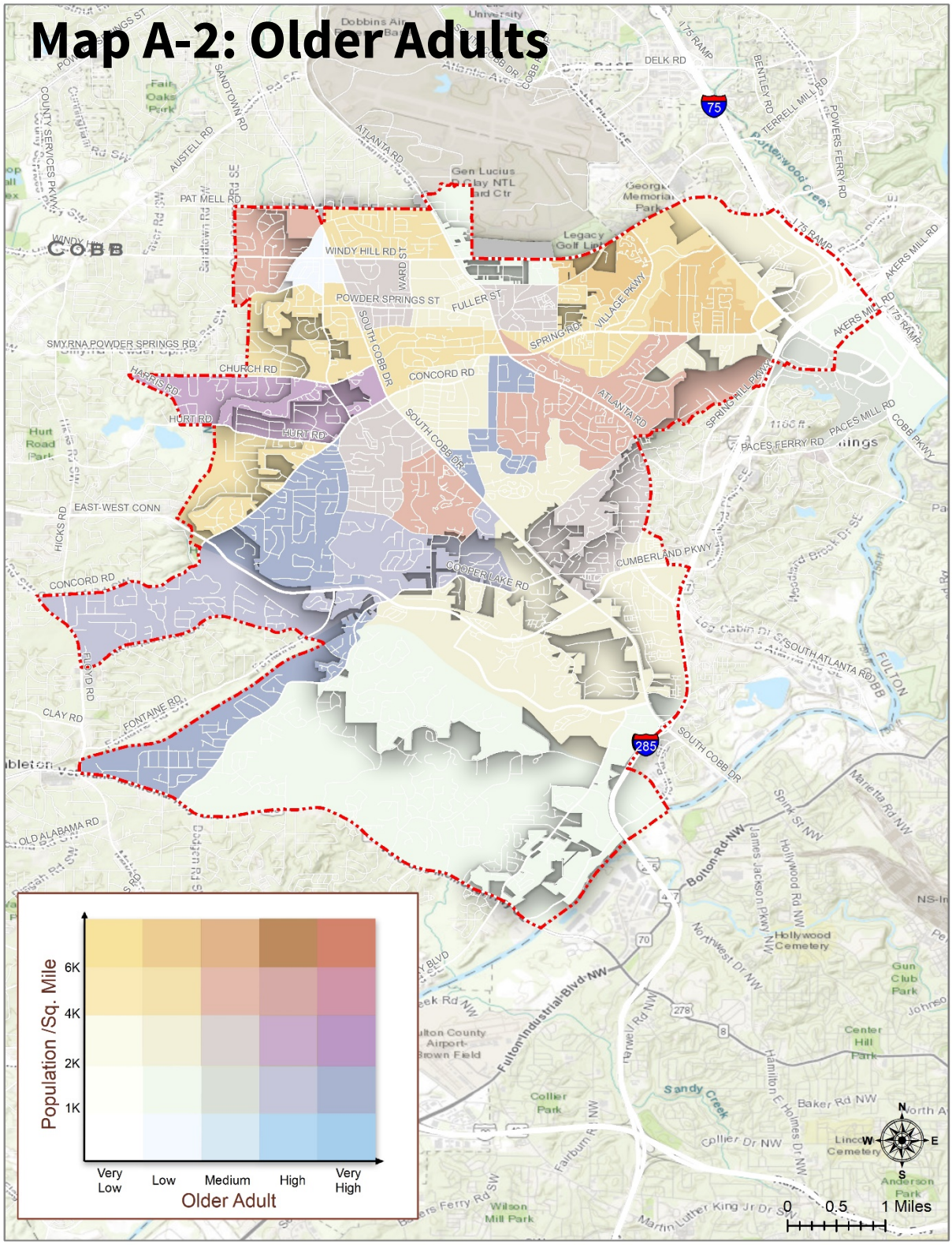
List of Maps



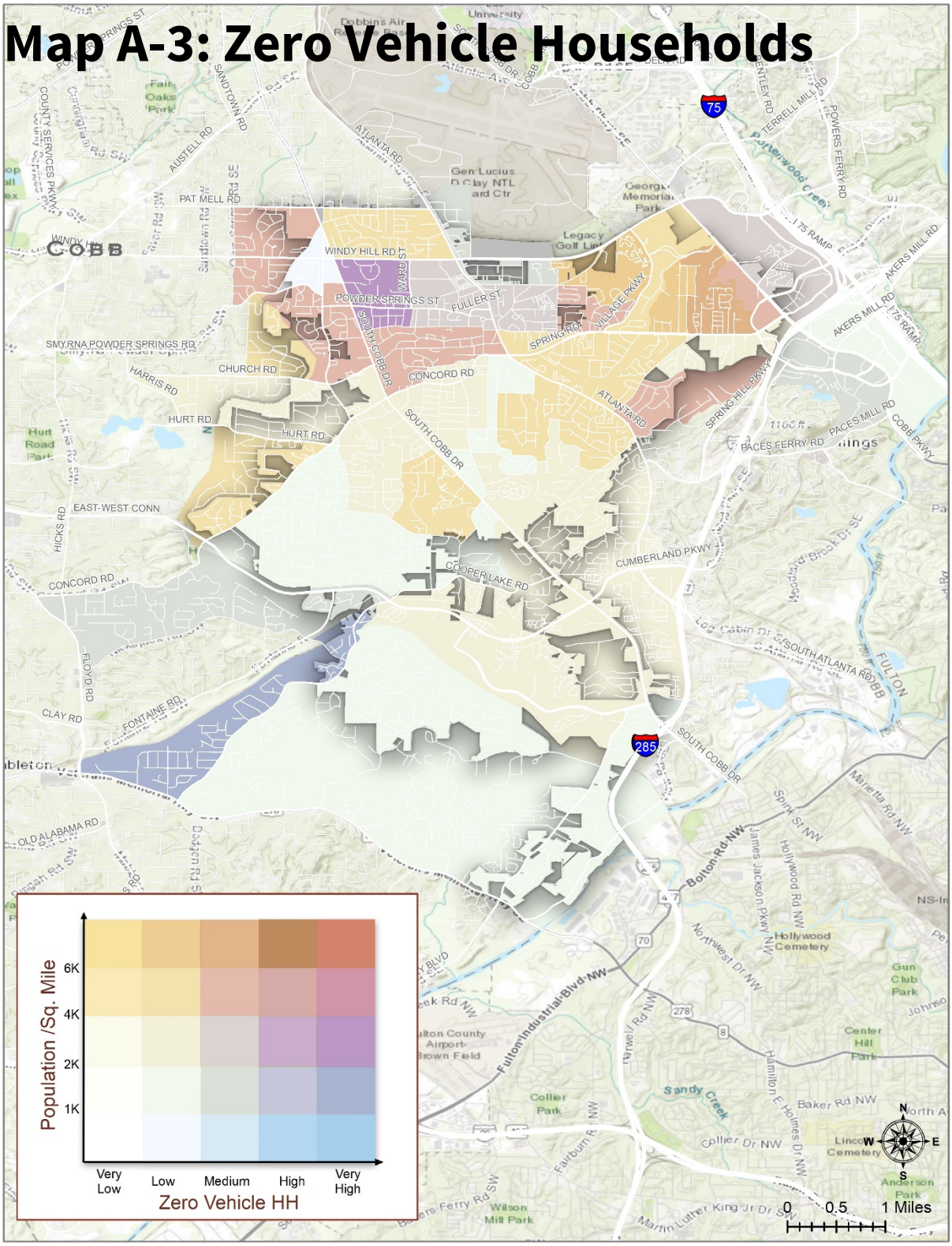
Map A-1: Poverty



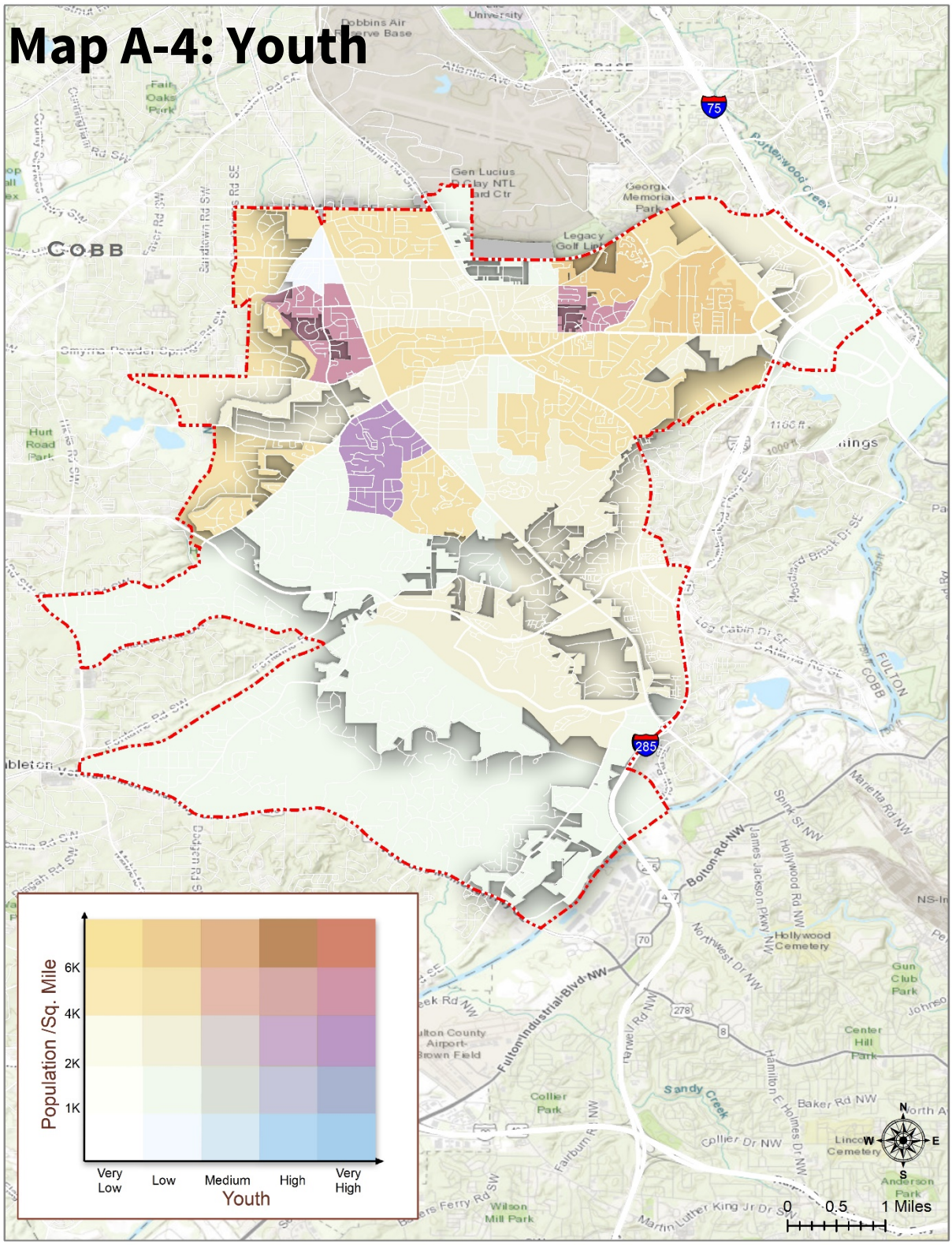
Map A-2: Older Adults



Map A-3: Zero Vehicle Households



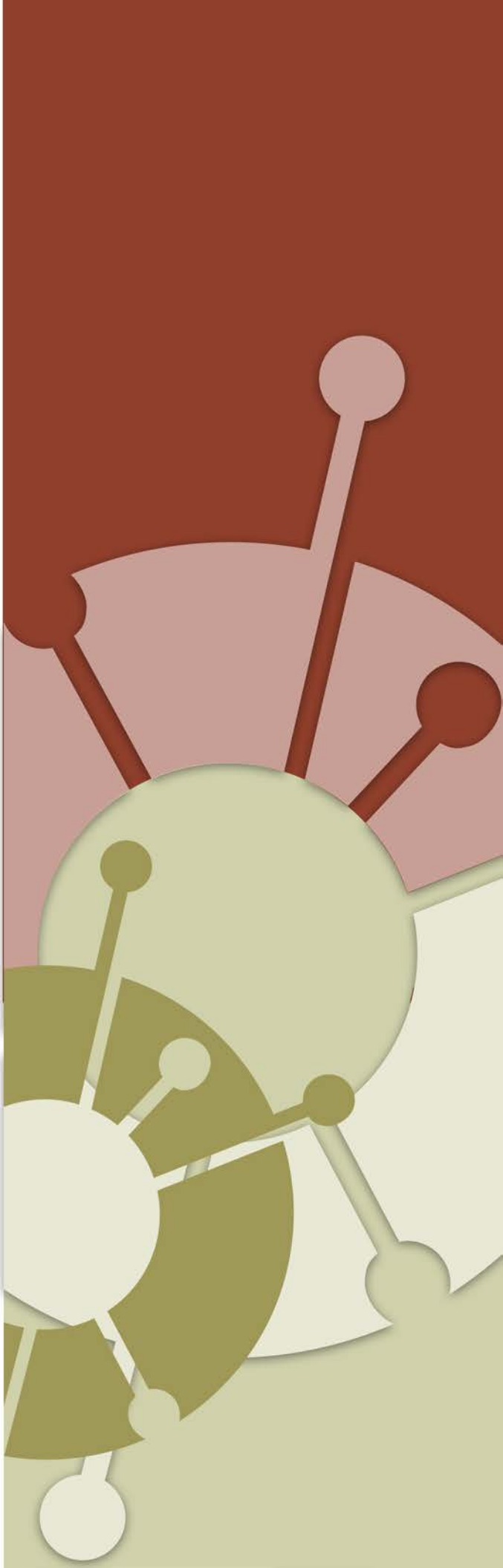
Map A-4: Youth


COBB
Population /Sq. Mile
6K
4K
2K
1K
Very Low
Low
Medium
High
Very High
Youth
0
0.5
1 Miles
N
S
E
W

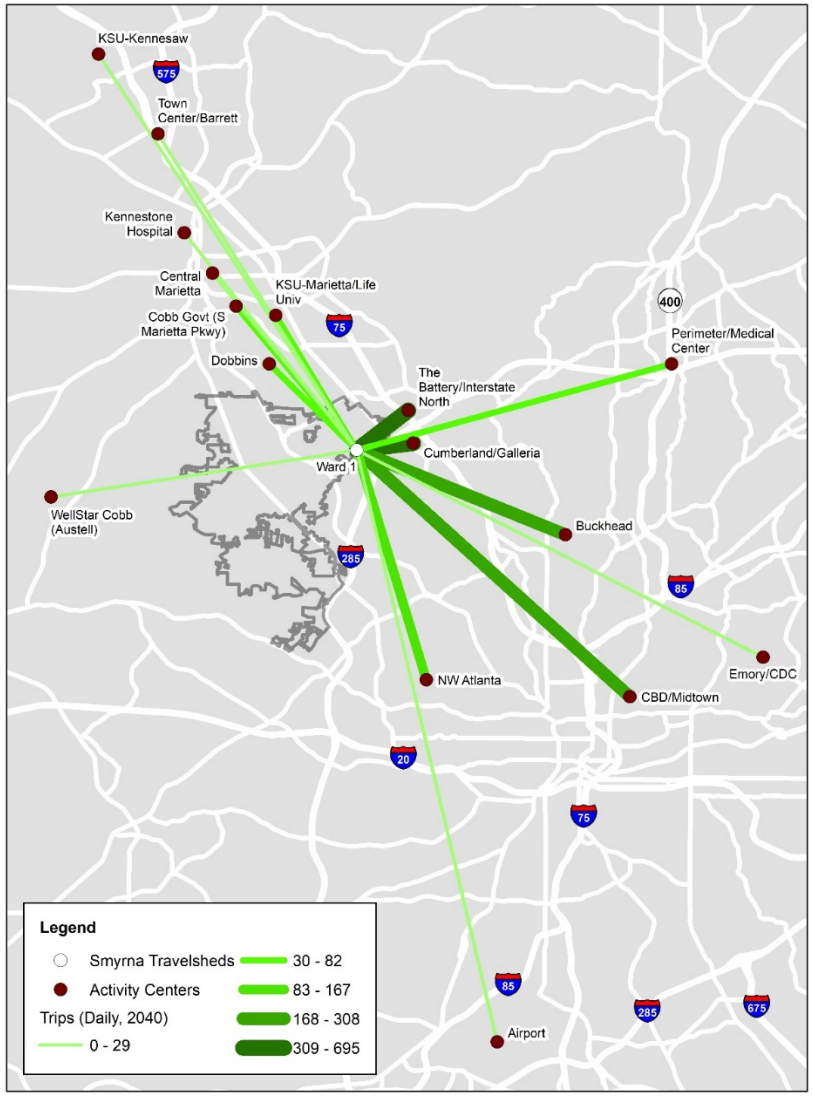
Appendix B: Travelshed Maps

These maps show travel flows by ward for each of the Internal travel markets analyzed for this study.

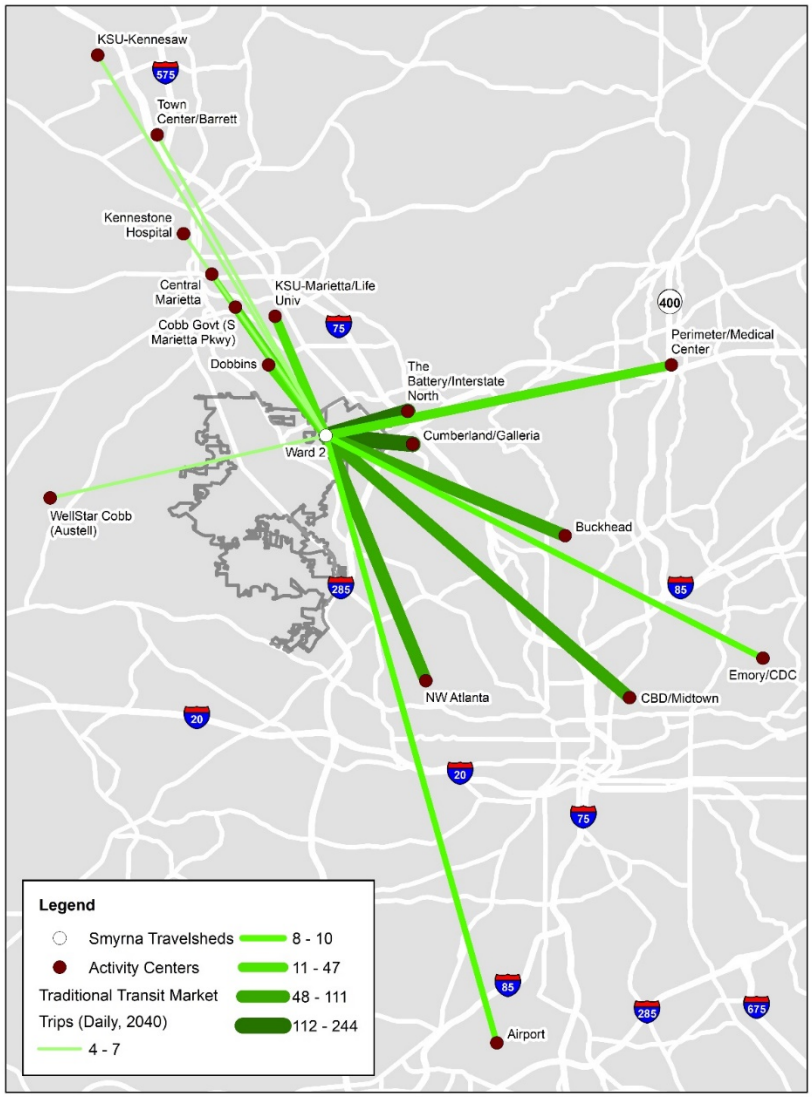
List of Maps



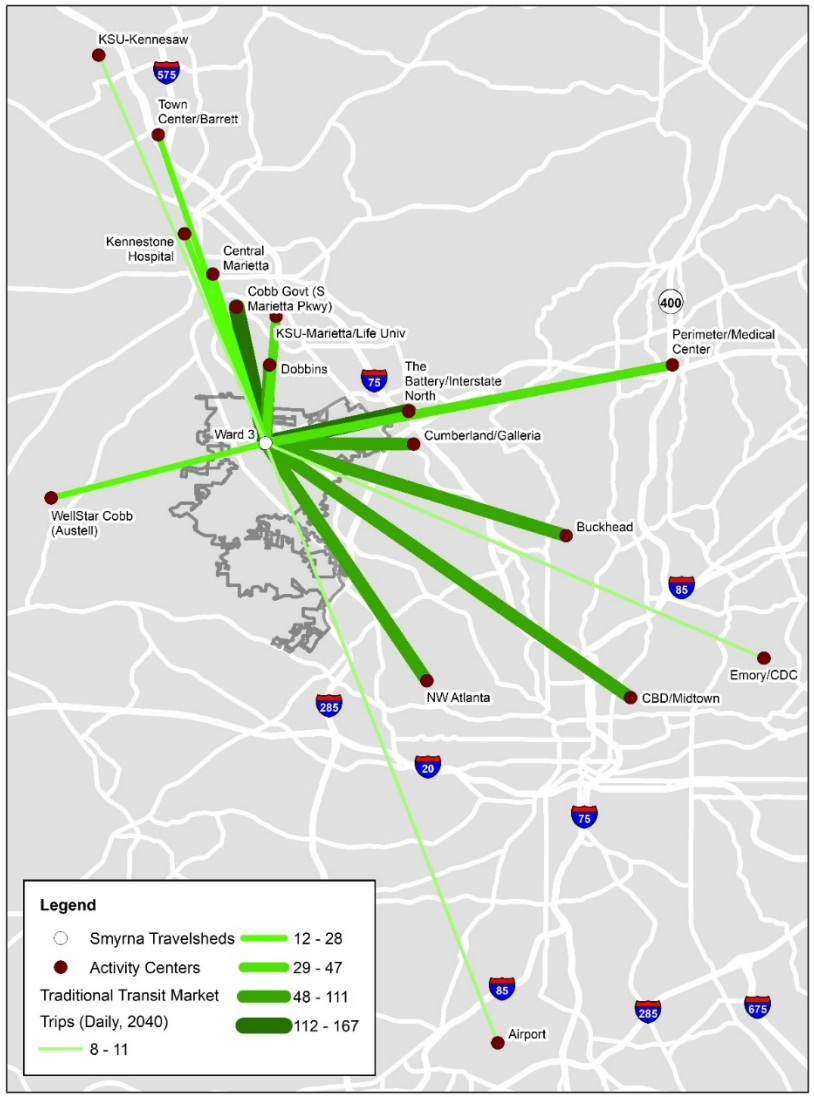
Map B-2: Low-Income Transit Markets-Ward 1



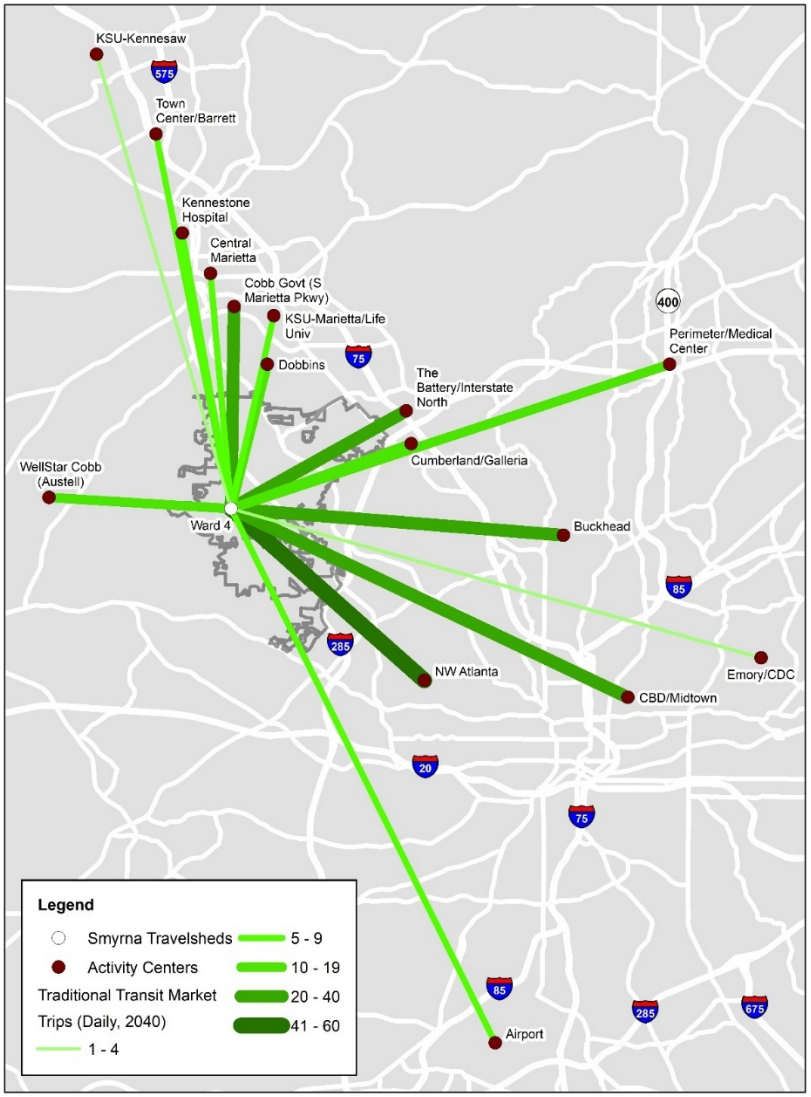
Map B-1: Low-Income Transit Markets-Ward 2



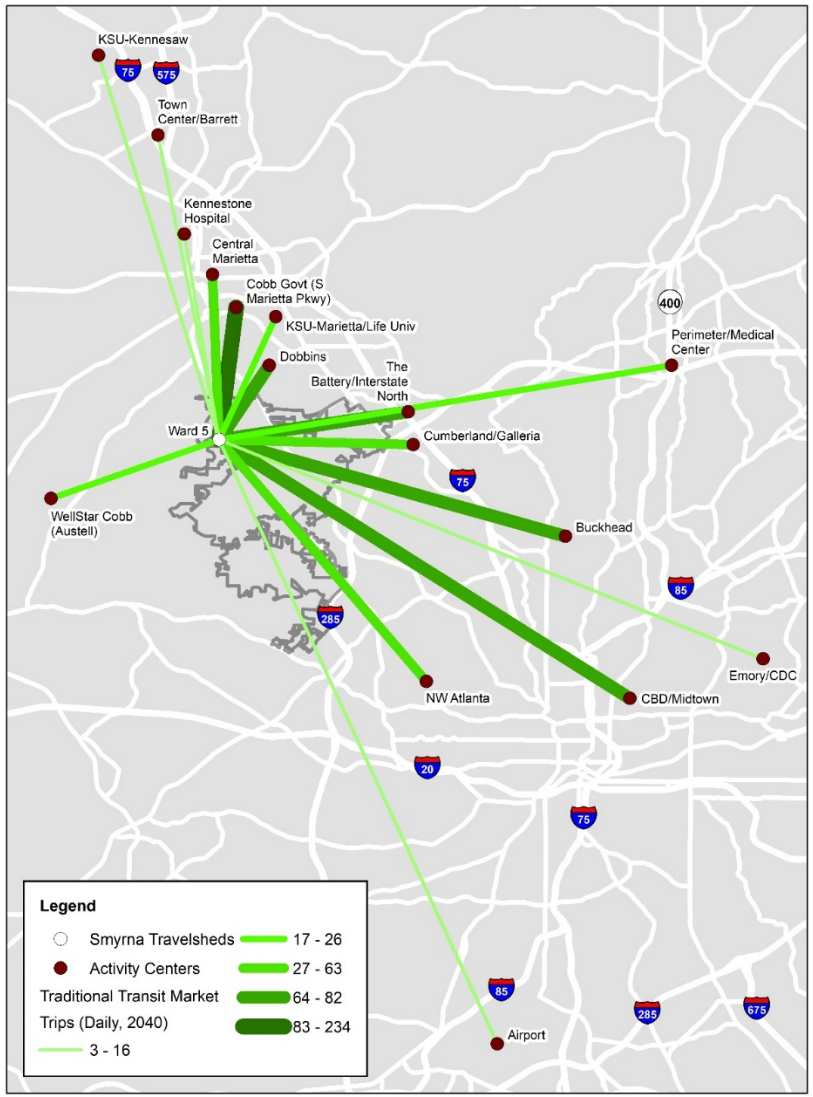
Map B-3: Low-Income Transit Markets-Ward 3



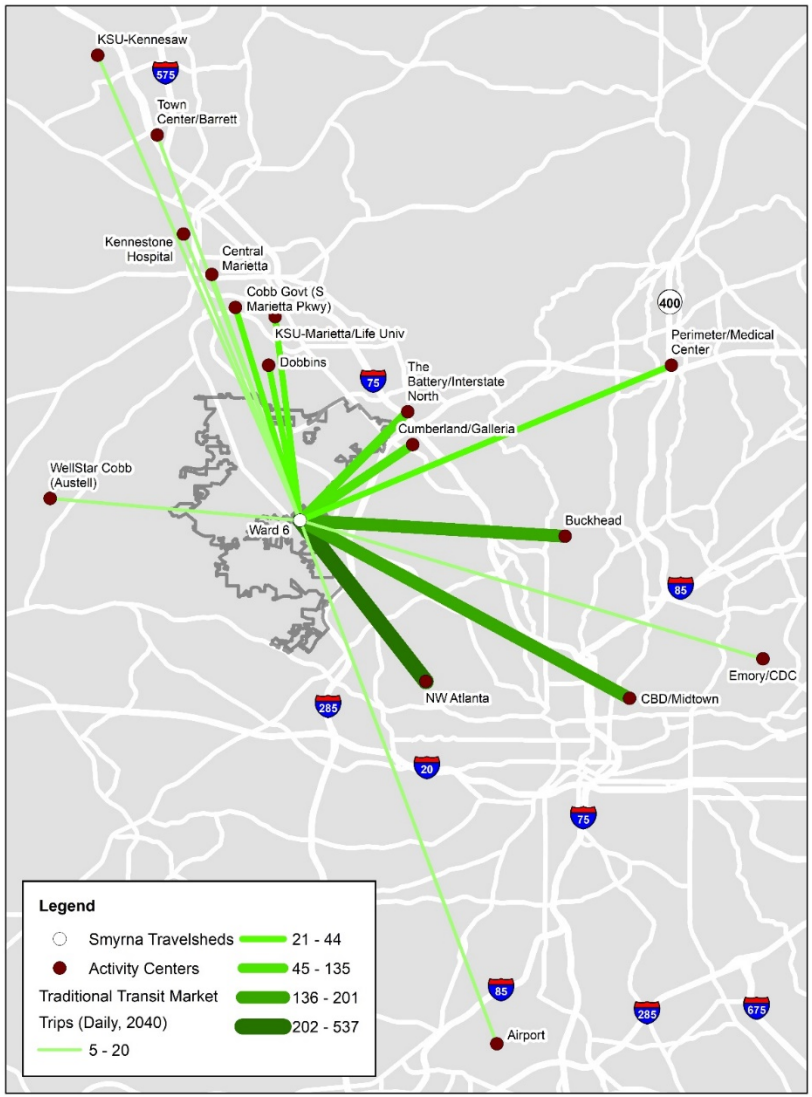
Map B-4: Low-Income Transit Markets-Ward 4



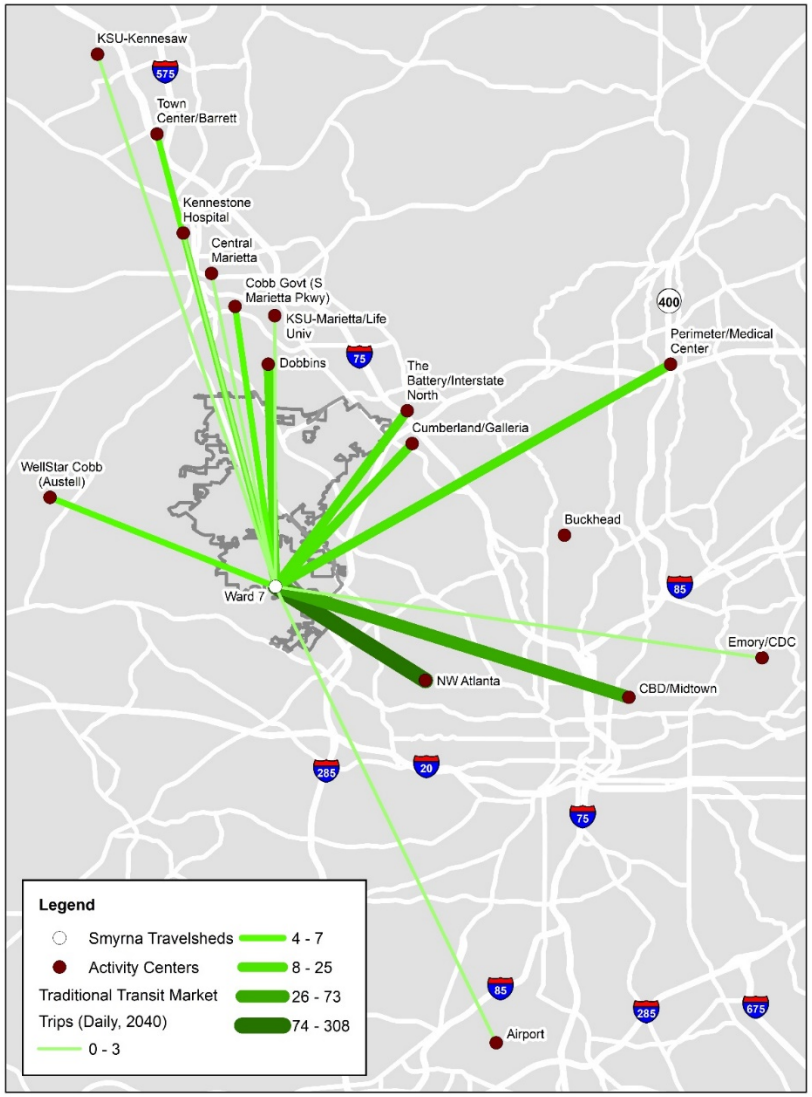
Map B-6: Low-Income Transit Markets-Ward 5



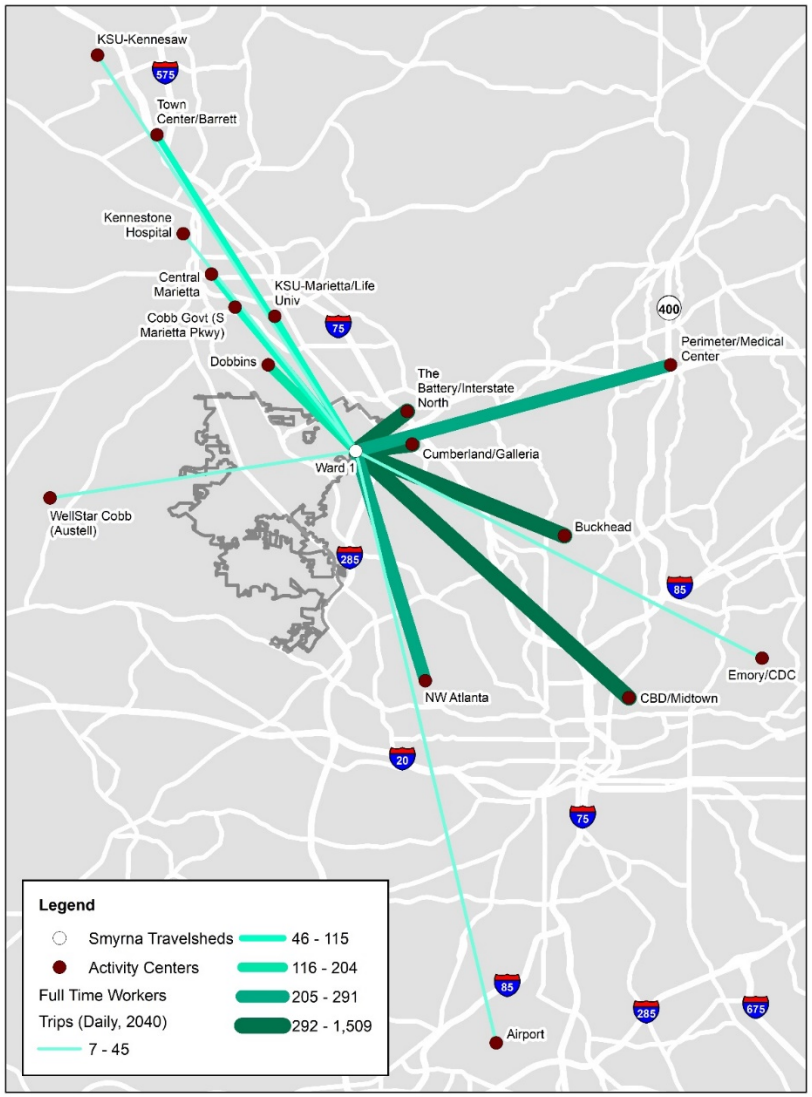
Map B-5: Low-Income Transit Markets-Ward 6



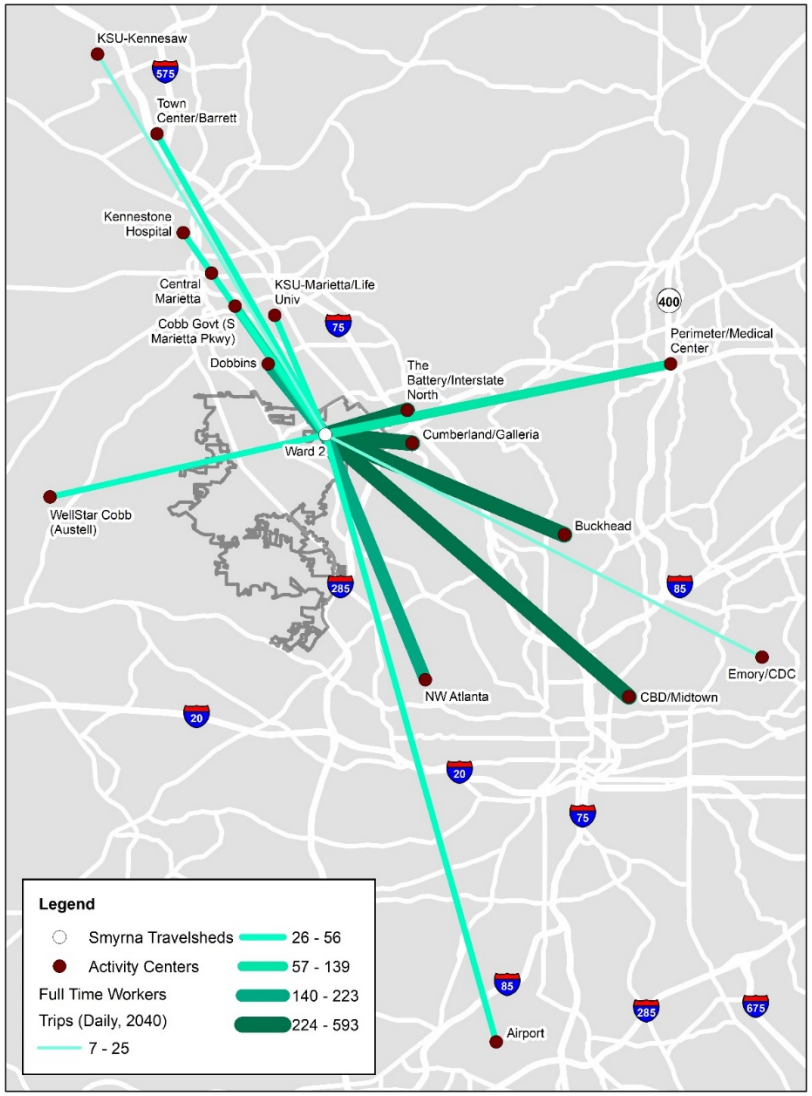
Map B-8: Low-Income Transit Markets-Ward 7



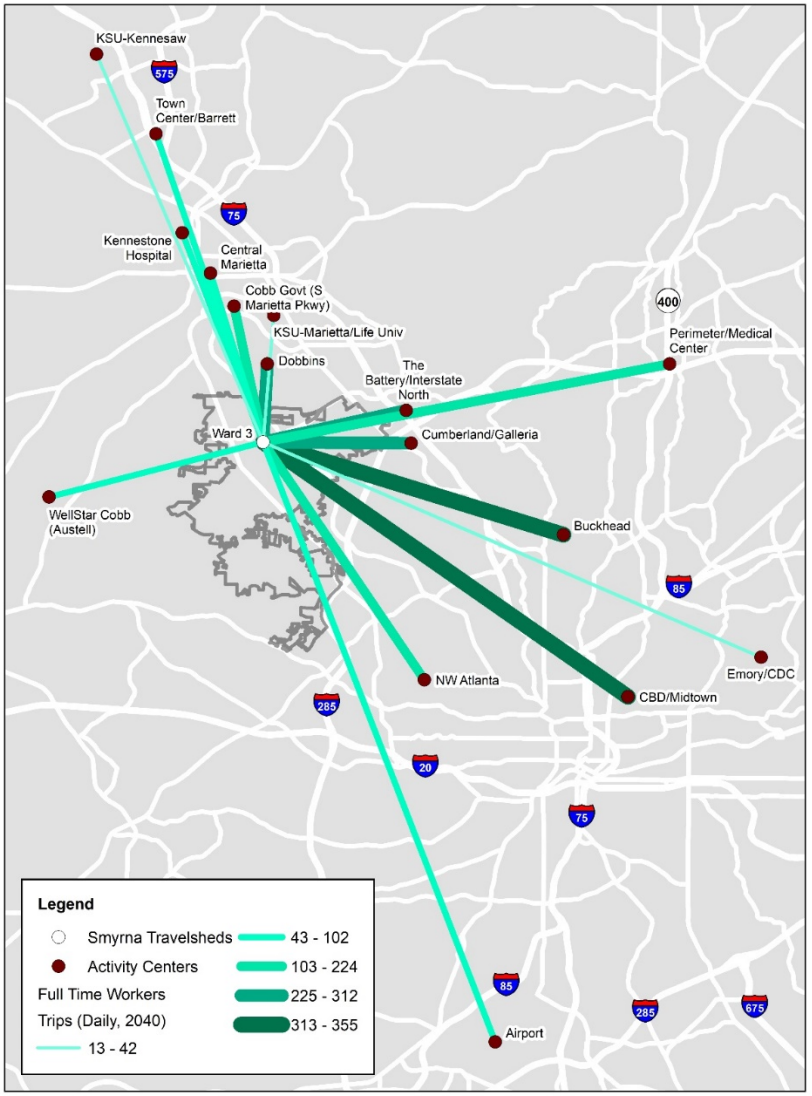
Map B-7: Full Time Workers Transit Markets-Ward 1



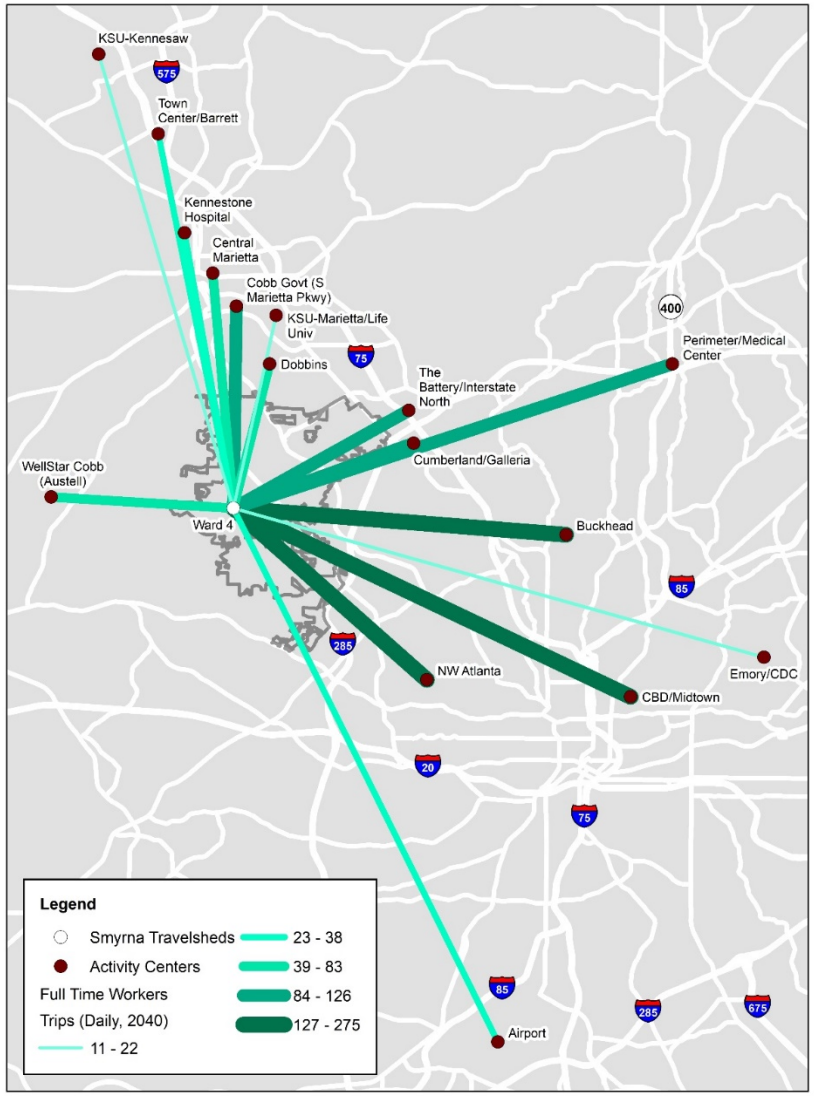
Map B-10: Full Time Workers Transit Markets-Ward 2



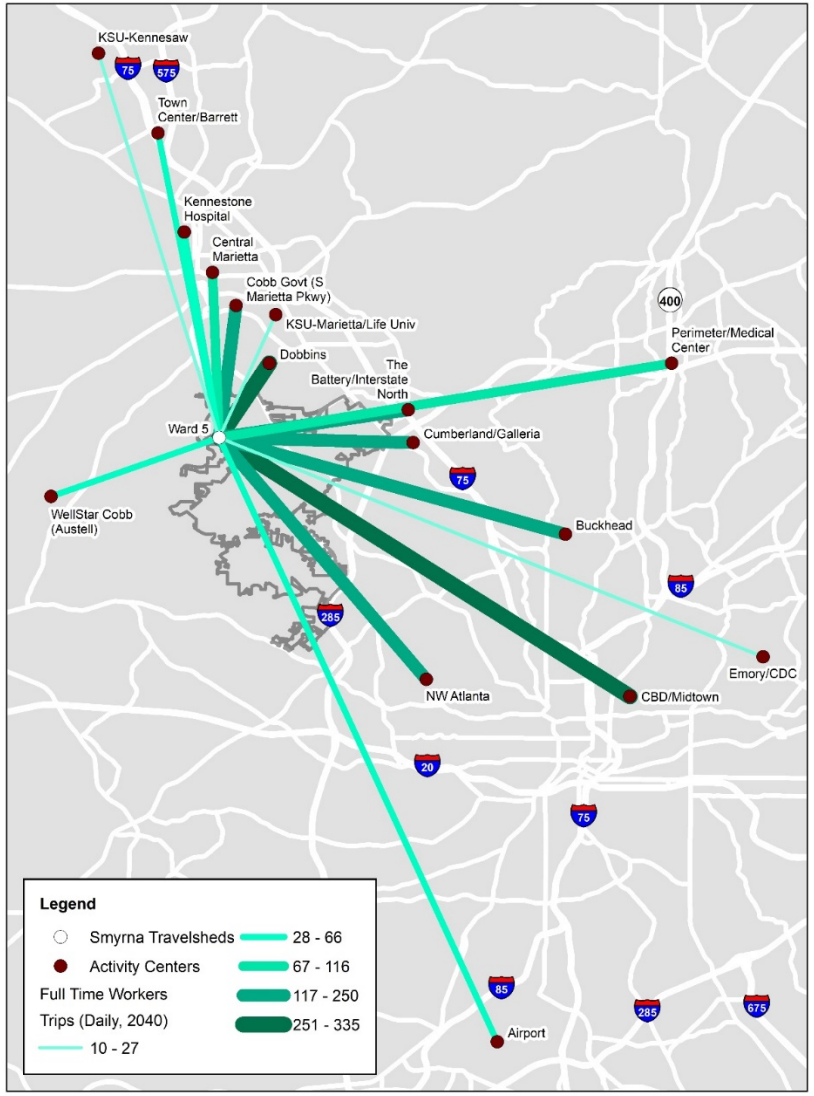
Map B-9: Full Time Workers Transit Markets-Ward 3



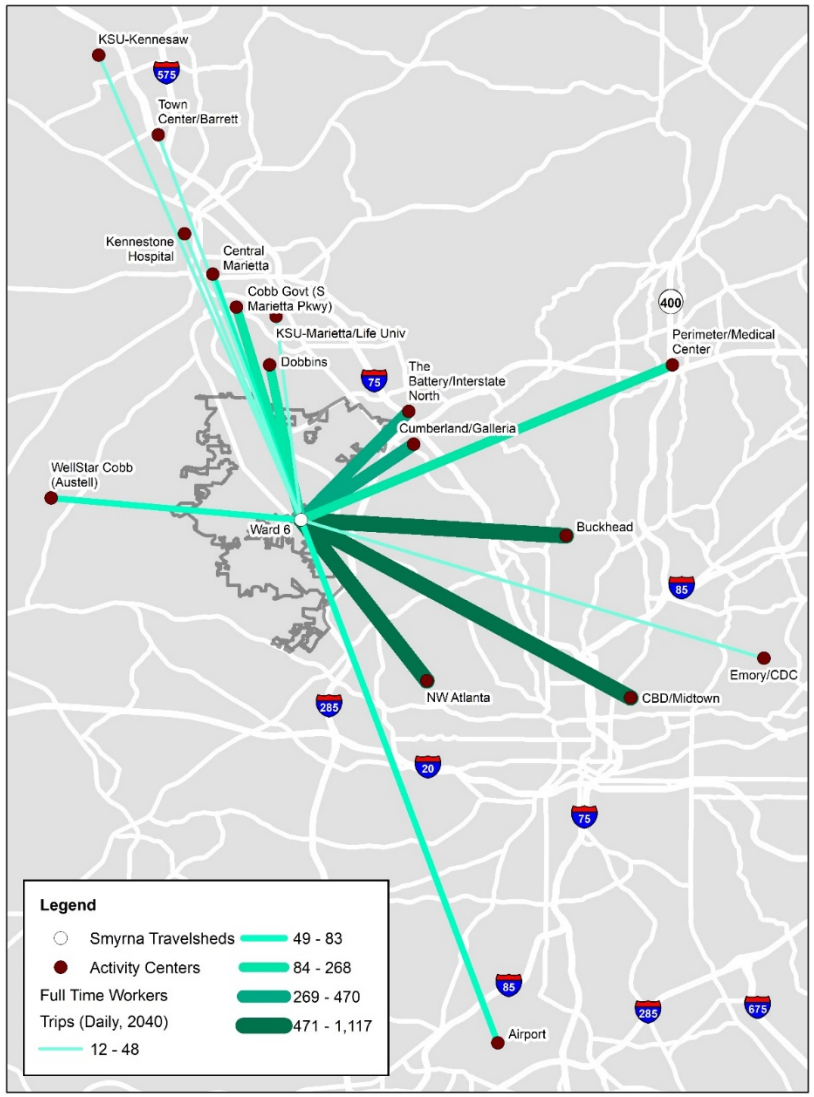
Map B-12: Full Time Workers Transit Markets-Ward 4



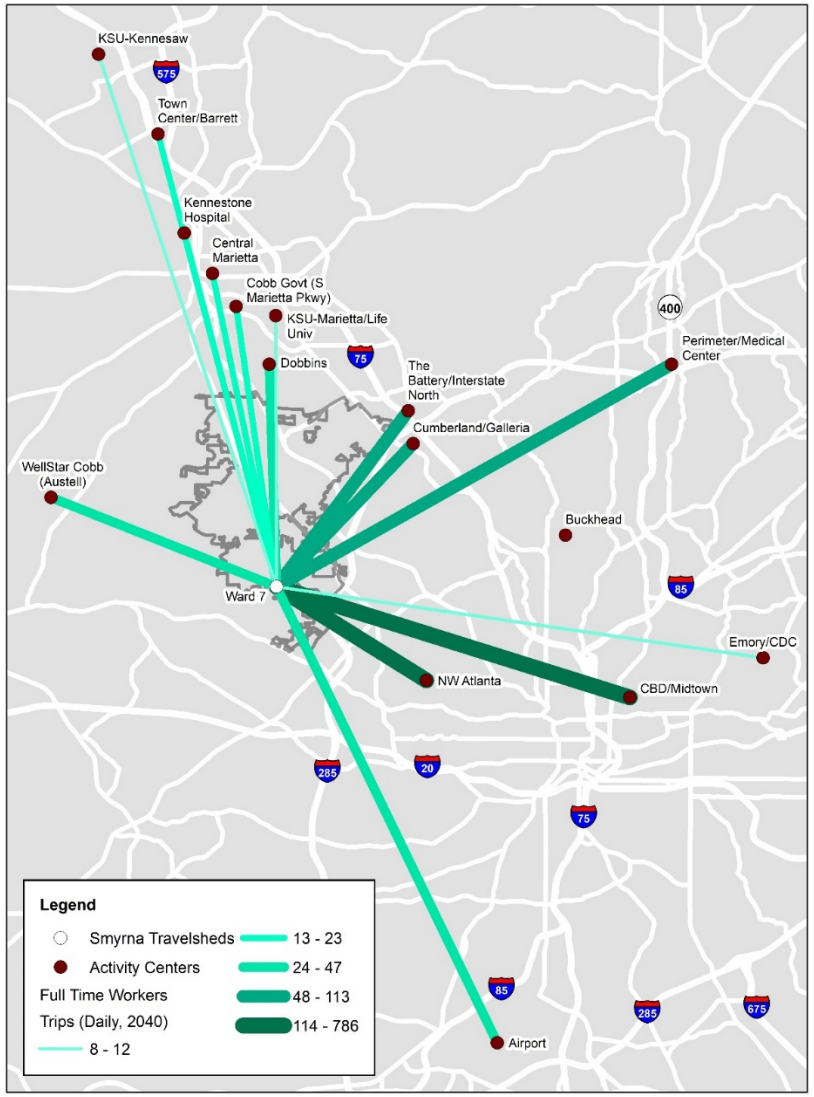
Map B-11: Full Time Workers Transit Markets-Ward 5



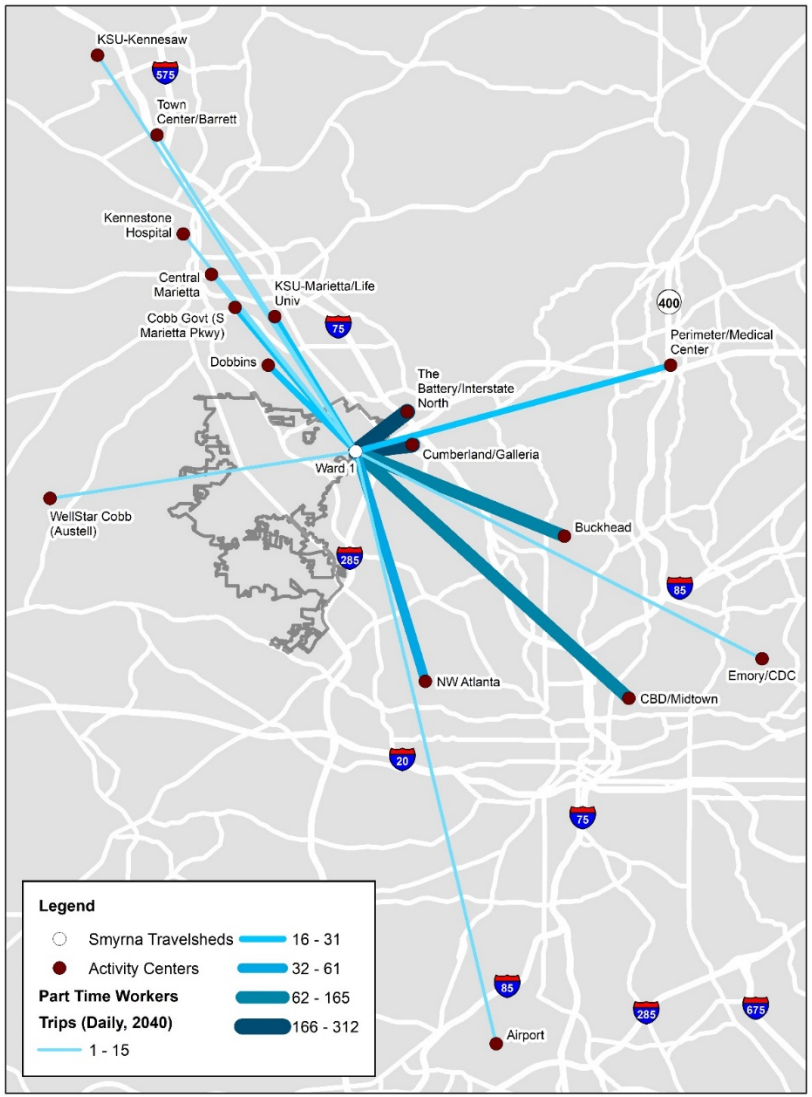
Map B-14: Full Time Workers Transit Markets-Ward 6



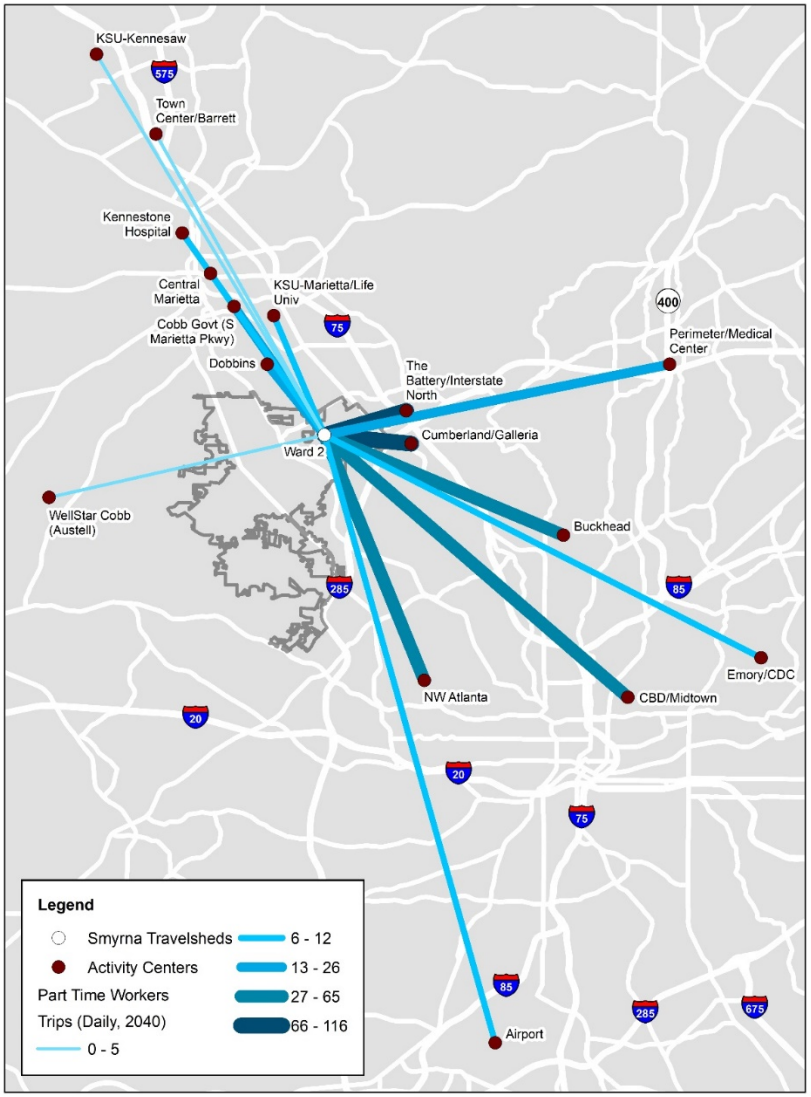
Map B-13: Full Time Workers Transit Markets-Ward 7



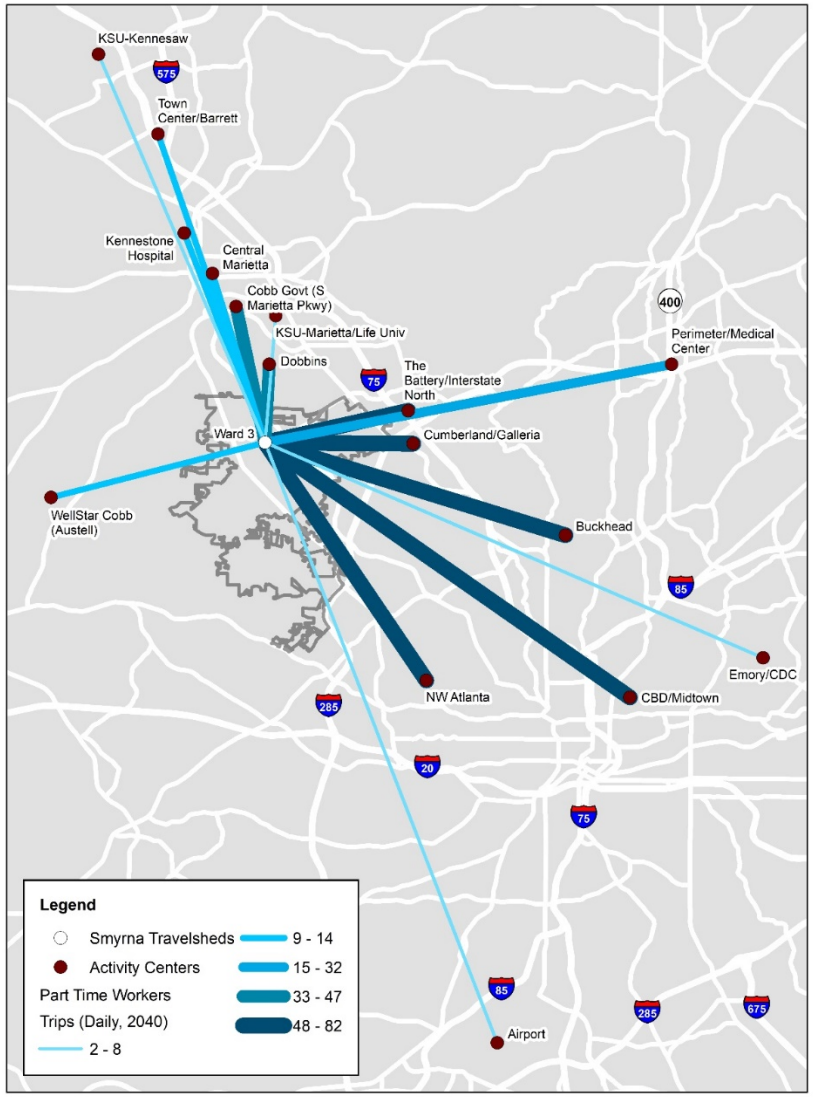
Map B-16: Part Time Workers Transit Markets-Ward 1



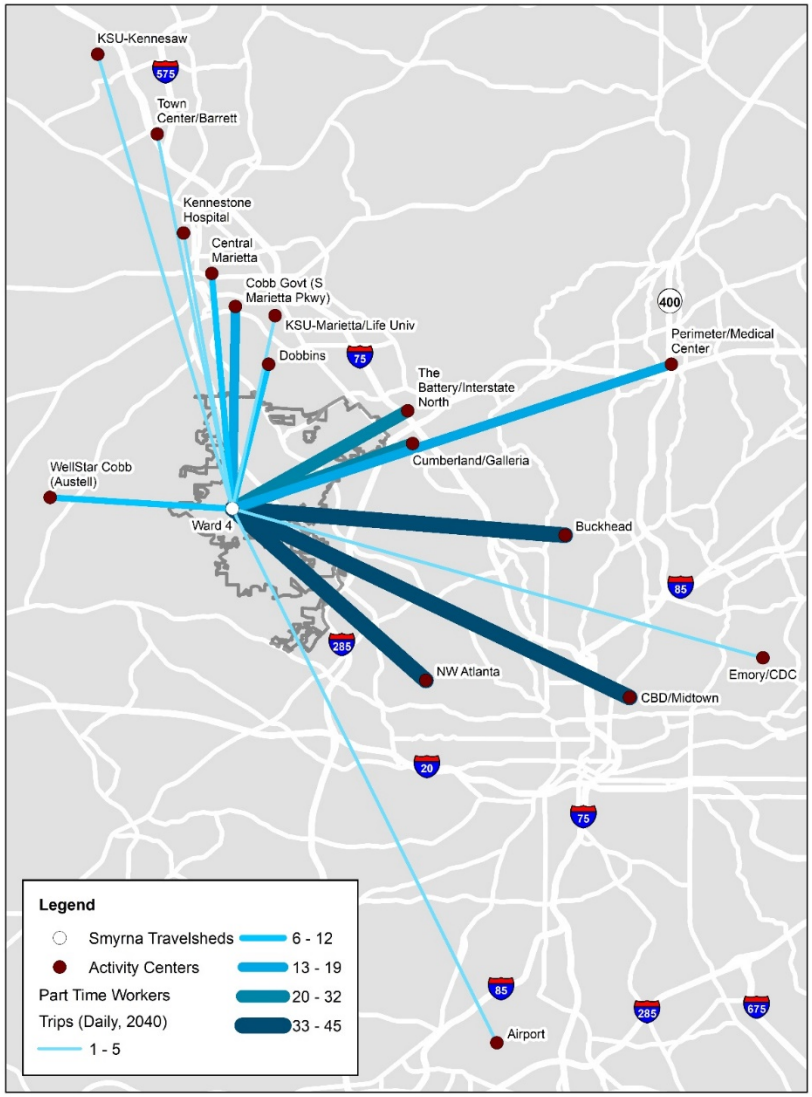
Map B-15: Part Time Workers Transit Markets-Ward 2



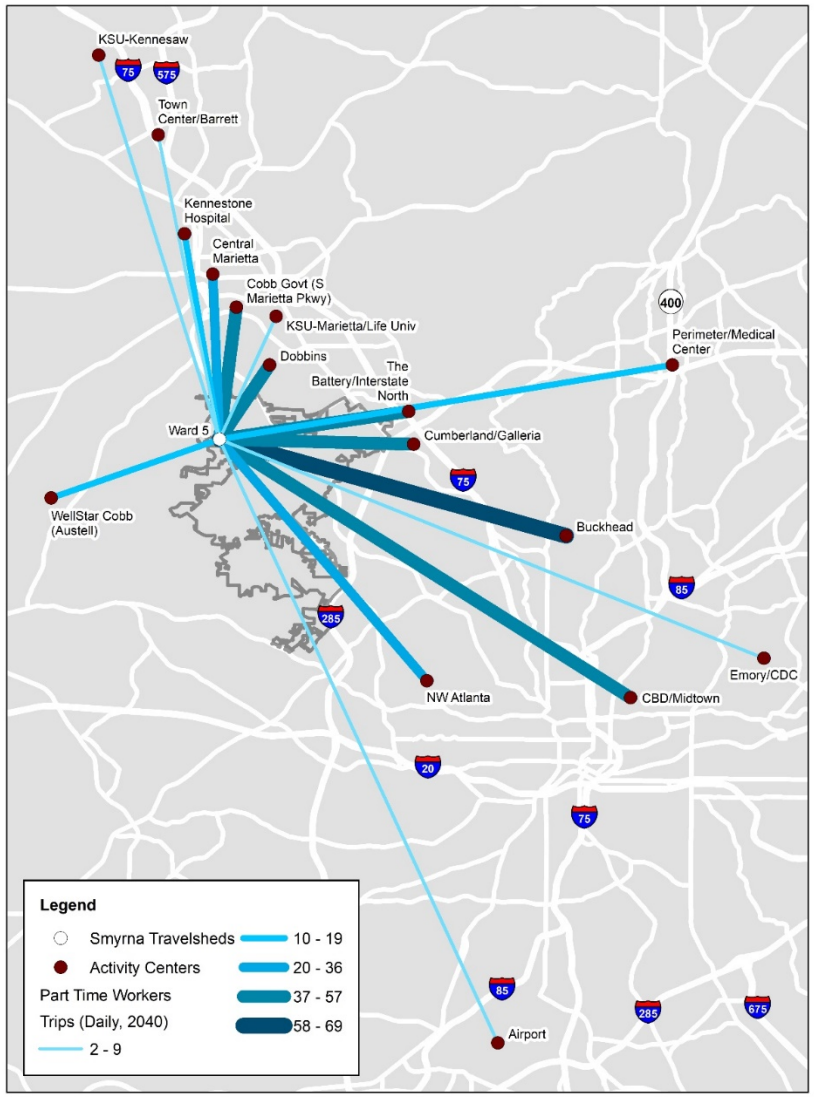
Map B-18: Part Time Workers Transit Markets-Ward 3



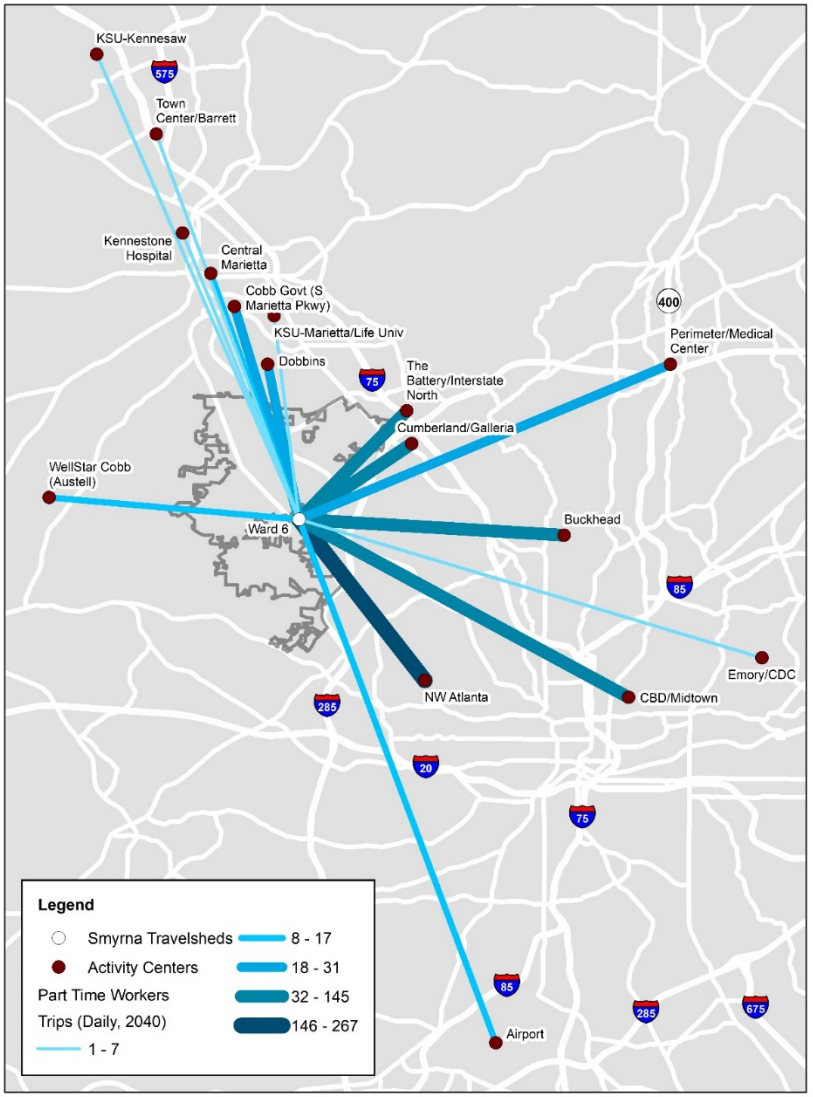
Map B-17: Part Time Workers Transit Markets-Ward 4



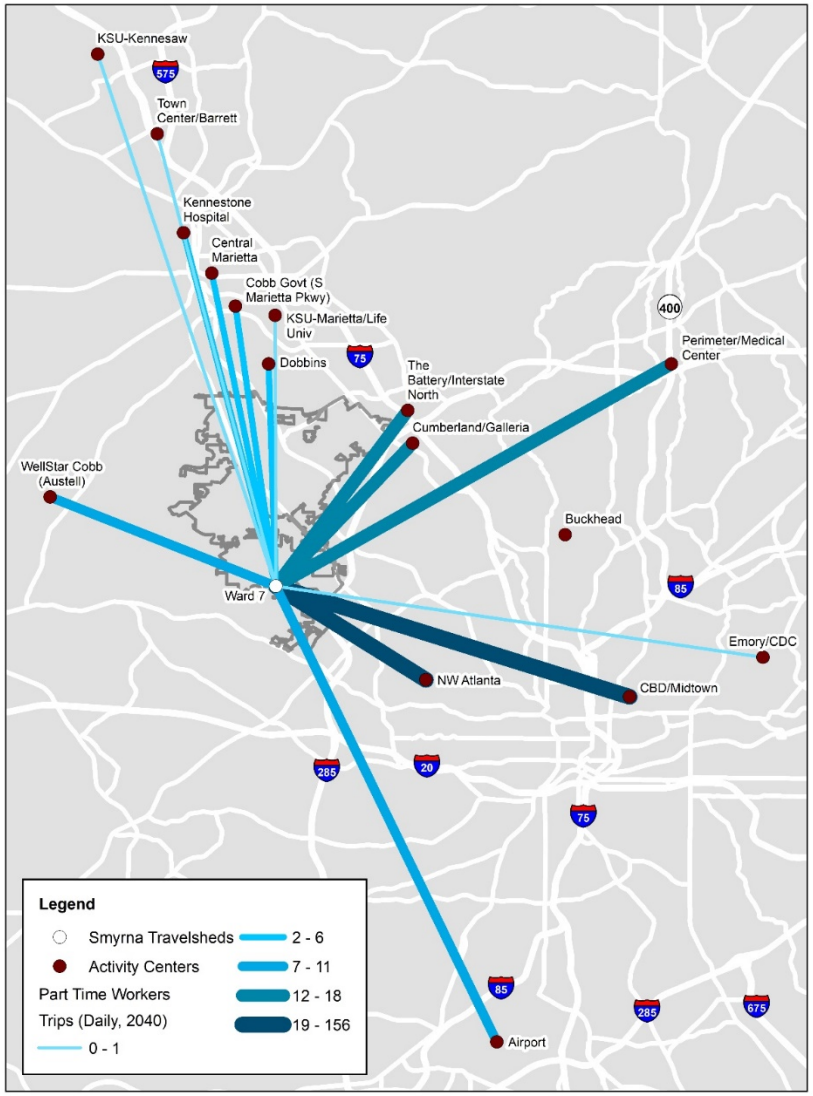
Map B-20: Part Time Workers Transit Markets-Ward 5



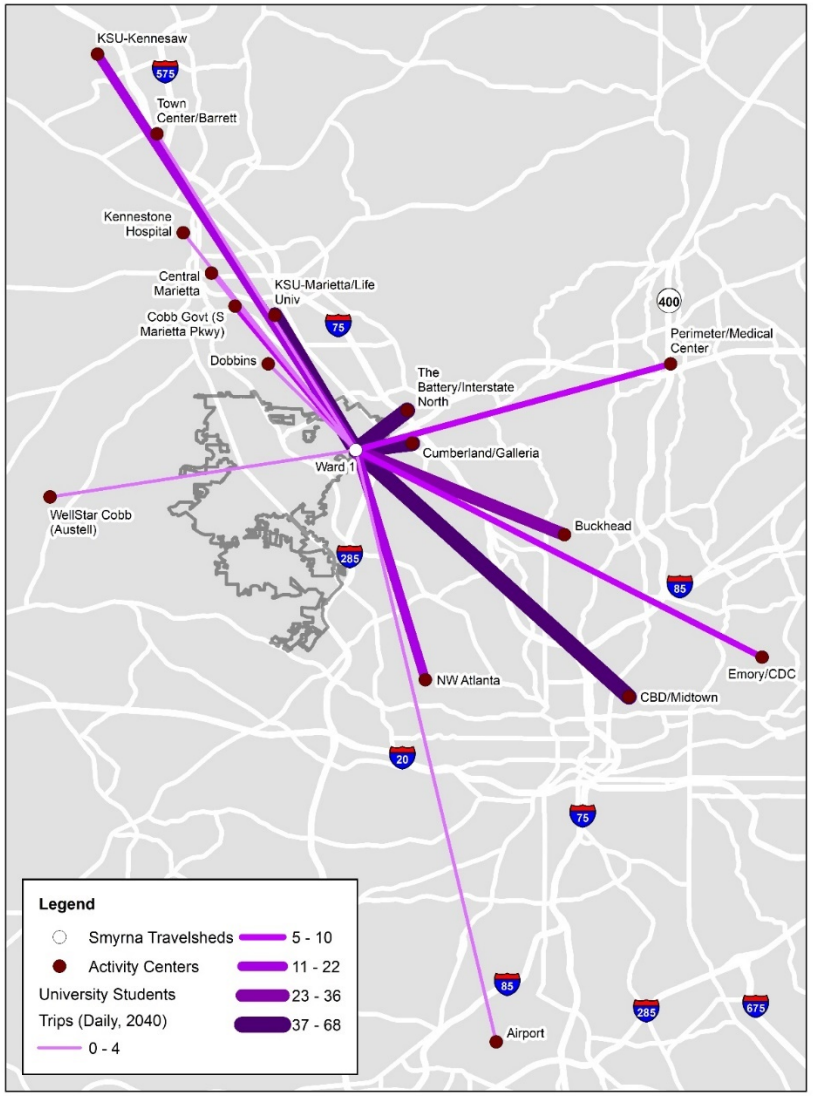
Map B-19: Part Time Workers Transit Markets-Ward 6



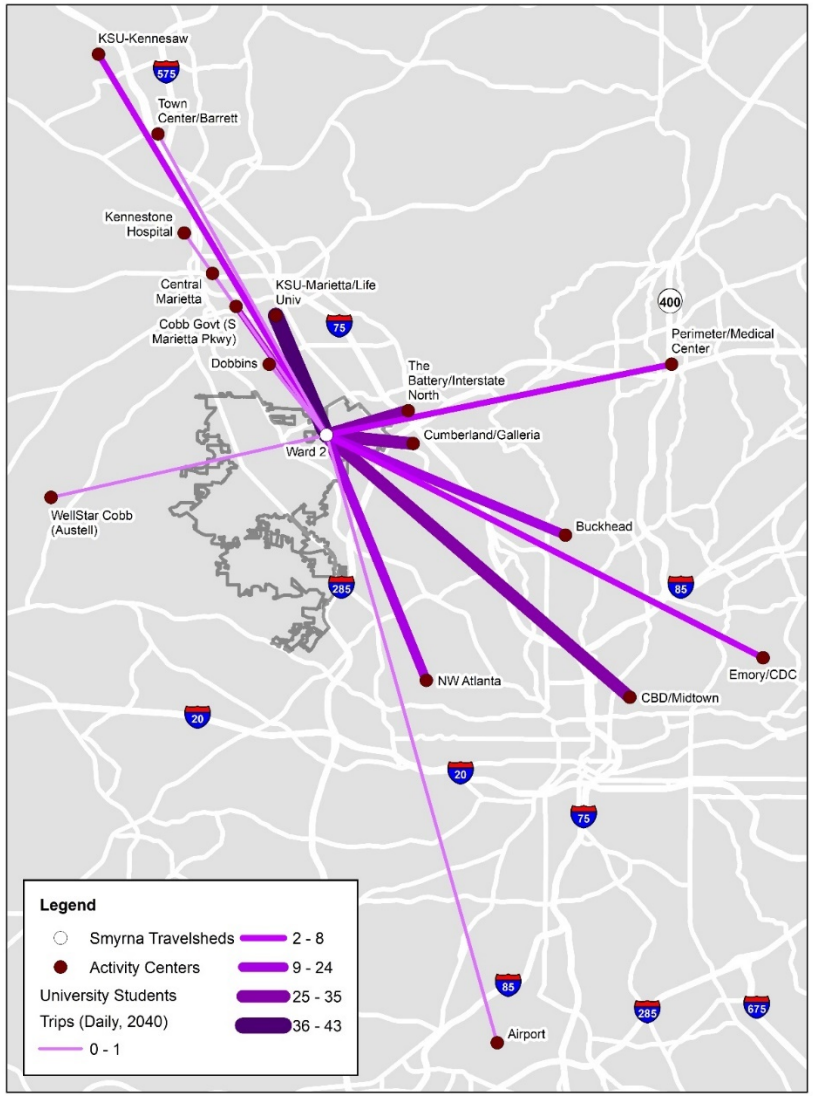
Map B-22: Part Time Workers Transit Markets-Ward 7



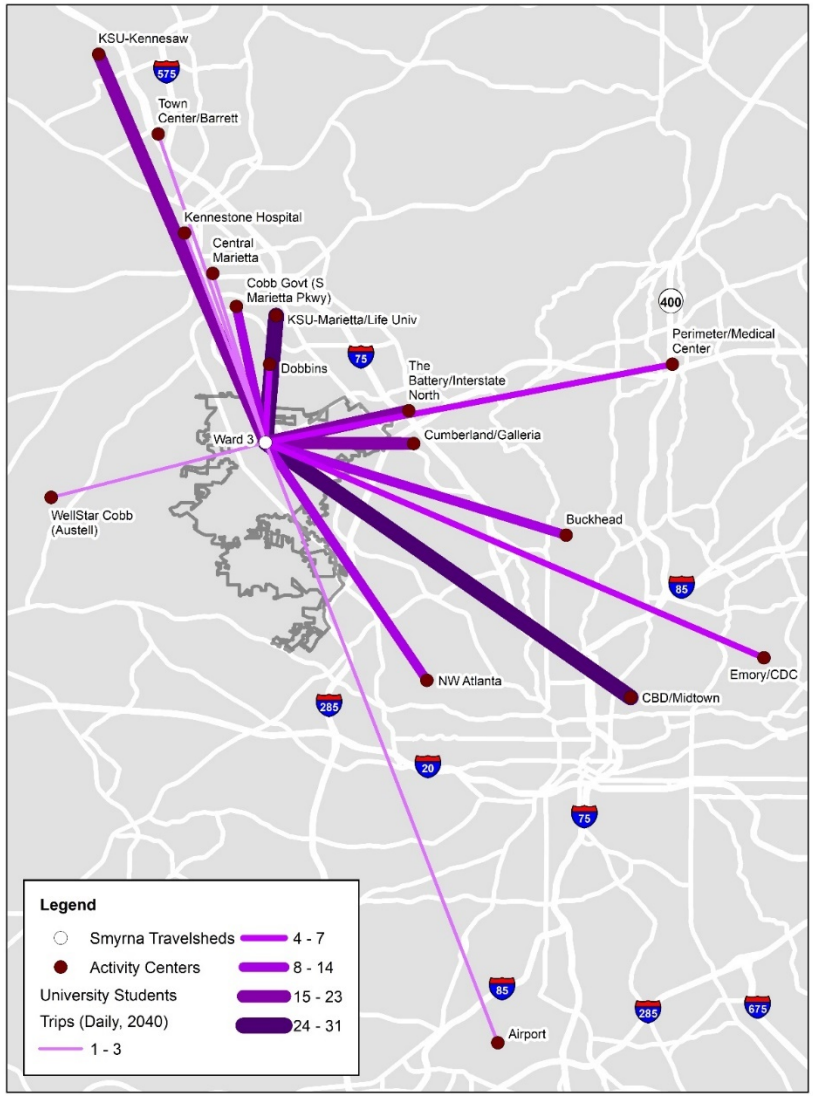
Map B-21: University Students Transit Markets-Ward 1



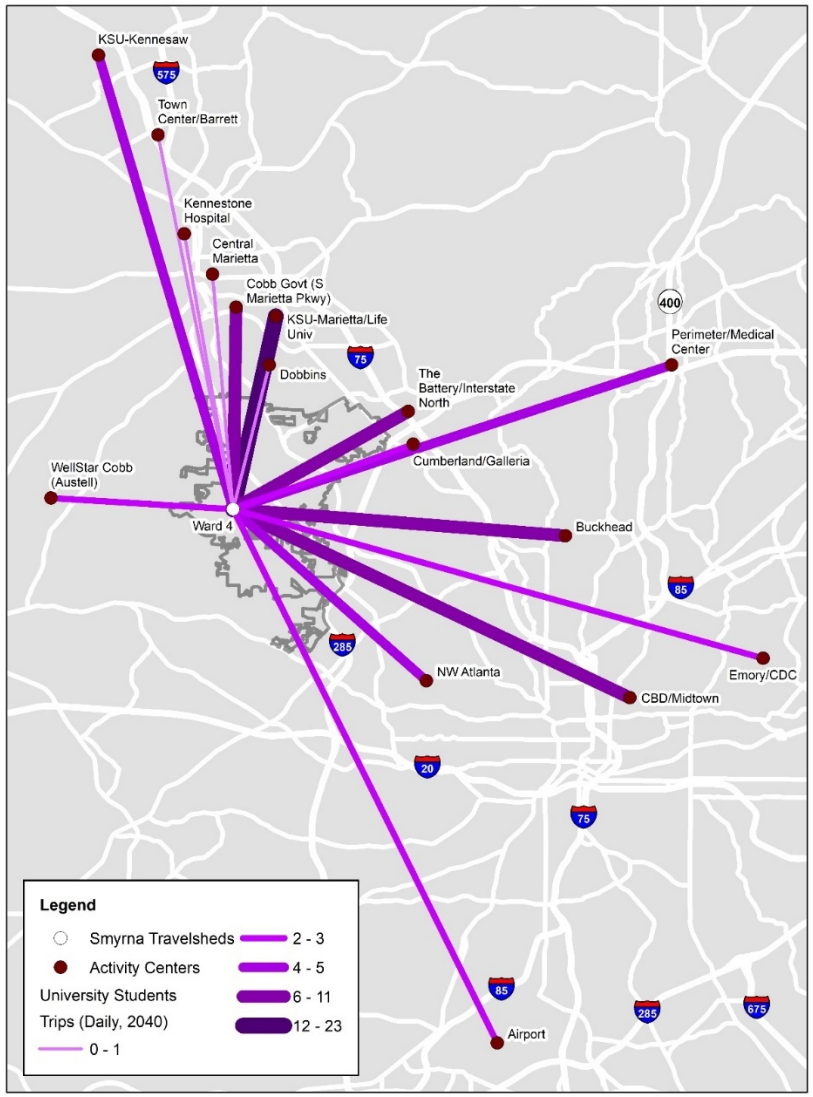
Map B-24: University Students Transit Markets-Ward 2



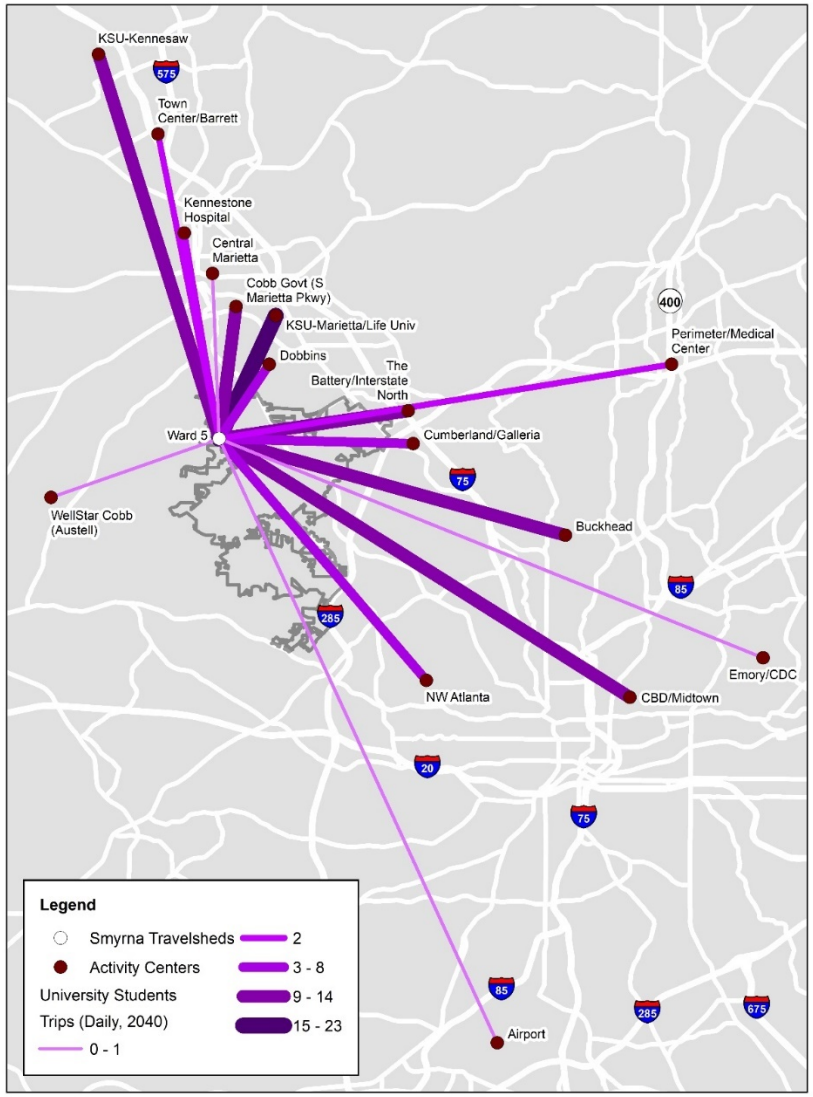
Map B-23: University Students Transit Markets-Ward 3



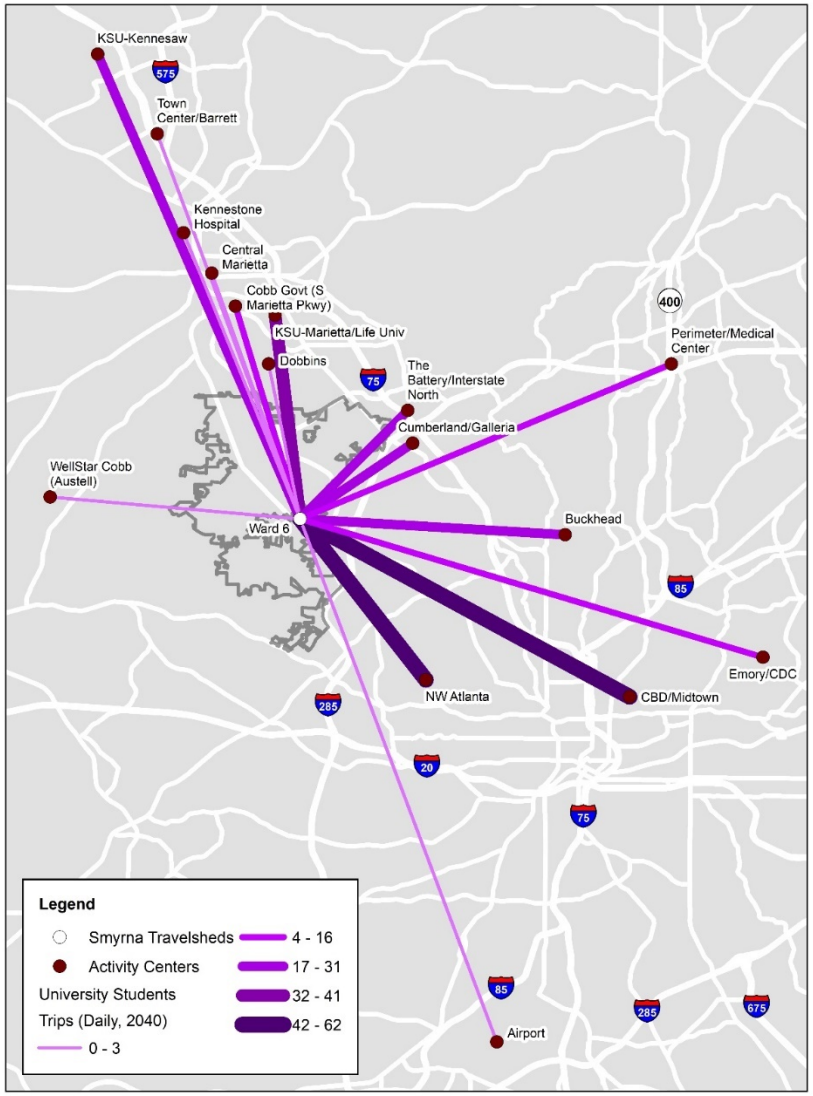
Map B-26: University Students Transit Markets-Ward 4



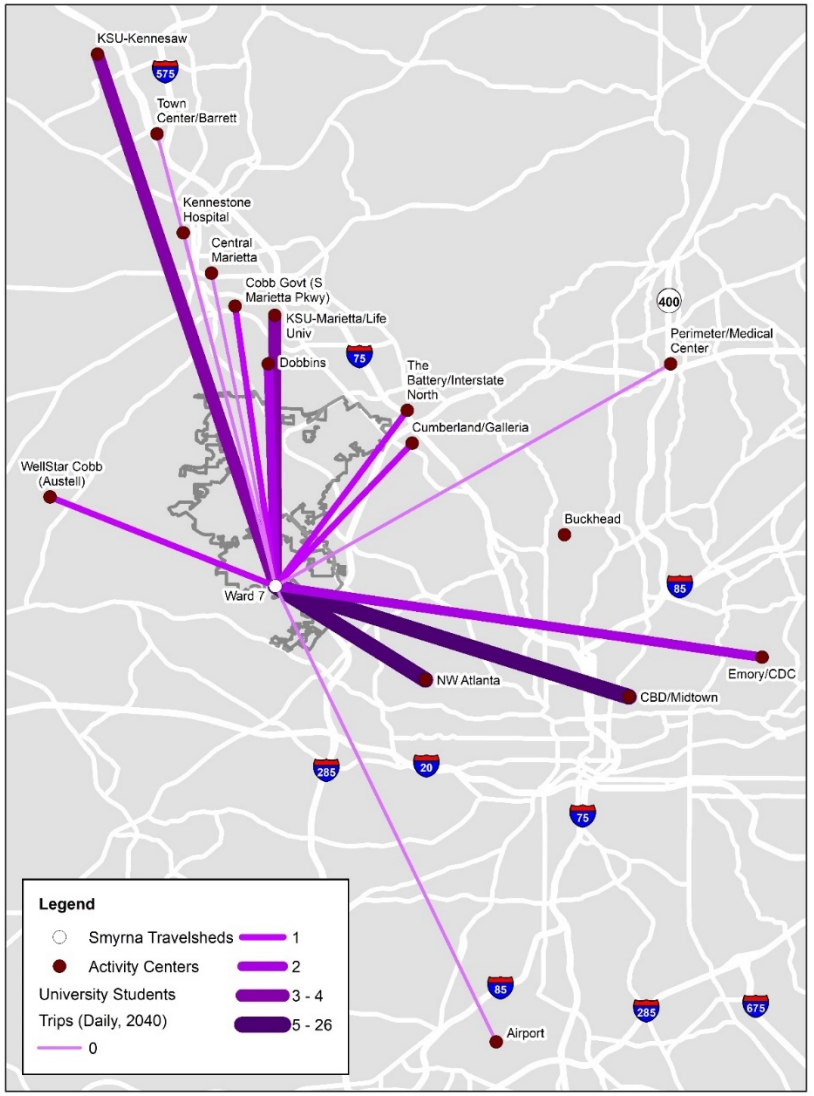
Map B-25: University Students Transit Markets-Ward 5



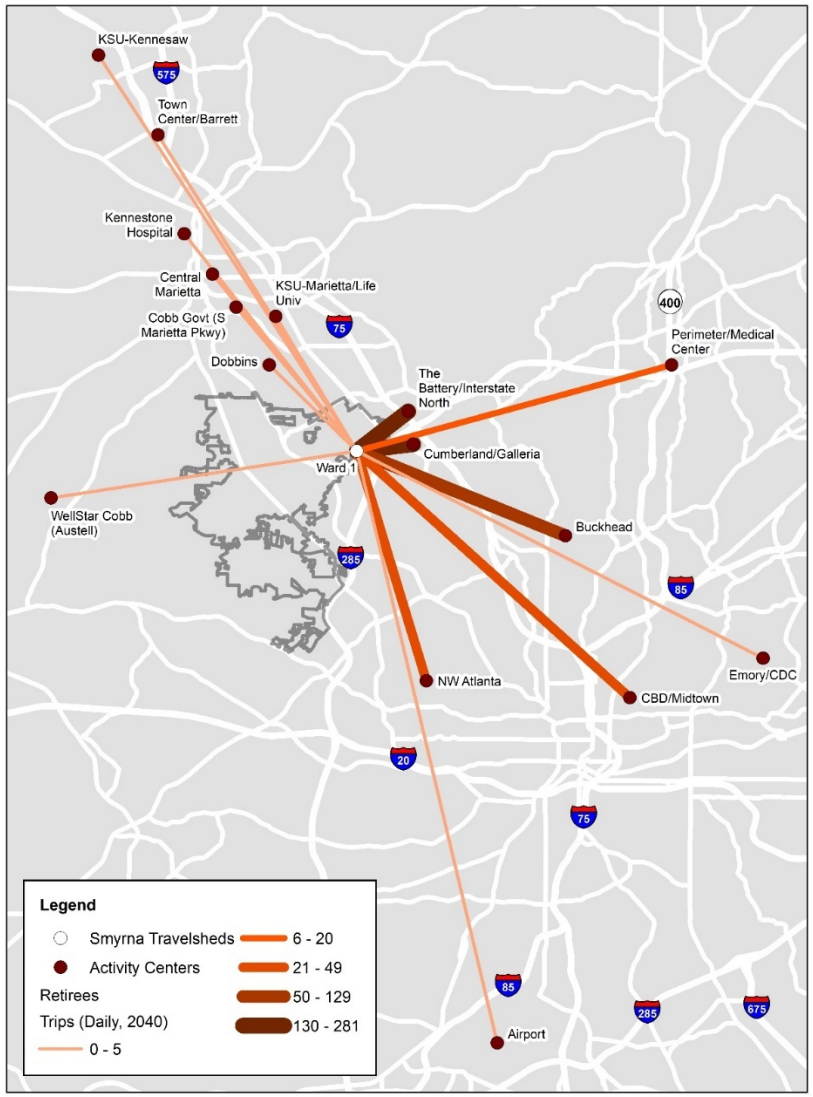
Map B-28: University Students Transit Markets-Ward 6



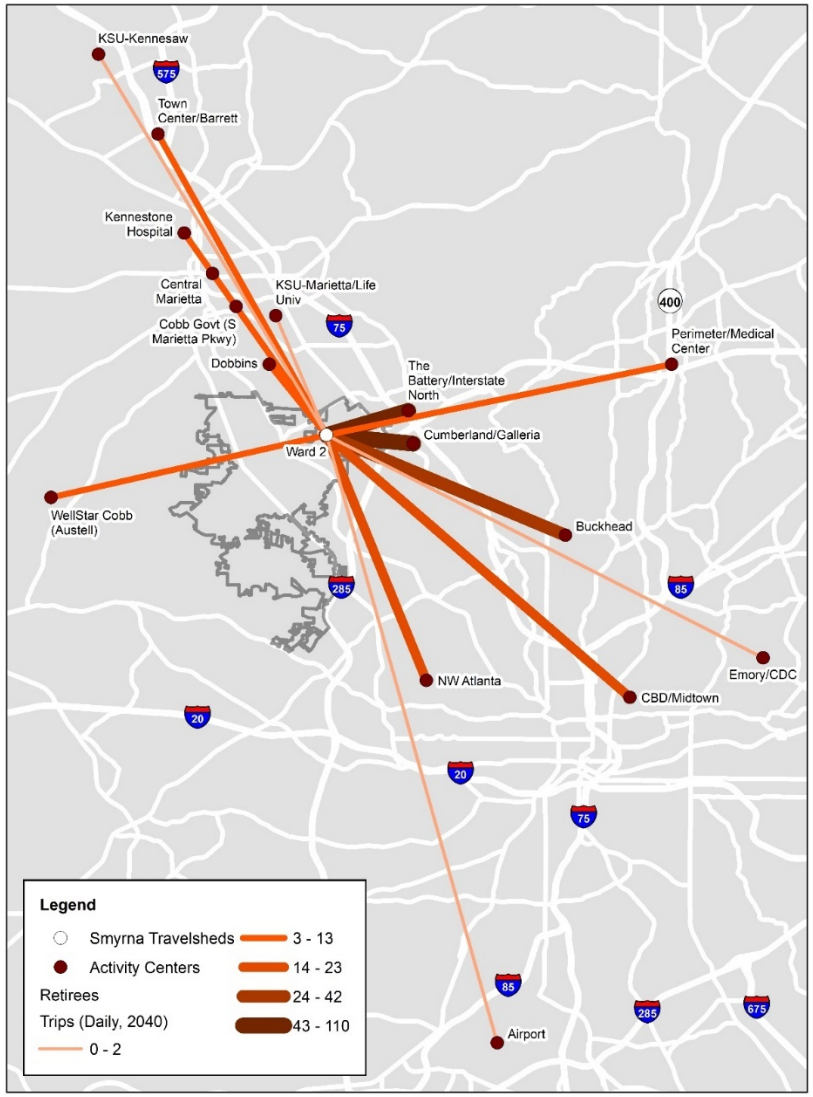
Map B-27: University Students Transit Markets-Ward 7



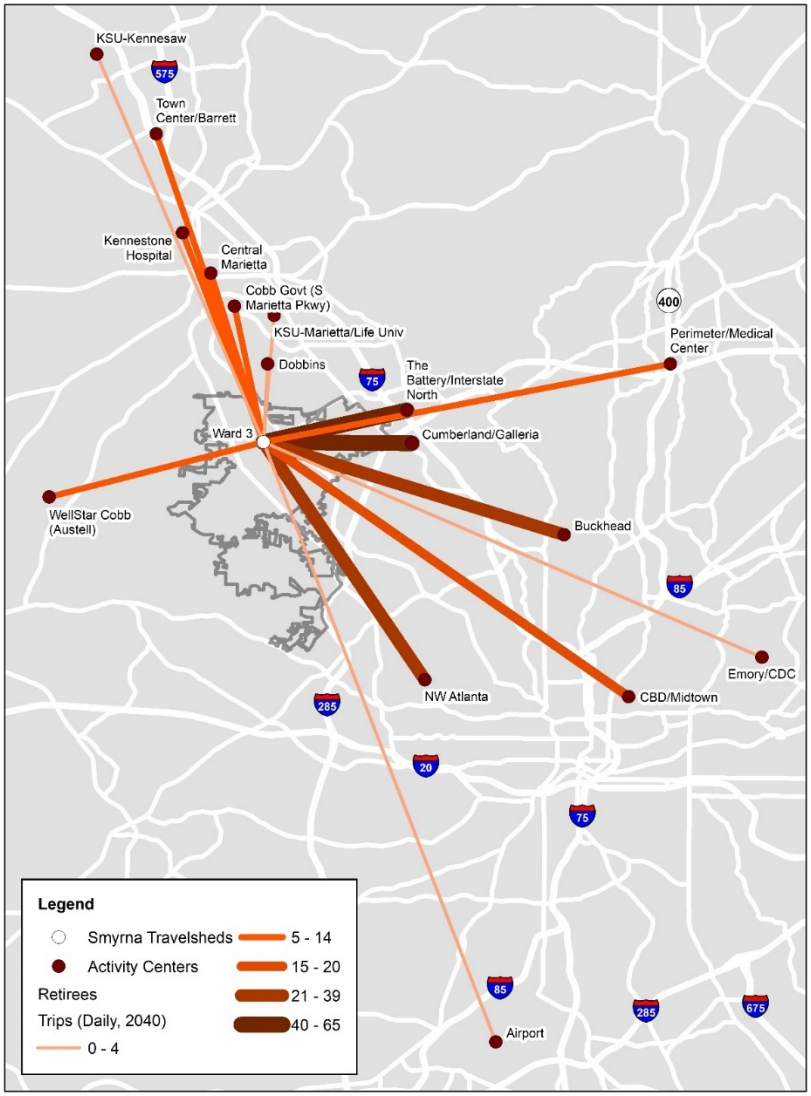
Map B-30: Retiree Transit Markets-Ward 1



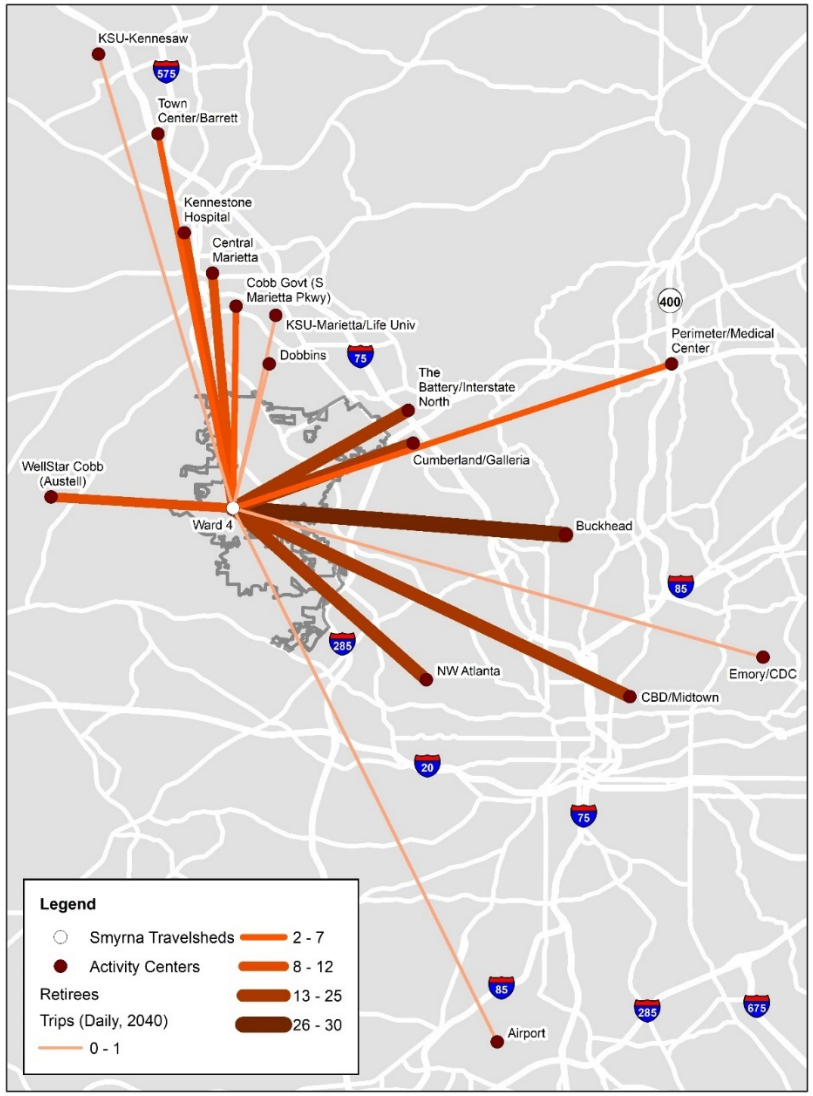
Map B-29: Retiree Transit Markets-Ward 2



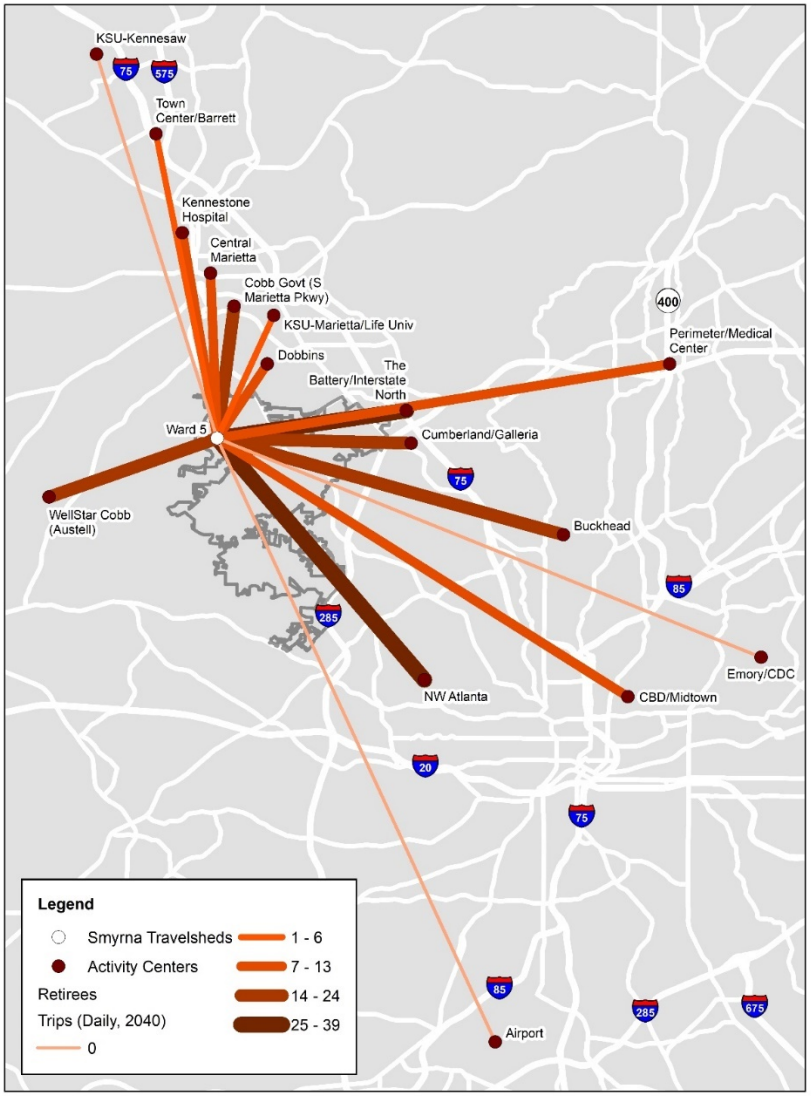
Map B-32: Retiree Transit Markets-Ward 3



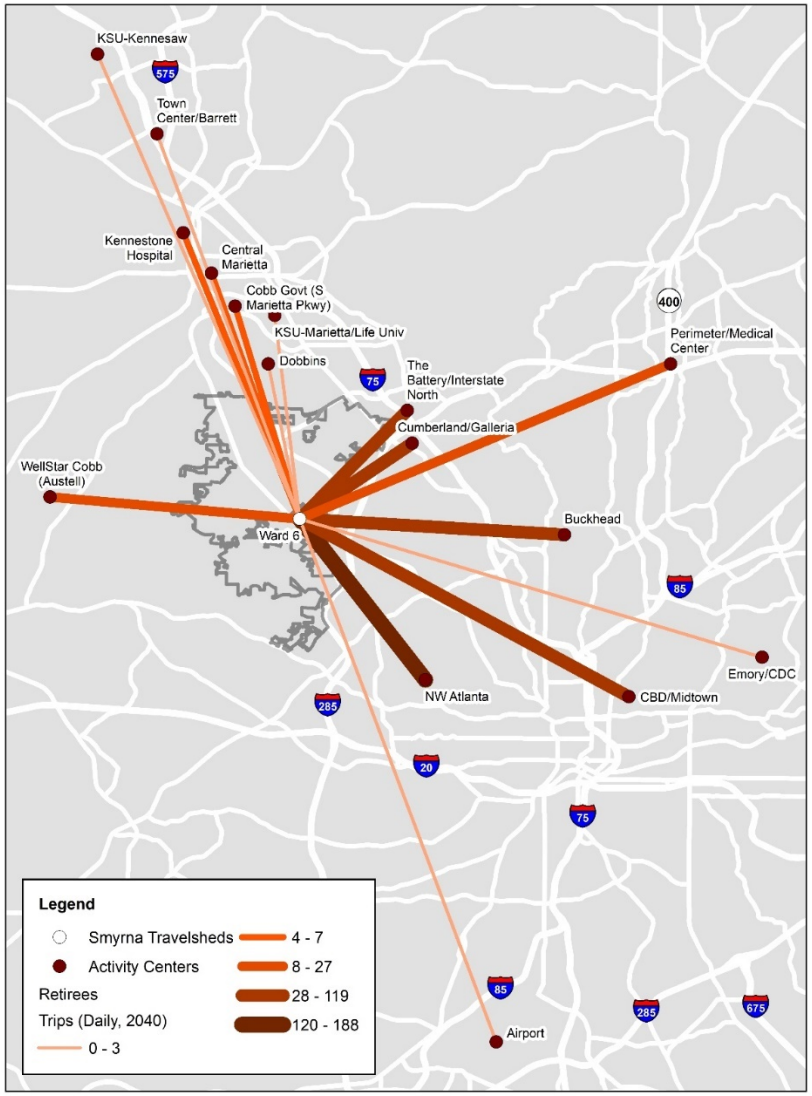
Map B-31: Retiree Transit Markets-Ward 4



Map B-34: Retiree Transit Markets-Ward 5



Map B-33: Retiree Transit Markets-Ward 6



Map B-35: Retiree Transit Markets-Ward 7