

An Application of
The Aerotropolis Concept

Developing the City of Hapeville into the Future Airport City



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Introduction

The prediction that air transportation will dominate passenger carriage and cargo shipment in the twenty-first century, both domestically and internationally, has led to the development of 'airport city' and 'aerotropolis' concepts. Advocated by Dr. John D. Kasarda, aerotropolis is a new type of urban form comprised of an airport city at its central core and a surrounding cluster of aviation-oriented businesses and enterprises extending up to 20 miles from the airport city.

Taking advantage of its proximity to Hartsfield-Jackson Atlanta International Airport, the metropolitan Atlanta is striving to become the next aerotropolis, in light of the 'railway wave' in the 19th century and the 'automotive wave' in the 20th century. The Atlanta airport is currently the world's busiest passenger airport, serving more than 82 million passengers annually. Additionally, almost half million tons of air cargo is shipped through the airport every year.

Immediately adjacent to the airport is the City of Hapeville, a typical Georgian city whose economic growth has been stalled by the physical obstruction created by rail tracks and highways, as well as by losing its biggest tax payer-The Ford Atlanta Assembly Plant. The redevelopment plan for the Ford plant, which will be within 1.5 miles from the new international terminal of the airport, is being undertaken by Jacoby Development. Named Aerotropolis Atlanta, the project is potential to be a stimulus for promoting aviation-oriented urban development in Atlanta region, as inspired by the Aerotropolis concept.

This paper examines the evolution of the 'aerotropolis' concept, its influence on regional economic development, and the opportunities and limitations for applying this concept on metro Atlanta area. In review of similar aerotropolis practices around the world, further complicated by current condition and development potential in this region, the paper recommends several strategies that could be taken to overcome political and economic barriers to developing Hapeville into a future airport city and metro Atlanta into the next aerotropolis.

Literature Review

Airport City and Aerotropolis

The concept of aerotropolis encompasses both the airport core and surrounding area that is driven by aviation-oriented commerce (Kasarda and Appold, 2009). The increasing numbers of airport employees, combined with hundreds of thousands of passengers passing through airports each year, comprise a population exceeding the minimum limit of metropolitan areas as defined by the U.S. Census Bureau. In addition to the expanding variety of shopping and entertaining venues at passenger terminals, airports have incorporated other aviation-oriented commercial activities such as hospitality, office and retail complexes, conference and exhibition centers, and time-sensitive goods processing (Kasarda, 2009). As destinations as much as places of departure, today's air gateways have indeed transformed into airport cities that are portals to national and regional economic growth (Charles, Barnes, et al, 2007).

Taking advantage of being the regional multimodal transportation and commercial nexus, airport edged cities have evolved into the new urban form of aerotropolis, an airport-integrated urban economic region centered by a multimodal city core, from which commercial development and aviation-intensive businesses spanning up to 20-mile radius (32 km) outward along expressway corridors and passenger rail lines (Kasarda, 2009). Evolving from passenger-focused business centers, aerotropoli have transformed into mixed-use commercial districts that resemble the central business districts in metropolis, driving employment growth, business location, urban economic prosperity, and global economic integration (Lester, 2009 and Kasarda, 2008).

Modern industries progressively perceive locating their business proximate to airports as a comparative advantage in terms of logistics, which led to agglomeration effect of concentrated commercial and industrial development, especially in manufacturing and distribution industries (Kasarda, 1998/1999). Aerotropoli have therefore become the nodes for international and domestic transportation of time-sensitive products such as microelectronics, pharmaceuticals, aerospace equipment, medical instruments, and high-value perishables, attracting relocation of corporate headquarters and high-tech companies that are highly dependent upon flight networks (Lester, 2009).

Other than stimulation of airport-linked business development, the emergence of aerotropolis can also be credited to the increasing passenger flow and cargo traffic at air gateways, as well as the commercial sectors' pursuit of more affordable and accessible land (Kasarda, 2008). The advent of internet and e-commerce has rendered speed and agility more important than quality goods/services and lower prices in the competition among modern businesses, thus the logistics have assumed a leading position in forming comparative advantage in today's industries (Kasarda, 2001). According to Kasarda's estimation in 2006, over the last 30 years, the value of air cargo has increased an astonishing 1,395%, while the global GDP and world trade have only grown 154% and 355% respectively. More than 40% of the total economic value of the produced goods in the world is now shipped by air (Lindsay, 2006). Furthermore, Kasarda and Sullivan (2005) demonstrated a strong positive statistical relationship among air cargo volume, GDP, and GDP per capita.

Kim (2009) provided the case study of a planned aerotropolis, New Songdo City, where there is a 1500-acre, \$30 billion mixed-use project that includes business districts, a medical and wellness village, amusement complexes, shopping malls and convention facilities, all

constructed on reclaimed land within eight miles from the Incheon International Airport.

The evolving development of SkyCity adjacent to the main passenger terminal of Hong Kong International Airport, illustrated that an aerotropolis can be planned and built into a completely self-contained community (Nuworsoo and Deakin, 2009).

Zuidas in Amsterdam, located six minutes from the terminal of Schiphol International Airport, is connected to the Schiphol airport and other major European cities through high-speed rail. A rapidly developing business district, the Zuidas-Schiphol corridor further intensifies the land use pattern along transportation infrastructure, and, promotes a new urban form by integrating regional economy with international networks (Salet and Majoor, 2005).

Aerotropolis Atlanta and the City of Hapeville

After Ford closed its 122-acre Atlanta Assembly Plant next to Hartsfield-Jackson International Airport in the City of Hapeville, GA, Jacoby Development purchased the property for \$40.3 million in 2008 (Fleming, 2009 and Tobin, 2010). The redevelopment plan, Aerotropolis Atlanta, envisions an aviation business park featuring office, retail, hotel, shopping, 4,000-space parking facility and light industrial development (Fleming 2009). The proposed \$1.5 billion, 10-year project will be connected directly to the international terminal currently under construction, with shuttle service provided from the site. The project aims to promote sustainable development and economic growth. The parking facility is expected to be constructed with solar panels on top, and installed with water filters that recycle runoff water back to the water table. Ten thousand jobs are estimated to be created as a result of the development, counteracting the 3,000 job lost due to the closure of the Ford plant (Coffee, 2009).

Prior to the closure of the Ford plant, the Atlanta Regional Commission's Livable Centers Initiative have selected Hapeville as a grant recipient to formulate a long-term development vision for the city's historic downtown and adjacent neighborhoods through promotion of visual appeal, compatible mixed use, transportation options, and sustainable economic development (Tunnell-Spangler-Walsh & Associates, 2005). The School of City and Regional Planning at Georgia Tech conducted a planning studio under the guidance of Professor Nancey Green Leigh following the announcement of the Ford assembly plant closure in 2006, identifying the negative impacts rendered by the plant, including lack of quality residential housing and pedestrian accessibility, as well as traffic congestions and poor traffic flow management. The study also recognized the potential for a redevelopment plan that would capitalize on the site's premium location by aligning the interests of the city, its residents, and the community as a whole (Leigh, Cerere, Foard, et al, 2006).

Mixed-Use Development and Industrial Location

Mixed-use development was resurrected in planning practice in the 1960s, when Jane Jacobs published her influential book, *The Death and Life of Great American Cities*, which argued for the essentiality of mixed, fine-grain, and diverse uses for vibrant and successful neighborhoods. Mixing uses had gained wide support in the literature by the 1980s, for its promise of 'restoring vitality, environmental quality, equity and [the] efficiency to postindustrial city' (Grant, 2002).

The Urban Land Institute (1976) defines mixed-use development as projects that functionally

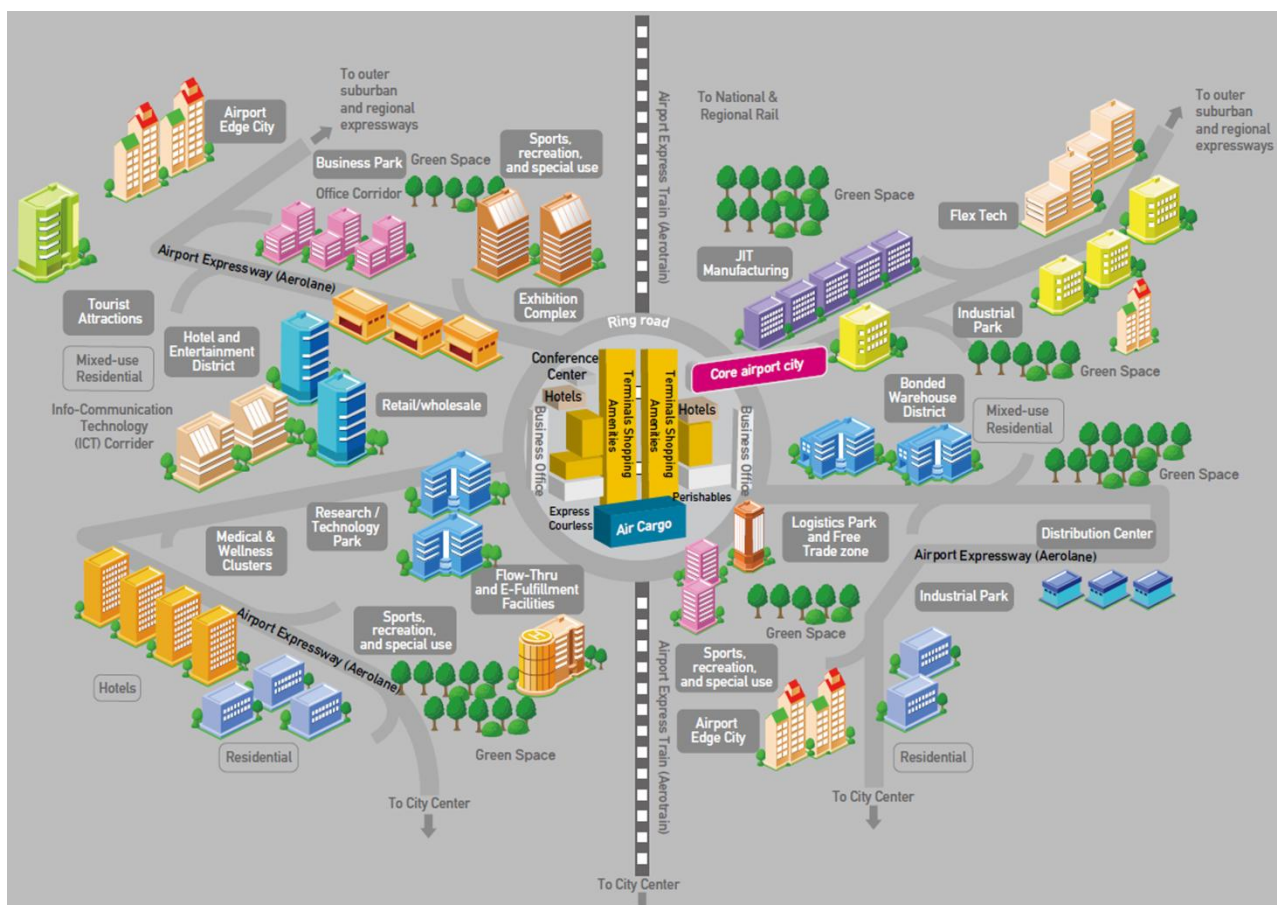
and physically integrate revenue-producing uses including retail, office, transient (hospitality), residential, entertainment, wholesaling, and industrial, in an organic and coherent plan. There is little discussion in the literature about the possibility of integrating industrial use into Traditional Neighborhood Design or Transit-Oriented Development, the two main streams of New Urbanism which has dominated planning principles in the late 20th century and beyond, for which mixed use is a key component (Grant, 2002 and N. Miller, J. Miller, 2003). Grant (2002) also noted the specification by Duany and Plater-Zyberk (1994), that special industrial districts are not compatible with other uses in the design of traditional neighborhoods. On the contrary, also according to Grant (2002), other scholars contended that new industries that are in compliance with “good neighbor” environmental criteria regarding noise and emissions should be allowed to be part of local urban fabric (Berridge Lewinberg Greenberg Ltd, 1991).

The City of Atlanta experienced a substantial loss of industrial land in recent years due to pressure from increasing residential housing demand and anticipated future development of BeltLine (Leigh, Driemeier, Hoelzel, et al, 2009). An analysis conducted by Fehribach, Rutherford, and Eakin (2001) revealed that proximity to the Dallas/Fort Worth Airport is a significant location factor that affects the value of industrial properties in Dallas. Recognizing the importance of airport as an attraction for the location of massive conurbations and their supportive services, Charles, Barnes, et. al (2007) raised concerns regarding the energy sustainability of aerotropolis because of its reliance on non-renewable resource, the risk of critical infrastructure being targeted by terrorist attack, and the need for integrating aerotropolis with other modes of transportation to bring out greater synergy.

The Aerotropolis Model

The concept of aerotropolis was defined by Dr. John D. Kasarda as a new type of urban form comprised of an airport city at its central city core and a surrounding cluster of aviation-oriented businesses and enterprises extending up to 20 miles (32 kilometers) from the center (Figure 1: A Spatially Compressed Model of the Aerotropolis). The composition and function of aerotropolis resembles that of a traditional metropolis, since they both contain a central business district and suburbs that are linked with regional expressway and multi-modal mass transit systems. However, the aerotropolis is unique compared to traditional metropolis in that it possesses the potential of being developed into a regional and national intermodal interchange nexus because of the presence of an international airport.

Figure 1: A Spatially Compressed Model of the Aerotropolis



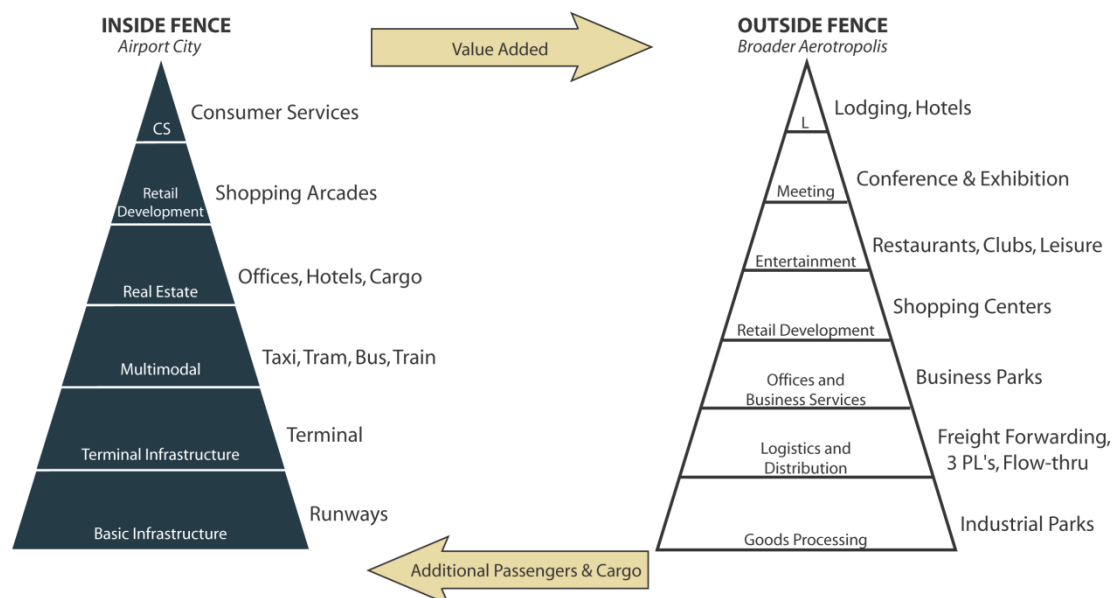
Source: Kasarda and Taoyuan, 2011

The airport is perceived as the most important mode of transportation for passenger carriage and cargo shipment in the 21st century. Kasarda (2011) predicts that airports will play an important role in regional economic growth and will transform urban landscape as railroads did in the 19th century and highways in the 20th century. The speed, agility and connectivity provided by air travel have radically increased the amount of passengers and cargo passing through airport gateways every day. Kasarda and Green (2005) observed a statistically

significant relationship between air cargo volume, GDP and GDP per capita. From 1992 to 2002, the GDP of the United States increased by 38%, and trade value expanded by 57%, yet air cargo value grew by 83%. Similar growth patterns of air cargo outperforming trade and GDP were also observed in other parts of the world. In this era dominated by express logistic service, air cargo plays an influential role in the competitiveness of business and trade, as well as the connectivity and efficiency of global supply chain.

The airport city, which usually hosts runways, terminals, and multimodal transportation hubs, is the ideal location for a variety of shopping and entertaining services, given its massive daily flow of passengers and goods. At the periphery of airport city, other aviation-driven and time-sensitive industries emerge and thrive, such as hospitality, office and retail complexes, conference and exhibition centers, and product distribution and processing facilities (Figure 2: Different Activities surrounding Airport City and Aerotropolis). They become the essential elements of aerotropolis.

Figure X: Different Activities surrounding Airport City and Aerotropolis



Source: Schiphol Group and Kasarda, 2010

With relocation of international headquarters and the influx of frequent air travelers to airport cities and their periphery, the airport region transforms from a gateway of departure to a destination point, acting as a metropolis whose function is no longer limited to serving the passengers and cargo brought in by the airport. A catalytic effect is then triggered and more employees and industries are attracted to this newly formed aerotropolis to cater to their customers who are residents and companies introduced by aviation-driven businesses and commerce. The growing population in aerotropolis therefore is more supportive for activities that require substantial inflow of people, such as tourism and exhibition. Such an agglomeration effect results in the interdependence between the airport and its surrounding aerotropolis, which finally leads to employment growth, regional economic prosperity, and global economic integration.

Aerotropolis Around the World

Incheon International Airport: New Songdo City

Developed on the 1,500 acres of reclaimed land along Incheon's waterfront, South Korea's New Songdo City, also known as Songdo International City or Songdo Intelligent City, is about 40 miles from Seoul and only 7 miles from Incheon International Airport. The project is being developed by the joint adventure between Gale International (a New York City-based developer) and POSCO E&C (South Korea's largest steel producer), and it is the largest private-sector development in the world. This \$30 billion project of multiple master plans incorporates 40 million square feet of commercial space, 35 million square feet of residential space, 10 million square feet retail, 5 million square feet for hospitality, and 10 million square feet of public space (Songdo IBD, 2011).

Designed especially for business professionals and their families, activities on site will include an international business district (Figure 3: Songdo International Business District), technology parks, Research and Development centers, leisure complexes, public and private schools, and health care facilities. The international business district, which is also the most ambitious project in the master plan, encompasses the Incheon Free Enterprise Zone, a custom-free zone with a logistic park and the future silicon valley of Korea. The groundbreaking ceremony took place in November 2004, and the first phase of New Songdo City opened in 2009. It is expected that when the project is completed in 2014, this new central business hub for the Northeastern Asia will house 65,000 residents and attract another 300,000 commuters.

Figure 3: Songdo International Business District



Source: Songdo IBD, 2010

Designated as the first sustainable city in the world, New Songdo City represents a new vision for international city, both in terms of sustainable design principles and urban planning practice. Not only will the city incorporate the first LEED certified project in South Korea and the largest outside North America, it will also be part of the LEED ND (Neighborhood Development) Pilot Program, which is built upon the principles of Smart Growth and Transit-Oriented Development, with special emphasis on neighborhood connectivity, transit accessibility, energy efficiency, and the provision of open space and natural habitat.

Incheon airport is targeting becoming the mobility pivot of South Korea's "Pentaport" concept, an integration of airport, seaport, business port, teleport, and leisure port (Yigitcanlar, Martinez-Fernandez, et al, 2008). New Songdo City will indeed be a manifestation of the aerotropolis concept, evolving around the airport edge and other airport-centric commercial activities. Serving as the nexus for Korean air, Asiana Airlines and Polar Air Cargo, Incheon International Airport is currently the eleventh busiest airport in terms of passenger movement and the fifth busiest airport in terms of cargo and freight shipment in the world. Strategically located about 15 minutes' drive from Incheon Airport, New Songdo City provides access to 1/3 of the world's population in less than 3½ hours' flight away, including China, Japan, and Russia.

In terms of transportation mobility, New Songdo City will be linked with the airport via both express bus system, which is also connected to surrounding smaller cities, and subway system, Seoul Metropolitan Rapid Transit (SMRT), which extends to the national railroad network (Figure 4: The Transportation Mobility of New Songdo City). The 7.6-mile Incheon Bridge opened in 2009 is currently the world's seventh longest cable-stayed spanning bridge, linking New Songdo City with Incheon International Airport in a short 15-minute trip. No matter which mode of transportation is chosen, travelers can reach other major finance centers in Asia via short-haul flights from the airport. Additionally, the Incheon subway operates multiple stations in the realm of New Songdo city, which provides access to all the other major business and residential clusters within the Seoul Metropolitan region.

Figure 4: The Transportation Mobility of New Songdo City



Source: Songdo IBD, 2010

Hong Kong International Airport: SkyCity

Located next to Terminal 1 and Terminal 2 (T2) of Hong Kong International Airport is the 10 million square feet business and entertainment peninsula called SkyCity. Built on the property of Airport Authority Hong Kong, SkyCity development targets domestic and international passengers, for the purpose of further enhancing the airport's role as an international transportation hub as well as promoting regional economic growth.

The phase one of SkyCity opened in 2007, offering a trade center, an expo center, SkyPlaza, SkyPier, and a nine-hole golf course. The World Trade Center, directly connected to the rail terminal, consists of an exhibition center, retail, office and hospitality spaces, and other recreational venues. The grand AsiaWorld-Expo provides an arena of 13,500 seats and

710,000 square feet space for other occasions (Nuworsoo and Deakin, 2009). The SkyPlaza offers offices, a business complex and a shopping mall integrated with the passenger Terminal 2. SkyPier provides cross-boundary ferry service to mainland China, without immigration and customs clearance imposed by the authority of Hong Kong. The Hong Kong SkyCity Marriott Hotel is still under development (Figure 5: Hong Kong International Airport SkyCity).

Figure 5: Hong Kong International Airport SkyCity



Source: Skidmore, Owings & Merrill LLP, 2011

SkyCity development is designed to be a completely self-contained community. Transforming from a city's airport to an airport city, the development takes advantage of its proximity to Terminal 2 and integrates commercial uses into its master plan. T2 is not only the centerpiece of SkyCity, but also a multimodal transportation nexus, where air, marine, ground, and rail transportation are merged seamlessly. Extending from the passenger terminal, SkyPlaza is also integrated with the airport express railway station with airline check-in facilities. An adjacent interchange station offers cross-boundary coaches to 115 cities and towns. A direct connection between SkyPlaza and SkyPier via a people mover tunnel is a possibility in the future, replacing current bus service.

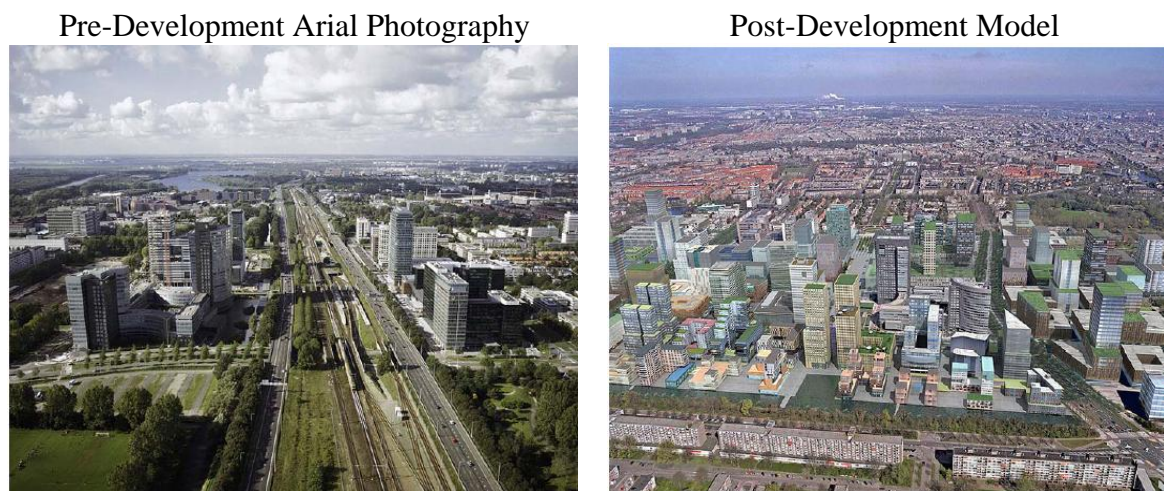
Hong Kong International Airport (HKIA) is a gateway to China and other international business centers of Asia. Located within five hours' flight from half of the world's population, HKIA is the third busiest international passenger airport and operating the busiest international cargo facility in the world (Airport Authority Hong Kong, 2011). The airport reaches more than 155 destinations throughout the world, including more than 40 mainland Chinese cities. In 2010, HKIA served 50.9 million passengers and processed about 4.1 million tons of air cargo passing through Hong Kong.

Schiphol International Airport: Zuidas

Amsterdam initiated an ambitious and prestigious project of developing a new international city called "Zuidas", meaning south axis, as a solution for the ever-increasing demand of

higher quality office space. Stretching along the south section of A10 road which circles the historic city of Dutch capital - Amsterdam, Zuidas is only six minutes' away from Schiphol International Airport. The city is designed to be the prime location for global companies and business development (Figure 6: Pre- and Post-Development Zuidas). The 25-year development consists of 42% housing, 42% office, and 15% services (Jantzen and Vetner, 2008). Ranging from affordable units to luxury apartments, the residential housing are expected to accommodate 25,000 residents, preventing this city from becoming a ghost town at night. The project provides 1 million square meters (about 10 million square feet) of Class A office space, 0.5 million square meters (about 5 million square feet) of residential space, leisure facilities, and open space (Pujinda, 2006). Zuidas currently houses the world headquarters of ABN AMRO Group and ING Corporate. By the time the project is completed, more international headquarters, small businesses, creative industries, and new cultural institutions are expected to locate in the city, attracting 80,000 employees and 30,000 students.

Figure 6: Pre- and Post-Development Zuidas



Source: Jantzen and Vetner, 2008

Another special feature of this development is interconnectivity. The site where a substantial amount of housing will be constructed is currently occupied by highways and railways, which later will be converted into a subterranean station extending 1.5 kilometers (almost 1 mile) long, at a cost of € 2 million Euros (about \$ 2.7 million dollars). By placing all of the transportation infrastructure underground, such a costly approach will demand a complete reconstruction of the existing infrastructure. The new high-speed train station at the heart of the development, called “Zuid/WTC”, will become one of the three largest stations in the Netherlands with 200,000 daily ridership and a departure frequency of every second minute (Jantzen and Vetner, 2008). This underground train station will serve as a gateway to and from Amsterdam, which cuts the travelling time from Schiphol International Airport to the capital down to only 11 minutes. Besides metro subway, this multi-modal transportation hub also provides bus, fast tram, and high-speed rail to Brussels, Paris, Cologne and Berlin (Figure 7: An Illustration of the Underground Multi-Modal Transit Station).

Figure 7: An Illustration of the Underground Multi-Modal Transit Station



Source: Jantzen and Vetner, 2008

Situated 20 minutes south-west of Amsterdam, Schiphol Airport provides connection to 284 cities in 93 countries. In 2009, the airport ranked fifth in Europe in terms of passenger movement, totaling 43.6 million. It is also the third busiest airport in Europe from the perspective of cargo movement, handling over 1.28 million tons of cargo that year (Schiphol Group, 2010). Besides the industrial and commercial activities surrounding the airport, the airport city becomes a synergy for knowledge-intensive industries. More than three quarters of the Schiphol Group (the owner of Amsterdam airport)'s annual operating income, over \$400 million, comes from real estate, business and consumer expenditure, and the remaining less than a quarter comes from aviation operations (Yigitcanlar, Martinez-Fernandez, et al, 2008). The Schiphol case provides another example that the economic value of aerotropolis does not only lie in aviation operations, but also can be capitalized from the additional values created by surrounding aviation-related businesses and their supporting industries.

Applying the Aerotropolis Model to Metro Atlanta

With an average of 240,000 passengers per day, Hartsfield-Jackson Atlanta International Airport has won the title of the world's busiest airport for the 13th consecutive year in 2010 (Hartsfield-Jackson Atlanta International Airport, 2011). The number of passengers increased 1.51 percent from, 88.0 million in 2009 to 89.3 million in 2010, and international passengers increased by 3.47 percent over the same period. Moreover, as the nation's fourth largest concentration of Fortune 500 companies, Atlanta is the focal point of headquarter relocations and expansions, both nationally and internationally.

Applying the Aerotropolis Model in metropolitan Atlanta area presents a bigger challenge different from the other metropoli in that more emphasis should be laid on bringing out the existing economic development potential in this region and enhancing the airport's presence as a gateway to the rest of the world. For such reason, realizing the aerotropolis vision can be achieved in three tiers: strengthening the airport's role as a national air cargo distribution center, developing Hapeville into an airport city leading economic growth in the Southern Atlanta, and finally, transforming metro Atlanta into the next aerotropolis and multimodal transportation hub for the region.

Atlanta Airport as an Air Cargo Distribution Center

The continuing liberalization, privatization and globalization of markets have rendered the aviation industry more important than ever. The aviation industry is assuming an increasing role in supporting the regional, national, and global economy through drawing foreign investments from international trade, and, introducing quality products and speedy service to places that have never been reachable before.

Apart from the interdependent relationship between air cargo and GDP as demonstrated by Kasarda and various other scholars, the aviation industry is also responsible for many other positive outcomes, including acceleration of global trade, integration of sourcing, manufacturing and distribution activities, and expansion of metropolitan cities.

Today, air cargo business is more concentrated in some parts of the world compared to passenger traffic. Eighty-five to ninety percent of the world's total air cargo is transferred through the 100 largest international airports. The 30 largest airports enjoy 70 percent of the total share (Senguttuvan, 2006). As the air cargo business becomes more competitive globally, the business forms in major metropolitan cities with international airports in presence are rapidly transforming and developing. For instance, Amsterdam's Schiphol Airport possesses one of the most liberalized customs in the world. A joint agreement between Schiphol Airport and Korea's Incheon International Airport has been signed recently in promotion of paperless air cargo transportation utilizing the Air Cargo Information System (Air Cargo World, 2011). With more initiatives undergoing to speed up the security inspection process for both air cargo and passengers, Schiphol Airport currently accounts for approximately 1.9% of the economic output in the country, and, has successfully attracted over 500 international companies to its surrounding area.

The Atlanta airport is already one of biggest employers in the city. According to the 2009 Economic Impact Report released by the airport, over 58,000 jobs in Atlanta are directly related to airport activity, and business revenues generated by the aviation business directly were \$32.5 billion. The airport is accountable for creating more than 434,000 jobs and \$58.2 billion business revenues in the metro area, combining direct, indirect and induced impacts. Eighty percent of the U.S. consumers, more than 200 million people, are within a range of either two hours' flight or one day's trucking from the Atlanta airport.

However, the ranking of the Atlanta airport by air cargo traffic has been steadily declining since 2002. The air cargo volume of Atlanta airport was 563,139 metric tons in 2009, when the airport fell behind the world's 30 busiest airports by cargo traffic. Freight transportation services only took up 7% of the airport's revenue in 2009, while the revenue coming from passenger service and airport administration reached 88% (Hartsfield-Jackson Atlanta International Airport, 2009).

An air cargo analysis utilizing the Commodity Flow Survey (2007) data discovered that Atlanta is a cargo distribution and processing center primarily serving the Southeastern U.S. and Europe (Yang, Leigh, and Zhou, 2010). More than 90%, which was about 450,000 tons, of the air cargo shipped or transshipped through Atlanta had an international origin or destination (Table 1: A Summary of Atlanta Air Cargo by Origin and Destination). There was significantly more cargo, both domestically and internationally, that is consumed in Atlanta area than being produced and disbursed from Atlanta. Europe and Eastern Asia were the predominant origins and destinations of international air cargo, contributing to about 90% of

the total value (Figure 8: Imports and Exports with Atlanta as Origin or Final Destination). Domestic cargo shipped to Atlanta majorly originated from Los Angeles and St. Louis, while the primary destinations of cargo shipped from Atlanta were Los Angeles and Boston. The major types of commodity shipped by air were machinery, electronics, precision instruments, pharmaceuticals and transportation equipment.

Table 1: A Summary of Atlanta Air Cargo by Origin and Destination

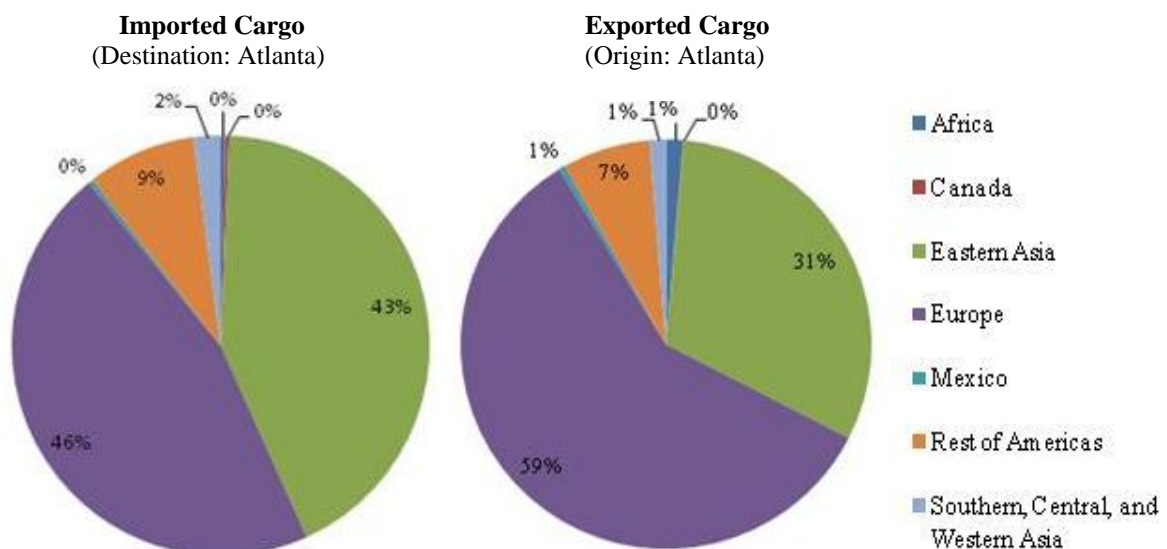
Origin	Transshipment	Destination	Total Weight (000 tons)	Total Value (\$ millions)
<i>Domestic Cargo</i>				
Domestic*	N/A	Atlanta	21.04	\$3,636.05
Atlanta	N/A	Domestic	15.99	\$2,255.19
<i>International Cargo</i>				
International**	Domestic	Atlanta	272.68	\$24,455.67
Atlanta	Domestic	International	173.62	\$12,238.19
International	Atlanta	Domestic	0.33	\$25.23
Domestic	Atlanta	International	4.62	\$435.28

*Domestic regions other than Atlanta

**International regions

Source: Yang, Leigh, and Zhou, 2010

Figure 8: Imports and Exports with Atlanta as Origin or Final Destination



Source: Yang, Leigh, and Zhou, 2010

The analysis of air cargo data also indicates that air is the only mode of transportation throughout the entire itinerary of air cargo shipped through Atlanta, instead of being transshipped via railroad, ferry or trucking. Such a finding implies that though the Atlanta airport is a principal aeronautic portal of the southeast region, its connection with various other modes of transportation still needs to be strengthened. The 1,244 miles of interstate highways currently within the boundary of Georgia have created an unparalleled advantage for Atlanta to be a trucking transshipment center. It would be ideal for an air cargo warehousing and distribution center to be located in a close proximity from the airport. A direct connection between airport terminal and this industrial/warehousing complex by

designated express corridors will substantially expedite the speed and efficiency of air cargo distribution.

Besides logistic infrastructure, the general economic environment may also affect the air cargo industry by exerting influence on aviation liberalization, custom reform, and the level of organizational corruption. According to the statistics provided by Kasarda and Green (2005), a positive correlation was observed between aviation liberalization and variables such as air freight, trade per capita, GDP per capita, and net foreign direct investment per capita. Estimation showed that for air cargo, an average of 20% transportation time and 25% cost were consumed in customs clearance process. The study further proved that aviation liberation, custom efficiency, and lower organizational corruption contribute to greater economic development of a region measured by GDP per capita and foreign direct investment.

One local example of aviation liberalization is the Foreign-Trade Zone (FTZ) #26, originating from Hartsfield-Jackson Atlanta International Airport. It encompasses several subzones of industrial and manufacturing sites throughout metropolitan Atlanta (Table 2: A List of the Subzones in Georgia Foreign-Trade Zone). FTZ #26 helps with enhancing the competitiveness of business in the global market through reduction in duties and processing fees and provision of quicker goods movement (Georgia Foreign-Trade Zone, 2007).

Table 2: A List of Subzones in Georgia Foreign-Trade Zone

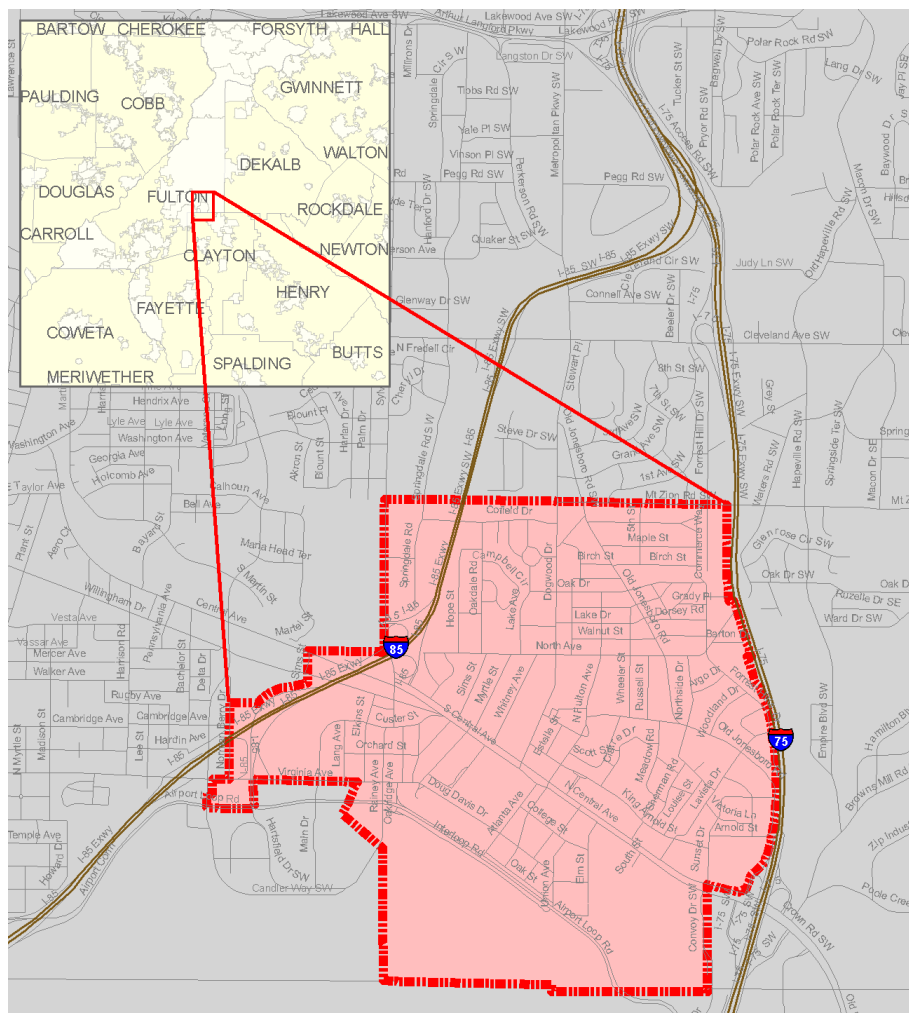
26A GM	26G Roper Corporation
26C Ford	26H Ricoh Electronics, Inc.
26D Yamaha	26I Inflation Systems, Inc
26E Pratt & Whitney	26J Eastman Kodak Company
26F Precision Components	26K Noramco, Inc.

Source: United States Department of Commerce, 2011

Airport City as a Regional Economic Engine

Located in Fulton County, Georgia, the city of Hapeville is approximately 10 miles south of downtown Atlanta and is immediately adjacent to Hartsfield-Jackson International Airport. The proximity of the city to the airport rendered great potential in developing passenger-oriented consumer services, office, hospitality, and mass transit that connects the airport city to the outer aerotropolis. Sitting in between I-75 and I-85, the two major interstate highways that provide access to metropolitan Atlanta (Figure 9: Hapeville Location Map), Hapeville evolved along the railroad track which parallels with its major thoroughfare-Central Avenue.

Figure 9: Hapeville Location Map



Source: Douangchai and Zhou, 2010

Current Condition

Hapeville currently hosts Delta Air Lines, Inc. Corporate Headquarters, Wachovia (now Wells Fargo) Processing Center, Korean Air Cargo U.S. Headquarter, and the very first Chick-fil-A restaurant. The Ford Atlanta Assembly Plant was built in 1945 and had been dominated its economy until being closed in 2007. The railroad terminates at the Ford site, creating an excellent rail access to the plant. Although only a small fraction of the 3,000 employees who lost their jobs as a result of the Ford plant closure were actually residents of

Hapeville, the plant's closure provides an impetus for the city to redevelop into a more pedestrian-friendly community with compatible mixed use and sustainable economic structure. Previously, the city's development had been physically and economically obstructed by the Ford site and the transportation arteries around it.

Between 1990 and 2009, the population of Hapeville saw a slow and steady growth. For a short period of time, the city experienced a decline in population between 1980 and 1990 due to the expansion of Hartsfield-Jackson Atlanta International Airport (Strategic Planning Initiatives). It then started to grow at a faster rate of 12.71% by the end of 2000. The estimation of 2005-2009 population by American Community Survey was 6,193, which represented $\frac{1}{4}$ of one percent growth (Table 3: Population of Hapeville, Fulton County, and Georgia).

Unlike Hapeville, both Fulton County and Georgia experienced continuous and significant increases in population since 1980. Between 1980 and 2000, Fulton County's population increased approximately 38% and Georgia's population increased approximately 50%. Though the rates of population growth in both jurisdictions were slowed from 2005 as a result of the economic recession, they were higher than 15%. While both jurisdictions are projected to continue strong growth into 2025, population in Hapeville is only expected to grow minimally at around 0.2%.

Table 3: Population of Hapeville, Fulton County, and Georgia

Year/Period	Hapeville	Fulton	Georgia
1980	6,166	589,504	5,457,566
1990	5,483	648,951	6,478,216
2000	6,180	816,006	8,186,453
2005-2009	6,193	987,148	9,497,667
Change 1980-1990	-11.08%	10.08%	18.70%
Change 1990-2000	12.71%	25.74%	26.37%
Change 2000-2009	0.21%	20.97%	16.02%

Source: U.S. Census 1980, 1990, 2000 and American Community Survey 2005-2009

The average 4.4% unemployment rate of Hapeville between 2005 and 2009 was lower compared to 6.0% in Fulton County and 5.2% in Georgia. However, the growth of employment in Hapeville is falling behind the two other jurisdictions (Table 4: Employment of Hapeville, Fulton County, and Georgia). During the past three decades, besides a sharp decline in employment by 1990, the growth rate of Hapeville employment is only a fraction of that in Fulton and Georgia. The biggest employment sectors of the city are construction; arts, entertainment, recreation, accommodation and food services; transportation, warehousing, and utilities. Total employment is projected to fall very slowly from 2010 to 2025.

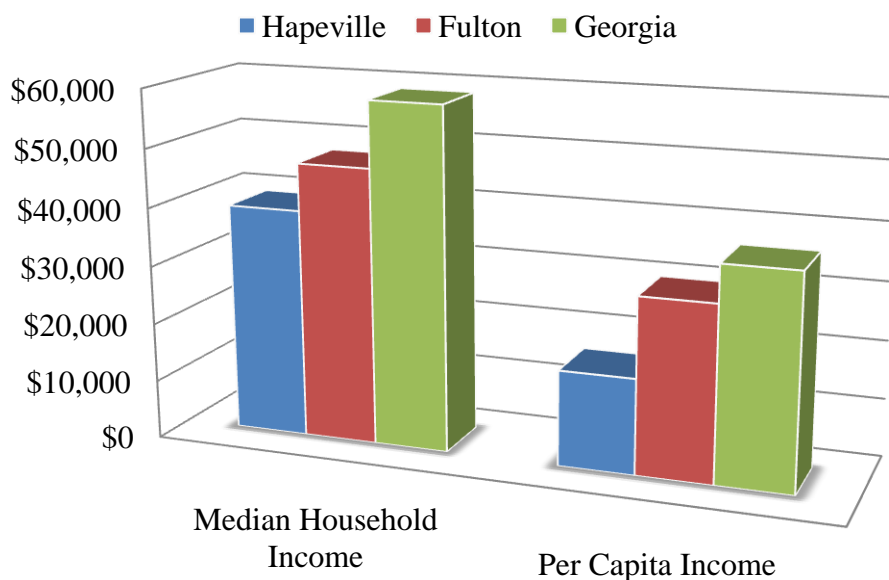
The City of Hapeville lags behind both Fulton County and Georgia in terms of income as well. The city's median household income (in 2009 inflation-adjusted dollars) was \$39,261, and the per capita income was only \$16,356. The median household incomes of the county and the state were \$47,321 and \$58,573 respectively, while the per capita incomes were \$30,003 and \$ 36,412 (Figure 10: Income Level of Hapeville, Fulton County, and Georgia).

Table 4: Employment of Hapeville, Fulton County, and Georgia

Year/Period	Hapeville	Fulton	Georgia
1980	2,888	258,911	N/A
1990	2,604	320,149	3,090,276
2000	2,828	392,627	3,839,756
2005-2009	3,000	488,824	4,345,885
Change 1980-1990	-9.83%	23.65%	N/A
Change 1990-2000	8.60%	22.64%	24.25%
Change 2000-2009	6.08%	24.50%	13.18%

Source: U.S. Census 1980, 1990, 2000 and American Community Survey 2005-2009

Figure 10: Income Level of Hapeville, Fulton County, and Georgia



Source: American Community Survey 2005-2009

Knowledge Economy

Besides air cargo processing and distribution, other aviation related industries that would exist and prosper in airport cities are commercial real estate (office buildings and retail stores), hospitality, transportation, and last but not the least, knowledge-based economy. Knowledge-based economy is currently the most underrepresented industry in Hapeville, yet it possesses the greatest potential of becoming the pillar industry of the Southern Atlanta region, given the city's location advantage brought by the airport.

In today's knowledge-based economy, the production and management of knowledge as well as the economic benefit of knowledge technology itself, plays a significant role. Cities all over the world are striving to enhance their global competitiveness in knowledge economy through expanding investment on knowledge production, building human capital, improving living standard to attract knowledge workers and developing knowledge-based economic centers. High-tech economic center refers to the spatial clustering of research and development centers, high-technology manufactures and other knowledge-intensive

companies. Examples include Silicon Valley, DNA Valley in Rockville, Maryland, and the development of One-North Business Park in Singapore.

The production of knowledge emphasizes innovation, creativity, and efficiency, which makes the international airports ideal locations for this type of development regarding national and international connectivity, expansive infrastructure system, and convenience (Yigitcanlar, Martinez-Fernandez, et al, 2008). The concentration of knowledge-based industries in airport cities is not only conducive to developing strong linkage and coordination between local knowledge industries, but also facilitates free flow of knowledge globally among international knowledge-based economic centers as well.

Airport city also benefits from this type of development. Global knowledge economy further strengthens the role of airport regions as the heart and synergy of knowledge industry concentration and knowledge spill-over. Since proximity to international gateways is becoming the key indicator of the functionality of knowledge-based cities, many airport cities have developed strategies to diversify their property portfolio and compete with each other to attract more knowledge-intensive industries.

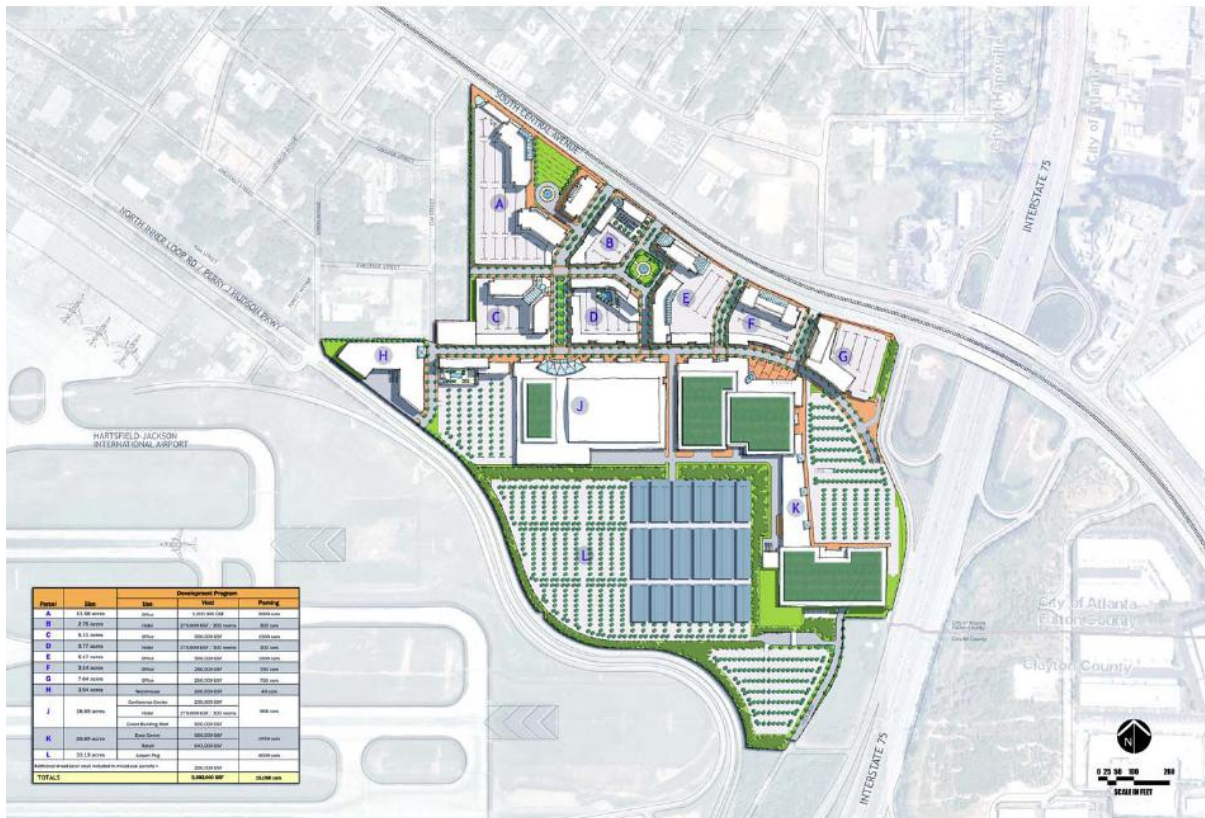
The Schiphol airport city is a great illustration of the mutually beneficial interplay between airport city and knowledge-based development. In Netherlands's polycentric urban strategy, Schipol is schematized as the Mainport (aviation and marine gateway), Brainport (knowledge networks), and Greenport (knowledge-intensive green business) of the country. Developed by Schiphol Group, it has involved into a magnet for knowledge-intensive industries and commercial businesses. The Brainport, a giant knowledge community, is composed of 21 municipalities, 725,000 residents and 355,000 workplaces. It houses a substantial number of educational institutions, high-tech companies, and knowledge-based organizations. The airport contributes to the development of Brainport by serving as the gateway for communication, trade, and information exchange.

The Anchor Effect of Aerotropolis Atlanta

The Ford Atlanta Assembly Plant in Hapeville was closed in 2006 as part of Ford's *The Way Forward* plan to reduce development and production costs associated with supporting unprofitable product lines. Jacoby Development purchased the property for \$40.3 million in 2008 (Fleming, 2009 and Tobin, 2010), and demolition began in August and lasted for about a year.

Bounded by Interstate 75 to the east and Hapeville's major thoroughfare Central Avenue to the north, the 122-acre site is only 5 miles from the Hartsfield-Jackson Atlanta International Airport and approximately 1.5 miles from the airport's new international terminal to be open in spring 2012. A majority of the site is located within the City of Hapeville, yet the proposed development also abuts the City of Atlanta and unincorporated Clayton County. The premium location of the site lends itself to the development of a cutting-edge aviation business park and live-work community. Named "Aerotropolis Atlanta" (Figure 11: Aerotropolis Atlanta Site Plan), the planned project features 2,081,400 square feet of office space, 1,662,000 SF of retail, 980,000 SF convention/conference center with a 1,440-room hotel, 500,000 SF data center, and 4,000 off-airport commercial parking spaces (City of Hapeville, 2009).

Figure 11: Aerotropolis Atlanta Site Plan



Source: Jacoby Development, Inc

The proposed \$1.5 billion, 10-year project places a special emphasis on sustainable development and economic growth. The 4,000-space parking facility is expected to be constructed with solar panels on top, and installed with water filters that recycle runoff water back to groundwater. A shuttle service using alternative fuel technology will be operated 24/7 between Aerotropolis Atlanta and the new international terminal, and, 20/7 between Aerotropolis and the existing western terminal, with the potential to serve the local community in the future. The objective of sustainable development can also be achieved by enhancing the connectivity and mobility of transit systems, employing renewable energy technologies, attracting knowledge-based industries and high-tech enterprises, and developing recycling facilities on site.

Over ten thousand new jobs are estimated as a result of the development of Aerotropolis Atlanta, more than what is needed to counteract the 3,000 job loss due to the closure of the Ford plant (Coffee, 2009). The redevelopment has the potential to invigorate the Southside Atlanta, where the growth has been stagnant due to various historic and economic reasons. The development will bring retail stores to the current food desert, and provide expansive modern office space for aviation-intensive and logistic companies. If developed and managed properly, the project will serve as a role model for redevelopment of the other Ford assembly plants and factories that were closed in the rest of the nation.

Transit-Oriented Development Potential

In the second station screening process of the Atlanta-Macon Commuter Rail (will be discussed in detail in the next section of *Aerotropolis as a Regional Transportation Hub*), the

City of Hapeville was selected as one of the seven future stations, based on several criteria: amount of developable land; drivers of ridership; real estate development demand; distance between stations; platform/rail alignment connection (Brookings Institute, 2010). The location of the Hapeville station will be immediately adjacent to the Aerotropolis Atlanta site.

Hapeville was included in the final list of stations because of the development potential driven by the airport, the city's proximity to downtown Atlanta, and substantial inventory of developable land (partially attributed to Aerotropolis Atlanta). The transit-supportive land use surrounding the station and regional demand for office space and quality retail have created incentives for retail, office, hotel, and residential developments at Hapeville Station. Therefore, Hapeville possesses the greatest opportunity for significant redevelopment in the entire corridor. The only limitation for highly intensive residential development is posed by the height restrictions of Federal Aviation Administration.

In Brookings study (2010), two scenarios were developed by RCLCO when conducting market feasibility analysis for potential stations. The "Base Case" conservatively assumes that the station area will compete for market share in the county and will be able to capture some growth that would otherwise have gone to somewhere else. The "Upside Potential" scenario slightly aggressively assumes that the station will capture a small portion of accelerated growth which otherwise would have gone to areas of historically high growth, such as Virginia Highland.

The rail alignment at the Hapeville Station follows the city's main thoroughfare of Central Avenue. The ¼- and ½-mile radii were drawn to define the five-and ten-minute walking distance from the location of the station (Figure 12: Station Area Planning Potential at Hapeville Station). The Aerotropolis Atlanta site takes up a majority of both the ¼-mile radius and ½-mile radius. Figure 13 depicts future development potential at the Hapeville Station, on which red indicates the center core of the station area suitable for higher density mixed-use development with ground level retail and upper story office/residential. The Orange area is the general district where similar mixed-use developments are proposed at a moderate density. Yellow areas are edge section, where low density residential or retail services are found to be most suitable.

The premium location of Hapeville lends itself to the highest intensity and density of development, only second to the Multi-Modal Passenger Terminal, especially with market demand for multi-family housing, high quality office space and time-sensitive commercial uses (Table 5: Market Potential at the Hapeville Station). The northern part of the ½-mile radius is occupied by a solid residential pattern with few parcels left for infill development.

Table 5: Market Potential at the Hapeville Station

	Base Case	Upside Case
Center Residential Units	1,217	1,276
General Residential Units	911	861
Neighborhood Retail/Office (sf)	506,000	384,000
Additional Regional Retail (sf)	396,000	131,000
Regional Office (sf)	1,550,000	650,000
Hotel Rooms	450	185

Source: Brookings Institute, 2010

Since the Hapeville station area is designed for higher density residential development, the density in central residential district ranges from 36 to 100 dwelling units per acre, and that of the general residential district is about 24-55 dwelling units per acre (Brookings Institute, 2010). A rough estimation indicates that the transit-oriented development at Hapeville station will attract about 4,000 new residents and 4,000 employees to the city, which is even more than its current population (Douangchai and Zhou, 2010). The new riders brought by the commuter rail and their expenditure on local businesses will create more revenues for the local government in the form of sales taxes.

Figure 12: Station Area Planning Potential at Hapeville Station

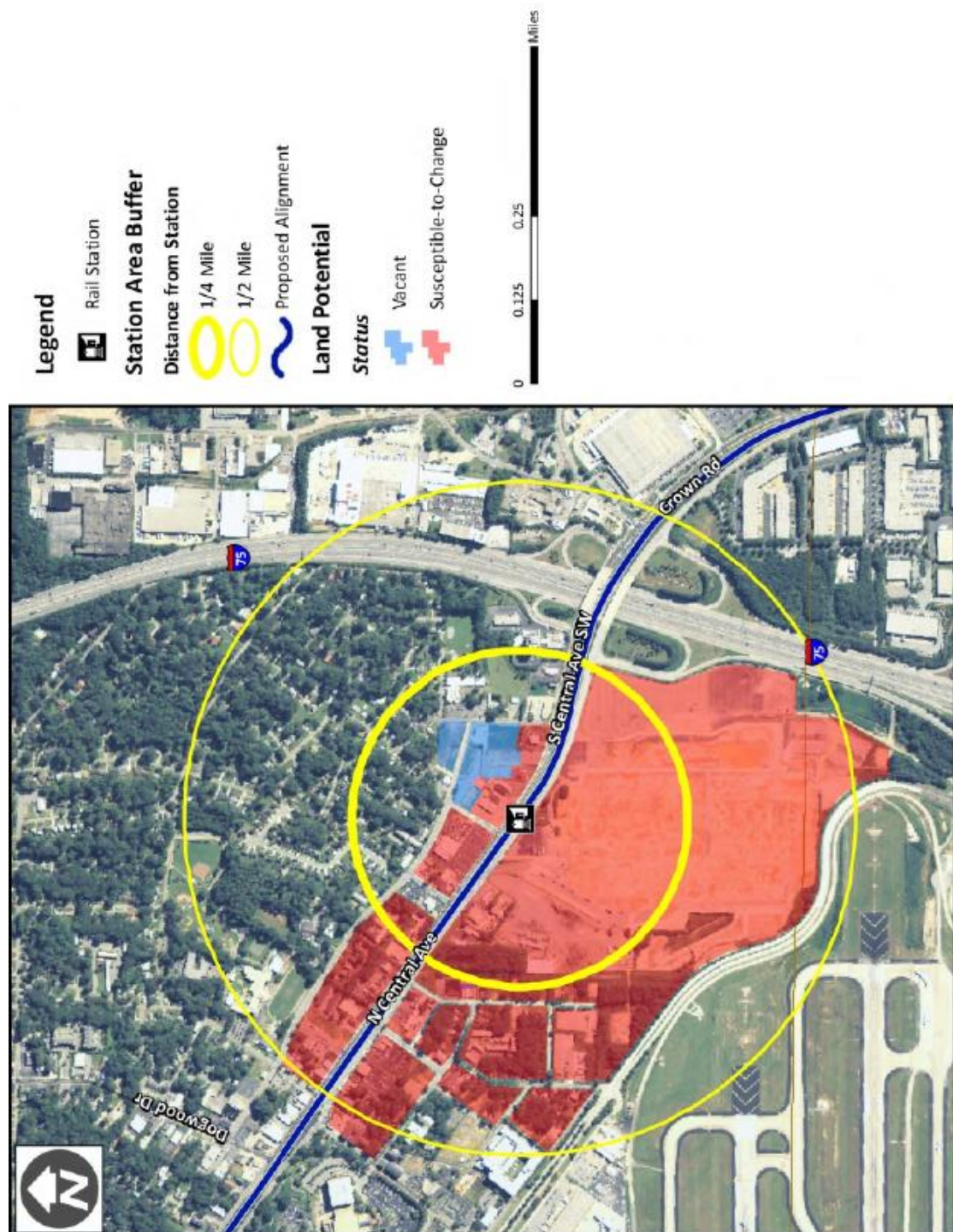
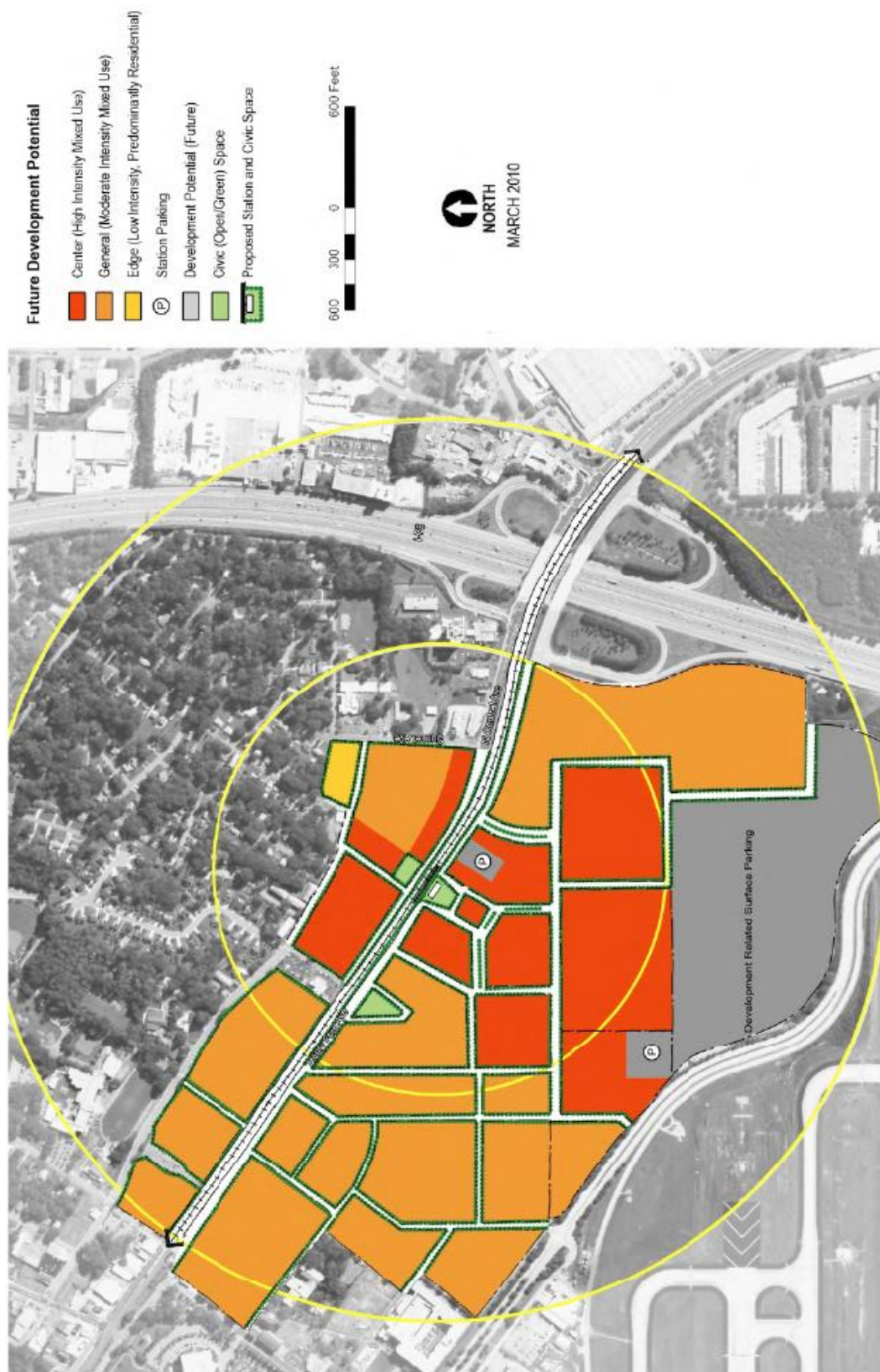


Figure 13: Future Development Potential at Hapeville Station



Source: Brookings Institute, 2010

Aerotropolis as a Regional Transportation Hub

Hapeville Public Transit

The City of Hapeville is currently serviced by three MARTA bus routes: 172 (Sylvan Road/Virginia Ave) connects the three MARTA rails stations including College Park, Oakland City, and Fort McPherson; 95 (Metropolitan Pkwy/Hapeville) extends to the West End Station in Atlanta; 178 (Empire Blvd/Southside Ind Park) majorly serves local Hapeville and links Fort McPherson with Southside Industrial Park.

C-TRAN was a bus service provided by Clayton County and operated by MARTA under contract to manage the local bus system, connecting MARTA, the Hartsfield-Jackson Atlanta International Airport, and major commercial districts and education institutions in the county. The system accommodated about 2.1 million riders a year. The service was terminated on March 31, 2010 due to budget shortfalls. GRTA expects that one-third of the former C-TRAN passengers, a population around 3,000, will convert to one of the three Xpress bus routes operating in its south corridor. However, the other 6,000 riders are left with no other transit alternatives.

In August, five months after the termination of C-TRAN, Quick Transit stood up to meet the transportation needs of Clayton residents and its surrounding areas. Quick Transit is a privately owned company and it currently runs bus service covering almost the entire previous C-TRAN bus routes. The scheduled fare rate at \$3.50 for a one-way trip is almost twice as much as the cost of a C-TRAN ticket, but it is much more affordable than the other transportation modes that are available for the riders. It is connected to the MARTA system via the College Park MARTA Station, but no free transfer is provided.

Transit Rider Profile

People choose to ride public transit for several reasons, including the availability of service, ownership of private vehicle, safety of pedestrian infrastructure, affordability and convenience of transit service, etc. The choice of transportation mode is further complicated by external factors such as weather conditions, and various internal factors such as income level, trip purpose and duration, and people's own perceptions. Therefore, transit riders can be characterized into two categories—choice riders who choose transit even though they have other means of travel (motor vehicles for example), and, captive riders who are unable to drive due to physical, mental or financial disadvantages.

There are some demographic groups who are more likely to be transit riders, captive riders in particular, than others. These groups of people tend to be elderly, youth (especially students), carless, and low-income households. Other potential transit riders are workers living in proximity to transit stations and commute by transit, and those who carpool for either environmental or economic concerns. Quantifying the number of transit riders through demographic profile may not necessarily generate the most precise result, but it still provides a valuable insight into the coverage of existing transit service and the potential transit riders if a new station is put into place.

Youth and Elderly

The residents of Hapeville are relative young. A majority of the population is between the

ages of 25 and 54, and the median age is 34.2 years old (American Community Survey, 2005-2009). For the purpose of analysis, this paper defines youth as between 10 and 24 years old, and elderly is defined as those that are 65 years and over.

School age children (ages 10-17) that are not old enough to apply for a driver's license may use transit to visit friends, go out for entertainment and social activities. Some of them even use transit to go to school. Adults aged 18-24 generally take advantage of mass transit less frequently, but still a portion of them, who do not have access to private vehicles, choose transit for similar trip purposes and also for attending higher education. There are about 1,284 residents fall in the category of youth as potential transit riders, and they take up 20.8% of the total population (Table 6: Potential Transit Riders).

Table 6: Potential Transit Riders

Potential Rider	Population Count	% of Population
Youth (Ages 10-24)	1,284	20.8%
Elderly (Ages 65 and over)	497	8.0%
Low-Income Households (Less than \$35,850)	2,735	44.2%

Source: U.S. Census, American Community Survey, 2005-2009

The elderly choose transit service because of their physical conditions and relatively large amount of spare time. Following the expansion of Hartsfield-Jackson Atlanta International Airport, more mobile residents moved out of the city, and the elderly population slightly increased as a result of the decrease in total population. Until 2009, there are 497 elderly, representing 8.0% of the total population (Table 6: Potential Transit Riders).

Low-Income Households

As presented earlier, the median household income and per capita income of Hapeville have been historically lagging behind that of Fulton County and Georgia. Low-income households tend to be transit riders simply because they do not have access to private motor vehicles and riding transit is most affordable means of transportation.

The U.S. Department of Housing and Urban Development defines low-income households as households with annual incomes below 50% of the Area Median Income (AMI), and those below 30% of the AMI are referred as households who are extremely low-income. The AMI for Atlanta-Sandy Springs-Marietta Metropolitan Statistical Area in Fiscal Year 2009 was \$71,700 (HUD, 2010), thus the thresholds for low-income households and very low-income households were \$35,850 and \$21,510 respectively. According to the American Community Survey 2005-2009, in Hapeville approximately 382 households earned an annual income of less than \$21,510 and approximately 780 households earned a family income of less than \$35,850. Together, low-income households make up 44.7% of the households in Hapeville. Given that the average household size was 3.51, the total population living in low-income households was 2,735 (Table 6: Potential Transit Riders).

In addition to the high percentage of low-income households residing in Hapeville, the city also has a significant number of individuals living below the poverty threshold. There were 20.7% (1,282) individuals whose income was below the poverty level set forth by U.S. Census Bureau.

Carless

Though the actual number of carless people is hard to estimate, the Vehicle Accessibility Index (of owned or leased vehicles), developed by ESRI, alternatively provides some indication of the personal mobility in the region. The VAI for Hapeville was 85, which was significantly below the U.S. average of 100. The result is not surprising, considering the concentration of low-income households in the city and the percentage of people living under poverty level.

The analysis of potential transit profile suggests that there is a severe demand for public transit in Hapeville, given that the potential riders represent a high ratio of the total population. However, it should be noted that the total population of potential transit riders should not be a simple summation of youth, elderly, low-income households and carless, since more frequently, they are overlapping with each other.

Commuting Pattern

The actual number of transit riders is much less than expected, according to the American Community Survey 2005-2009. Among the 2,941 workers that were 16 years and older, 53.1% (1,561) of them drove car/truck/van to work alone, 24.6% carpooled and only 12.7% either used public transportation or walked to work. The average travel time to work was 33.4 minutes (Table 7: Hapeville Commuting Pattern).

Table 7: Hapeville Commuting Pattern

Mode of Transportation	Population Count	% of Population
Drive alone (car, truck, or van)	1,561	53.1%
Carpool (car, truck, or van)	723	24.6%
Public Transportation (excluding taxicab)	348	11.8%
Walk	25	0.9%
Other Means	176	6.0%
Work at Home	108	3.7%

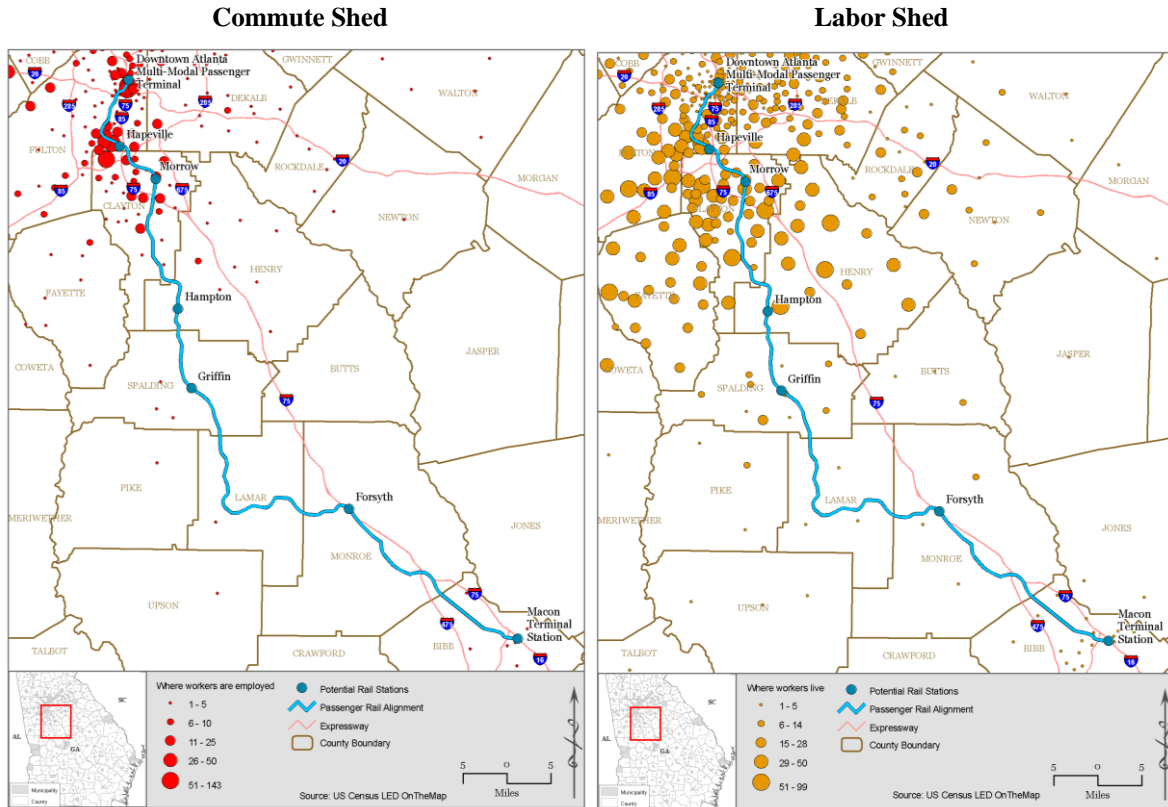
Source: American Community Survey 2005-2009

Longitudinal Employer-Household Dynamics (LEHD 2008) is a dataset collected by the collaborative effort of federal and state governments and the U.S. Census. LEHD provides information about where Hapeville residents are employed (Commute Shed) and where Hapeville employees live (Labor Shed). The commute pattern maps (Figure 14: Commute Pattern of Hapeville Residents and Employees) show that even though the employees working at Hapeville are more evenly dispersed in the metro area, a majority of them are clustering in Eastern Fulton County (East Point area) and Clayton County. The places where Hapeville residents are employed are more concentrated in Downtown Atlanta, East Point area, and Northern Clayton County.

Like other typical Georgia cities, Hapeville evolved around the railroad track, with its primary thoroughfare-North and South Central Avenues extending along the railroad. Radiating from the city's spine are pedestrian-friendly streets and grid-patterned neighborhoods. The interconnected street system, with enough width to accommodate sidewalks and pedestrian movement, provides access to various local businesses (Tunnell-Spangler-Walsh, & Associates, 2005). Standing near the convergence of several modes of

transportation, the pedestrian-friendly neighborhoods of Hapeville can support transit service and are even suitable for transit-oriented development, if the newly constructed superblocks are subdivided and the local business investment potential is realized.

Figure 14: Commute Pattern of Hapeville Residents and Employees



Source: Douangchai and Zhou, 2010

Potential Expansion

Marta Heavy Rail

Hapeville was one of the proposed MARTA rail stations in 1979 that were never built (Figure 15: The Original MARTA Plan in 1979). In anticipation that the planned lines would be built eventually, MARTA constructed provisions for these lines to make future expansion easier (Ferreira, 2001). A picture (Figure 16) of the Hapeville trail track shows the extra space left in the tunnel design. The idea of running a spur line above-ground from the International Airport to the city of Hapeville emerged, but was not executed. The South Line was considered for extension from Hapeville into Clayton County, but was cut off due to voter's refusal to approve tax funding. Following the initiation of constructing another international terminal to the south of Hartsfield-Jackson Airport, MARTA expressed interest in placing another station at the Aerotropolis site in 2009 (Peters, 2009). Similar to the other transportation expansion projects, availability of funding will be a major limit.

Figure 15: The Original MARTA Plan in 1979



Figure 16: A Picture of Hapeville Station



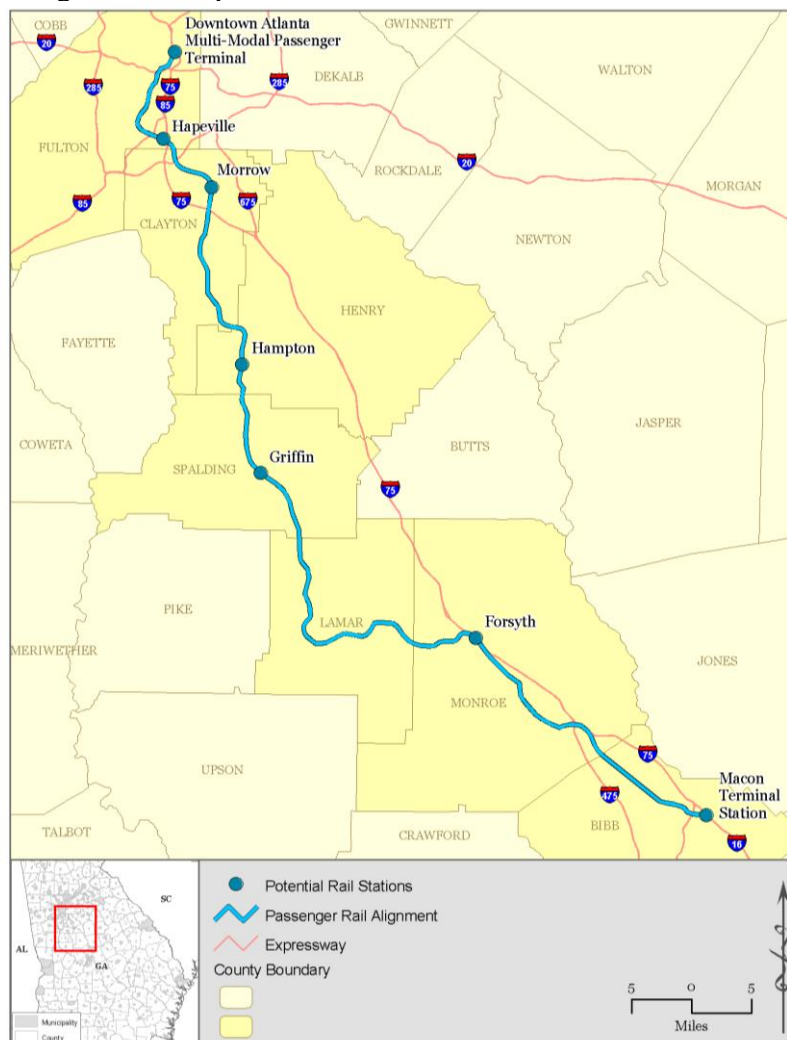
Source: Ferreira, 2001

Atlanta-Macon Commuter Rail

The Atlanta-Macon commuter rail is perceived as a solution for promoting walkable, higher density neighborhoods in suburban Georgia. The passenger rail extends 103 miles from downtown Atlanta to Macon, and is expected to bring economic stimulus to not only its two downtown termini, but also the key stations along the corridor. Seven potential stations passed the second screening process in the study conducted by Brookings Institute (2010), including Atlanta Multi-Modal Passenger Terminal, Hapeville, Morrow, Hampton, Griffin, Forsyth and Macon (Figure 17: Proposed Atlanta-Macon Commuter Rail Line). During each workday, there will be a total of 12 round trips made by six train sets in this passenger rail corridor. Four round trips will be provided between Macon and Atlanta, and the other eight round trips will serve the segment between Griffin and Atlanta.

According to the estimation by the Brookings Institute (2010), given that the construction will start in 2016 and the service will begin in 2018, the total cost comprised of capital investment and operating and maintenance will reach \$725 million in 2010 dollars. The construction cost of \$400 million covers 2016 to 2018. The \$25 million annual operation and maintenance cost kicks in from 2018 until the end of the study time frame in 2030 (Table 8: Summary of Project Cost).

Figure 17: Proposed Atlanta-Macon Commuter Rail Line



Source: Douangchai and Zhou, 2010

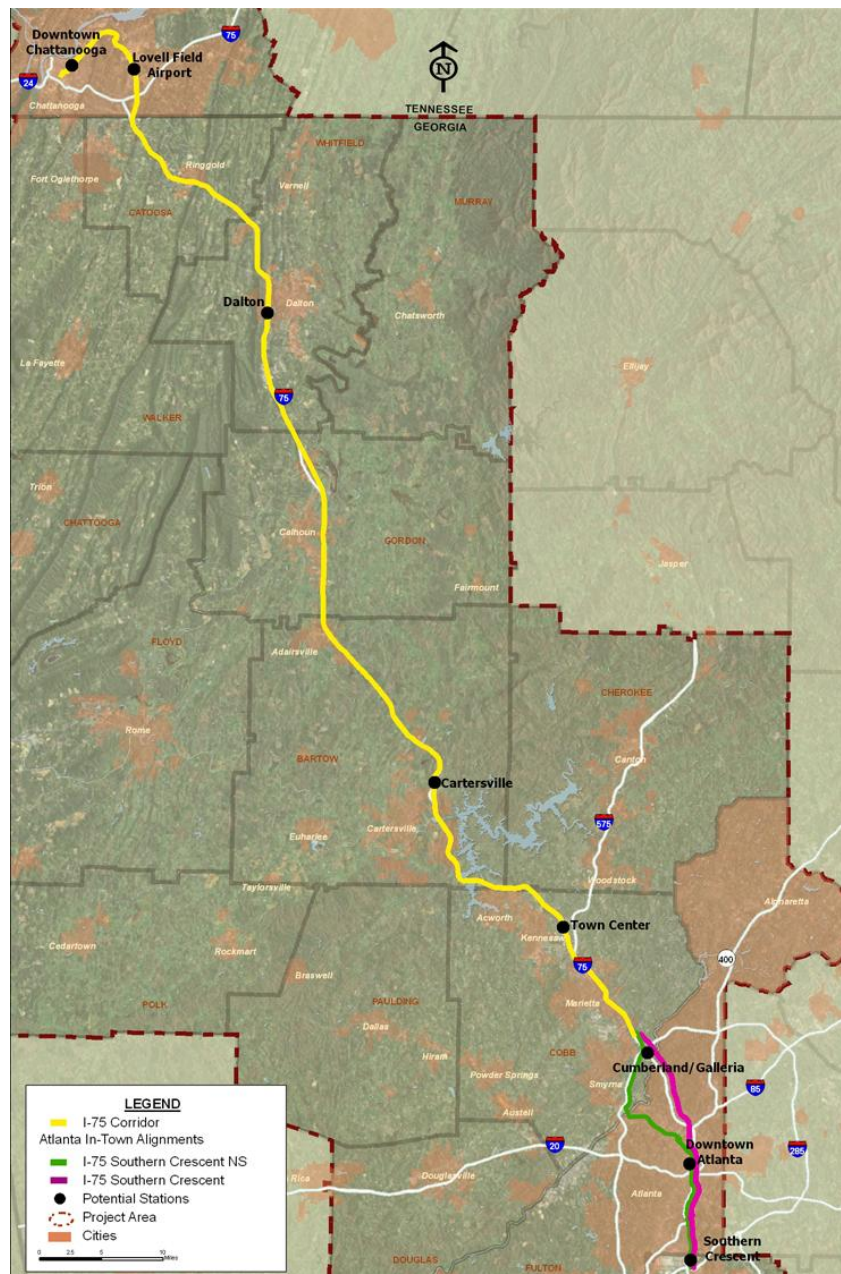
Table 8: Summary of Project Cost (in millions)

Capital Costs		Total 2016-2018
Atlanta-Griffin		\$260
Griffin-Macon		\$140
Capital Total		\$400
Operation & Maintenance	Annual	Total 2018-2030
O & M Total	\$25	\$325
Capital + O & M Total		\$725

Source: Brookings Institute, 2010

Atlanta-Chattanooga Maglev

Figure 18: Four Alignments Recommended for Atlanta-Chattanooga Maglev



Source: Georgia Department of Transportation, 2011

The 110-mile Atlanta-Chattanooga Maglev is planned to provide convenient, reliable and environmental-friendly city-to-city travel at a speed of 180 mph or higher. As projected population growth in the next 15 years will eventually bring major highways currently serving the corridor - I-75, US-41, and US-27 - to their highest capacity, the High Speed Ground Transportation is brought up as a solution to relieve traffic congestion, improve intermodal mobility and promote economic activity.

At an estimated cost between \$6 and \$9 billion, the system is expected to open by 2020 to accept riders between 7,200 and 11,200 daily. The trains will be operated at a frequency of at least one per hour. The Tier I Environmental Impact Statement (EIS) identified the preferred alignments and potential station locations for further study. Based on a comprehensive assessment on ridership, mobility, environmental, and financial/economic criteria, four alignments going through I-75 and stops at Southern Crescent (close to Hapeville) were recommended (Figure 18: Four Alignments Recommended). Four determined stations are Downtown Chattanooga, Down Atlanta, Lovell Field Airport of Chattanooga, and Hartsfield-Jackson Atlanta International Airport. By the time the maglev is constructed, traveling from Atlanta airport to Chattanooga airport will be diminished to merely one hour. However, the potential connection with Atlanta-Macon commuter rail and extension to Jacksonville or Charlotte is still unclear at this time, but will be addressed in the future studies.

Looking Ahead

Concept 3 is a long-range transit vision developed by Transit Planning Board for the Atlanta metro area. Adopted in August 2008, Concept 3 plans for an extensive network of commuter rail, light rail, and bus rapid transit by 2030, totaling about 500 miles (Figure 19: Concept 3: Atlanta Region's Long Range Transit Vision). The Regional Transit Committee, established within Atlanta Regional Commission in January 2010, is responsible for the implementation of Concept 3.

Concept 3 depicts a state-of-art transit network for the future. The plan incorporates existing heavy rail and express buses systems in operation, as well as transit projects still in the planning and implementation phases, including the expansion of MARTA Heavy Rail, Atlanta-Macon Commuter rail, BeltLine, Atlanta Downtown Streetcar, etc. Figure 19 clearly indicates that the Southern Crescent, which is immediately adjacent to the Atlanta airport and Hapeville, will be transformed into an intermodal transit station for heavy rail (MARTA), regional rail (Atlanta-Macon Commuter Rail), express bus service (GRTA), and arterial Bus Rapid Transit (from and to the airport). Where the future airport city is located, there will be a principal activity center for southern Atlanta, bringing residential, aviation-oriented commercial, and real estate development opportunities to the region.

Eight miles to the north will be the Multi-Modal Passenger Terminal (MMPT) in downtown Atlanta, which provides even further connection to extensive heavy rail, light rail, regional rail, streetcar, arterial Bus Rapid Transit, and express bus systems. As the future transportation hub for the aerotropolis, the MMPT will cut the travel time to Atlanta airport down to 10 minutes via maglev, bringing the passengers in the southern U.S. hours closer to the rest of the country and other international destinations.

Figure 19: Concept 3: Atlanta Region's Long Range Transit Vision



Source: Regional Transit Commission, 2011

Policy Recommendations

Enhance competitiveness of the Atlanta airport in air cargo industry. As demonstrated in the analysis above, although the Atlanta airport has remained the world's busiest passenger airport for years, the competitiveness of the airport in air cargo transportation is continuously decreasing. With the world headquarter of UPS located in the Perimeter Center of Atlanta, and the nation's fastest growing Port of Savannah four hours' away, the Atlanta airport possesses the leverage of becoming an air cargo distribution center for the South. To accomplish this goal, different sectors of cargo transportation industry - air, rail, trucking, and marine, should be integrated centering the airport through provision of designated express corridors. To further enhance the efficiency of air cargo distribution, measures should be taken at the airport to expedite customs clearance process, such as implementing new technologies that will accelerate security check, partnering with other major aerotropoli in cargo transshipment, and providing customized services to major shippers.

Attract anchor tenants to stimulate economic activities in airport city. Priority should be given to companies that will be the biggest beneficiaries from proximity to airport, including time-sensitive manufacturing, e-commerce and dotcom business, telecommunication, logistics, as well as domestic and international headquarters whose employees are usually frequent flyers. Construction of industrial parks, distribution centers, R&D clusters, high-tech complexes, and wholesale markets will induce the impact of agglomeration, driving economic development at an even larger scale.

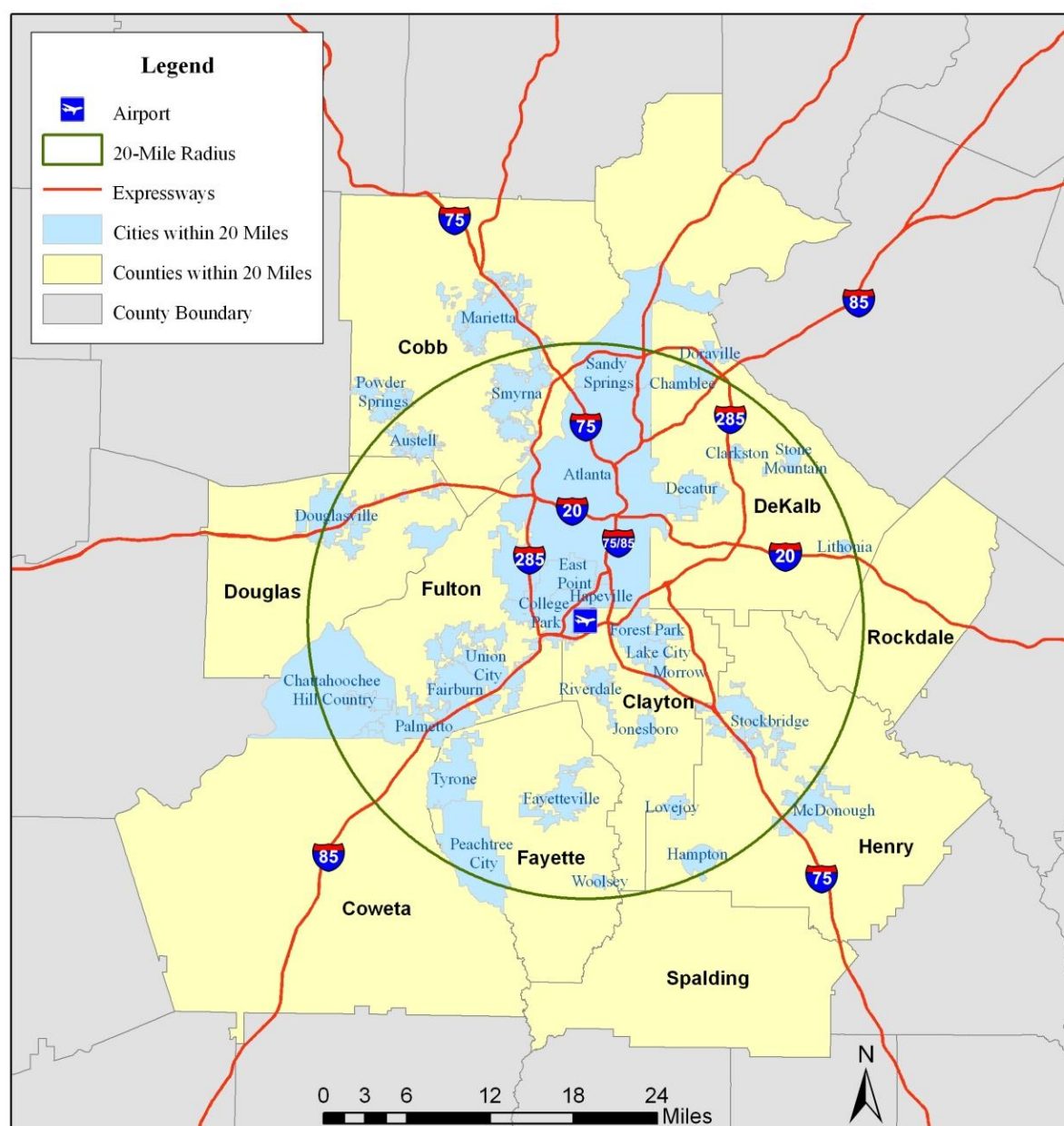
Improve the infrastructure of airport city. Hapeville still has a long way to go in becoming an airport city. One important factor on which companies base their relocation decision is work/live/play environment. To attract new residents, characterized by young families working in fast-paced environment, Hapeville will have to reinvest in transportation infrastructure, education, health service, parks and open space, as well as other public services. The airport city should not only be a prime location for companies and research centers, but also an enjoyable environment that provides quality living for its residents. The city should be designed to be a destination for international travelers, offering a variety of unique experience including restaurants, retail stores, cultural events, and entertainment venues.

Realize the aerotropolis vision through intergovernmental collaboration. The ambitious plan of aerotropolis cannot be achieved without establishing an entity across multiple jurisdictional boundaries and designating it for this initiative specially. The 20-mile radius of aerotropolis as defined by Kasarda delineates a region encompassing 10 counties in Georgia (Spalding, Clayton, Cobb, Coweta, DeKalb, Douglas, Fayette, Fulton, Henry, Rockdale) and 35 cities including Atlanta, Decatur, Sandy Springs and Marietta in the North, and Peachtree City in the South (Figure 20: Political Jurisdictions within 20-Mile Radius of Hartsfield-Jackson Atlanta International Airport).

One possible model of how this multi-jurisdiction entity can be structured is the Piedmont Triad Aerotropolis Initiative. In the implementation guideline put forth by Kasarda and Appold (2008), two governance mechanisms were recommended: regional revenue sharing and intergovernmental agreements. Regional revenue sharing, recognizing the extra cost in service provision imposed in neighboring communities when new development comes in one municipality, collects a portion of the increased tax revenues from the municipality to a regional pool and redistributes them by applying some formula. This mechanism reduces the

competition for new non-residential developments among different jurisdictions and provides a fairer way to allocate revenues based on cost incurred and the population in each community. Intergovernmental agreement is a form of informal governance built upon consensus on strategic policies and public-private partnership. Under this mechanism, municipalities acting cooperatively in attracting business, promoting regional growth, building human capital, and applying for funding from higher levels of government. By combining both mechanisms, the Piedmont Triad Partnership, which incorporates 12 counties and 63 municipalities, is striving to maximize the benefit from implementing the aerotropolis plan and replace the 91,000 job loss over the past ten years in the region (D. Hauser, personal communication, April 25, 2011).

Figure 20: Political Jurisdictions within 20-Mile Radius of Hartsfield-Jackson Atlanta International Airport



A variety of stakeholders will be involved in the Atlanta aerotropolis entity. The 45 city and county governments that are within the boundary of 20-mile radius should be the major facilitators for this intergovernmental collaboration effort, since their tax bases will be significantly expanded when the economic value of aerotropolis is realized, especially for the City of Atlanta, the City of Hapeville, Fulton County and Clayton County. The city's Department of Aviation, which is the authority for airport operation, will be an indispensable alliance for this entity. The airport owns multiple properties in both Fulton County and Clayton County, and these properties can be converted to other users that are supportive for aviation business, leading the transformation of economic structure in this region. The regional non-profit organizations, the Metro Atlanta Chamber, the Atlanta Regional Commission, and the Association County Commissioners of Georgia will be important partners in consensus building between local governments. Support from Delta Air Lines, AirTran Airways, Norfolk Southern Corporation, UPS, and other cargo carriers and logistic companies are essential to improve the efficiency of air cargo industry. In addition, transportation agencies in the region, MARTA, GRTA, and GDOT should be incorporated in the implementation process of building the aerotropolis as the region's multimodal transportation hub. Georgia Institute of Technology and Emory University should be the leading research institutes and incubators for future high-tech companies.

Through establishment of intergovernmental agreement, the local governments will be able to consolidate resources for unified provision of land, tax incentives and permits to attract business relocations. The entity should be designed as a strong and consistent leader of this aerotropolis initiative, adopting a unified marketing and branding strategy to promote Atlanta aerotropolis to the public.

Invigorate economy by promoting mass transit. The region has drafted a long-term plan for an interconnected transit system. Cooperation among multiple jurisdictions is essential to implement this ambitious plan. Investing in mass transit will generate several benefits: creating more employment opportunities, bringing economic opportunities to areas that were inaccessible before, and further connecting the aerotropolis to the rest of the nation. Therefore, the Atlanta aerotropolis entity should also assume the responsibility of implementing a coordinated strategy for transit system expansion in the region, initiatively facilitating the construction of Atlanta-Macon Commuter Rail and Atlanta-Chattanooga Maglev.

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