

**DELAWARE'S PARATRANSIT POLICY
AND THE NEED FOR INNOVATION**

by

Eli Turkel

A thesis submitted to the Faculty of the University of Delaware in partial
fulfillment of the requirements for the degree of Master of Public Administration

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GLOSSARY

Demand Response Transportation: Federal law defines demand-response transportation as any non-fixed route system of transporting individuals that requires advanced scheduling by the customer, including services provided by public entities, nonprofits, and private providers.

Job Access Reverse Commute Program: Established to address transportation challenges faced by welfare recipients and low-income persons to pursue and maintain employment. The program purchased small vans and buses to assist low-income workers seek and maintain employment.

New Freedom Program: The New Freedom program allocated funds designed to provide expanded service in both geographic coverage and hours or days of service. The program was specifically targeted transporting people with disabilities beyond requirements of the Americans with Disabilities Act.

Unlinked Passenger Trips: The number of passengers who board public transportation vehicles. Passengers are counted each time they board vehicles no matter how many vehicles they use to travel from their origin to their destination.

Vehicle Revenue Miles: The miles vehicles are scheduled to, or actually travel while in revenue service.

Vehicle Revenue Hours: The hours vehicles are scheduled to, or actually travel while in revenue service.

ABSTRACT

Demand-response transportation, as defined in federal law refers to, “any non-fixed route system of transporting individuals that requires advanced scheduling by the customer, including services provided by public entities, nonprofits, and private providers”. Paratransit is a term often used to refer to demand-response transportation. The State of Delaware provides a high level of paratransit services. The reason for this is that Delaware provides paratransit services to and from any location throughout the entire state. Due to Delaware’s unique paratransit policy, IPA has studied the issue in Delaware for over 10 years. This thesis seeks to continue IPA’s work by investigating the effectiveness of transportation coordination strategies, specifically transportation coordinating councils. By comparing two counties that have similar transportation issues, this study seeks to make recommendations to improve paratransit in Delaware.

Chapter 1

INTRODUCTION

Demand-response transportation, as defined in federal law refers to, “any non-fixed route system of transporting individuals that requires advanced scheduling by the customer, including services provided by public entities, nonprofits, and private providers” (*Code of Federal Regulations*, 1970). In other words, demand-response transportation is transit provided through direct request by the rider to the service agency. A rider places a request for a ride and the transit agency responds by fulfilling the request.

Paratransit is a term often used to refer to demand-response transportation. Paratransit makes up 2% of all public transportation trips on a daily basis in the United States.¹ Since public transportation accounts for only 2% of all the transportation in the United States, and paratransit is only 2% of all public transportation, paratransit is a relatively small part of transportation in the United States (Mallet, 2015).

The State of Delaware provides a high level of paratransit services. Paratransit trips constitute approximately 9% of transit trips on an annual basis in Delaware (National Transit Database, 2016). The reason for this is that Delaware provides paratransit services to and from any location throughout the entire state. Based on

¹ The remaining 98% of trips breakdown this way: 50% of all public transportation trips are fixed-route bus service, 36% heavy rail, 5% commuter rail, 5% light rail (Mallet, 2015).

reports published by the University of Delaware's Institute for Public Administration (IPA), it is clear that Delaware is the only state that provides this high level of paratransit services (Institute for Public Administration, University of Delaware, 2013; Scott & Tuttle, 2007; Tuttle & Falcon, 2003).

Due to Delaware's unique paratransit policy, IPA has studied the issue in Delaware for over 10 years. IPA's most recent paratransit report, published in 2013, compiled ten recommendations. The first three recommendations stressed the need to implement transportation coordination activities, including adopting a memorandum of understanding committing the state to transportation coordination and creating an "Interagency Council on Specialized Transportation". The recommendations also stressed the need for improved data collection mechanisms, including maintaining an inventory of vehicles purchased or leased with state funds, and data of human services transportation cost and ridership. Finally, the report recommended several planning initiatives, including a study of the impact of rising paratransit costs on fixed-route service and considering a paratransit voucher program utilizing taxi services (Institute for Public Administration, University of Delaware, 2013).

This thesis seeks to continue IPA's work by investigating the effectiveness of transportation coordination strategies, specifically transportation coordinating councils. In order to do this, the thesis begins by reviewing the costs and benefits of Delaware's paratransit policy and framing the consequences of the policy central to understanding strategies for future directions. Next, the thesis investigates the spatial distribution of paratransit costs in Delaware and articulates the planning assumptions that contribute to the costs. The investigation reveals Sussex County Delaware to be a main driver of paratransit costs. After framing the issue and a major source of costs,

the thesis moves on to exploring cost containment strategies. The study proceeds by articulating the statutory and policy environment for developing transportation administration. It then provides an overview of national transportation issues, especially those experienced by disadvantaged populations.

The study then presents case studies of coordination as a way of framing potentially more adequate policies for Delaware. By comparing two counties that have similar transportation issues, this study seeks to make recommendations to improve paratransit in Delaware. Specifically, the role of coordination councils is given primary consideration as a way of fostering better, more efficient service. The study concludes by discussing several policy directions for improving Delaware's paratransit policies and directions for further study.

Chapter 2

DELAWARE’S PARATRANSIT POLICY, COSTS AND BENEFITS

In this chapter the details of the paratransit services in Delaware will be discussed, along with the current costs and benefits of paratransit services in Delaware. Finally, the transportation-disadvantaged populations effected by those costs and benefits will be addressed. In this study, transportation-disadvantaged populations are demographic or geographic groups who take fewer trips per day relative to other demographic and geographic groups (Mallet, 2015). The discussion will illustrate the current challenge Delaware faces in paratransit services: how to contain costs in the face of raising demand.

The Costs of Delaware’s Paratransit Policy

In addition to offering policy and administrative recommendations to the paratransit program, IPA’s 2013 report articulated the different human services transportation programs currently operating in Delaware. There are three human services transportation programs operating in Delaware: DART paratransit services, Medicaid and dialysis paratransit, and private non-profit human services agencies (Institute for Public Administration, University of Delaware, 2013). Each of these programs is designed to improve the transportation availability for transportation-

disadvantaged populations. While the public cost of DART services and private non-profit services are readily known, the cost of Logisticare is not.

The Americans with Disabilities Act and Delaware's Paratransit Policy

Passed in 1990, the Americans with Disabilities Act (ADA), Public Law 101-336, mandates that individuals with disabilities have a right to full inclusion in American society. The statute sets explicit requirements regarding the accessibility of buildings and public transportation services, including the provision of demand-response paratransit services to compliment fixed-route bus service to individuals unable to ride public transit. The ADA did not intend complimentary paratransit service as a comprehensive system of transportation (West, 1996). Rather, complimentary paratransit service was meant to accommodate those who are unable to use public bus systems equipped with services to allow disabled individuals the opportunity to board and disembark the bus. ADA specified three categories of eligible paratransit riders:

1. Those who cannot board, ride, or disembark a fixed route vehicle independently
2. Those who can board, ride or disembark independently but for whom an accessible vehicle is not available at time or place of travel
3. Those who cannot reach bus or rail stop due to disability and environmental barriers (West, 1996)

The ADA mandates public transit providers provide complementary fixed-route service within three-fourths mile of all fixed-route transit (Wehman, 1993). Title

II, Subtitle B outlines specific requirements applicable to public transportation providers.

- Identical hours and days must be provided within three-fourths mile either side as well as a radius beyond fixed bus routes.
- Reservations system must be established to accept and provide next day service up to 14 days out.
- Fares must not exceed two times regular passenger fixed route fare (Wehman, 1993).

In the mid-1990s the State of Delaware made the decision to provide paratransit service throughout the entire state, regardless of rider or destination location in relationship to the fixed-route system. The policy decision to provide universal paratransit services through the entire state has led to increasing costs of paratransit service.

Table 1 2014 DART Transit Figures
Source: National Transit Database

	Para	Fixed-route	Commuter	Total
Actual Cost	\$58,401,000	\$55,820,000	\$5,473,000	\$119,694,000
Proportional	49%	47%	5%	-
Ridership	1,018,000	9,934,000	-	-
Cost Per Rider	\$57.36	\$5.64	-	-

In 2014 the Delaware Transit Corporation (DTC), the entity responsible for providing paratransit services in Delaware, spent more money on paratransit services than on fixed-route service, while serving 10 times as many fixed-route riders as paratransit riders. The reason to the spending relative to service imbalance is due to

the fact that DTC spends an average of \$57.36 per paratransit trip, while it spends only an average of \$5.64 per fixed route trip.

In recent years DART has made reforms to its fare and route structure. On July 1, 2015 the ADA fare became \$3 and the Non-ADA fare became \$5. On July 1, 2016 the ADA fare will become \$4 and the Non-ADA fare will become \$6. Prior to the increase, the rate of ADA and Non-ADA paratransit trips was \$2. An ADA trip is one in which both the beginning and end point are within three-fourths mile of a local fixed route (“Paratransit Services,” 2016). In addition, DTC has introduced flex-routes in Sussex County that allow riders to request pickup off of the main service route. Flex routes serve Georgetown, Georgetown-Millsboro, and Seaford (“Sussex County Routes,” 2015).

Medicaid and Dialysis Transport

Non-emergency Medicaid transportation is a federally mandated service. All fully eligible Medicaid clients are eligible for transportation services; however, transportation services are not a benefit in the Delaware Healthy Children Program. Logisticare provides Delaware’s non-emergency Medicaid transportation. Logisticare brokers transportation services, meaning they partner with taxi services, ambulance companies, and limousine services to manage requests for services. Trip arrangements are requested no less than three days in advance of a scheduled appointment to allow Logisticare time to verify the recipient and specific transportation request as eligible for service. Once both criteria are confirmed, Logisticare arranges for appropriate

transportation to the covered medical service by one of their contracted transportation providers (“Delaware Division of Medicaid and Medical Assistance,” 2016).

In addition, Delaware’s Chronic Renal Disease Program (CRDP) provides assistance to Delawareans diagnosed with End Stage Renal Disease (ESRD). The State of Delaware provides 100% of the funding for this program, administered by the Division of Medicaid and Medical Assistance (DMMA). As State funds are limited, ensuring the widest coverage requires that all third party resources (Medicare, Medicaid, VA, private insurance, etc.) must be considered before CRDP funds are used. In order to qualify, applicants must be diagnosed with End Stage Renal Disease (ESRD), receive dialysis or have had a renal transplant. Further, the individual's gross countable income must be below 300% of the federal poverty level. In addition, applicants who have Medicare A or B must apply for Medicare Part D Prescription Drug Coverage and if eligible, for Social Security’s Extra Help Program, unless they have other insurance that provides equivalent prescription benefits (“Delaware Division of Medicaid and Medical Assistance,” 2016).

The Elderly and Persons with Disabilities Program, 5310 Services

The Federal Transit Administration (FTA) created the Elderly and Persons with Disabilities Program (Section 5310) in the mid-1970s to help states fill gaps in specialized-transportation services. Section 5310 is designed as a federal-state matching program that covers the complete cost of purchasing a vehicle. Meaning, through a cost sharing system, the FTA provides 80% of acquisition costs, and the

individual state provides the remaining 20%. Vehicles and equipment are then contracted out to eligible nonprofit organizations or local governments to provide transportation service for seniors and persons with disabilities.

DelDOT has been designated by the Governor to oversee the Section 5310 program in the state. DTC has been delegated by DelDOT as the state agency responsible for administering Section 5310 funds allocated from the FTA. DTC is responsible for advertising the program and screening and selecting eligible organizations. In addition, DTC is responsible for the procurement of vehicles and monitoring the use of awarded equipment. Applications for new and replacement vehicles and related equipment are funded until combined state and federal allocations have been exhausted. DTC uses a systematic approach to selecting applications from eligible organizations based upon the following priorities:

- 1) Provide vehicle replacement to current 5310 organizations needed to maintain current programs. Requests for this type of funding must be defined clearly in the applicant's request.
- 2) Provide new vehicles to previously funded organizations that will allow new service to be implemented in an area not adequately represented by the program.
- 3) Provide vehicles to agencies that demonstrate a need for transportation but currently have no transportation options available.

Eligible organizations selected by DTC to receive Section 5310 funded vehicles have cost obligations, including registering and titling of the vehicle, collision and comprehensive insurance, and liability insurance. The liability policy must assure DTC will not be held liable for incident that arises out of an organization's use of a

vehicle (Institute for Public Administration, University of Delaware, 2013).

Though it is not required, DTC also offers safety classes for individuals and organizations participating in the 5310 program, including a driver training program. Organizations with Section 5310–funded vehicles are required to submit monthly reports to DTC on the number of trips, miles traveled, as well as other data by the 15th working day of the following service month. DTC uses these reports to monitor and evaluate the program; however, it does not appear to stipulate minimum service requirements. Organizations awarded Section 5310–funded vehicles are required to participate in DTC’s Vehicle Preventative Maintenance Program. The program provides routine vehicle maintenance and inspection on a regularly scheduled basis. Each organization and agency is responsible for the cost of labor, parts, and supplies, along with all costs associated with maintenance outside of a routine nature.

Vehicles acquired under the program may be leased in certain circumstances to other entities such as local public bodies, nonprofit agencies, or private for-profit operators. In such an arrangement, the lessee operates the vehicles on behalf of the Section 5310 recipient and provides transportation for the recipient’s clientele as stipulated in the grant application. This is permitted only when all of the following criteria are met:

- 1) The transportation service provided by the public body is specialized service for elderly and/or persons with disabilities, and the public body does not provide general public transportation services.

2) The public body cannot acquire vehicles through other FTA funding sources to provide the service; private for-profit operators must be given the first opportunity to participate in the provision of such service, and the control and responsibility for the vehicle remains with the private nonprofit organization.

3) DTC must approve any contractual agreement entered into that involves a Section 5310 vehicle prior to its execution (“Federal Section 5310 Program, FY2012, Applicant Information Guide.” Delaware Transit Corporation, p. 9.).

In the event that the contract with the eligible organization is terminated, or if the vehicle has exceeded its useful life (as determined by DTC), the vehicle will be returned to DTC, which will dispose of the vehicle in accordance with state law. Table 5 shows the total amount of funding that has been awarded for the 5310 Program in Delaware for the past six years. Note that the year shows when the award was made, not the year the agency received the new vehicle.

Low-Income

In addition to the actual cost of providing paratransit service, there is the opportunity cost of not spending on fixed-route service, which adversely affects Delaware’s low-income population who either rely on underfunded public transportation systems, or spend a significant portion of their income on private transportation. While the proportion of income individuals spend on vehicles has decreased significantly since the 1970s, low-income families spend nearly 40% of families net income on transportation and nearly 10% of net income is used for the commute alone. The vast majority of this spending, 95%, is on private vehicles (Lucas, 2004).

The overwhelming cost of private transportation for low-income families affects the annual of miles traveled and the number daily trips. Car drivers in the lowest income group log annual distances travels of 8,700 miles, compared to 13,800 miles for the average driver (Lucas, 2004). Individuals from households with incomes between \$15,000 and \$19,999 average 3.3 trips per day, while those incomes between \$30,000 and \$34,000 averaged 3.5, and those incomes between \$45,000 and \$49,000 average 3.69. The average number of trips increased with household income until it reached those making over \$100,000. Those individuals averaged 3.92 trips per day, while those making \$75,000 to \$79,000 averaged 4.11 (Mattson, 2012).

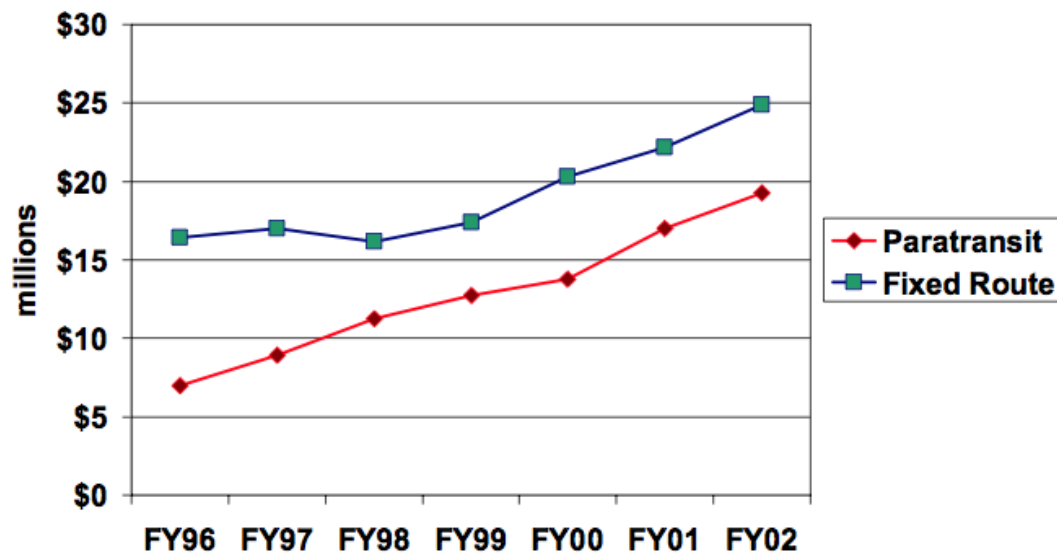


Figure 1 DART First State Annual Net Operating Cost: Paratransit vs. Fixed Route Since FY96
Source: Tuttle & Falcon, 2003

Figure 1 shows that between fiscal year 1996 and fiscal year 2002, overall spending on transit in Delaware increased, and the gap in spending between paratransit services and fixed-route services narrowed.

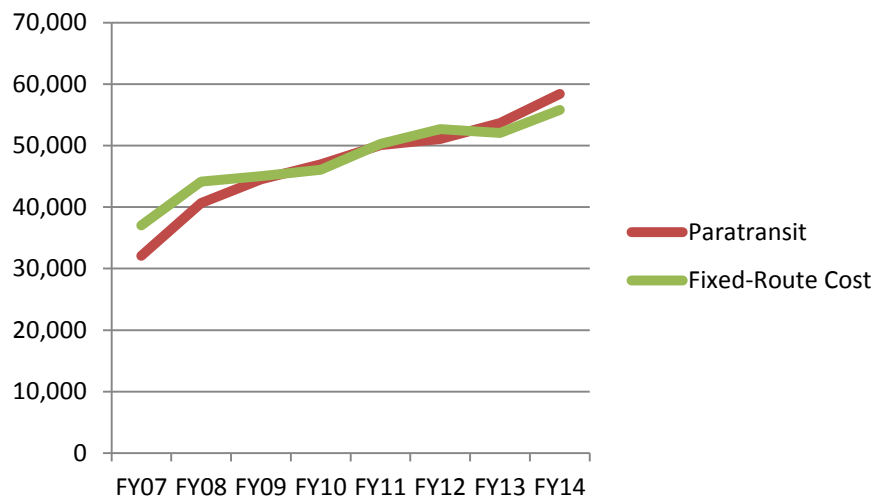


Figure 2 DART First State Annual Net Operating Cost: Paratransit vs. Fixed Route Since FY07
Source: National Transit Database, 2016

Figure 2 shows a continuation of both these trends, with paratransit services overtaking fixed-route spending in fiscal year 2013.

Benefits of Delaware's Paratransit Policy

While there a significant cost of Delaware's paratransit policy does, it also provides the state with a tremendous benefit by allowing individuals unable to drive or used fixed-route transit the opportunity to travel to work, medical appointments, or the grocery store.

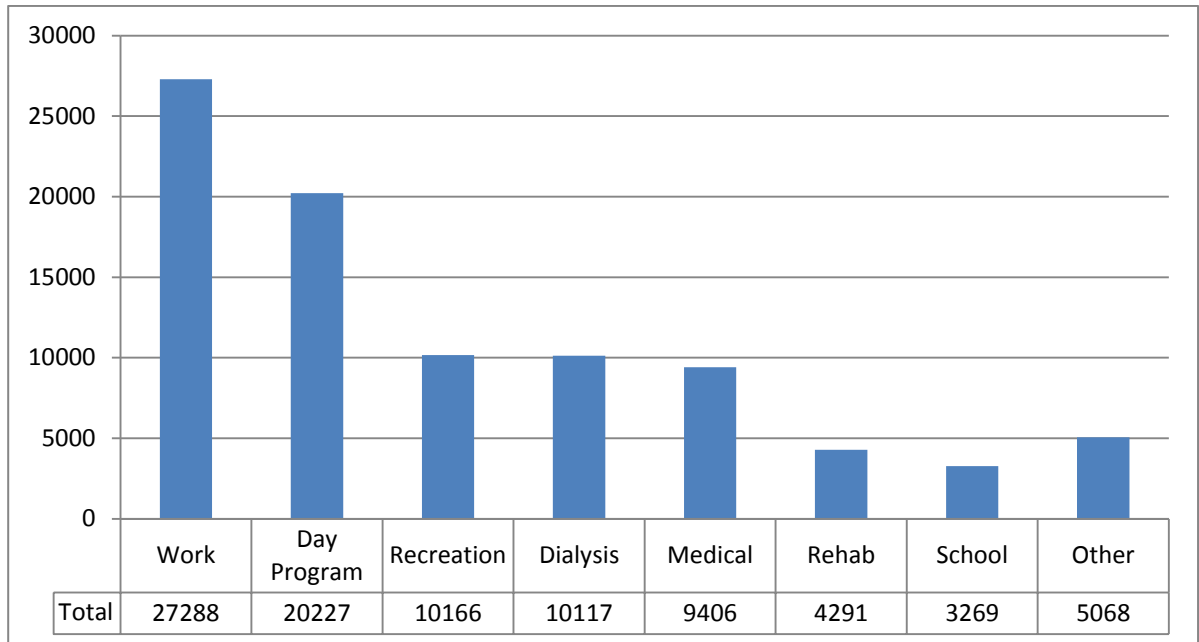


Figure 3 ADA and Non-ADA Paratransit Trips by Purpose
Source: DTC, 2015

The above figure demonstrates that more than 50% of daily paratransit are either to work or day programs. Of the remaining 47%, 30% is comprised of medical, dialysis or school related trips, while 11% is for recreation. Without the universal paratransit services, there are individuals who would not be able to access vital services on a daily basis as those who are able to access fixed-route service, or are able to drive.

Disabled

The Bureau of Transportation Statistics reports that more 3.5 million people never leave their homes. Of these, 1.9 million are individuals with disabilities. About 560,000 disabled people indicate they never leave their homes because of

transportation difficulties. The top reasons cited for not leaving the home is that they do not have a car (45.1%), followed by public transportation cost or availability (31.2%) (Bureau of Transportation Statistics, 2003).

The inability to leave home is a barrier to employment as demonstrated by the disproportionately high unemployment rate among individuals with disabilities. Americans with disabilities are much more likely than average Americans to be unemployed and live in poverty. As of May 2015, 19.8% of people with a disability were participating in the labor force (National Council on Disability, 2015). Disabled Americans have an unemployment rate of 10.1%, double the unemployment rate for Americans without disabilities. Individuals with disabilities earn \$6,500 less per year than non-disable people when both groups have the equivalent of the high-school diploma. When both groups have a masters degree or higher, the gap expands to \$21,000 (National Council on Disability, 2015). Further, those without a medical condition averaged 4.13 trips per day, while those who do averaged 2.6 trips per day (Mattson, 2012).

Seniors

21% of Americans over 65 do not drive. For this subset of American seniors, the daily reality is not leaving home most days. Older non-drivers report 15% fewer trips to the doctor, 59% fewer shopping trips, and 65% fewer social, family, and religious activities than older drivers (Farber, Shinkle, Lynott, Fox-Grage, & Harrell, 2011). The lack of contact is detrimental to the emotional well-being of older adults and can result in depression (Farber et al., 2011). Finally, Americans senior citizens –

those 65 and older, but especially those 75 and older – are less likely to drive and take fewer trips than younger Americans (Mattson, 2012).

Conclusion

Delaware's current universal paratransit policy provides important services to disadvantaged populations, especially individuals with disabilities and senior citizens. At the same time the policy strains Delaware's fixed-route transit budget because while the State is obligated by statute to provide universal paratransit service, it is not obligated to increase the capacity of fixed-route bus service. This creates a funding competition between transportation-disadvantaged individuals who qualify for paratransit service and those who do not.

Chapter 3

SUSSEX COUNTY'S TRANSPORTATION ENVIRONMENT

The costs and benefits of Delaware's paratransit policy is the central concern of this thesis. In particular, how can paratransit costs be constrained? In order to answer that question, further analysis of costs is necessary. In this chapter we seek to understand the spatial distribution of paratransit costs and the challenges it poses to constraining costs. Through this analysis we will gain insight into strategies for constraining paratransit costs.

Changing Transportation Paradigms

There is a changing paradigm in transportation planning away from an auto-centric paradigm and towards a multimodal paradigm, which seeks to correct current distortions currently seen in the transportation market (Litman, 2006, 2013). This shift parallels greater public awareness of the steep challenges faced by individuals with disabilities, seniors, and low-income individuals have staying connected to community activities. These two trends have the potential to reshape public spaces and increase the accessibility of vital services, especially in rural areas experiencing growth where, because development is occurring, there is an opportunity to apply the principles of the new, multimodal paradigm. In growth areas there is an opportunity to increase access to jobs, education, and health care, especially for the transportation

disadvantaged – individuals with disabilities, seniors, and low-income individuals. In order to assess these two paradigms, it is necessary to review several key economic concepts.

Market Distortions

The difficulties transportation poses for transportation-disadvantaged communities is exacerbated by the automobile-centric planning practices. 90% of seniors report a strong preference to live in their own residences as they age, and 96% of Americans over 65 live in a non-institutional setting (Farber et al., 2011). Aging in place is the ability to live in one's own home and community safely, independently, and comfortably, regardless of age, income, or ability level. Many communities across the country are not designed for populations unable to drive. This is demonstrated by the overwhelming proportion of Americans who to drive to work every day (Farber et al., 2011).

Economic Neutrality

It is impossible to separate federal, state, and local policy and planning from the transportation market because public policies significantly affect transportation markets (Litman, 2006). Governments provide transport facilities, regulate travel activity, control prices and taxes, and influence land use. The immense influence that government has over transportation markets violates the principle of economic neutrality. The principle states that in order to have optimal markets public policies

cannot arbitrarily favor one good, service, activity, or group over another. In transportation policy and planning transport investments across modes and users must be equitable, unless special treatment is justified. For instance, the federal government's mandate that complimentary paratransit services be provided is not equitable, but is justifiable. However, current transportation policies violate economic neutrality through cost-based market distortions and limiting consumer options (Litman, 2006).

Cost-Based Pricing

Current transportation planning practices favor automobile-oriented improvements even when other solutions are more cost-effective and beneficial overall. In economics, demand refers to the relationship between price and consumption. Basic market principles state that individual consumption plateaus at various levels. However, in the transportation market, the provision of roads and parking are often perceived to be free. Thus, decisions about roads and parking are underpriced, and demand grows to fill the underpriced roads and parking (Litman, 2006). The resulting generated traffic – additional traffic that occurs when roadway capacity is expanded – is not counted as a cost. This skews planning decisions toward roadway capacity and away from alternative solutions to traffic problems (Litman, 2006).

Consumer Choice

Performance indicators favor mobility over accessibility. Conventional planning assumes the goal of the transportation system is to maximize the distances people can travel given their time and money budgets, and therefore increase travel speed. In order to achieve this goal there are four factors the conventional planning paradigm relies upon: motor vehicle travel conditions, quality of transportation options, transport network connectivity, and land use accessibility (Litman, 2006).

Motor vehicle travel conditions are assessed by considering roadway level of service, average traffic speeds, congestion costs, and crash rates, while the quality of transportation options heavily considers the speed of public transit while active transit modes, such as biking and walking, receiving little attention. Transport network connectivity concerns the density of connections between paths, roads, and modes and, therefore, the directness of travel between locations. Conventional traffic networks consider major regional road and transit networks, while local streets and connections between modes are often ignored. Finally, land use accessibility concerns development density and mix, which makes it a major factor in determining the distances people travel between local destinations. For instance, roadway level-of-service, average traffic speeds, and congestion indicators undervalue walkability, multi-modalism, telecommuting, and land use reforms.

The new paradigm is more comprehensive and multimodal. Rather than considering mobility as the central goal of the transportation system, the multimodal paradigm considers access to vital services to be the ultimate goal of the transportation

system. The multimodal paradigm considers the same four factors as the conventional paradigm, but with a broader range of modes, objectives, impacts, and improvement options.

In terms of motor vehicle travel conditions, the multimodal paradigm proposes that impacts should be considered per capita in order to take into account the distances people must travel to reach destinations. The new paradigm argues that quality of should include convenience, comfort, safety, affordability, and integration. Transport network connectivity in the multimodal paradigm argues that fine-grained analysis of sidewalk, path, and road network connectivity, and of connections between modes, such as the ease of walking and biking to public transit terminals. Finally, the multimodal paradigm proposes fine-grained analysis of how land use factors affect accessibility by various modes (Litman, 2013).

Rural Transportation Disadvantaged

Geographic location greatly affects transportation accessibility. All transportation-disadvantaged populations previously mentioned – low-income, disabled, seniors – are more disadvantaged in terms of the number of trips taken on a daily basis if they live in rural instead of urban areas. Rural areas are generally lower-density than urban areas, making fixed-route bus service less viable. Of the roughly 1,500 rural transportation services in the United States, only one-third of them are fixed-route service, while 89% are demand-response service (Mattson, 2012). The small proportion of fixed-route service mirrors the travel behavior of individuals in

rural areas who tend to take fewer trips per day, but drive longer distances from place to place than their urban counterparts (Mattson, 2012).

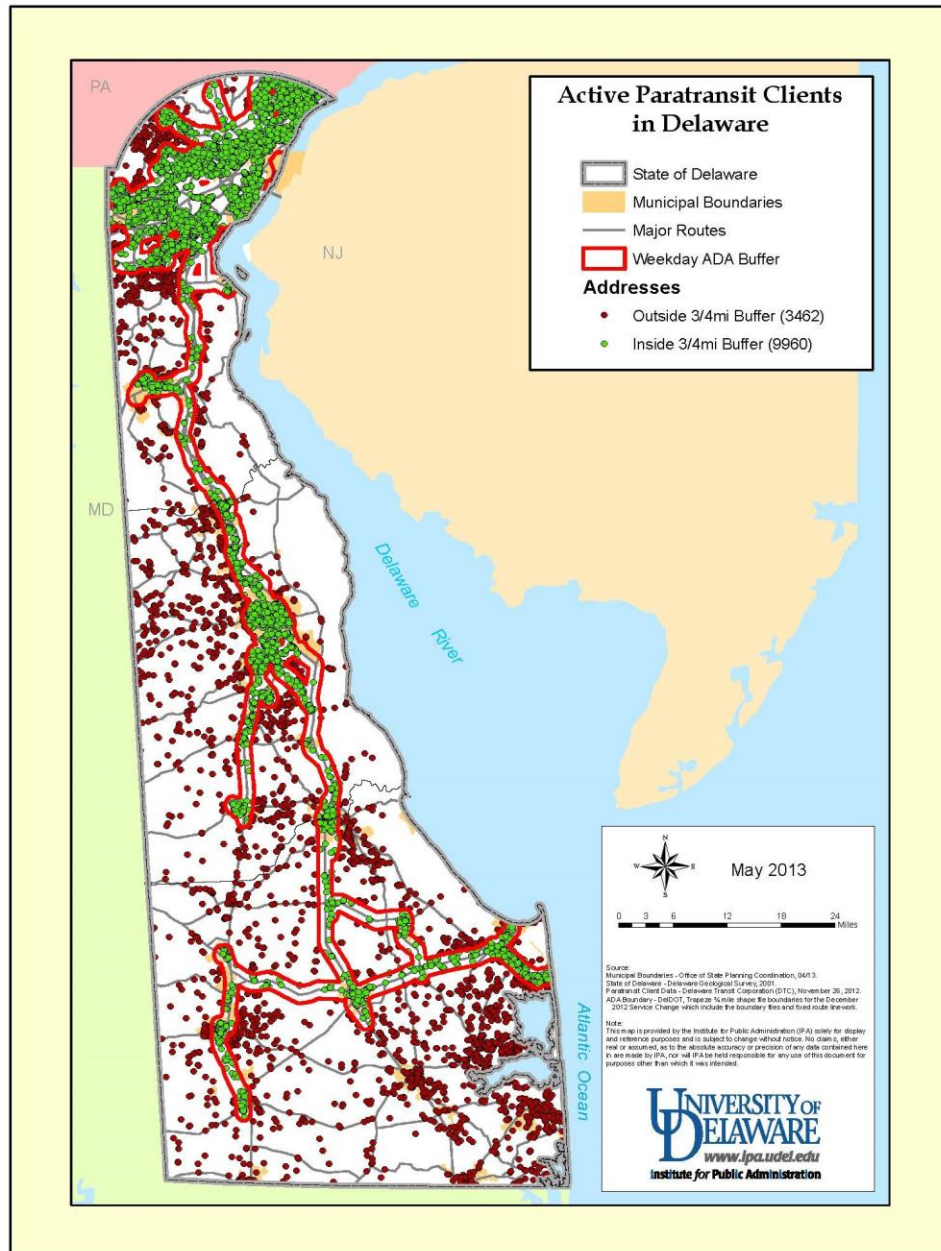


Figure 4 Active Paratransit Clients in Delaware
 Source: Institute for Public Administration, University of Delaware, 2013

Figure 4 illustrates how Delaware’s paratransit policy creates disparities between those transportation-disadvantaged individuals who qualify for paratransit service and those who do not. The vast majority of trips in New Castle County fall within the ADA boundary, while the vast majority of trips in Sussex County occur outside of the ADA boundary. The limited fixed-route service in Sussex County means that those who qualify for paratransit service receive more government provided transportation than those who do not qualify for paratransit services. This is problematic because many people who are transportation-disadvantaged are left to utilize a very limited fixed-route service.

Rising Demand

By 2030, Delaware’s population is estimated to be 1,049,865 million people; 114,251 more than the population in 2014 and 263,492 more than the population in 2000.

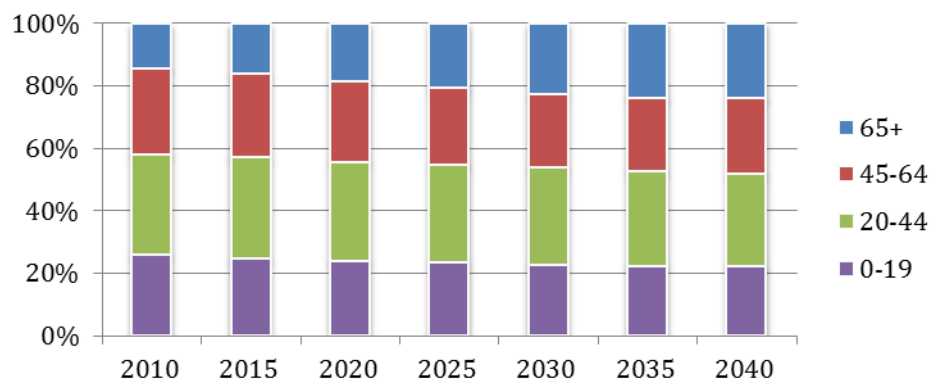


Figure 5 Delaware’s Age Distribution 1950-2040
Source: Delaware Population Consortium, 2015

Figure 5 shows that by 2030 Delaware's senior population (65-and-older) is projected to be 23% of the state's population, a larger proportion of Delaware's overall population than is the case for the nation as a whole (Delaware Population Consortium, 2015, Institute for Public Administration, 2013). With a growing senior population, there is likely to be greater demand for paratransit services in Delaware since seniors are more likely to become disabled.

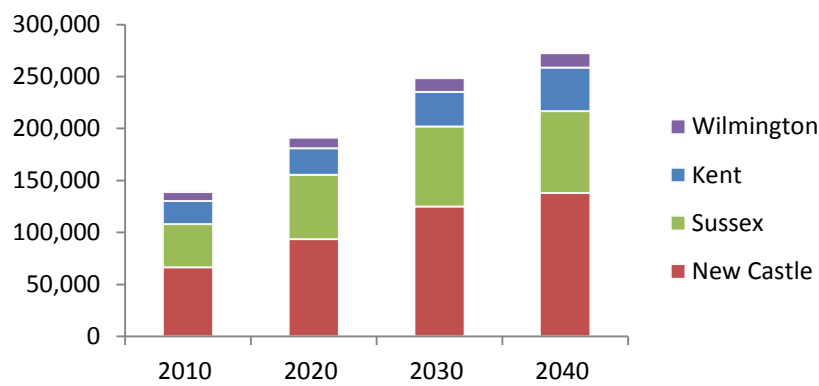


Figure 6 Delaware's Senior Population (2010-2040)
Delaware Population Consortium, 2015

The administrative challenge posed by this population trend is enhanced because much of Delaware's population growth is occurring in unincorporated areas. In the 1960s the population was more evenly distributed between incorporated and unincorporated rural areas. Now, 27% of Delaware's population lives in towns and cities, while 72% lives outside incorporated areas (*Delaware Strategies for State Policies and Spending*, 2015). Figure 5 illustrates that the populations of Kent and Sussex counties will account for 6% more of the state's total population in 2030 than in 2010.

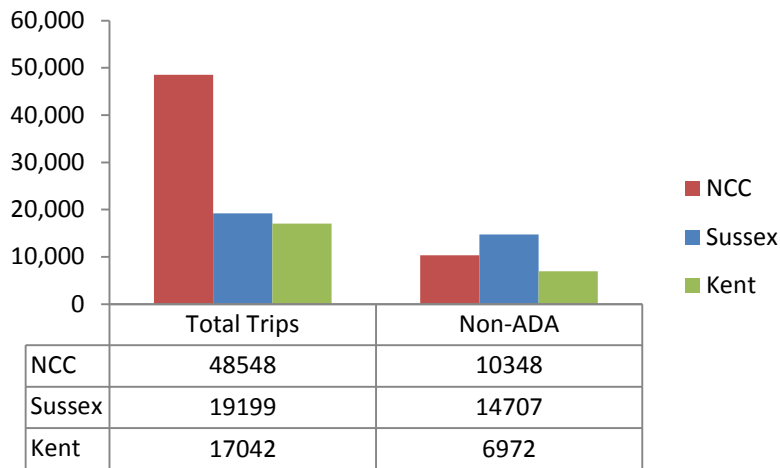


Figure 7 Total Paratransit Trips v. Non-ADA Trips, by County
Source: DTC, 2015

This is problematic because, as Figure 7 shows, Sussex County is where the most Non-ADA trips occur.

Strategies to manage growth

The State of Delaware has a number of strategies currently in place to track the composition of the state's growing population to make investment decisions that meet the needs and preserve the quality of life of Delaware's population at minimal cost to taxpayers (The Cabinet Committee on State Planning Issues, 2014). Delaware's local and county governments are mandated to write and implement comprehensive plans. At the state level, Delaware's executive branch maintains the Cabinet on State Planning Issues, which oversees land use activities throughout the entire state. The Cabinet's activities include the PLUS process and the Strategies for State Policies and

Spending and are designed to promote orderly growth and desirable patterns of land use (The Cabinet Committee on State Planning Issues, 2014).

The rationale for shared governance of land use decisions is that while land use is generally regarded as a local responsibility, state government funds much of the infrastructure, including paratransit service, 200 schools receive who receive two-thirds of their funding from the state, the maintenance of 90% of the over 13,000 lane miles in Delaware, and 15 state service centers that deliver 760 programs and account for 600,000 visits. With planning at local level and provision of infrastructure at the state level, shared governance is necessary to coordinate activities and to minimize inefficiencies (The Cabinet Committee on State Planning Issues, 2014).

The State's Role

The Strategies for State Policies and Spending (SSPS) is the organizing mechanism the state of Delaware uses to operationalize the objectives of the Cabinet on State Planning Issues. First published in 1999 and revised every five years, most recently in 2015, the SSPS is not a land use plan; rather it is a guide for state investment. As an investment plan, the SSPS strives to achieve orderly growth and desirable land use patterns through the concept of complete communities. The concept of complete communities is that mixed-use, compact development patterns are well suited for the fiscal health of the state because they use less land and reduce the separation of land uses. It is not just about density, complete communities allow for walkways, bike paths, newer streets, residential and commercial uses (The Cabinet Committee on State Planning Issues, 2014).

To move the state towards a complete communities vision, the SSPS breaks Delaware land areas into four levels. Levels one through three are areas where state policies support growth and economic development, with Levels 1 and 2 as the primary focus. Level 4 is where the state supports agriculture and open-space, including the promotion of agricultural industry support activities. The document contributes towards capital budgeting, PLUS review, school site reviews, public facility localization. Local governments rely heavily on the document when writing comprehensive plans.

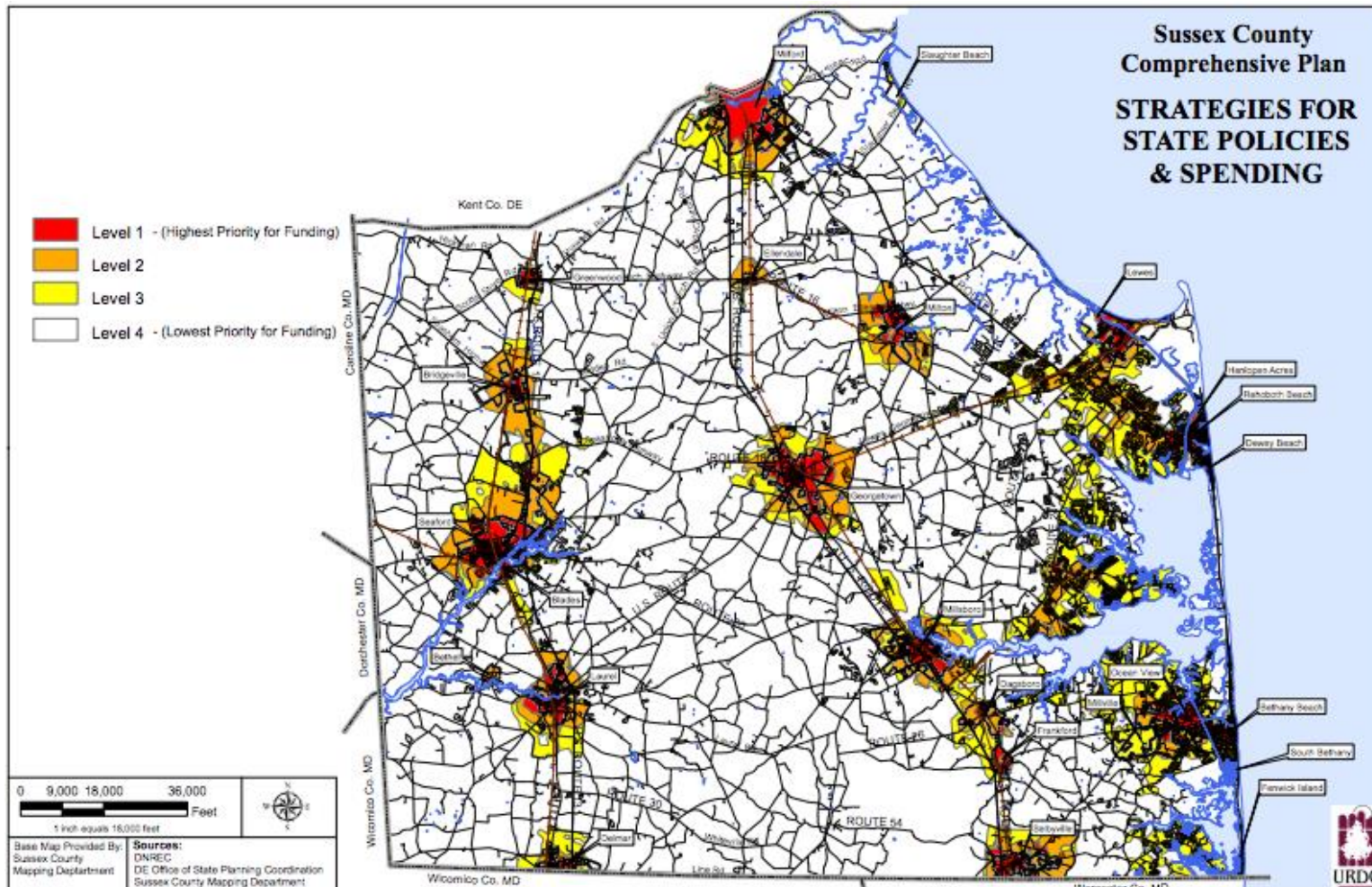


Figure 8 Delaware Strategies for State Policies & Spending, Sussex County
Source: Sussex County Delaware: Comprehensive Plan Update, 2008

Tracking Land Use and Growth

In order to evaluate the effectiveness of SSPS and PLUS, the state contracts with IPA to collect building permits and development approval data from all sixty local jurisdictions since 2008. From 2008 to 2013 local governments approved 32,042 residential units for future development, 20,202,617 square feet of new building. New Castle County accounted for 44% of these units, or 13,959. 88% of 28,150 units were in growth areas (L1 and L2). 99% were in Levels 1-3. In Sussex 66% were in Levels 1-3.

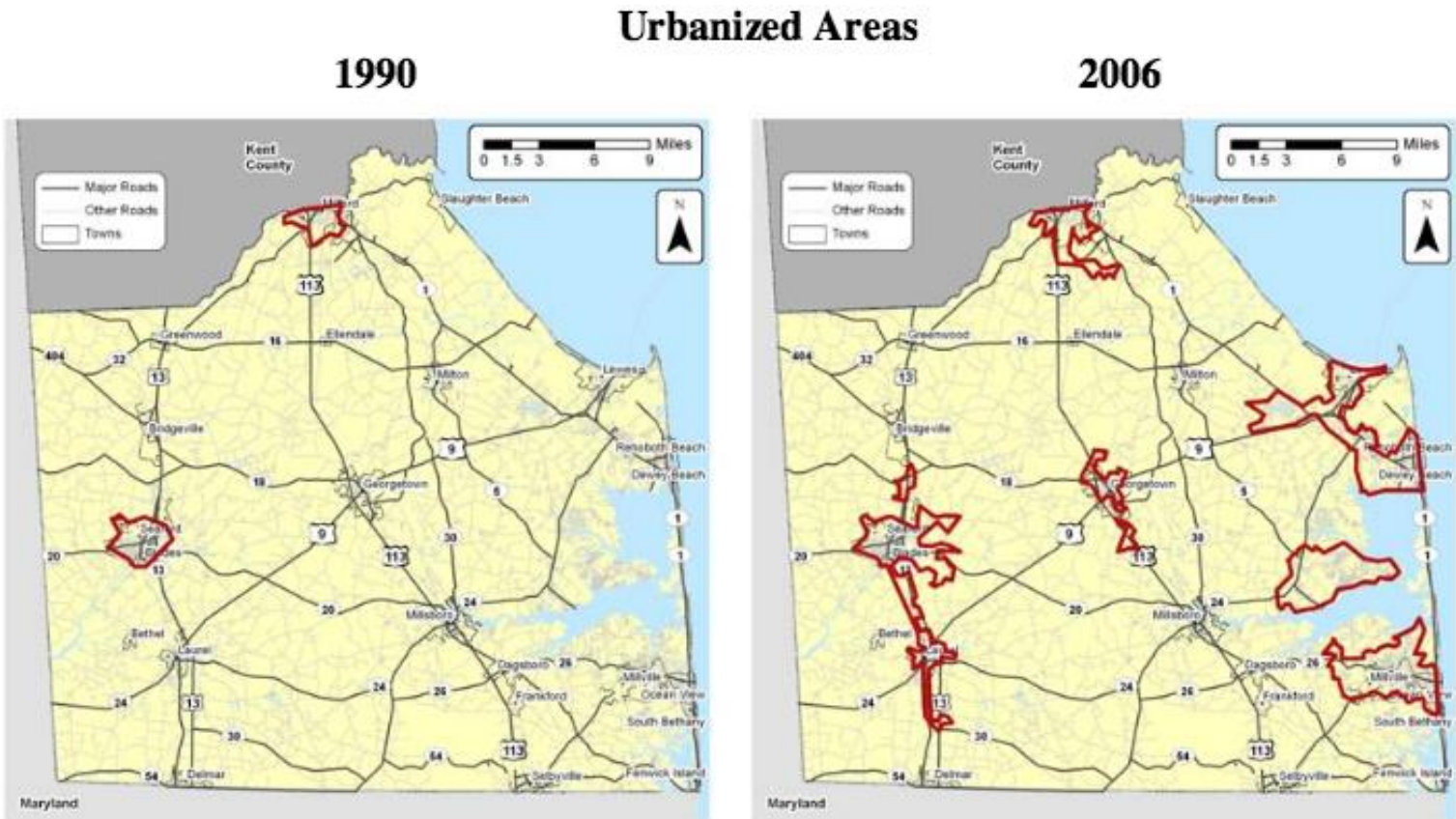


Figure 9 Urbanized Growth in Sussex County, 1990-2006
 Source: Sussex County Delaware: Comprehensive Plan Update, 2008

Transit Oriented Development

The distortions currently seen in the transportation market have the tendency of resulting in low-density development that discourages fixed-route transit. This further disadvantages those who are transportation-disadvantaged because it results in individuals paying more for transportation than they can afford taking fewer trips than is optimal.

In a widely-known investigation of transit densities, Pushkarev and Zupan recommended minimum residential units per net acre and the gross size of a jurisdiction's central business districts ("Transit-Supportive Densities and Land Uses," 2015). The authors found that in order to support minimum bus service, which means 20 buses a day, a jurisdiction with a 10 million square foot non-residential central business district there is a needed density of four units per net acre. To support intermediate bus service, which means 40 buses a day, 7 units per net acre are necessary, and to support frequent bus service 15 units per net acre are necessary.

Mode	Service	Minimum residential units per net acre	Remarks
Local Bus	Minimum (20 bus/day)	4	10 million non-residential CBD s.f.
Local Bus	Intermediate (40/day)	7	
Local Bus	Frequent (120/day)	15	35 million non-residential CBD s.f.
Express Bus (foot)	Five buses in two hour peak period	15 (2 square mile area)	50+ million non-residential CBD s.f.
Express Bus (auto)	5-10 buses in two hour peak period	3 (20 square mile area)	10 to 15 miles from CBD (preferably 20+ million non-residential CBD s.f.)
Light Rail	5 minute peak-hour headways	9 (corridor of 25 to 100 square miles)	20 to 50 million non-residential CBD s.f.
Heavy Rail Rapid Transit	5 minute peak-hour headways	12 (corridor of 100 to 50 square miles)	50+ million non-residential CBD s.f.
Commuter Rail	Twenty trains per day	1 to 2	Only to largest downtowns

Figure 10 Transit-supportive Densities
Source: Transit-Supportive Densities and Land Uses, 2015

In the 1990s transit oriented development (TOD) emerged as a way encourage transit use by building dense housing within walking distance of transit stations and hubs. One of the leading voices in the movement was Peter Calthorpe who defined transit-oriented development as

Mixed-use community within an average 2,000-foot walking distance of a transit stop and a core commercial area: TOD and mixed residential, retail, office, open space, and public uses in a walkable environment making it convenient for residents and employees to travel by transit, bike, foot, or car (Renne & Wells, 2002,).

Since the early 1990s, TOD has been adopted by jurisdictions across the United States, including New Jersey. In 1999, New Jersey adopted two planning proposals that encouraged transit oriented development, Transit Friendly Planning Land Use and Development process (TFPLUT) and the Transit Village Initiative.

TFPLUT focused on partnerships. At the state level transit agency conducts vision planning and encourages local governments to do next step with transit-supportive zoning changes (WSP-Parsons Brinckerhoff, Cervero, GB Place Making, & The Overhead Wire, 2016). The goal was to increase transit ridership. The program provides transit-friendly planning assistance to help municipalities create and implement community based plans to guide growth where transit exists. A significant number of localities that engage the TFPLUT process end up adopting a transit villages model (WSP-Parsons Brinckerhoff et al., 2016).

Transit Villages Initiative encourages local government adoption of Transit-Oriented Development in government master planning, zoning code, and redevelopment plan and the creation of TOD-friendly design guidelines. The transit

villages initiative creates incentives for municipalities to redevelop or revitalize areas around transit stations using design standards of Transit Oriented Development (State of NJ). To qualify as Transit Village Municipalities must:

- Attend pre-application meetings with transit village coordinator
- Identify existing transit
- Demonstrate municipality willingness to grow
- Adopt TOD redevelopment plan or ordinance
- Identify specific TOD sites or projects
- Identify bike and pedestrian improvements

Conclusion

The auto-centric paradigm is primarily concerned with moving vehicles as quickly as possible from point A to point B. The problem with this is the auto-centric paradigm has undervalued planning communities in which driving is not necessary. As a result the auto-centric paradigm has created residential neighborhoods that are far away from employment, shopping, and service centers, a phenomenon that the Brookings Institute has termed location inefficiency (Belzer & Autler, 2002). Transit oriented development corrects this market distortion by making it efficient to take train, bus, walk, or bike. For transportation-disadvantaged communities, these are positive steps that should be looked into.

Chapter 4

MOBILITY MANAGEMENT

Mobility management is a strategic approach to public transportation designed to increase efficiency, effectiveness, and accessibility (Sen, Majumdar, Highsmith, Cherrington, & Weatherby, 2011). It proposes to do so by broadening the concept of public transportation beyond solely providing fixed-route service to include coordinating all transportation resources in a community. However, industry-wide standards for mobility management performance measures are not yet established (Ellis, 2009b; Sen et al., 2011). Embracing all available transportation options, whether private, non-profit, or public as available resources to transport individuals and groups of people requires that specific mobility management practices be rooted in the needs of local communities and individuals (Ellis, 2009b; Sen et al., 2011). Bill Millar, former president of the American Public Transportation Association, defined mobility management this way:

Mobility management involves creating partnerships with transportation providers in a community or region to enhance travel options, and then developing means to effectively communicate those options to the public (Sen et al., 2011, 9).

As Millar points out, mobility management takes a broad approach to transportation, citing “travel options” as the means of moving people around in a given area. Travel options could mean walking, biking, or taking the bus or train in order to get people where they need to go. Further, mobility management involves

engaging transportation providers to find creative ways to streamline service or provide additional service.

Millar's definition is far from the only definition of mobility management available. A 2011 Texas Transportation Institute study of mobility management performance measures defines mobility as:

Mobility management is an innovative approach for managing and delivering coordinated transportation that embraces the full family of transportation services. Mobility management emphasizes the movement of individuals through a wide range of transportation options and service providers, in order to achieve a more cost-effective and efficient transportation system (Sen et al., 2011, 2).

The Texas Transportation Institute (TTI) emphasizes coordinating rather than creating partnerships, as Millar does. Further, TTI emphasizes cost effectiveness, whereas Millar does not mention cost. Finally, Millar includes communicating coordination decisions to the public, which is not mentioned by TTI.

Finally, the National Resource Center for Human Transportation Coordination's definition of mobility management (NRC). The NRC's definition includes the following (Ellis, 2009b):

- The movement of people instead of vehicle
- Customer needs and the discrete travel needs of individual consumers
- Focusing on the entire trip rather than one portion
- Improvements to the effectiveness, efficiency, and quality of the travel service being delivered
- Design and promotion of transit-oriented development, livable communities, and energy efficient sustainable communities

In order to implement these goals mobility management urges collaboration between public and private partners, greater use of information technology, travel

demand management, transportation management associations, and transportation coordination (“Q&A on Mobility Management,” n.d.; Sen et al., 2011).

While there are models that take a broader understanding of mobility management articulated by the National Resource Center for Human Services Transportation Coordination, emphasizing both the coordination of transportation services as well as the coordination of transportation and land use planning.

Transportation Coordination

As a governmental strategy towards transportation, mobility management was introduced by the Intermodal Surface Transportation Efficiency Act in 1991, which embraced the notion that more multimodal transportation options were needed across the United States (Ellis, 2009b; Sen et al., 2011). In 2005, the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU) went a step further by including the hiring mobility managers as an eligible activity in the Federal Transportation Agency’s (FTA) three specialized transportation programs – S. 5310, JARC, and New Freedom (Ellis, 2009b).

Transportation Coordination Councils

Transportation coordination is currently applied at the national, state, and regional levels (National Conference of State Legislatures, 2015). At the national level there is the Federal Coordinating Council on Access and Mobility (CCAM). Formed in 2004, CCAM was comprised of 11 federal departments and 60 federal programs by

Executive Order 1330 of President George W. Bush. CCAM was chaired by the Secretary of Transportation, and composed of the Secretaries of Health and Human Services, Education, Labor, Veterans Affairs, Agriculture, Housing and Urban Development, Interior and Justice as well as the Commissioner of the Social Security Administration and the Chairperson of the National Council on Disability (“CCAM Overview,” 2015). The goals of the CCAM are to:

- Simplify customer access to transportation,
 - Reduce duplication of transportation services
- Streamline federal rules and regulations that may impede the coordinated delivery of services, and improve the efficiency of services using existing resources (“CCAM Overview,” 2015).

One of the main CCAM initiatives, United We Ride, created many state and local transportation coordinating councils (National Conference of State Legislatures, 2015).

State transportation coordinating councils are multidisciplinary, statewide, ongoing initiatives (National Conference of State Legislatures, 2015). They are multidisciplinary in that they involve coordination among diverse transport and human services providers and ongoing in that the process of how best to coordinate transportation an active process, rather than sporadic (National Conference of State Legislatures, 2015). The common goal of state coordinating councils is to achieve effective, efficient, and accessible transportation service. Effective is that they link riders to destinations, efficient with taxpayer dollars, and accessible in that services are easy for riders to navigate and use (National Conference of State Legislatures, 2015).

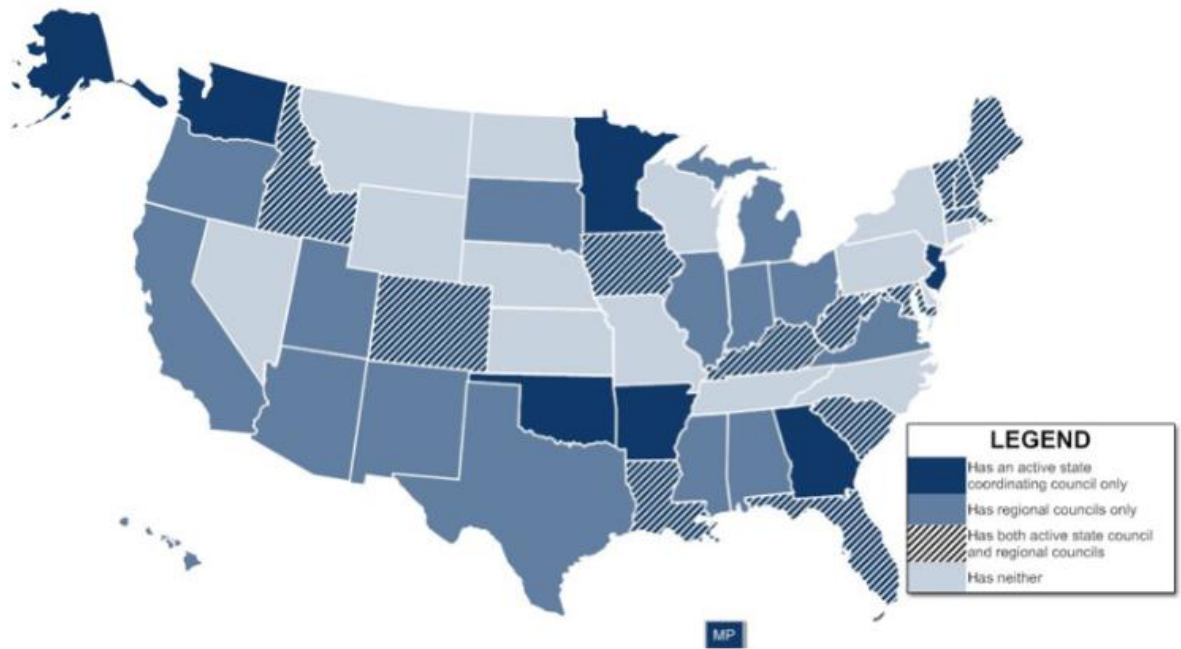


Figure 11 State and Regional Coordinating Councils
Source: NCSL, 2014

Figure 11 highlights states that have an active state coordinating council, does that have a regional coordinating council, those that have both, and those that have neither. Of the 20 active state coordinating councils in the United States, there are key differences in membership, core duties and responsibilities, and whether they were established by a legal mandate (National Conference of State Legislatures, 2015).

Like CCAM, many state coordinating councils are comprised of State Departments of Transportation, human services agencies, state legislators, and possibly members of the governor's office (National Conference of State Legislatures, 2015).

The most common duty is identifying gaps and duplication of services, maximizing efficient use of resources, and planning (National Conference of State Legislatures, 2015). Planning is a crucial aspect for some councils because Enhanced Mobility of Seniors and Individuals with Disabilities grant program (49 U.S.C. § 5310) will only fund projects included in a coordination transportation plan, while Moving Ahead for Progress in the 21st Century Act (MAP-21), requires grant applicants to approve coordinated plans through a process that includes participation by older adults, people with disabilities, transportation and human services providers, and other members of the public (National Conference of State Legislatures, 2015). Findings from a 2011 National Cooperative Highway Research program survey reports that 55% of respondents say that coordination in their jurisdictions was better as a result of having gone through the planning process (National Conference of State Legislatures, 2015).

Benefits and Challenges of Transportation Coordination

State coordinating councils provide benefits to improve human services transportation systems by strengthening communications, solving mutual challenges, and improving mobility. The increased effectiveness of the transportation services benefits the community at large by increasing access to employment. State coordinating councils strengthen communication by providing greater access to information. Bringing multiple agencies and providers together makes it possible to identify gaps in service and learn about previously unknown transportation providers

and funding opportunities. Further, bringing providers together helps in solving problems facing the group at large. One provider may bring an issue to the table that will solve the same problem for a number of agencies. Addressing mutual challenges allows providers to deliver more efficient and effective services. The increased effectiveness of human services transportation systems increases access to employment for transportation-disadvantaged (National Conference of State Legislatures, 2015).

Benefits of Multi-level Coordination Strategies

20 states have only state coordinating councils, 13 have both state and regional councils, 15 states have just regional councils, and 15 have neither state nor regional councils (National Conference of State Legislatures, 2015). The advantages of having both a state and regional councils are that different stakeholders can focus on different issues. State councils tend to focus on coordinating federal initiatives and local efforts (National Conference of State Legislatures, 2015). Additionally, state councils create an environment supportive of coordination through state policy and the regulatory framework have state agencies as core members, ensuring consistent statewide requirements (National Conference of State Legislatures, 2015).

Implementation Challenges

A major challenge is dealing with the complexity of many systems with alternative ways of organizing transportation provision. A number of states use

transportation brokers for the non-emergency Medicaid transportation. States are locked into contracts and there are brokers who refuse to coordinate with other agencies (National Conference of State Legislatures, 2015).

Another challenge concerns whether there is a state mandate for transportation coordination. While certain states mandate coordination, not all do. In states where there is no mandate to coordinate many agencies comes to the table with a defensive attitude, thinking that coordination means their services are no longer needed.

The Need for Transportation Coordination

The need for transportation coordination is apparent in the area of specialized transportation, where many entities respond to the needs of the transportation-disadvantaged. In fact, there are 80 federal programs that fund human services transportation for the transportation-disadvantaged, however only four explicitly state transportation for the transportation-disadvantaged as their express purpose: Elderly Persons and Persons with Disabilities, Job Access and Reverse Commute Program, Capital and Training Assistance Program for Over-the-Road Bus Accessibility, and the New Freedom Program (GAO, 2012). All four of the programs are housed in the Federal Transit Administration (GAO, 2012). 73 of these programs primarily provide a variety of human services, hence the term, which incorporate transportation as an eligible program expense to ensure program participants access to a service (GAO, 2012).

The federal government spends \$11.8 billion directly on 28 specialized transportation programs. These expenditures, however, are much less than the total amount spent on specialized transportation since there are 52 additional federal programs that partially include specialized transportation.

The response from many entities fulfills a need, but also produces a complex, piece-meal approach (National Conference of State Legislatures, 2015). Public or private agencies that administer or refer clients to human service transport may have different goals, serve different populations, and receive funds from different sources that have different rules and restrictions (National Conference of State Legislatures, 2015). Vehicle needs, operating procedures, routes and other factors vary greatly across organizations. Services overlap in some areas and are absent in others. Funding shortfalls, policy implementation failures and lack of coordination can leave many in need without options. As a solution, state and local governments formed transportation coordinating councils in order to improve resource management, share power and responsibility among agencies, and share management and funding (National Conference of State Legislatures, 2015).

Transportation Coordination Plans

The federal government provides guidance on producing transportation coordination plans to state or local entities. The guidance specifies that plans should contain specific planning elements, including identification of transportation needs,

strategies for meeting those needs, and prioritization of transportation services for funding and implementation. Plans must also be produced with the involvement of private, non-profit, and public providers as well as members of the public representative of targeted populations. The key aspect of the federal government's guidance is that a coordination plan should maximize the program's collective coverage by minimizing duplication of services. Coordination plans are only required in communities seeking 5310 funding, though coordination plans should incorporate activities offered under other programs sponsored by federal, state, and local agencies. Determining who should be the lead agency is made at the state, regional, and local level.

For traditional 5310 projects, the FTA guidelines identify filling gaps in service and ridership as the two main performance measures. For other 5310 projects performance measures include increases or enhancements to geographic coverage, additional changes to physical infrastructure, and actual or established number of riders.

Two of these programs, New Freedom and JARC, were recently consolidated into the Elderly Persons and Persons with Disabilities under the FAST Act, enacted in December, 2015. Both of these programs were introduced in the 2005 authorization of the federal transit administration, titled the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). The Job Access and Reverse Commute program, then Section 5316, purchased small vans and buses to assist low-income workers to seek and to maintain employment. While the New

Freedom program, (Section 5317), allocated funds designed to provide expanded service in both geographic coverage and hours or days of service (GAO, 2012). The program was specifically targeted to transporting people with disabilities beyond requirements of the Americans with Disabilities Act (ADA). The goal of Section 5310, According to Federal Transit Administration guidelines (FTA C 9070.1G), is to improve mobility for seniors and individuals with disabilities throughout the country by removing barriers to transportation services and expanding transportation mobility options (“Enhanced Mobility of Seniors and Individuals with Disabilities Program Guidance and Application Instructions,” 2014).

The Enhanced Mobility of Seniors and Individuals with Disabilities program was started in 1975, originally Section 16(b)(2) now (Section 5310), to allow non-profit agencies to purchase vehicles in order to offer demand-response service to increase the mobility of transportation disadvantaged populations, in this case seniors and individuals with disabilities (“Federal Transit Administration,” 2016). In particular, the federal government’s Enhanced Mobility of Seniors and Individuals with Disabilities Program, Section 5310, has increasingly asked grant recipients to coordinate with one another and has asked that state and local governments to oversee and collect data on coordination. Transportation coordination refers to strategies that synchronize various transit operators in a given jurisdiction (“Federal Transit Administration,” 2016).

Transportation Coordination in Delaware

As previously stated, Delaware utilizes the federal government's 5310 program, with non-profit providers throughout the state receiving vehicles to provide services not covered by the ADA. Though, it must be noted that in Delaware much more service is provided by ADA paratransit services than other states.

In addition, Delaware is not recognized as engaging in transportation coordination strategies by NCSL. NCSL does not recognize any organization in Delaware as transportation coordination council. However, Delaware does have a standing committee called the Elderly and Disabled Transit Committee (EDTAC), which meets on a regular basis. EDTAC discusses current issues impacting individuals with disabilities that are utilizing DART paratransit services as well as fixed route bus services. The EDTAC is comprised of riders, DART First State staff, and representatives from agencies working with the aging and disability communities (DART, 2016).

Chapter 5

METHODOLOGY

A formative framework for evaluating state coordination policies was introduced by Scholssberg (2004). Scholssberg studied the coordination policies of Ohio, Florida, and Michigan. Ohio had an incentive-based coordination policy, Florida a mandated policy, and Michigan a laissez-faire policy (Scholssberg, 2004). Through archival data, interviews, and focus groups Scholssberg found that the state level involvement in Ohio and Florida contributed to the success of specialized transportation services (Scholssberg, 2004).

There are differences and similarities between Scholssberg's study and the present study. Scholssberg focuses on coordination policy while this thesis focuses on the institutional design of coordination. However, both Scholssberg's study and this thesis are both concerned with whether coordination leads to increased effectiveness of specialized transportation systems (Scholssberg, 2004).

In order to explore the institutional effects of state transportation coordinating councils, this thesis conducts comparative institutional analysis. The study assesses the impact of state coordinating councils on the effectiveness of specialized transportation systems. Based on the findings of NCSL describing the benefits of both state-wide coordinating councils and multi-level coordination strategies, this thesis hypothesizes that a county which operates in a state-wide coordinating structure will offer more

effective specialized transportation than a county that does not operate in a state-wide coordinating structure.

My independent variable is whether a state has an active state-wide coordinating council. I will also include average income and density as independent variables because as has been indicated above, income and population density have significant effects on specialized transportation.

Comparative Institutional Analysis

In order to compare counties, counties were selected that have similar population sizes and similar average incomes. The two counties selected for comparison are Montgomery County, Virginia and Washington County, Maryland. Montgomery County, VA is an example of a county with active regional coordinating councils, but no state coordinating council, while Washington County, Maryland is an example of a multi-level coordination, with both a state coordination council and regional coordinating councils (Scholssberg, 2004). Further, the counties have similar population densities. Washington County has a population density of 322.1 people per square mile while Montgomery County has 243.9 people per square mile. Finally, Washington County has a median income of \$55,609, and Montgomery County has a median income of \$45,543 (U.S. Census, 2015).

Table 2 Geographic and Population Figures for Washington County, Md. and
Montgomery County, Va.
Source: U.S. Census, 2016

	Population Density (per sq. mile)	Sq. Miles	Population
Washington County, Md.	322.1	468	149,000
Montgomery County, Va.	243.9	388	96,000

Performance Measures

Six key performance data points for rural demand response transportation: (1) vehicle-hours; (2) vehicle-miles; (3) passenger trips; (4) total operating expense; (5) accidents/safety incidents; and (6) on-time trips.

Vehicle-hours is a measure of the amount of time a vehicle is in service starting with the time the vehicle leaves a garage to the time it pulls into the garage after completing service, including deadhead time. Vehicle Revenue Hours is a similar measure, except this measure excludes deadhead time and lunch breaks. The clock starts when the first passenger is picked up and runs until the last passenger is dropped off. Vehicle hours are obtained from vehicle operator logs, logs should report scheduled time off. If volunteers or taxis are used to provide Demand Response Transportation, their time is counted as vehicle-hours. The National Transit Database (NTD) uses vehicle revenue hours as an official performance measurement, rather than vehicle hours, except for the 2008 figures. The 2008 National Transit Database defines Vehicle Revenue Hours as vehicle hours (Ellis, 2009a).

A similar distinction is made between vehicle-miles and vehicle revenue miles. Vehicle miles measures of number of miles a demand-response transit vehicle travels beginning when the vehicle leaves a starting location until the time it pulls in after completing service. Vehicle miles includes deadhead miles needed to travel to the first-pick up location and the last drop-off location, while vehicle revenue miles does not. Again, the Rural NTD asks for the revenue-based version of this measure. If volunteers or taxis are used, their distance traveled are counted (Ellis, 2009a).

There are several issues with the performance measures of hours and miles. First, at times transit agencies include operator pay hours instead of vehicle revenue or vehicle-hour data. This is inaccurate because operator pay hours tend to run longer than vehicle hours, due to maintenance or office work. Further, issues regarding the estimation of hours and miles data, incorrect treatment of lunches and breaks, and incorrect calculation of total vehicle-miles can also occur (Ellis, 2009a).

Passenger trips, or unlinked passenger trips, refers to ridership. It is a count of the number of passengers who board the DRT vehicle. Volunteer and taxi usage should count towards passenger trips. The issues with passenger trips is mistakenly counting only round trips and using an incorrect definition of passengers (Ellis, 2009a).

Total operating expenses, or total operating costs, include those costs needed to operate and administer transit services day to day. These costs include salaries and wages, fringe benefits, materials and supplies, insurance, taxes, and outside services such as cleaning and utilities. Rural NTD, however, does not ask reporters for

operating costs by mode. Rather, rural NTD asks for the annual operating expenses for all the rural transit services operated, including DRT. The issues are the poor cost allocation of joint expenses and the inclusion of capital charges in purchased transportation costs (Ellis, 2009a).

Finally there are the number of accidents or safety incidents which occur, and on-time trips. On-time trips refer to the number of trips at the scheduled pick-up location within the DRT system's definition of on-time. This window varies from agency to agency (Ellis, 2009a).

Table 3 Performance Measurement Descriptions
(Ellis, 2009a)

Measure	Definition
Passenger trips per vehicle-hour	$\text{Productivity} = \text{Total passenger trips} / \text{Total vehicle-hours}$
Operating cost per vehicle-hour	$\text{Operating cost per vehicle hour} = \text{total operating cost} / \text{total vehicle-hours}$
Operating cost per passenger trip	$\text{Operating cost per vehicle-mile} = \text{total operating cost} / \text{total vehicle-hours}$
Safety incidents per 100,000 vehicle miles	$\text{Safety incidents per 100,000 vehicle-miles} = \text{NTD reportable safety incidents} / \text{total vehicle-miles} * 100,000$
On-time performance	$\text{On-time performance} = (\text{total on-time trips, including no-show}) / (\text{total completed trips} + \text{no-shows} + \text{missed trips})$

In order to measure the effectiveness of county-level specialized transportation systems the study will use the measure of on-time trips. An on-time trip is one that arrives at its destination within the local transit organizations definition of on-time (Ellis, 2009a). The NCSL report cited earlier in the proposal defined effectiveness as “getting users where they want to go” (National Conference of State Legislatures, 2015). This loose definition of effectiveness neglects the time component of transportation service delivery. If a rider has a medical appointment at a specific time, then simply dropping that rider to the location of their appointment at any time is ineffective. The service must be able to get the person to their appointment at a given time. Therefore, a measure that makes arrival at the correct location at a specified time is necessary. The measure of on-time trips meets both the requirement of arrival at a specific location and arrival within a specified time.

Chapter 6

CASE STUDIES

Federal requirements for the 5310 program stipulate that local or regional transportation coordination plans must identify the transportation needs of individuals with disabilities, older adults, and people with low incomes. Further, plans must provide strategies for meeting those needs and prioritize the funding and implementation of those strategies. In both cases, Washington County, MD and Montgomery County, VA the federal requirements of a ridership needs assessment and a service offerings, capacities, and strategic planning assessments were conducted. In both cases, strategic planning assessments included the identification of service gaps. Finally, in both cases, priorities for implementation based on resources, time and feasibility were stated (MTA, Office of Local Transit Support, 2010).

In the following section, the details of these assessments are provided. Special attention is paid to the strategies that came out of coordination councils. A key limitation of this study is that on-time performance data was not available. In addition, a study by the Transit Cooperative Research Program (2009) questions of the reliability of the National Transit Database's paratransit data (Ellis, 2009a).

Washington County, Maryland

Washington County is located in the western region of Maryland. The largest city is Hagersberg.

Demographics

Mapping the population density of potential transit-dependent persons allows for assessment of whether fixed-route service is appropriate for particular areas because density is a significant factor in fixed-route service. The area may not have enough density for fixed-route service, but may have populations in need of transit service. A key challenge for the western Maryland region is how to provide comprehensive transit services for a low-density population living in a large area whose destinations are also spread across the region.

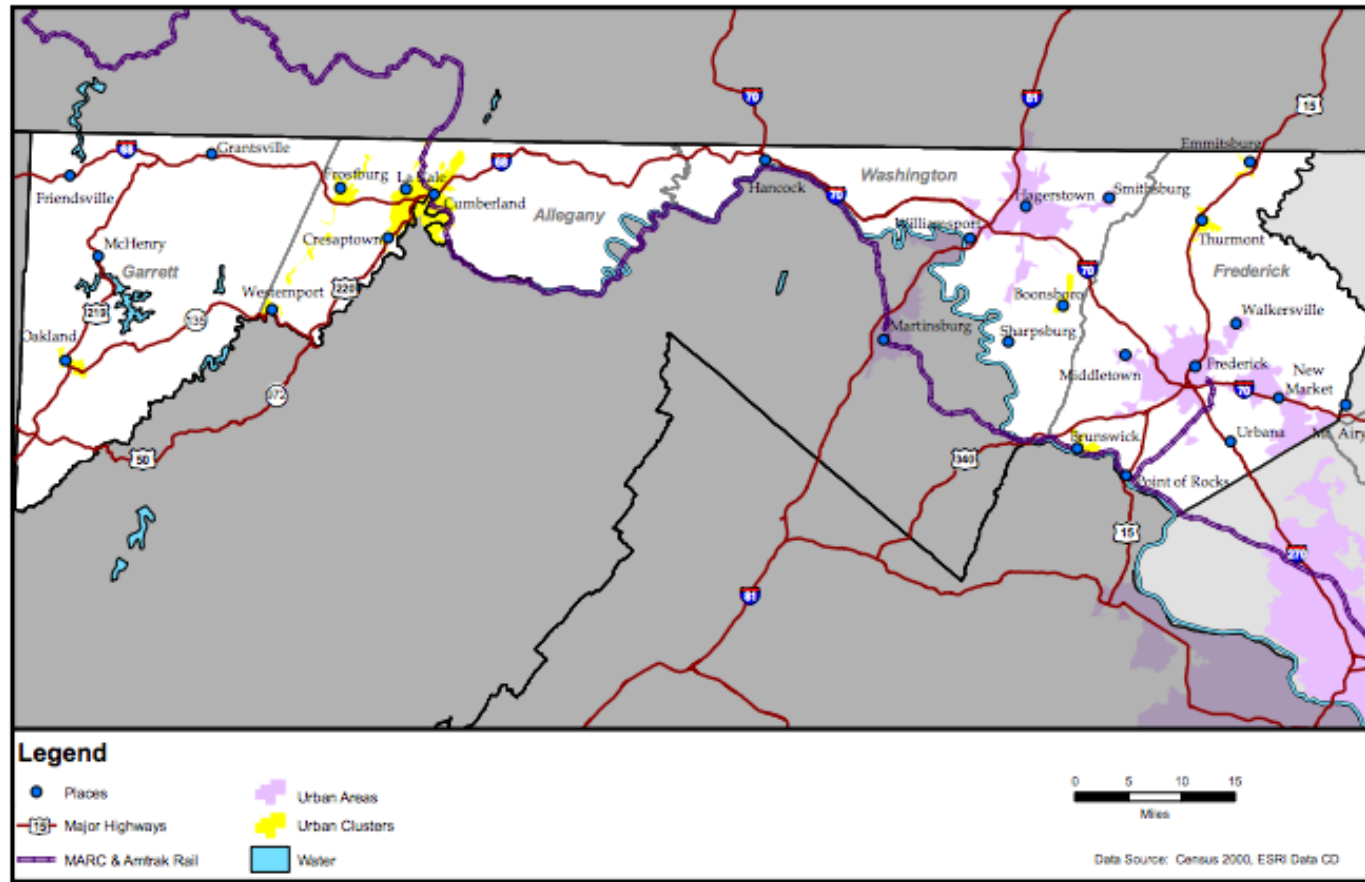


Figure 12 Map of Washington County, MD
 Source: MTA, Office of Local Transit Support, 2010

Current Services and Programs

The Washington County Transit system, known as the County Commuter, provides fixed-route and paratransit service from 6:00 a.m. until 9:45 p.m. on Monday through Friday, and from 8:00 a.m. until 9:45 p.m. on Saturday. County Commuter headways vary from 30 to 60 minutes, the base fare is \$1.25 per trip, and complementary ADA paratransit services are provided. The base fare for ADA Complementary Paratransit is \$2.00 per trip (MTA, Office of Local Transit Support, 2010).

Table 4 Washington County, Md. Transit Figures 2014
Source: National Transit Database

	Para	Fixed-route	Commuter	Total
Actual Cost	220	1,555	-	1775
Proportional	12%	88%	-	-
Ridership	437	13	-	-
Cost Per Rider	17	4	-	-

The specialized transportation providers in Washington County include, County Medical Transport, Mid-Maryland Medical Transport, and North Star Limousine.

The 5310 providers in Washington County include The ARC of Washington County, Easter Seals, Horizon Goodwill Industries, Turning Point of Washington

County, Washington County Commission on Aging, and Washington County Community Action Council.

There are two JARC projects in the region. The first is the Hopewell Express, which is a free employment transportation program. The Hopewell Express assists individuals seeking employment or employed at businesses located in the Hopewell Road area of Washington County, specifically employers in the Newgate/Hunters Green Business Park. The second is Community Access Transit (CAT). This service provides transportation services to elderly, disabled, and low-income citizens of Washington County, Frederick County, and rural areas of Western Maryland who otherwise do not have access to transportation (MTA, Office of Local Transit Support, 2010).

Transportation Coordination

Like many states, Maryland's transportation coordination push came in response to the federal requirements under SAFETEA-LU that in order to be eligible for specialized transportation grant programs (5310, JARC, New Freedom) jurisdictions must submit a coordinated human service transportation plan. Maryland's method of compliance with federal transportation coordination regulations is formally authorized by executive order. The original Executive Order was signed in 2007 by Governor Bob Ehrlich and was updated in 2010 by Governor Martin O'Malley. The 2010 update added several more members to the statewide committee, but did not substantially alter the scope of the committee. The charge of the committee is to

examine the needs of citizens who are elderly or disabled and require transportation in order to access jobs, medical and health appointments and other programs requiring the transportation of individuals who qualify as transportation disadvantaged.

The committee is responsible for completing a five-year human services transportation plan. The MTA is a designated recipient for Section 5310 funds; however, the Maryland Interagency Committee on Specialized Transportation is responsible for the management of the program. The committee reviews, evaluates, and selects private, non-profit organizations for funding under the 5310 program. In addition, it develops criteria and establishes the process for candidate projects. The plan includes information on many transportation services offered in the region. The plan was first written in 2007 and updated in 2010. The 2010 plan reaffirms unmet transportation needs and strategies outlined in 2007, and reflects agreed upon modifications that came out of a 2010 regional transportation forum. The plan sets goals of providing cost-effective, affordable, high capacity, high quality easily understood, safe and accessible transportation and objectives to help transportation-disadvantaged citizens access jobs, education and training programs, healthcare services, and other activities.

Though not specifically stated in either executive order, Maryland Transit Administration's (MTA) Office of Planning/Statewide Planning Division with assistance from the KFH Group, transportation consulting firm, led the development of a statewide and six regional Coordinated Transportation Plans, one of which was the Western Maryland region, comprised of Garrett, Allegany, Washington, and

Frederick Counties (MTA, Office of Local Transit Support, 2010). The needs assessment collected census data detailing transportation dependent population segments and then mapped the findings to create a transit dependent profile. The analysis was presented at a regional transportation forum in March 2007. The forum participants provided input and prioritized unmet transportation needs.

Strategies

A demand-response taxi voucher program (Ride Assist) is available for the elderly and disabled through the MTA's Statewide Specialized Transportation Assistance Program. Taxi service runs Monday through Saturday from 6:00 a.m. until 10:00 p.m. The Ride Assist program supplements the transportation costs for those eligible to use the service. Currently, the cost of vouchers is \$3.75 for a book of vouchers valued at \$10.00.

County Commuter also offers a subscription service to Washington County residents enrolled in Temporary Cash Assistance customers and low-income persons by providing transportation to and from daycare facilities and work sites, called JOBS. The JOBS shuttle is operated using two vehicles and has been funded as a partnership between the County Commuter and the Department of Social Services.

Washington County Gaps in Service

Washington County's plan found services gaps in the following area. There were not enough wheelchair-accessible vans, as well as a need for additional

operational funding and marketing (MTA, Office of Local Transit Support, 2010).

Further, the assessment recommended the expansion of transit options in the following areas: along Hopewell Road, rural areas of the county, dialysis trips, greater night and weekends for all trip types, and greater access to employment opportunities.

New River Valley, Virginia

The New River Valley region of Virginia is the jurisdictional designation of the New River Valley Metropolitan Planning Organization (NRV MPO). The NRV MPO has 88,561 individuals under its jurisdiction, which classifies it as a small-urbanized, including Blacksburg, Christiansburg, Radford, portions of Montgomery and Pulaski counties. The NRV MPO is responsible for transportation planning and policy-making in the region. The region is home to two separate college towns; Blacksburg, home to Virginia Polytechnic Institute and State University and Radford, home to Radford University. The combination of college towns surrounded by rural, mountainous areas creates a challenging setting for providing public transportation.

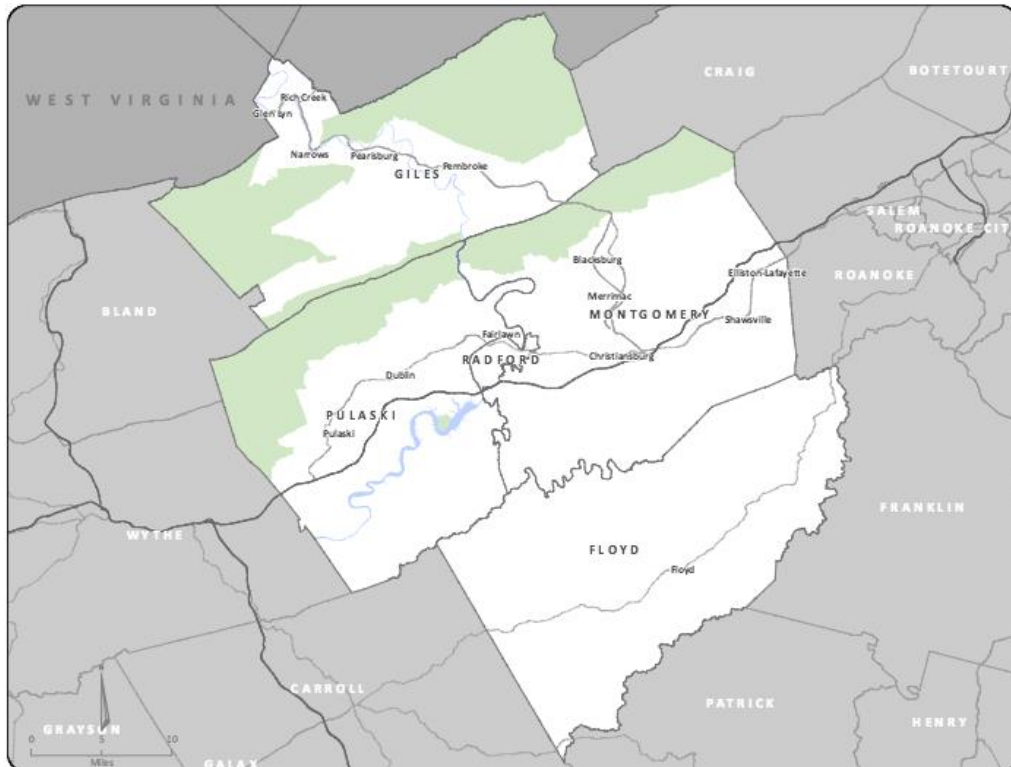


Figure 13 Map of Montgomery County, Va.
Source: “New River Valley (PDC 4) Coordinated Human Service Mobility Plan,” 2013

Demographics

Montgomery County’s demographic analysis focused on population density, and on potentially transit dependent populations like older adults, individuals with disabilities, those living below the federal poverty level, and auto-less households. The analysis used block group data from the U.S. Census, including Community Survey 5-year estimates (2005-2009) and the 2010 Decennial Census.

Montgomery County has block groups with low population density as well several with high population density. The northern block group has very high number of seniors and disabled people, but is primarily composed of higher income households. The poorer sections of Montgomery County are in block groups where there is higher population density. This is underscored by the very high number of auto-less households in higher population density sections of Montgomery County.

Prior to the 2010 census NRV MPO region was eligible for federal 5307 Rural Transportation Grant funding, however the recorded growth after the census resulted in Radford being designated from a rural area to an urbanized area eligible for 5311 Urban Transportation funding. The 2014 Transit Funding and Regional Coordination study examines how federal dollars can be split between organizations and how New River Valley can coordinate service (“New River Valley (PDC 4) Coordinated Human Service Mobility Plan,” 2013).

Prior to the 2010 census, the NRV region received \$1.9 million in federal funding. After the 2010 census it received \$1.5 million. The loss of federal dollars was \$400,000, and the total loss could be as great as \$800,000 due to the loss of local matching funds. The recommendation of the report is that funds should be split according to formula that considers population and population density. A three-year phase in from the current allocation to new allocation should be used (“New River Valley (PDC 4) Coordinated Human Service Mobility Plan,” 2013).

Current Services and Programs

Within the New River Valley there are multiple public transit systems, including Blacksburg Transit, Radford, Pulaski Area Transit, and Megabus. The presence of multiple public providers adds a layer to the coordination challenge. The region must consider how to coordinate non-profit and private providers with several different public systems. This differs from larger metropolitan areas where there is a single public provider.

Table 5 Montgomery County, Va. Transit Figures 2014
Source: National Transit Database

	Para	Fixed-route	Commuter	Total
Actual Cost	881,000	5,384,000	-	6,265
Proportional	14%	86%	-	-
Ridership	13,000	3,653,000	-	-
Cost Per Rider	28	2	-	-

The Blacksburg system serves Blacksburg and the Virginia Tech campus along with Christiansburg with funding assistance from Job Access and Reverse Commute (JARC). Operated directly by the town of Blacksburg, the Blacksburg system is the largest in the region with 11 fixed bus routes, a fleet of 44 vehicles, and an annual budget of \$6.3 million (*FTA S.5307 Transit Funding and Regional Coordination Study*, 2014). Blacksburg provides complementary ADA service within their service area. In fiscal year 2013, Blacksburg operated over 92,000 revenue service hours and

provided almost 3.5 million trips (*FTA S.5307 Transit Funding and Regional Coordination Study*, 2014).

The Radford system is significantly smaller, with six fixed-routes and a fleet of 14 vehicles and focuses on serving the Radford community (*FTA S.5307 Transit Funding and Regional Coordination Study*, 2014). With an annual budget of just over \$1.3 million, the Radford system provided just under 330,000 trips and operated over 30,000 revenue hours in fiscal year 2013 (*FTA S.5307 Transit Funding and Regional Coordination Study*, 2014).

The Pulaski area transit system is the rural public transportation provider in the New River Valley, connecting rural residents to the urbanized areas in the region. After starting service in 2005 with a budget of \$171,000 generated from the Virginia Department of Rail and Public Transportation grant funding, by fiscal year 2013 was the system's total budget was \$425,834, supporting 10 buses and providing 40 hours of service per day. A portion of those funds were received through the federal government's 5311 rural transportation grant program. Since 2013, 50% of funding has come from the 5311 program, 20% from DRPA, and 30% from the town of Pulaski ("Pulaski Area Transit," 2016). Finally, The Smart Way is a commuter bus system that links the Roanoke Valley to the New River Valley ("The Smart Way," 2016).

Transportation Coordination

The state of Virginia does not have a state transportation coordinating council, nor does the state require regional councils. However, the state did rally an effort to write regional plans after the passage of the SAFETEA-LU². In 2012, the New River Valley independently authorized a regional coordinating council. NRV MPO passed a resolution of endorsement creating the Regional Transit Coordinating Council, responsible for facilitating regional dialogue, coordinate planning efforts, and informing transit partners (*FTA S.5307 Transit Funding and Regional Coordination Study*, 2014).

The New River Valley region undertook a regional transit organization study, published in 2016. The purpose of the study was to evaluate long-term organizational models available for the region and specific partnerships that would benefit local committees. The principals of the study were the New River Valley planning district committee and the New River Valley Metropolitan Planning Organization. The committee included Montgomery County, Pulaski County, the City of Radford, the Town of Christiansburg, the Town of Blacksburg, Blacksburg Transit, Pulaski Area Transit, Community Transit, and The Smart Way.

² Passed in 2007, House Bill 226 requires the Commonwealth Transportation Board to cooperate with local, regional, or statewide agencies to establish specific mobility goals addressing the transportation needs of populations with limited mobility and incorporate such goals in the development and implementation of the Statewide Transportation Plan.

RTCC regularly meets to discuss public transit and serve as coordinator for governmental entities. The RTCC is made up on local governments, transit operators, transit managers, funding partners, and regional stakeholders. The Council receives support staff through a partnership between PDC and MPO.

The Regional Connection Study investigates existing and prospective future enhancements or changes to regional connections provided by Radford Transit, Blacksburg, and Pluaski. The objective is to expand the findings from the MPO split funding study, soon-to-be-completed Radford Transit TDP, and utilize Blacksburg Transit. Particular attention was to be placed on current and planned services could be used to make regular connections and plans to improve or provide improved user information.

Strategies

In order to fill these gaps, the plan proposes continued, if not expanded financial support for current transportation coordination and mobility management activities. It also called for new mobility management and transportation coordination programs, expanded availability of demand-response services, expanded use of volunteer drivers, and the establishment of a ride or car-sharing program for long-distance medical trips. Implementation of new public transportation services or provision of existing services on a more frequent basis, and expanded access to taxi and other private transportation operators were also proposed.

On-going Radford Transit was established in August 2011 through a joint partnership between the City of Radford and Radford University. The system is operated by New River Valley Community Services (NRVCS). The establishment of Radford Transit occurred after community stakeholders initiated a transit feasibility study for the City. The 2009 Transit Service Plan for City of Radford/Radford University recommended possible transit alternatives and organizational structures, and advised an application to DRPT for S. 5311 funding. Radford Transit offers deviated fixed route service from approximately 7:00 a.m. to 10:00 p.m. Mondays through Thursdays, 7:00 a.m. to 2:30 a.m. on Fridays and Saturdays, and 6:00 p.m. to midnight on Sundays. The Radford Transit schedule also varies with the Radford University semester schedule.

Chapter 7

CONCLUSION

The State of Delaware has been providing premium paratransit service since the mid-1990s. Over the last seven years of that service arrangement, the amount of money the state has spent on paratransit service has been almost identical, if not slightly greater, than expenditures on fixed-route bus service. Over the same time period, Delaware paratransit has served one customer for every ten customers served by fixed-route service. Thus, while paratransit service has provided a tremendous benefit to transportation-disadvantaged individuals eligible for paratransit service, it has constrained the resources spent on fixed-route service.

In this thesis I have explored different strategies designed to address the disparity between the cost per rider of paratransit service and the cost per rider of fixed route service. In other words, are there strategies to limit the growth of the cost of paratransit service without eliminating, or severely restricting, premium paratransit service?

I attempted to address this question by investigating the transportation environment in Sussex County, Delaware, where paratransit services are most expensive.

In order to broaden the scope of the study in a comparative direction, I explored paratransit and related transportation services in Montgomery County, VA and Washington County, MD. This comparison focused on the role of coordinating councils in the provision of transportation services. While these comparisons are not exhaustive, they do point out the uniqueness of Delaware's paratransit policy. In each of the comparators, coordination played a positive role in managing complex transportation services across areas that are rural but have urban centers. Sussex County, Delaware is a large, rural county without a comparable urban center. As a result, especially in light of the policy of providing universal paratransit services, there is high-cost and inefficiency in Sussex County compared to the other jurisdictions studied. It would not be overstated to characterize Delaware's paratransit policy as providing the equivalent of providing an urban level of service in a rural area (Ellis, 2009a). The gaps in services found in the two case study counties concerned a lack of wheelchair-accessible vans, underfunding of operations and marketing. These concerns are the exact inverse of the challenges posed by paratransit services in Sussex County where there is a state mandate to supply paratransit services to an ever-increasing demand.

This study has been framed in a wider context of paradigm change in the field of transportation. Challenging the dominant auto-centric paradigm that focuses on speed of travel for automobiles with all the attendant inefficiencies and land-use costs, a newer paradigm has emerged that is more holistic. The multi-modal paradigm prioritizes the movement of people and views automobiles as a single mode of

transportation along with public transportation and active transportation. One of the main ways in which this new paradigm is relevant to this thesis is the ways in which it links land use to transportation. Indeed, the problems associated with paratransit policy are in part due to the relationship between dispersed land use planning and auto-centric transportation.

The study sought solutions to this broader context with the mobility management solution of transportation coordination. An auto-centric solution could be the creation of a high-speed highway that connects Laurel to Rehoboth with exits in Georgetown and other small towns across Sussex County. However, the thesis argues that these types of solutions only exacerbate problems created by auto-centric thinking. Such a solution would enable faster paratransit services at very high cost. The challenge this thesis poses to policymakers is how to contain paratransit costs without drastically reducing service. The thesis argues that mobility management solutions focused on reducing trip distances and coordinating existing services provide solutions that are cost-effective.

Recommendations

Based on the conceptual framework and findings of this study, the following strategies should be implemented. The recommendations work separately as individual components, but also can be thought of as a strategy to improve coordination of paratransit services. The main idea of the recommendations is to present a strategy for transitioning paratransit riders from DART provided service to 5310 service. The

recommendations break down into four key points: establish a transportation coordination council, establish a dial-a-ride program, study rate hikes, and introduce an impact fee for service centers who establish outside state strategies Levels 1 and 2.

First, Delaware should establish a statewide transportation coordination council. While it is true that Delaware has a working group that includes transit providers and riders dedicated to discussing paratransit issues, the group does not produce transportation coordination plans. Introducing a transportation coordination council that is tasked with writing a localized transportation coordination plan similar to those written in the case study counties would allow Delaware to meet federal guidelines of the 5310 program.

In addition, a transportation coordination council would facilitate information sharing. Organizations asking for funds under the 5310 program would need to be part of the conversations regarding paratransit services. This would facilitate a dialogue regarding service duplication and possible ways to find efficiencies.

Though not required by the 5310, it would be beneficial to add common destination providers – i.e. representatives from dialysis centers and senior centers – to the transportation coordination council. Having common destination providers present at the transportation coordination council would allow for information regarding scheduling of trips to occur.

Finally, the establishment of a transportation coordination council would facilitate a conversation about establishing a coordinated dial-a-ride service that incorporates 5310 providers for non-ADA paratransit service. Such a service would

incorporate 5310 providers into DART's dispatching service, not unlike the service provided by Logisticare.

Forth, an analysis of the current rate hikes should be conducted in order to understand their impact. The reason for rate hikes on paratransit service is not to recoup more in fare box ratios, but rather to incentivize other modes of transportation. Research suggests that a 10% rate hike could result in a 4% decrease in ridership, however this research is dated and was conducted on fixed-route systems (Pham & Linsalata, 1991). Due to the limitations of the current research available on fare elasticity, Delaware could provide an interesting case study on the matter. The result of the study would allow Delaware to consider further rate hikes to Non-ADA paratransit service.

In addition, it is certainly the case that premium paratransit service provides a tremendous benefit to the disabilities community. However, that benefit comes at the expense of fixed-route service that can be utilized by the entire Delaware community. If Delaware is going to maintain premium paratransit service, it must do so in a way that attempts to limit the impact of the budget for fixed-route service. Therefore, an investigation should be conducted into routes that have been proposed in the last several years. If fixed-route service expansion has not been authorized, the investigation should include a determination as to why that has been the case.

Fifth, whether or not Delaware continues premium paratransit service, impact fees for paratransit service demand drivers should be imposed. The location of dialysis centers and other health clinics that rely on paratransit service must be monitored in

order to ensure that the chosen locations are efficient for the provision of paratransit service. One example of a transit impact fee comes from Broward County, Florida. Broward County essentially overlaid a transit impact fee program on a Florida road impact fee program structure. The fee is assessed in 10 transit concurrency districts and is based on the size of the development at the permit stage and the number of anticipated transit trips. Service must be spread throughout the 10 districts using the county's service standard of providing bus trips every half hour. The fee structure does not help very dense routes that need more than 30-minute service, especially at weekday peak hours, and mandates equivalent service in areas with little demand. In addition, there are developer concerns about the increased cost of new housing. Since new development adds to the tax base, if the impact fee prevented construction, jurisdictions would forego these benefits (Johnson & McDaniel, 2008). In Delaware's case, impact fees would be assessed at the licensing stage of development approval. In most localities, the entity responsible for land use and the entity responsible for transit are different. In Delaware, the current land use and transit regimes make such an impact fee plausible. In addition, no other jurisdiction has premium paratransit service.

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