

TRANSIT-ORIENTED DEVELOPMENT
POLICY ANALYSIS IN WASHINGTON D.C., METROPOLITAN AREA
BASED ON CASE STUDY AT THREE TRANSIT NODES

by

Qinghua Nian

A dissertation submitted to the Faculty of the University of Delaware in partial fulfillment of the requirements for the degree of Doctor of Philosophy in Urban Affairs and Public Policy

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TABLE OF CONTENTS

| | |
|----------------------|-------|
| LIST OF TABLES | xiv |
| LIST OF FIGURES..... | xvi |
| ABSTRACT..... | xviii |

Chapter

| | | |
|-------|---|----|
| 1 | INTRODUCTION | 1 |
| 1.1 | Introduction to Transit Oriented Development | 1 |
| 1.1.1 | Define Transit-Oriented Development | 1 |
| 1.1.2 | TOD Benefits | 2 |
| 1.2 | Focus of the Study | 4 |
| 1.3 | Literature on Various Dimensions of TOD Implementation..... | 6 |
| 1.3.1 | Transit Use in TOD | 6 |
| 1.3.2 | Land-Use, Socio-Economic & Economic Development Changes under TOD Planning | 8 |
| 1.3.3 | TOD Impacts on Regional Connectivity | 10 |
| 1.3.4 | Transit Agency Involvement & Its Role in TOD Process | 12 |
| 1.3.5 | Difficulties in TOD Policy Planning & Implementation..... | 13 |
| 1.3.6 | TOD Sites in Metropolitan Areas with Regional Transit Services..... | 16 |
| 1.3.7 | Literature on Specific Transit Stations | 17 |
| 1.4 | Research Framework, Methodology, Data Sources, and Chapter Outline..... | 20 |
| 2 | INSTITUTIONAL ENVIRONMENT OF TOD IN WASHINGTON, D.C., METROPOLITAN AREA..... | 24 |
| 2.1 | Washington D.C. Metropolitan Area | 24 |
| 2.1.1 | Political Subdivisions | 24 |
| 2.1.2 | Demographics | 25 |
| 2.2 | Economy..... | 29 |

| | | |
|-----------|---|----|
| 2.2.1 | Transit-Oriented Development in Washington D.C. Metropolitan Area | 30 |
| 2.3 | Federal & State Agencies Involved in TOD Implementation in Washington D.C., Metropolitan Area | 32 |
| 2.3.1 | Federal Government Involvement..... | 32 |
| 2.3.1.1 | FTA, FHWA and Transit-Oriented Development | 33 |
| 2.3.1.2 | Other Federal Institutions and Their Programs | 36 |
| 2.3.1.2.1 | Internal Revenue Service & Tax-Free Transit Benefits | 36 |
| 2.3.1.2.2 | Department of Housing & Affordable Housing Programs | 37 |
| 2.3.1.2.3 | U.S. Treasury & Tax Credit Programs..... | 37 |
| 2.3.2 | State Governments | 38 |
| 2.3.2.1 | Virginia State Department of Transportation & Its TOD Policy..... | 39 |
| 2.3.2.2 | Maryland Department of Transportation & Its TOD Policy..... | 40 |
| 2.3.2.2.1 | Introduction | 40 |
| 2.3.2.2.2 | TOD Programs..... | 41 |
| 2.3.3 | Private Sector | 45 |
| 2.3.4 | Non-Governmental Organizations | 46 |
| 3 | TRANSIT STATION AREAS IN WASHINGTON D.C., METROPOLITAN AREA..... | 49 |
| 3.1 | Metropolitan Planning Organization and Transit-Oriented Development..... | 49 |
| 3.1.1 | The Metropolitan Washington Council of Governments | 50 |
| 3.1.2 | The National Capital Region Transportation Planning Board | 51 |
| 3.1.2.1 | Institutional Structure of TPB..... | 51 |
| 3.1.2.2 | TPB & TOD Promoting Activities | 51 |
| 3.2 | Major Transit Agency in Washington D.C., Metropolitan Area | 53 |

| | | |
|---------|--|----|
| 3.2.1 | General Introduction of WMATA Metrorail System & The Stations | 53 |
| 3.2.2 | The Institutional Structure of WMATA | 55 |
| 3.2.3 | WMATA's TOD Efforts..... | 58 |
| 3.3 | Other Transit Agencies in Washington D.C., Metropolitan Area | 61 |
| 3.4 | Municipal Governments | 62 |
| 3.4.1 | Arlington County & TOD..... | 62 |
| 3.4.1.1 | Introduction | 62 |
| 3.4.1.2 | How Arlington County Government Defines and Participates into TOD Process | 62 |
| 3.4.1.3 | Institutions Participating in Transportation Planning..... | 63 |
| 3.4.1.4 | Institutions Participating in the Integration of Land-Use and Transportation | 64 |
| 3.4.2 | Montgomery County & TOD..... | 65 |
| 3.4.2.1 | How Montgomery County Defines and Participates into TOD Process | 65 |
| 3.4.2.2 | Institutions Involved into TOD Process | 66 |
| 3.5 | Institutional Structure for Transit Nodes..... | 68 |
| 3.5.1 | Transportation Policy Implementation in Washington D.C., Metropolitan Area | 68 |
| 3.5.2 | Land-Use Policy Implementation in Washington D.C., Metropolitan Area | 70 |
| 3.6 | The Importance of Cooperation..... | 71 |
| 3.6.1 | Government Cooperation..... | 72 |
| 3.6.2 | Public-Private Cooperation..... | 72 |
| 3.7 | Introduction of TOD Case Studies..... | 73 |
| 3.7.1 | Metro Nodes & Transit-Oriented Development | 73 |
| 3.7.2 | Metrorail Alignment Planning in Arlington and Montgomery County | 77 |
| 3.7.3 | Metro Station Planning in Arlington and Montgomery County..... | 79 |

| | | |
|-----------|--|-----|
| 3.7.4 | Why Choosing Ballston, Court House and Bethesda as Case Studied Areas..... | 81 |
| 4 | DETAILED CASE STUDIES: BALLSTON AND COURT HOUSE, ARLINGTON COUNTY, VIRGINIA | 84 |
| 4.1 | Introduction of Arlington County..... | 84 |
| 4.1.1 | Political Debate for TOD Planning Arlington County | 84 |
| 4.1.2 | Metro Station Area Planning & Development in Arlington County..... | 85 |
| 4.1.2.1 | Rosslyn-Ballston Corridor..... | 86 |
| 4.1.2.2 | The Introduction of Ballston & Court House Metro Station Areas | 90 |
| 4.1.2.2.1 | Ballston | 91 |
| 4.1.2.2.2 | Court House..... | 93 |
| 4.2 | Planning the Metro Station Areas in Arlington County, Virginia | 95 |
| 4.2.1 | Building up TOD Communities in Arlington County..... | 95 |
| 4.2.1.1 | Concentrating Development on Metro Station Areas | 95 |
| 4.2.1.2 | Zoning Ordinance to Promote Development & Affordable Housing at Metro Station Areas..... | 99 |
| 4.2.1.2.1 | Coordinated Mixed Use Zoning (C-O-A) to Stimulate Desired Mix of Development | 99 |
| 4.2.1.2.2 | High Residential Zoning (RA-H-3.2) for Low- & Moderate-Income Housing | 101 |
| 4.2.1.3 | Street Design to Improve Non-Auto Travel & Accessibility to Metro Stations..... | 102 |
| 4.2.2 | Building up Local Identity..... | 108 |
| 4.2.2.1 | Establishing Ballston as Retail Center in Arlington ... | 108 |
| 4.2.2.2 | Establishing Court House as Government Center in Arlington..... | 112 |
| 4.3 | How Metro Station Area Design Foster Public Transit & Other Travel Alternatives..... | 114 |

| | | |
|-----------|---|-----|
| 4.3.1 | Encouraging Transit Public Taking..... | 114 |
| 4.3.1.1 | Increasing the Level of Public Transit Services in Ballston & Court House | 114 |
| 4.3.1.2 | Strategies to Encourage Non-Auto Travel Alternatives in Ballston & Court House | 119 |
| 4.3.1.2.1 | Subsidizing Public Transit Taking | 119 |
| 4.3.1.2.2 | Travel Advisory Services in Ballston & Court House, Arlington..... | 121 |
| 4.3.2 | Providing Carpooling & Carsharing Choices around Metro Stations | 122 |
| 4.3.3 | Convenience for Bikers in Metro Station Areas | 125 |
| 4.4 | Results of Transit-Oriented Development Planning & Implementation in Arlington..... | 129 |
| 4.4.1 | Establishing Environment Fostering Non-Auto Travel Modes | 129 |
| 4.4.2 | Metrorail Connection to D.C., Metropolitan Region & Local Revitalization..... | 136 |
| 4.4.2.1 | Local Revitalization in Ballston | 136 |
| 4.4.2.2 | Local Revitalization in Court House..... | 137 |
| 4.5 | Conclusion..... | 138 |
| 4.5.1 | Complex Policy Making Environment & Cooperation among TOD Participants | 138 |
| 4.5.2 | Specific TOD Planning with Focusing on Local Themes | 139 |
| 5 | DETAILED CASE STUDY: BETHESDA, MONTGOMERY COUNTY, MARYLAND | 141 |
| 5.1 | Introduction of Montgomery County..... | 142 |
| 5.1.1 | Introduction of Bethesda..... | 144 |
| 5.1.2 | Metro Stations in Montgomery County..... | 148 |
| 5.2 | Planning Bethesda Metro Station Area | 151 |
| 5.2.1 | History of Planning Metro Station Areas in Montgomery County..... | 151 |
| 5.2.2 | Preparing for Bethesda Metro Station Opening | 152 |

| | | |
|-----------|---|-----|
| 5.2.3 | Establishing Special Districts in Bethesda to Foster TOD | 156 |
| 5.2.3.1 | Metro Core District | 156 |
| 5.2.3.2 | Transit Station Residential (TS-R) District | 159 |
| 5.2.3.3 | Central Business District | 159 |
| 5.2.4 | Planning & Emphasizing Development in Bethesda Metro Station Area..... | 160 |
| 5.3 | Differences in Developing Metro Station Area between Montgomery and Arlington County..... | 163 |
| 5.3.1 | Montgomery County Planning Agency for Developing Bethesda..... | 163 |
| 5.3.2 | Developing Bethesda Metro Station Area | 165 |
| 5.3.2.1 | WMATA’s Joint Development Project in Bethesda | 165 |
| 5.3.2.2 | Encourage Civic & Cultural Activities in Bethesda Metro Station Area..... | 167 |
| 5.3.3 | Establishing Bethesda Urban Partnership which Fosters TOD in Downtown Bethesda..... | 169 |
| 5.3.3.1 | Organizational Structure of Bethesda Urban Partnership | 169 |
| 5.3.3.2 | Funding Resources of Bethesda Urban Partnership.... | 170 |
| 5.3.3.3 | Special Districts Administered by Bethesda Urban Partnership | 171 |
| 5.3.3.3.1 | Bethesda Urban District | 173 |
| 5.3.3.3.2 | Transportation Management District | 173 |
| 5.3.3.3.3 | The Bethesda Parking Lot District | 173 |
| 5.3.3.4 | BUP’s Efforts in Promoting Non-Auto Travel Modes | 174 |
| 5.3.3.4.1 | Providing Bethesda Circulator Service | 174 |
| 5.3.3.4.2 | Providing Financial Incentives for Carpooling | 176 |
| 5.3.3.4.3 | Encouraging Biking | 178 |
| 5.3.3.4.4 | Providing Free Travel Advisory Services in Bethesda | 180 |

| | | |
|-----------|--|-----|
| 5.3.4 | Housing Policies in Bethesda..... | 181 |
| 5.3.4.1 | The Transit Station Residential District: Preserving Residential Development Well Connected to Bethesda Metro Station..... | 181 |
| 5.3.4.2 | Policies Support Residential Development Near Metro Service..... | 183 |
| 5.3.4.3 | Policies & Financial Incentives to Foster Affordable Housing around Metro Station..... | 184 |
| 5.4 | Similarities in Policies Fostering TOD as Arlington County..... | 186 |
| 5.4.1 | Street Design to Improve Accessibility to Metro Stations | 186 |
| 5.4.2 | Encouraging Transit Public Taking..... | 188 |
| 5.4.2.1 | Increasing Level of Public Transit Services | 188 |
| 5.4.2.2 | Strategies to Encourage Walkability & Non-Auto Travel Modes in Bethesda | 190 |
| 5.4.2.2.1 | Parking Policies to Encourage Public Transit Riding & Limiting Auto Commuting in Bethesda..... | 190 |
| 5.4.2.2.2 | Providing Car Sharing Choices around Metro Stations | 192 |
| 5.4.2.2.3 | Convenience for Bikers in Bethesda Metro Station Areas..... | 193 |
| 5.4.2.2.4 | Telecommuting..... | 196 |
| 5.5 | Conclusion..... | 196 |
| 5.5.1 | Complex Policy Making Environment & Cooperation among TOD Participants | 196 |
| 5.5.2 | Montgomery County Emphasizing Bethesda Downtown Commercial Area Image..... | 197 |
| 6 | CONCLUSION | 199 |
| 6.1 | Study on TODs in Metropolitan Area under Same Transit Major System..... | 199 |
| 6.1.1 | How This Study Related to TOD General Literature..... | 199 |
| 6.1.2 | Variations among Stations under Same Regional Public Transportation System..... | 201 |

| | | |
|---------|---|-----|
| 6.2 | Differences in Station Area Planning & Management in Same Metropolitan Region | 203 |
| 6.2.1 | Corridor vs Single Station Planning | 203 |
| 6.2.2 | Deliberately Planning Local Identity vs. Enhancing Existing Feature..... | 205 |
| 6.2.3 | WMATA: How the Transit Agency Acts Differently in Participating into Station Area Development | 206 |
| 6.2.4 | Different Strategies in Promoting Affordable Housing Around Metro Station Areas | 207 |
| 6.3 | Similar TOD Strategies within Differently Planned Station Nodes | 207 |
| 6.3.1 | Encouraging Mixed Land Use | 208 |
| 6.3.2 | Providing Multiple Non-Auto Travel Choices at Metro Station Areas | 208 |
| 6.4 | Better Understanding the Institutional Environment for TOD Implementation..... | 209 |
| 6.4.1 | Multi-Level Actors Participating into Station Area Planning & Development..... | 209 |
| 6.4.2 | Primary & Secondary Actors in TOD Implementation in Washington D.C., Metropolitan Area..... | 212 |
| 6.4.2.1 | Primary Actors..... | 212 |
| 6.4.2.2 | Secondary Actors..... | 214 |
| 6.5 | Conceptual Framework for Analysis of Dynamics of TOD Station Planning & Management..... | 216 |
| 6.6 | Directions of Future Research | 218 |
| 6.6.1 | Research on Other Corridors or Stations in Arlington & Montgomery County | 218 |
| 6.6.2 | Research on Dynamic Actors in TOD Implementation..... | 219 |
| 6.6.3 | Studying on Distinctive Station Area Planning & Enriching the Overall Standards of TOD Accomplishment | 219 |
| | REFERENCES | 221 |

Appendix

| | | |
|---|---|-----|
| A | METRO STATION WEEKDAY BOARDING IN WASHINGTON DC METROPOLITAN AREA..... | 237 |
| B | WMATA JOINT DEVELOPMENT PROJECTS..... | 241 |

LIST OF TABLES

| | |
|---|-----|
| Table 2.1: Washington DC Metropolitan Area Population by Jurisdiction: 2000 and 2010 | 27 |
| Table 2.2: Population by Race/Hispanic Origin: 2000-2010 in Washington D.C. Metropolitan Area | 29 |
| Table 3.1: Washington Metrorail System..... | 54 |
| Table 3.2: WMATA Institutional Structure..... | 57 |
| Table 3.3: Transportation Policy Implementation in Washington D.C., Metropolitan Area | 69 |
| Table 3.4: Land Use Policy Implementation in Washington D.C., Metropolitan Area | 71 |
| Table 4.1: Arlington County Population Changes 1960-2011 | 84 |
| Table 4.2: Rosslyn-Ballston Corridor Development..... | 89 |
| Table 4.3: Ballston Population and Employment Data | 92 |
| Table 4.4: Court House Population and Employment Data | 94 |
| Table 4.5: Pedestrian Improvement Projects in Ballston and Court House | 104 |
| Table 4.6: ART Service in Ballston and Court House | 117 |
| Table 4.7: Other Public Transit Services in Arlington County in 2009 | 118 |
| Table 4.8: Traffic Trends on Arterial Streets..... | 130 |
| Table 4.9: AM Peak Period Mode of Access to Ballston and Court House Metro Stations..... | 131 |
| Table 4.10: Mode Share for All Trips by Residential Site in 2005 | 132 |
| Table 4.11: Mode Share at Residential Sites by Travel Purpose..... | 133 |

| | |
|--|-----|
| Table 4.12: Mode Share for Midday Trips by Trip Purpose – Office Site..... | 135 |
| Table 5.1: Total Population of Montgomery County by Planning Place, 2000 and 2010 | 144 |
| Table 5.2: Bethesda Demography Data..... | 147 |
| Table 5.3: 2010 Transportation Mode to Work (Employees age 16+) for Bethesda, MD | 192 |
| Table 6.1: Demographic and Socio-Economic Data of Ballston, Court House, and Bethesda..... | 202 |
| Table 6.2: Multi-Level Institutional Environment for TOD Implementation in Washington D.C., Metropolitan Area | 211 |
| Table A.1: Metro Station Weekday Boarding | 237 |
| Table B.1: WMATA Joint Development Projects | 241 |

LIST OF FIGURES

| | |
|---|-----|
| Figure 1.1: TOD Model..... | 2 |
| Figure 2.1: Geographic Designations in the Washington D.C. Metropolitan Area ... | 25 |
| Figure 2.2: Population of the Washington DC Metropolitan Area by Sub- Region: 2000 and 2010..... | 28 |
| Figure 3.1: WMATA Metrorail Service Lines and Transit Nodes | 54 |
| Figure 4.1: Arlington County Metro Corridors..... | 87 |
| Figure 4.2: MSAs in Arlington County..... | 91 |
| Figure 4.3: Ballston Metro Station Surrounding Amenities | 107 |
| Figure 4.4: Court House Metro Station Surrounding Amenities | 108 |
| Figure 4.5: Ballston General Land Use Plan | 110 |
| Figure 4.6: Court House General Land Use Plan..... | 113 |
| Figure 4.7: Ballston and Court House Metrorail Station Weekday Boarding 1980-2009..... | 116 |
| Figure 4.8: Zipcar Service Locations in Ballston & Court House..... | 124 |
| Figure 4.9: Ballston Celebrates Bikeshare Stations, Bike to Work Day | 128 |
| Figure 5.1: Montgomery County Map – Incorporated Cities & Unincorporated Locales | 143 |
| Figure 5.2: Bethesda in Montgomery County, Maryland..... | 145 |
| Figure 5.3: Metro Stations in Montgomery County, Maryland..... | 149 |
| Figure 5.4: Bethesda Metro Station Area | 151 |
| Figure 5.5: Bethesda Sector Plan Study Area & Its Components..... | 155 |
| Figure 5.6: Metro Core District..... | 158 |

| | |
|---|-----|
| Figure 5.7: Bethesda Land-Use Planning Map | 162 |
| Figure 5.8: Bethesda Planning Area Defined by Montgomery Planning Board | 165 |
| Figure 5.9: Bethesda Metro Center | 166 |
| Figure 5.10: Special Districts Managed by BUP in Bethesda | 172 |
| Figure 5.11: Bethesda Circulator Bus Service Map | 175 |
| Figure 5.12: Bethesda Public Parking Garages & Lots..... | 177 |
| Figure 5.13: Bethesda Maps of Bike Routes | 179 |
| Figure 5.14: Bethesda TS-R District | 182 |
| Figure 5.15: Bethesda Metro Station Surrounding Amenities..... | 188 |
| Figure 5.16: Metrorail Average Weekday Passenger Boarding 1985-2009..... | 189 |
| Figure 5.17: Zipcar Service Locations in Bethesda | 193 |
| Figure 5.18: Capital Crescent Trail | 195 |
| Figure 6.1: Metrorail Average Weekday Passenger Boarding in Ballston, Court House and Bethesda | 203 |
| Figure 6.2: TOD Model of Dynamics | 217 |

ABSTRACT

Transit-oriented development (TOD) concept has been a popular planning strategy to reduce car-dependency because it encourages public transit, walking, and bicycling in mixed-use activity nodes around transit stations. There is research that indicates TOD implementation can bring important benefits to specific transit nodes, regions with public transit connection and persons living or working in the region. Through exploring TOD institutional environment and three case studied nodes in Washington D.C., metropolitan area, this study provides detailed evidence and analysis on TOD of dynamics which has received limited attention in the previous research. This study shows that TOD strategy can be implemented in areas having different socio-economic and cultural characteristics. The work contributes to general understanding of TOD in relation to how TOD planning can vary in different transit station areas due to deliberate design by the local governments involved. The institutional environment within which TOD policies and strategies can be adopted and carried out in major metropolitan areas is normally quite complex. Local governments and transit agency work together with other government agencies, private sector firms, quasi-public agency and community groups to develop the land at stations and immediately adjacent areas. On the basis of the findings, a framework is constructed which shows the actors and their dynamics in planning and managing individual station nodes. The conceptual frame created by this study can be used and expanded for further research on station development and design policies.

Chapter 1

INTRODUCTION

1.1 Introduction to Transit Oriented Development

1.1.1 Define Transit-Oriented Development

TOD has become a popular planning strategy to reduce car-dependency because it encouraged public transit, walking, and bicycling in mixed-use activity nodes around rail stations. This concept was first developed by Peter Calthorpe, a theorist and practitioner in relating urban transportation to the environmental sustainability movement (IURD, 2007). In the definition of TOD, Calthorpe addressed the ecology of communities. He saw TOD as an easily comprehensible solution for regional growth. He believed that TOD met the need of transit agencies for alternative revenue sources and it was a natural evolutionary next-step from many familiar community design precedents.

While many definitions are found in the literature, provided by government, transit and planning agency and scholars, TOD is most commonly defined as a mixed-use, relatively high-density, pedestrian-friendly community that is located close to and well-served by transit (Still 2002; Bernick and Cervero 1997; California Department of Transportation 2001; Maryland Department of Transportation 2000, MARTA; BART; WMATA). Furthermore, the development must be designed to encourage and/or facilitate transit riding.

The general TOD model is comprised by the factors shown in Figure 1.1.

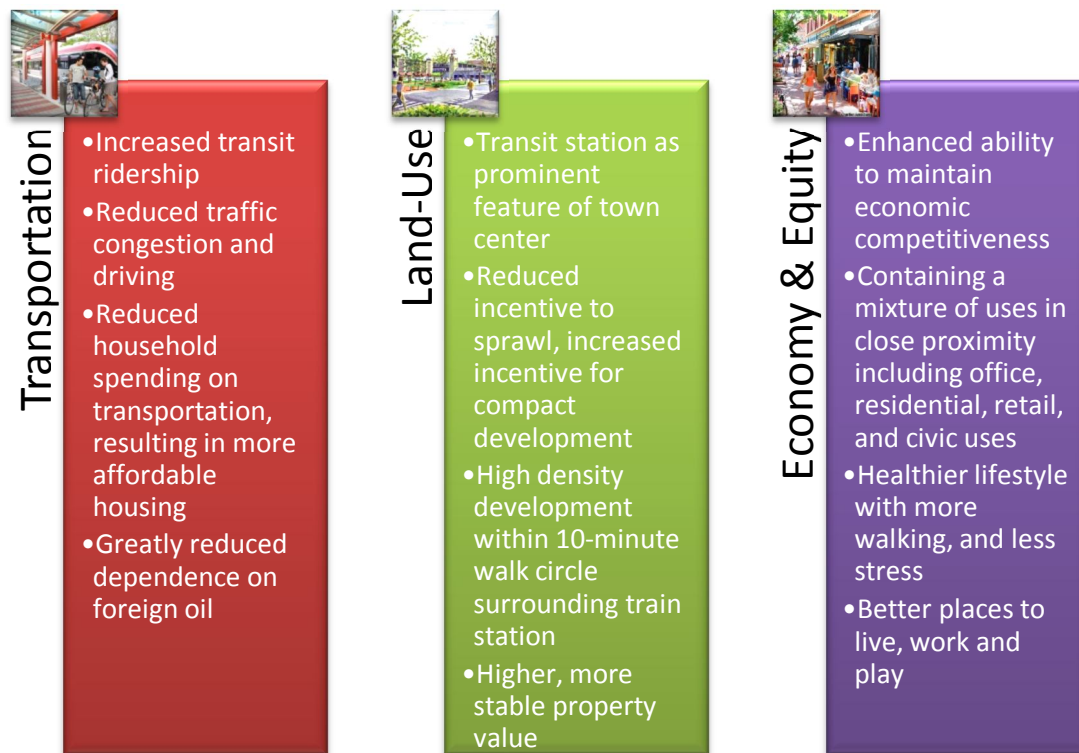


Figure 1.1: TOD Model

1.1.2 TOD Benefits

There is research that indicates the application of TOD model can bring important benefits to specific transit nodes, regions with public transit connection and persons living or working in the regions (TPB, 2004). In TOD, residents own fewer cars, drive less, rely more on alternative modes (walking, cycling, public transit, carsharing and taxi), and have a high level of local accessibility, as opposed to Transit Adjacent Development, which is conventional, automobile-oriented development located near transit stations (Renne, 2009).

Health benefits exist with a cleaner environment and as more people walk and bicycle and take public transportation. Caltrans' research found TOD benefits as improving the efficiency and effectiveness of transit service investments by increasing the use of transit near stations by 20 to 40 percent, and up to five percent overall at all regional level (Caltrans 2002). TOD increases ridership and farebox revenues, alleviates traffic congestion, and decreases VMT (vehicle miles traveled) related costs, like pollution and fuel consumption (Arrington and Parker 2001).

TOD does more than just shifting automobile trips to transit. It is a more pedestrian-friendly, human-scale community that is safe, relaxing, and attractive (FTA 2002). By creating "activity nodes" linked by transit, TOD provides mobility choice and a better fit of the transit service into the neighborhood (FTA 2002). Because TOD consumes less land than low-density, auto-oriented growth, it reduces the need to convert farmland and open spaces to development. It helps reduce sprawl and conserve open space and decrease road expenditures and other infrastructure outlays (TPB, 2004).

TOD also plays a role in economic development and contributes to more affordable housing (Arrington and Parker 2001). It provides joint development opportunities, revitalizes the neighborhoods and brings economic development. And it adds land values, rents, and real-estate performance and increases local retail sales around the station areas. Furthermore, TOD is conducive for households to save money by reducing the need for more than one car, reducing driving costs and increasing physical activities of residents (Arrington and Parker 2001). By allowing young people, the elderly, people who prefer not to drive, and those who do not own

cars the ability to get around, TOD also increases the access to job opportunities within a region and encourages more people use transit system for everyday activities.

1.2 Focus of the Study

As presented in the previous section, a large amount of research exists that supports the TOD design and the benefits, while less attention has been given to the array of public, private, non-governmental and community groups that cooperate to establish, plan and manage successful transit station areas. Especially in complex metropolitan regions, these actors interact to create individual nodes within the same transit system that are deliberately designed to have quite different socio-economic and cultural characteristics.

A more detailed study of how transit stations under the same regional transit service and their immediate areas can be developed and operated to have distinct features and of the policy making frameworks, including the actors and their dynamics are valuable. Such study can enrich the general understanding of how TOD can be facilitated in large and institutionally divided metropolitan regions.

In order to contribute to building our knowledge from this perspective, this study examines a metropolitan region that is widely recognized as having a successful TOD-oriented transit system, the Washington D.C. region, as well as some transit nodes that have been deliberately designed to have quite different characteristics. Further, the research analyzes the development in three station nodes, Ballston and Court House in Arlington County, Virginia and Bethesda, in Montgomery County, Maryland, and the policy and planning frameworks within which TOD took place and the dynamics among the actors.

Thus, the study:

- 1) Identifies and analyzes the planning and management of three quite different metro stations in the Washington Metropolitan Area Transit Authority.

Ballston and Court House in Arlington County, Virginia and Bethesda in Montgomery County, Maryland are quite different transit nodes in physical size, socio-economic characteristics and development focus. Both Arlington and Montgomery County aim to promote TOD in their station areas, while with various strategies in planning and management the station areas. It will be interesting to exploit how TOD can be deliberately designed with consideration of local features and planning needs.

- 2) Explores the complex institutional environment of TOD policy implementation in the metropolitan area and discusses the major functions of the involved actors.

Many institutions have participated in fostering or constraining TOD implementation in station areas, especially in metropolitan region. Actors are from multiple levels of governments, the private sector, and non-governmental organizations. They plan and manage the station areas in metropolitan area from various perspectives, such as providing non-auto travel alternatives, building up walkable communities, encouraging mixed land use, etc. Some of them are directly involved in planning and developing station and station immediate areas; while other are indirectly involved by providing fund or advisory services. This study focusing on Washington D.C., Metropolitan Area can be helpful for enriching the TOD knowledge by conducting a systematic study on the institutional environment and their efforts on TOD implementation.

- 3) Based on the research findings, a model is constructed of the dynamics of the planning and management of differently designed stations to fit local as well as regional TOD goals that can contribute to further research and further understanding of ways to develop TOD.

There are several benefits for building up the dynamic TOD model based on the findings of research on metro station areas in D.C., Metropolitan region. First, it will combine the information of TOD actors and the planning process together. Second, it will include the unusual actors and their inputs in the model which show the flexibility of TOD. Third, it will allow adding new actors and new strategies to plan and manage station areas in metropolitan areas. This third property of TOD model of dynamics can help keep improving the model in the future when more research has been conducted and more evidence has been found.

1.3 Literature on Various Dimensions of TOD Implementation

1.3.1 Transit Use in TOD

More than 200 studies and reports dealing with various aspects of TOD have been published since the concept was first articulated by Peter Calthorpe in the late 1980s. They range in their focus on the TOD model in general, specific dimensions, policy and planning, specific metropolitan areas, and transit stations.

Past studies gauged the ‘ridership bonus’ of TODs, which meant more public transit riding, with comparing transit modal shares among those living within a walkable distance of stations with the shares of those who lived further away. Arrington, et al. (2008) and Cervero and Arrington (2008) found that TODs generated fewer (about half) automobile trips as conventional, automobile-oriented development.

Research by Goldstein (2007) indicated that household located within walking distance of a metro (rail transit) station drove 30 percent less on average than they would if located in less transit-accessible locations, although far fewer than 30 percent of these residents regularly relied on metro for transportation. The author suggested that this reduction results, in part, from the concentration of retail services around transit stations and reductions in per capita vehicle ownership.

Surveys from the early 1990s of residents of multifamily complexes near suburban rail stations in the San Francisco region showed an increase of 45 percent took rail transit to work, much higher than the regional average of 9 percent (Cervero 1994). Evans and Pratt (2007) summarized extensive research on the effects of TOD on travel. They found that in Portland, Oregon, as of 1995, the average central area TOD transit share for non-work travel was roughly four times that for areas further away from TODs, which in turn had over one-and-two-thirds times the corresponding transit share of mostly-suburban, non-TOD land development. In Washington DC, work-commute transit mode shares declined from 75 percent at downtown office buildings right at Metrorail stations to just over 10 percent on average at office buildings within roughly 1/2-mile of a station but located in the suburbs outside of the Capital Beltway. Transit mode shares along the Washington Metro system were found to decrease by 7 percentage points for every 1,000 feet of distance from a station in the case of housing and by 12 percentage points in the case of office worker commute trips. Surveys of those living along the highly urbanized four-mile long, half-mile wide Rosslyn-Ballston Metrorail corridor in Washington D.C. Metropolitan area revealed that 39 percent used transit to get to work and 10 percent walked or cycled,

rates that were three times higher than for Arlington County as a whole (Cervero et al. 2004).

1.3.2 Land-Use, Socio-Economic & Economic Development Changes under TOD Planning

TOD planning decisions influence land use directly, by affecting the amount of land used for transport facilities, and indirectly, by affecting land use accessibility (VTPI, 2005) and therefore development location and design. Public transit improvements encourage mixed-use strategy (Litman, 2009). One mixed-use strategy is jobs-housing balance, always considered by transportation planners as a way to reduce peak-period travel and rationalize commuting mode share (Cervero 1994; Ewing 1996). It has been accepted by policy-makers from many states. In Maryland and Delaware, "Live Near Your Work" programs have been enacted that offered cash grants to workers who purchased homes close to their places of employment (TPB, 2002).

This mixed-use strategy of jobs-housing balance has also been studied from a socio-economic perspective. A significant amount of research has been done to assess the role of public transit in addressing the geographical imbalance between jobs and housing locations. There was a spatial mismatch hypothesis generated in urban economics. It states that low-income persons tend to reside in geographically disadvantaged urban neighborhoods while job opportunities are relatively concentrated in suburban areas (Sanchez, Shen, and Peng, 2004). Cervero, Sandoval and Landis (2002) found that there was a positive relationship between transit access to employment locations and employment participation for low-income people. The research suggested metro transit services that should be encouraged to expand to better

serve inner-city, low-income residents depended on it (Ball, 1994; Kawabata, 2003). Living near transit station can be an option for low-income people to get more job opportunities.

It has been found that eighty-six percent of transit station areas, in comparison to the average neighborhood in the surrounding area, are more diverse by race and/or income (FHA 2001). Furthermore, residents of these areas had about one less car per household than the population at large, resulting in an economic benefit from living near transit of between \$150 and \$450 per month (CNT & CTOD). These two findings indicate strategies for meeting America's growing affordable housing and transportation needs. TOD appeared to be a supportive type of neighborhood design for promoting more mixed-income and mixed-race housing.

Yet, some studies have shown that transit accessibility increased housing values and rents of apartment around transit stations (Landis et al., 1994; Voith, 1993; Gatzlaff and Smith, 1993) which can make difficulties for low-income people to continue living there. Policies have been implemented by some local government to avoid such situations (TRB, 2004).

Thus, transit can play a valuable role in shaping and increasing the economic activity of a location (Ewing, 1996). If land use policies encourage high density development around transit nodes, then a symbiotic relationship often develops in the form of increasing populations, businesses, recreation, and general urban activity or vibrancy in such areas (NBCRT, 2003). Transit friendly policies such as limited parking, road tolls, and transit incentives also increase the impact that a transit network can have (NBCRT, 2005). The key to success with a transit network is to plan out the corresponding land uses and transit nodes accordingly. It is clear that high

population density and a critical mass of commuters must be achieved around transit stations to make a transit network financially viable.

Studies have also shown that air quality is influenced by community design, land use, and transportation patterns (Pollard 2003). TOD facilitated mixed land-use and transit ridership and non-vehicle travel modes supports environment protection. Current development, design, and transportation patterns are intended to limit the environment damage caused by motor-vehicle pollution. As noted, there is evidence that changes to the built environment can reduce trip lengths, increase non-vehicle and public transit trips, and reduce vehicle emissions.

Thus, TOD-related affects within transit station areas can include increased walking, cycling, and transit use; reduced vehicle miles traveled; increased physical activity and health outcomes; and social connection arising from casual neighbor-to-neighbor contact (Levine 2006).

1.3.3 TOD Impacts on Regional Connectivity

The function of the transit system is intended to have an impact on connecting where people live with the places they work, go to school, and go for entertainment. A local decision to build a transit line is about transporting people to jobs, education and cultural opportunities and stimulating economic development. Research has shown that not only residential developments around the station areas matters in terms of generating transit ridership, but also the presence of business districts affects the use of transit much more than waiting for residential uses to sprout up along the line (Barnes, 2005). Connecting destinations is an important strategy for generating ridership gains. The importance of destinations themselves also needs to be considered. Transit lines connecting major universities and regional special events

destinations can experience significant ridership increase, particularly during the off-peak hours (Center for Transit-Oriented Development, 2009). The connectivity of lines to other modes of travel as well as employment centers is an important part of why certain lines attracted more ridership (Ohland et al., 2005).

In San Diego, a city loop was created with the addition of the Green Line allowing people to travel to destinations along the Blue and Orange lines without having to route through downtown (Linthicum, 2007). In Denver and St. Louis, new lines created a spur from the existing network increasing the connectivity between downtown destinations and employment centers along the line (Denver RTD, 2007). Transit shares to downtown Minneapolis and St. Paul increased 2.43 percent for each 1000 residents per square mile. Low income residents also increased the share positively for every 1 percent increase in their numbers (Barnes, 2005). In New Jersey, NJ Transit operates six major rail passenger services that provide radial connections to the concentration of jobs and services in the northeast part of the state. Four of the lines—Morris and Essex, Raritan Valley, Northeast Corridor, and New Jersey Coast—tie directly into New York’s Penn Station. Among the host of factors that have stimulated TOD activities in New Jersey, the most widely cited one was major rail service improvements: specifically, the introduction of direct, no-transfer services into midtown Manhattan; reduced headways; and refurbished train stations (Holusha, 2003). These enhancements have worked to revitalize the town centers of traditional suburban communities by virtue of their superior access to New York City as well as the burgeoning waterfront district between Hoboken and Jersey City (Holusha, 2003).

1.3.4 Transit Agency Involvement & Its Role in TOD Process

In every region where TOD has been adopted on a regional scale, a transit authority played a key leadership role (SRT, 2009). These agencies facilitated and advanced conversations on community form with regional growth strategies. They also worked with local municipalities to create model land development regulations, and in a few cases they sponsored local planning initiatives to create more transit supportive environments.

In New Jersey, NJ Transit has been involved in area planning by enhancing rail service and releasing a TOD handbook. Chicago Metra is a strong advocate of TOD. The agency has released three studies that promote TOD on economic grounds and inform constituents about implementation strategies (CATS, 2000). Metra has also developed an extensive database of proposed TOD projects in nearly 200 communities based on a regional survey. Metra has fostered good long-term relationships with local planning departments and developers, who often approached Metra for advice and commentary.

Dallas Area Rapid Transit (DART) did not have a formal TOD program (named as such), but promoted transit-supportive growth via economic development activities and programs. DART also returned 15 percent of the sales taxes it received from cities through DART's Local Assistance Program (TRB, 2004). The funds can be used for a wide variety of transit and congestion mitigation projects. In the Portland, Oregon area, TriMet's involvement in TOD has been as an advocate, an educator, and a funder. The agency has been willing to provide substantial time and resources to further the implementation of TOD. At the same time, TriMet has been a major beneficiary of regional policies (TRB, 2004). By focusing growth next to transit stops, the policies helped fill TriMet's trains and buses. Since 1990, ridership on buses

and light rail has grown at a rate significantly higher than both population and vehicle miles traveled (Portland Metro, 2003). The major transit authority in Washington, D.C., Metropolitan area, WMATA, has created a real-estate development department within WMATA for joint development activities purposes. WMATA has developed its own TOD guidelines, aimed at attracting new riders, increasing revenue intake, and helping expand the local tax base.

Albeit the transit agencies play essential roles in fostering TOD, in metropolitan regions, the creation and success of transit stations relies on the efforts of an array of actors, including local governments, regional, state, and federal agencies, private sector firms, and non-governmental and community groups that can influence.

1.3.5 Difficulties in TOD Policy Planning & Implementation

Although the transportation, social and economic benefits of TOD can be significant, the broad implementation of TOD is not an easy job. Local economic and fiscal circumstances may discourage localities from pursuing TOD (Boarnet & Crane, 1997, 1998). The private land market may not sustain new development projects, including transit-oriented ones. The risk and cost are higher for developers (Caltrans 2002). Public financing available for implementing TOD is limited and often difficult to obtain (Caltrans 2002). Private lenders often require ownership of the land being built on to be put up as collateral to secure the project loan, financially strapped nonprofit housing builders must often make concessions to lenders in terms of project design. In the process, important details of good transit-oriented design may be sacrificed in order to satisfy the lending institution. One of the most problematic factors in high-density TOD is the cost of parking structures that can accompany it (Dunphy, 2004). TOD coordination between transit agencies and localities can be

especially difficult in areas with strong traditions of small, independent governments and where a number of municipalities govern land-use matters via local zoning. Similarly, successful TOD projects often require changes in thinking and organization within the government agencies involved in the process (Cervero, 2004).

Many residents equate TOD with more traffic, crowded schools, and longer lines at grocery stores. In some cases, they oppose TOD because they anticipate it would result in people with lower incomes or African Americans moving into the neighborhood (Cervero, 2004).

In creating TODs, planners faced a congestion paradox. Development concentrated in one area can add traffic and lower transit levels of service. While TODs were presumed to increase transit ridership, they also can add more traffic congestion and arouse a community backlash against TODs.

Planners often argue that local traffic increase is a short-term disbenefit that must be weighed against the long-term benefits of less regional traffic. Some planners also make the case that added traffic is a sign of an active, rejuvenated community. Elected officials who do not always have the patience to wait until the long-term benefits of TOD cannot be supportive which hinders the implementation of TOD.

The definition of the function of a transit station is another problem. Traditionally, transit officials believed transit stations were the “nodes” where customers can access trains and buses, rather than the “places” for marshalling community resources so as to create an attractive, vibrant neighborhood that promotes sustainability, social interaction, economic development, affordable housing construction, and other benefits. Transport takes precedence. Such transit managers judge any projects that took place on their property on the basis of whether they were

financially self-supporting, increase ridership and farebox receipts, and helps keep trains and buses on schedule. Parking is sited as close to a station as possible even if it means creating a poor walking environment which limits the opportunities of TOD. In a survey of nineteen rail systems in North America, Porter (1997) found that most officials prioritized park-and-ride lots over passenger-generating land uses near stations. Along with the parking dilemma within station area, rigid parking standards are another barrier to TOD. People often decide to live in station-areas because they want to shed one or more automobiles, thus freeing up money for other purpose. Nonetheless, lenders and local planners often insist on two parking spaces per residential unit. In dense areas, podium or tuck-under parking spaces can add \$20,000 or more to the cost of a unit. Rigid parking standards can make TOD financially infeasible.

Previous research has recommended policies and planning strategies for overcoming barriers and achieving TOD goals. It suggests financing approaches emphasizing public sector funding support for planning and implementation. Such approaches include providing funding and financial incentives to enable local jurisdictions, local agencies and private organizations to implement TOD, offering funding for identified types of TOD demonstration projects, changing existing laws to allow local agencies to provide “tax increment financing” around major transit station, even if they were located outside redevelopment areas, allowing greater flexibility in the use of state transportation funds for TOD, and helping make private TOD mortgage instruments, such as a location-efficient mortgage program, more widely available (Krizek, 2003). Other policies and planning strategies highlight the importance of coordination and collaboration. They suggested that the state encourage

improved coordination of land use and transportation planning at local and regional levels and facilitate the use and sale of state-owned land near major transit stations for TOD (Renne & Wells, 2002).

1.3.6 TOD Sites in Metropolitan Areas with Regional Transit Services

The majority of the TODs are located in large rail-served metropolitan region in the United States (Cervero, 2002).

Boston has a long, rich tradition of transit-shaped development and a healthy present-day economy that is receptive to TOD. Many train station areas in Boston metropolitan region located in transit oriented development communities in 1990s (TRB, 2004). In the Chicago region, potential sites for TOD are plentiful. As the Chicago region expands, some established inner-ring suburbs have successfully used TOD to exploit transit's development capacity and capture a larger share of regional growth. There are two major transit agencies – the Chicago Transit Authority (CTA) and Metra in Chicago metropolitan region. CTA is an independent governmental agency created by state legislation that has 142 stations on its seven rapid transit lines along 100 miles of rail (City of Chicago, 2014). The San Francisco Bay Area rail transit service provider, the San Francisco Bay Area Rapid Transit District (BART) operates a 104-mile rail transit system with 43 stations and runs in four counties: San Francisco, Alameda, Contra Costa and San Mateo. In the Portland region, dozens of TODs have been constructed since 1990 (Arrington and Brinckerhoff, 2012). Most of them have received public subsidies (CTOD, 2011). Government planners have made TOD the dominant transportation and land use strategy in the Portland region (CTOD, 2011). Portland area policy makers diverted funds from a long-planned highway project to invest in a metropolitan light rail system – Tri-Met system during the 1980s

which was based on TOD planning (Dill, 2008). TriMet, more formally known as the Tri-County Metropolitan Transportation District of Oregon, is a public agency that operates the mass transit in the Portland metropolitan.

1.3.7 Literature on Specific Transit Stations

Research on specific transit stations can be found, but it tends to give general details on specific dimensions of individual transit station rather than their overall planning, development and operation as well as how they may differ in general or in the same regional transit system. The transit nodes have homogeneity in many aspects, like high density, mixed land-use, pedestrian friendly, etc. Cervero, et al. (2004), PPS (1997), Reconnecting America (2009), NYSMPO (2009) and journalists from local papers describe numerous successful TOD node case studies. The TOD Searchable Database at California State Department of Transportation (DOT) website¹ had information on various TOD station areas in California.

The successful TOD transit stations tend to be strongly supported by governments and transit agencies. The Sunnyside Village Transit Plaza is a TOD located about 10 miles from downtown Portland, built with \$2 million in combined federal, state and local funds (RA, 2009). The Delaware Valley Child Care Council and the Southeastern Pennsylvania Transportation Authority (SEPTA) recently developed a map showing where more than 1,600 licensed childcare centers are in relation to bus, train, subway and trolley routes in the Philadelphia metropolitan area. The Kids' Care Connections map, a colorful, two-sided spread, is expected to be particularly useful to parents starting new jobs and to businesses seeking workers in a

¹ <http://transitorienteddevelopment.dot.ca.gov>

competitive labor market (RA, 2009). The map helps identify where child care services may be inadequate, noting that there were few accredited child care facilities in some of the outer counties despite a high concentration of jobs and children in these areas.

New Jersey Transit had hired the non-profit Project for Public Spaces to help with the renovation of five of its 173 stations, including Maplewood (PPS, 1997). This century-old station was one of the busiest on the Morristown rail line with some 1,200 daily riders, but it was dilapidated. Commuters didn't want to hang around, and they certainly didn't want to use the restrooms (PPS, 1997). As a result, in Maplewood, the New Jersey Transit spent \$650,000 to renovate the station (PPS, 1997).

Many TOD transit stations have joint development projects to achieve mixed land-use goals. In Sunnyside Village Transit Plaza for example, apartments, townhouses, small-lot single-family residences, and professional offices surround a core of retail and public services, including a library, community center and daycare, around the station, all in a dense and walkable setting. The goal was to allow Sunnyside residents to satisfy more of their needs without adding to regional highway traffic congestion (Cervero, et al., 2004).

King County, Washington, has worked on bus-related TOD joint-development projects since 1998. King County projects were implemented in the cities of Redmond, Renton, Seattle and Shoreline. These projects included transit centers, park-and-ride lots, off-street bus-layover facilities, and residential, institutional, retail, office, hotel and entertainment uses. Project concepts ranged from 300 apartments above a park-and-ride lot in Redmond (near Microsoft world headquarters) to four skyscrapers above an underground bus-layover facility in downtown Seattle near the

state Convention & Trade Center (NYSMPO, 2009). This project was finished in February 2008 (King County Website).

The Transportation Research Board's Transit Cooperative Research Program (TCRP) Report (1996) described how Sky Train transit stations have been a catalyst for regional town centers in Vancouver, British Columbia. Each center is intended to serve 100,000 to 200,000 people living and working in the area. Development within each center is controlled by local governments. There is a strong emphasis on pedestrian orientation with the centers, resulting in buildings with limited or no setbacks and minimal surface parking. Governments encouraged commercial, employment and residential development within the centers by leasing office space, and by addressing developer's needs, such as building parks. The result has been hundreds of millions of dollars in development and hundreds of thousands of square feet of new office and residential buildings, high population densities, and high levels of transit use (TRB, 2004). Cochrane Village in California had an affordable housing development located in Morgan Hill Ranch Business Park (TRB, 2004). In the late 1980s the business park struggled to find business occupants, in part because of the high cost of housing for employees. As a result, businesses, local government and a non-profit developer worked together to build 96 apartments and town houses, a playground and daycare facility within the office park, located with convenient access to retail shops (Nelson & Nygnard, 2002).

California State DOT has developed a "California Transit-Oriented Development Website" which provides a comprehensive database online for light rail, heavy rail, commuter rail, and bus station areas². People can access the land use,

² <http://transitorienteddevelopment.dot.ca.gov/miscellaneous/NewHome.jsp>

transportation, demographics, and travel outcomes data through this website. The California TOD website also provides the ability to compare station areas on their land uses and demographics data. But the comparison results do not indicate the differences of the strategies adopted for station area planning and management and of the dynamic actors participated in the TOD process. Information about the array of TOD actors cannot be found either. Although the data is elaborate and convenient to get, it does not provide the most recent information. All data shown on the website is a decade old. The station area land uses and transportation data is presented for year 2001; and the demographic data is for years 1990 and 2000.

1.4 Research Framework, Methodology, Data Sources, and Chapter Outline

The research in this study focuses on the perspectives that have received less attention or have not been fully explored in the existing TOD literature. This study looks at three station nodes that are Ballston and Court House in Arlington County, Virginia and Bethesda in Montgomery County, Maryland. It examines various TOD-related policies and strategies implemented in areas with different local features and the participants in TOD process in Washington D.C., Metropolitan area and their dynamics in the planning and management of selected station areas that have different characteristics and identities. This study also explores TOD institutional structure and the roles of participants in metropolitan area. A better understanding of the environment for TOD implementation in metropolitan areas can help build a framework for the analysis of TOD station area planning and development.

Two types of comparisons are applied to analyze TOD policy implementation in these three studied areas. One is to observe and analyze policies and programs applied in three nodes. It is conducted by exploring the policies about transportation

facility construction, travel alternatives, parking management, joint development, zoning, and housing development since the Metrorail service was accepted and introduced in each studied node. Local and regional planning agencies can choose the development patterns which benefit their areas the best. Some of the planning agencies can plan to build up the transit corridor which connects the transit nodes. Some of the agencies can plan to concentrate development on separate station areas and carefully rezone the areas which foster mixed land uses and affordable housing. Building up local identity can also occur. The policies implemented to foster local identities in station areas are discussed in the first type of comparison. The comparison of policy implementation helps understand the importance of preserving and respecting diverse properties of TODs both to local and to the regional planning and provide more policy options.

The other type of comparison is to explore sets of actors involved in building up station areas within the same transit system. These actors include all levels of governments from local to national, quasi-governmental entities, businesses and firms, and citizen groups. Current TOD research shows that transit agencies can actively work with private companies to accomplish joint development projects. The transit agency also works with various levels of government to make sure that the projects have enough funding support and can get approved by the local board. The major actors in the station area planning are not always the same in the metropolitan area. Besides a regional transit agency and local governments, other actors, such as quasi-public agency and community group, make contributions in developing the transit corridor and station areas. The second comparison will contribute to presenting the full

range of actors that can play essential roles in promoting local and regional TOD implementation.

Data utilized for analysis in this study is from U.S. Census, Washington Metropolitan Area Transit Authority (WMATA), Metropolitan Washington Council of Governments (COG), the National Capital Region Transportation Planning Board (TPB), Maryland and Virginia Department of Transportation, Arlington County Department of Community Planning, Housing and Development, and the Maryland-National Capital Park & Planning Commission (M-NCPPC).

The remainder of the study is organized as follows.

Chapter 2: The chapter presents the examination of federal, state, non-governmental agencies and the private sector for TOD implementation in general and specifically in the Washington D.C., Metropolitan Region. It introduces the TOD history and the actors involved in TOD process. Each major actor's functions and programs that influenced the TOD node implementation are discussed.

Chapter 3: The development history of Washington Metrorail and transit stations in Washington D.C., Metropolitan Area and the inputs of regional planning and transit agencies and local jurisdictions are introduced and the institutional environment of TOD implementation in D.C. region is discussed.

Chapter 4 & 5: These two chapters are case studies of the implementation of three diverse transit nodes – Ballston, Court House and Bethesda. The purpose of case studies is to examine how the characteristics of the three nodes fit with the generic TOD goals, the assumptions about transit node development in the general literature, and with their overall functionality in regional transit system of which they are part.

Chapter 6: The last chapter summarizes the findings of three studied areas and discusses the contribution of the overall study to the general understanding of TOD implementation in transit nodes at Metropolitan area.

Chapter 2

INSTITUTIONAL ENVIRONMENT OF TOD IN WASHINGTON, D.C., METROPOLITAN AREA

2.1 Washington D.C. Metropolitan Area

2.1.1 Political Subdivisions

The Washington D.C. Metropolitan Area, formally known as the Washington–Arlington–Alexandria, DC–VA–MD–WV MSA, and also known as the National Capital Region, is a U.S. Metropolitan Statistical Area (MSA) defined by the United States Office of Management and Budget. The Washington D.C., Metropolitan Area is defined as the District of Columbia, five counties in Maryland, ten counties and six independent cities in Virginia, and one county in West Virginia.

For all Washington Metro Area jurisdictions, as shown on Figure 2.1, District of Columbia, Arlington County and Alexandria are the core areas. Montgomery, Prince George's, and Fairfax are inner suburbs. Frederick, Loudoun and Prince William are outer suburbs. And Calvert, Charles, Clarke, Fauquier, Fredericksburg, Spotsylvania, Stafford, Warren, and Jefferson are far flung suburbs.

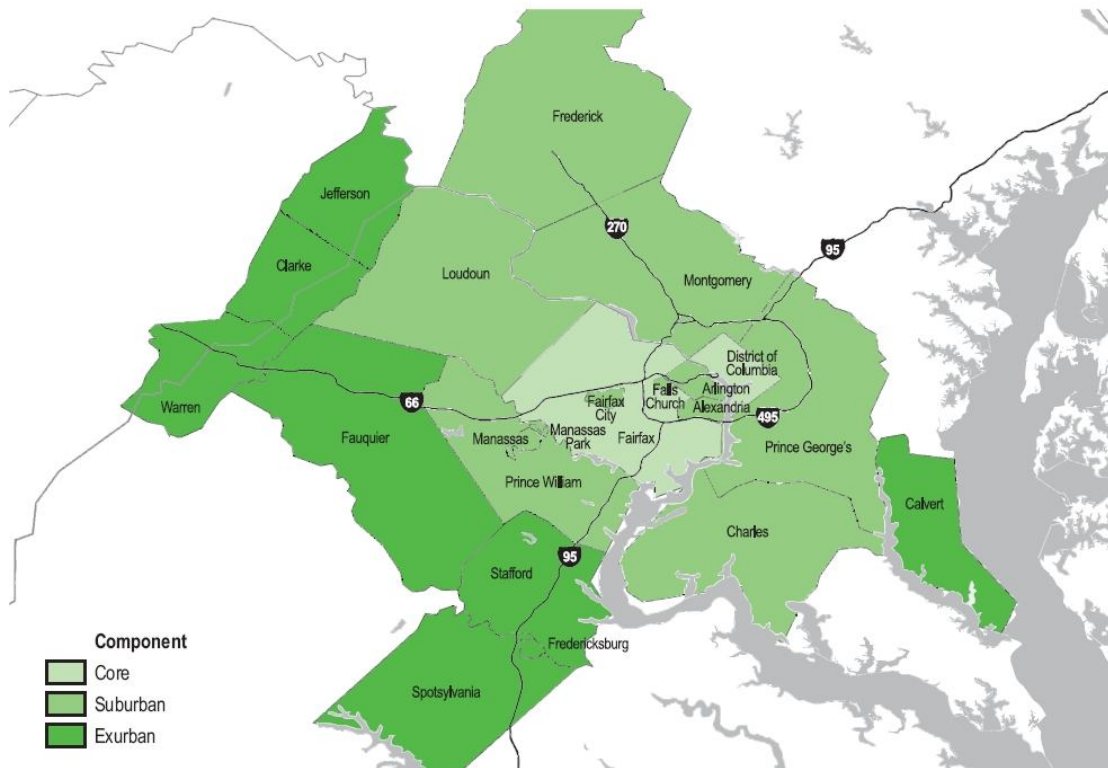


Figure 2.1: Geographic Designations in the Washington D.C. Metropolitan Area³

2.1.2 Demographics

From 1980 to 2010, over 2 million people moved to D.C. Metropolitan region as a whole even as the core city population dwindled by 36,410 (U.S. Census, 1980-2010). As presented on the above Table 2.1, between 2000 and 2010, the population of the Washington D.C., Metropolitan Area grew by 16.4 percent (U.S. Census, 2000, 2010). The region's growth rate was faster than the U.S. growth rate, as well the growth rates in Maryland and Virginia (U.S. Census, 2000, 2010). This area also

³ Source: U.S. Department of Labor Bureau of Labor Statistics:
<http://www.bls.gov/opub/mlr/2006/12/art1full.pdf> Monthly

remained a comparatively dense region, with population densities comparable to those of Boston and Philadelphia (TPB, 2004).

Table 2.1: Washington DC Metropolitan Area Population by Jurisdiction: 2000 and 2010

| Jurisdiction | 2000 | 2010 | Change | Percent Change |
|--------------------------------|-----------|-----------|---------|----------------|
| District of Columbia | 572,059 | 601,723 | 29,664 | 5.2 |
| Northern Virginia Total | 2,116,692 | 2,623,079 | 506,387 | 23.9 |
| Arlington | 189,453 | 207,627 | 18,174 | 9.6 |
| Clarke | 12,652 | 14,034 | 1,382 | 10.9 |
| Fairfax | 969,749 | 1,081,726 | 111,977 | 11.5 |
| Fauquier | 55,139 | 65,203 | 10,064 | 18.3 |
| Loudoun | 169,599 | 312,311 | 142,712 | 84.1 |
| Prince William | 280,813 | 402,002 | 121,189 | 43.2 |
| Spotsylvania | 90,395 | 122,397 | 32,002 | 35.4 |
| Stafford | 92,446 | 128,961 | 36,515 | 39.5 |
| Warren | 31,584 | 37,575 | 5,991 | 19 |
| Alexandria | 128,283 | 139,966 | 11,683 | 9.1 |
| Fairfax City | 21,498 | 22,565 | 1,067 | 5 |
| Falls Church | 10,377 | 12,332 | 1,955 | 18.8 |
| Fredericksburg | 19,279 | 24,286 | 5,007 | 26 |
| Manassas | 35,135 | 37,821 | 2,686 | 7.6 |
| Manassas Park | 10,290 | 14,273 | 3,983 | 38.7 |
| Suburban Maryland Total | 2,065,242 | 2,303,870 | 238,628 | 11.6 |
| Calvert | 74,563 | 88,737 | 14,174 | 19 |
| Charles | 120,546 | 146,551 | 26,005 | 21.6 |
| Frederick | 195,277 | 233,385 | 38,108 | 19.5 |
| Montgomery | 873,341 | 971,777 | 98,436 | 11.3 |
| Prince George's | 801,515 | 863,420 | 61,905 | 7.7 |
| Jefferson County, WV | 42,190 | 53,498 | 11,308 | 26.8 |
| Washington Metro Area | 4,796,183 | 5,582,170 | 785,987 | 16.4 |

Source: U.S. Census Bureau, 2000 and 2010 Census

The Washington area suburbs gained population faster than the District of Columbia and Northern Virginia outpaced suburban Maryland in terms of population growth (Figure 2.2).

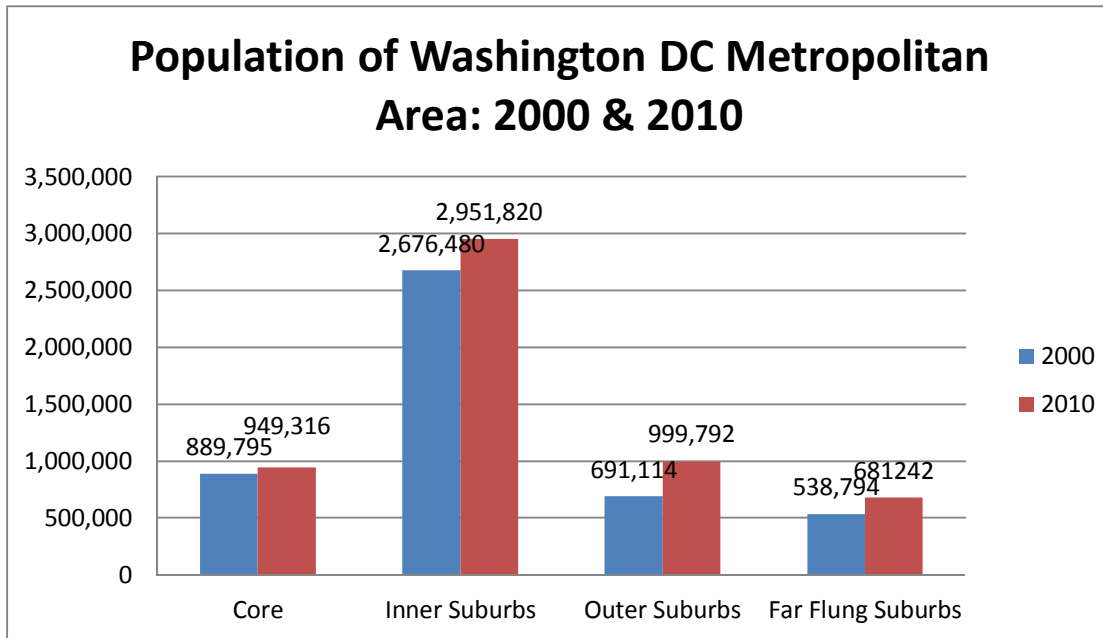


Figure 2.2: Population of the Washington DC Metropolitan Area by Sub-Region: 2000 and 2010⁴

Dramatic change to the racial and ethnic make-up of the population is another trend in the region. In 2000, the Washington D.C., Metropolitan Area was majority white with 55 percent of the population non-Hispanic white (U.S. Census, 2000). By 2010, the non-Hispanic white population had dropped to 49 percent of the region's overall (U.S. Census, 2010).

In most suburbs, population growth was fueled primarily by growth of minorities, particularly Hispanics and Asians (Table 2.2). The largest suburban jurisdictions either lost white population or gained white population at a slower rate than they gained non-whites. Montgomery County's white population declined by

⁴ Source: U.S. Census Bureau, 2000 and 2010 Census.

nearly 41,000 over the decade and Fairfax County's white population fell by about 34,000 (U.S. Census, 2000, 2010).

Table 2.2: Population by Race/Hispanic Origin: 2000-2010 in Washington D.C. Metropolitan Area

| Race | 2000 | | 2010 | |
|---------------------------|-----------|------|-----------|------|
| | # | % | # | % |
| White | 2,653,239 | 55.3 | 2,711,258 | 48.6 |
| Black | 1,253,825 | 26.1 | 1,409,473 | 25.2 |
| Asian | 327,476 | 6.8 | 513,919 | 9.2 |
| Other*⁵ | 131,955 | 2.8 | 176,725 | 3.2 |
| Hispanic | 429,688 | 9 | 770,795 | 13.8 |
| Total | 4,796,183 | 100 | 5,582,170 | 100 |

Source: U.S. Census Bureau, 2000 and 2010 Census

2.2 Economy

Various agencies of federal government, technology industry, and research and non-profit organizations provide numerous job opportunities in Washington D.C., Metropolitan Area. Over 140,000 professionals worked for federal government agencies in 2010 (U.S. Census, 2010). However, the Washington D.C. Area is increasingly home to a diverse segment of businesses not directly related to the federal government. Over 240,000 tech jobs were reported in D.C. region by American City Business Journals in May 2009 (American City Business Journal, 2009) which made this region rank the second best Center for high-tech employment among the top 100

⁵Note: White, black, Asian and other races are all non-Hispanic.*Includes other races, as well as persons who indicated two or more races.

Metropolitan areas in the United States (American City Business Journal, 2009). The Washington D.C., Metropolitan Area is also home to many research universities, think tanks, and non-profit organizations. Moreover, this area attracts conferences and conventions every year which contribute to the region's economy.

2.2.1 Transit-Oriented Development in Washington D.C. Metropolitan Area

Washington, D.C., was often cited as having some of the worst traffic congestion in the United States (Schrunk & Lomax, 2005). Like many large metropolitan areas, the region's investment in new road capacity has failed to keep pace with rising vehicle miles traveled (Transportation Planning Board, 2004). Severe congestion is now found on most of the region's major highways, including I-95, I-270, and the Capital Beltway (Transportation Planning Board, 2004).

Given its population density and congestion levels, it was not surprising that the area also has one of the nation's top-performing transit systems. The Washington Metropolitan Area Transit Authority (WMATA), the area's main transit operator, runs the Metrobus and Metrorail systems. WMATA is the fourth-largest transit system in the United States in terms of annual trips, and the rail system is second only to MTA in New York City in terms of ridership. During rush hour, 18 percent of all person trips in WMATA's service area use transit, the second-highest percentage in the country (WMATA, 2003).

More than 40 percent of peak-period trips to the downtown core use transit (Metro Funding Panel 2005). However, beyond the city and inner suburbs, transit options are fairly limited, and public transportation account for just 3 percent of all trips in the region as a whole (WMATA, 2003). Outside WMATA's service area, transit mainly consists of two regional commuter rail system, MARC (serving

primarily Maryland) and VRE (serving Virginia), as well as various local jurisdictional bus systems.

Early TOD success was limited largely to downtown and corridors within the D.C. Metropolitan area. TOD nodes in this area are not separated, but well connected by Metrorail service system. They are the important transit nodes in D.C. Metropolitan region, with mixed-use and walking-friendly designs.

The benefits of TOD location efficiency can translate into direct savings for individuals, households and regions. As has been demonstrated, residents of denser, transit-rich neighborhoods spend less on automobile transportation than people in auto dependent areas. For example, one study found that cities where households spent the highest percentage of their income on transportation were Houston, Atlanta, Dallas, and Miami, while the lowest spending was in Washington, D.C., Boston, San Francisco, Chicago, Baltimore, New York, and Honolulu (Surface Transportation Policy Project and Center for Neighborhood Technology 2000). One result is that Metrorail accessible real estate in Washington D.C. Metropolitan area is sold and leased for a premium.

Among the five mid- to high-rise apartment projects near Metrorail stations outside the District of Columbia, vehicle trip generation rates were more than 60 percent below that predicted by the ITE manual (ITE, 2003). The comparatively low vehicle trip generation rates for TOD housing near Washington Metrorail stations are consistent with recent findings showing high transit modal splits from a 2005 survey of 8 residential sites (WMATA 2006). For projects within ¼ mile of a Metrorail station, on average, 49 percent of residents used Metrorail for their commute or school trips (WMATA 2006). One of the projects we surveyed, the Avalon apartments at

Grosvenor Station which was also surveyed in the 2005 WMATA study. The Avalon, which had the highest trip generation rate among the five projects surveyed in the Washington area, had an impressively high work- and school-trip transit modal split in the 2005 WMATA survey—54 percent—given its comparatively lower-density, car-oriented setting. High ridership levels and vehicle-trip suppression in metropolitan Washington are tied to the region's success in creating a network of TODs, highlighted by the Rosslyn-Ballston corridor (Cervero et al. 004). Synergies clearly derive from having transit-oriented housing tied to transit-oriented employment and transit-oriented shopping along many Washington Metrorail corridors. The success of early projects however, has encouraged interest in TOD as an economic development tool in neighborhoods and as a congestion remedy in the region's outer suburbs.

2.3 Federal & State Agencies Involved in TOD Implementation in Washington D.C., Metropolitan Area

The institutional environment for TOD can be very complicated, especially if many municipalities, agencies, and organizations are involved. This is true for the Washington D.C., Metropolitan Area.

2.3.1 Federal Government Involvement

The functions of federal government on TOD involve providing funding, planning guidance, and technical assistance. At federal government level, Federal Transit Administration (FTA), U.S. Department of Transportation - Federal Highway Administration (FHWA), Internal Revenue Services (IRS), U.S. Department of Housing and Urban Development (HUD), and U.S. Treasury have all been involved in the process in the Washington D.C., Metropolitan Area. FTA and FHWA supervise Washington, D.C., Metropolitan planning and funding. Besides providing funding

directly, FTA and FHWA prepared guidance for lower level governments to implement federal TOD policies, such as the Transportation Equity Act for the 21st Century (TEA-21⁶) and the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). Joint FTA/FHWA guidance encourages and facilitates attention by metropolitan and statewide planning processes to critical planning emphasis areas having national significance. IRS provides tax free transit benefits to commuters. HUD and U.S. Treasury support affordable housing near transit stations with some policies and tax credit programs.

Federal agencies and other institutions traditionally located in the D.C. area have increasingly dispersed to suburban locations, partly in response to the policies of the radial corridor plan and promotion of public transit riding. The office leasing policies of the General Services Administration during the 1960s and 1970s, with emphasis on minimizing rental costs, have particularly supported office development in Ballston, Court House, Rosslyn, Crystal City and other locations served by Metrorail.

2.3.1.1 FTA, FHWA and Transit-Oriented Development

FTA is one of 11 operating administrations within the U.S. Department of Transportation with over 500 employees located in Washington, DC and 10 regional offices across the nation. Many offices in FTA support transit-oriented development and joint development through implementing programs and policies. Its Office of Planning & Environment (OPE) is the most proactive one. Its mission is to support the

⁶ TEA 21 was enacted in 1998. TEA-21 authorized the Federal surface transportation programs for highways, highway safety, and transit for the 6-year period 1998-2003.

development of information that local, state, and federal officials can use to make transportation investment decisions. On an as-needed basis, OPE also works with FHWA in providing technical assistance to federal field offices and State and local agencies on such issues as transportation conformity, fiscal constraint, public involvement, and analytical methods.

FHWA is a major agency of the U.S. Department of Transportation (DOT). As a vital partner of FTA in promoting public transportation and joint development, FHWA provides financial and technical support to them for constructing, improving, and preserving America's highway system. The Office of Policy in FHWA participates into TOD process by supporting the FHWA, DOT, and Congress on intergovernmental affairs, policy development and execution, policy information needs, and international programs.

FTA and FHWA defined TOD as projects that are commercial, residential, industrial, or mixed-use developments and undertaken in concert with transit facilities. They may include private and non-profit development activities usually associated with fixed guideway (Rail or Busway) transit systems. Joint development projects may also be associated with bus facilities, intermodal transfer facilities (e.g. bus to rail), transit malls, and Federal, State or local investments in local facilities (such as a bus terminal and tourist facility). Although TOD and joint development are not discrete programs of the U.S. DOT, FTA grantees may use FTA financial assistance for TOD activities that incorporated private investment or enhance economic development.

FTA cooperates with FHWA and provides two programs to encourage TOD. One of the programs is the New Starts.

New Starts program is the federal government's primary financial resource for supporting locally-planned, implemented, and operated transit capital investments. The FTA's New Starts program has helped hundreds of new or extended transit systems, including heavy, light and commuter rail and bus, across the country⁷. These rail and bus investments, in turn, have improved the transit services, have helped decrease congestion and air pollution in the areas they serve, and have fostered the development of vibrant, healthy, and more livable communities. FTA evaluates the New Starts projects with explicit considerations of existing land use, transit supportive plans and policies.

The FTA approval process for joint developments seeks to have proposed projects met the definition of a capital project, is the highest and best transit use, and provides a fair share of revenue for public transit (Williams & Schloss, 2010).

The other very important TOD program is SAFETEA-LU. SAFETEA-LU is built on the firm base of ISTEA and TEA-21. As authorized by SAFETEA-LU in 2005, the FTA provides stewardship of combined formula and discretionary programs totaling more than \$10 billion to support a variety of locally planned, constructed, and operated public transportation systems throughout the United States⁸. In order to promote TOD, SAFETEA-LU program creates a “Center for TOD” to develop standards and definitions for TOD adjacent to public transportation facilities. The Center provides modeling techniques for metropolitan planning agencies and public transportation agencies to maximize ridership through land use planning and adjacent

7 http://www.fta.dot.gov/12304_2608.html

8 <http://www.trb.org/researchfunding/federalresearchprograms.aspx#fhwa>

development and gave research support to TOD participants. Section 1117 of SAFETEA-LU – the Transportation, Community and System Preservation Program (TCSP) – makes TOD plans and capital projects eligible for federal funding, and gave priority consideration to state and local preservation of development plans, including TOD plans (FHWA & FTA, 2009). TCSP pilot program supports joint transportation and land use planning projects that address the planning goals, such as improving the efficiency of the transportation system, reducing the environmental impacts of transportation, and examining patterns of private sector development (FHWA & FTA, 2009).

In order to support proactive public involvement, FHWA and FTA have jointly issued an Interim Policy on Public Involvement. State DOTs, MPO, and transit agencies are required to develop, with the public, effective involvement processes which are tailored to local conditions. The performance standards for these proactive public involvement processes include early and continuous involvement; reasonable public availability of technical and other information; collaborative input on alternatives, evaluation criteria and mitigation needs; open public meetings where matters related to Federal-aid highway and transit programs are being considered; and open access to the decision-making process prior to closure (FHWA & FTA, 2009).

2.3.1.2 Other Federal Institutions and Their Programs

2.3.1.2.1 Internal Revenue Service & Tax-Free Transit Benefits

Federal tax-free transit benefits can be used by both employees and residents, effective in January 2001 and administered by the Internal Revenue service (IRS 15-B). They provide rules to allow transportation benefits provide to employees are

excludable from gross income. Tax-free transit benefits allow employers to provide employees up to \$230 per month (\$2760 per year) to cover the cost of commuting on transit systems and carpools (IRS 15-B). Unlike ordinary wage payments, employers do not have to pay their share of federal payroll taxes on tax-free transit benefits (IRS 15-B). The cost of providing tax-free transit benefits can be deducted as a normal business expense (IRS 15-B). The tax-free transit benefits to employees can be offered as employer contribution, pre-tax deduction from the employee's paycheck, and combination of pre-tax deduction and direct benefit (IRS 15-B).

2.3.1.2.2 Department of Housing & Affordable Housing Programs

Department of Housing and Urban Development (HUD) provides a Community Development Block Grant Program (CDBG) to support TOD and affordable housing. The CDBG program is a flexible program that provides communities with resources to address a wide range of unique community development needs.

Another affordable housing program – HOME provides formula grants to the States and localities to fund a variety of activities that build, buy and/or rehabilitated affordable housing for rent or homeownership or provide direct rental assistance to low-income people (HUD, 2013). The program's flexibility allows States and local governments to use HOME funds for grants, direct loans, loan guarantees or other forms of credit enhancement, or rental assistance or security deposits (HUD, 2013).

2.3.1.2.3 U.S. Treasury & Tax Credit Programs

U.S. Treasury Department has financial incentive programs to facilitate TOD and affordable housing. New Markets Tax Credit (NMTC) is one of them. The NMTC

Program provides taxpayers with a credit against federal income taxes in exchange for making qualified equity investments in low-income communities near transit stations (IRS, 2010). Low-Income Housing Tax Credits (LIHT) is another financial assistance for supporting affordable housing at public transit served areas. Grants to State housing credit agencies make sub-awards to finance the construction or acquisition and rehabilitation of qualified low-income housing⁹.

2.3.2 State Governments

State DOTs hold the responsibility to create an efficient, economical, and environmentally sound transportation system that provides viable options for the movement of people and goods. Therefore, many of the benefits associated with TOD, such as reduced VMT and decreased infrastructure needs and maintenance, are directly in line with state DOT's objectives (AASHTO, 2006). In addition, state DOT's involvement in TOD planning and development can directly benefit the DOT in a number of meaningful ways, such as the reductions of congestion and transportation demand.

State DOTs' professional and technical expertise can help ensure that Federal and state funds supporting TOD are used as efficiently and effectively as possible, providing the greatest transportation benefits.

For the most part, state DOTs are supportive of TOD, although not heavily involved in the actual planning activities on the local or station area level. More

⁹ Department of Housing & Urban Development website:
http://portal.hud.gov/hudportal/HUD?src=/program_offices/comm_planning/affordablehousing/training/web/lihtc/basics

commonly there is participation on advisory committees, evaluation of plans, and the funding of TOD studies (Cambridge Systematics, 2006). In some instances, DOTs have made land available for TOD. Value capture is another potential benefit of state DOT involvement in TOD. In general, investments that improve transportation access (such as transit stations or highway interchanges) increase the value of adjacent property (Cambridge Systematics, 2006). Value capture strategies, such as tax increment financing, can help finance the infrastructure investments that create these value increases. While value capture strategies are typically implemented directly by local governments, State DOTs may be able to facilitate the use of value capture strategies through partnerships, technical assistance, and advocacy for state and municipal policy changes (Cambridge Systematics, 2006).

2.3.2.1 Virginia State Department of Transportation & Its TOD Policy

Virginia State Department of Transportation (VDOT) does not actively promote or plan for TOD. Land use in Virginia is locally controlled, but the VDOT can indirectly support TOD. For example, in Arlington County, where corridor planning involves a number of municipalities, VDOT has been important and influential in helping the group of governments to come to a consensus on how to deal with a specific decision.

There is also a state telecommute-supportive program – Telework!VA, indirectly fostering TOD. In 2011, the Virginia General Assembly approved new tax credit legislation aimed at encouraging private sector telework in Virginia. Launched by the Virginia Department of Rail and Public Transportation in 2011, Telework!VA allows companies to receive tax credits from the Commonwealth of Virginia. In addition, the program covered technical assistance costs, consultants' fees, and usage

fees at local telework centers. The new telework legislation extended the tax credit through 2016 (TeleworkVA website¹⁰).

2.3.2.2 Maryland Department of Transportation & Its TOD Policy

2.3.2.2.1 Introduction

The State of Maryland is nationally recognized for its leadership in implementing TOD-related policies and programs. By applying such strategies, Maryland State links transportation and land use to economic development, local revitalization and increased transportation options for people in the State¹¹. Maryland has built extensive transit infrastructure, which continues to expand. The State promotes TOD to increase the number of riders and get a better return on this public investment. The goal is to surround stations with vibrant neighborhoods where people can live, work and shop or eat out, all within a safe and pleasant walk to trains, subways and buses.

MDOT's TOD work began in the mid-1990s as an outgrowth of Governor Paris Glendenning's Smart Growth initiatives, but has continued (with different methods and focus) under the current administration. With the support of the 2008 General Assembly, Governor Martin O'Malley signed into law legislation designed to facilitate the creation of Transit Oriented Development (TOD) in Maryland (MDOT

10 TeleworkVA webpage address:

<http://www.teleworkva.org/teleworkTaxCredit/index.aspx>

11 Metropolitan Washington Council of Governments webpage address:

<http://www.mwcog.org/transportation/activities/tlc/database/detail.asp?id=64>

website¹²). The legislation, recorded at Section 7-101(m) of the Transportation Article, defined TOD to be a “transportation purpose”, thus authorizing the Maryland Department of Transportation (MDOT) to use departmental resources, including land, funds, and personnel, to support “designated” TOD projects (the 2008 TOD Law). Maryland State government supported TOD implementation by providing funding to agencies promoting TOD.

The Maryland Transit Administration (MTA) is a division of the Maryland DOT. MTA operates local and commuter buses, light rail, Metro Subway, Maryland Area Regional Commuter (MARC) Train Service, and a comprehensive paratransit system. MTA has funding from MDOT for TOD planning, administration, and capital improvements throughout the state (MTA, 2013). The Maryland Department of Transportation (MDOT) has been proactive in its commitment to develop transportation investments and facilities and support for transit-oriented, joint and transit-adjacent development that support economic growth and neighborhood revitalization in close proximity to transit facilities.

2.3.2.2.2 TOD Programs

MDOT supports transit node projects. These projects initially focused on funding capital projects such as structured parking at stations and streetscaping (MDOT, 2009). MDOT takes active leadership and addresses key obstacles and areas of uncertainty for TOD implementation (Cambridge Systematics, 2006).

12 MDOT webpage address:
http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/TOD/TOD_Designation.html

Many offices in MDOT's have been involved in working on TOD-related programs. The Office of Planning and Capital Programming (OPCP) in MDOT, however, has informally taken the lead on most TOD initiatives, working with MDOT's modal administrations, including the State Highway Administration (SHA) and the Maryland Transit Administration (MTA) (Cambridge Systematics, 2006). Four staff within OPCP each devote between 25 and 75 percent of their time to TOD-supporting activities. MDOT's Office of Real Estate (ORE) is involved in TOD process as well. Through the disposition of state land for joint development, ORE has worked closely with OPCP on TOD efforts (Cambridge Systematics, 2006). Ongoing implementation has continued to come from the leadership and the initiative is carried out by key staff within the agency.

MDOT increasingly emphasizes the importance of land use and TOD in planning for any new transit facility or project, and ensures that this is an integral part of the existing transit system (i.e. MTA rail system and WMATA Metrorail system) (Cambridge Systematics, 2006). This consideration includes making alignment and station location decisions to maximize TOD and economic development opportunities, as well as specific project and station design issues. The agency's TOD-supportive activities, including:

1) Change or enforce agency policies and practices

Since 1992, the State of Maryland has adopted a variety of Smart Growth laws and policies (MDOT, 2009). Many of these laws and policies have been administered by the Maryland Department of Planning. Built on the 1992 policies, in 1997, Governor Glendening and the State of Maryland launched the Smart Growth and Neighborhood Initiative which allows using state funds as incentives to TOD (MDOT,

2009). Signed into law by Governor Martin O'Malley in 2008, the current package includes laws intended to strengthen local comprehensive plans, creating 12 new visions for sustainable growth, and establishing statewide goals for growth (MDOT, 2009). All these Smart Growth laws and policies promote compact, transit-oriented, bicycle-friendly and use, with walkable streets, mixed-use development and a wide range of housing choices in Maryland.

MDOT uses development potential as a criterion in prioritizing transit projects, locating alignments, and stations. The OPCP sponsored a pilot study to examine needs for pedestrian improvements in the Wheaton Station area on the WMATA Red Line (Cambridge Systematics, 2006). The study's objectives were to examine and prioritize area-level needs comprehensively and to bring together the stakeholders responsible for implementation (Cambridge Systematics, 2006). SHA endorsed the study and is now working to identify 10 other locations where it can conduct similar studies. SHA staff note that the study has been helpful for its engineers as they can use the recommendations to prioritize and systematically implement improvements, rather than simply responding to complaints and requests on an ad hoc basis (Cambridge Systematics, 2006). Adopting flexible or context-sensitive design standards, such as improving safety and mobility for travelers, including pedestrians as well as vehicles also has some effects on promoting TOD.

2) Financial support

Maryland State engages in leveraging existing and new transit investments to maximize transit ridership and in increasing the cost-effectiveness of these investments. The State also explores creative financing and funding techniques that can contribute toward transit facilities. Moreover, reducing vehicle travel demand and

the need for highway indirectly increase the transit service investment in Maryland State.

3) Assist with land purchase and sale

Maryland DOT sells or leases state-owned land near transit stations for TOD purposes. MDOT's ORE has worked closely with OPCP through the disposition of state land for TOD and joint development. For example, ORE supported OPCP in a \$150,000 study examining how best to dispose of 25 acres of state-owned land adjacent to the existing Baltimore Metrorail and light rail lines as the core area in a larger redevelopment of 110 acres of urban land (AASHTO, 2006).

4) Undertake TOD Study

Maryland DOT proactively conducts corridor and station area planning studies to support TOD. The agency assists DOT's engineers in prioritizing and systematically implementing pedestrian and traffic improvements in station areas. The OPCP led an award-winning pilot study for the West Hyattsville Station area on Washington's Metrorail system. This study brought together the various stakeholders who need to be involved in implementing the plan (e.g., local elected officials, planning and zoning staff and commissions, resource and public works agency staff, land-owners, and neighbors) (MDOT, 2003). The goal is not just to create a plan, but to ensure that the support and tools necessary to implement the plan are in place. Lacking resources to conduct such studies on a widespread basis, OPCP looks to implementing agencies, such as WMATA, the MTA, or local jurisdictions.

5) Establish partnerships

For the purpose of getting the maximum benefits from federal transit capital investment, such as New Starts, the cooperation with municipal land use planning is

very essential to the Maryland DOT. It sponsors demonstration TOD planning studies with focus on partnership. OPCP staff is also concerned about the cooperation with engineers for TOD efforts since it will improve TOD implementation by better technical information and methods.

Another program which facilitates private sector involvement is the State's Transportation Public-Private Partnership (TP3) program administered by the Maryland Transportation Authority (MTA) (Cambridge Systematics, 2006). TP3 initiatives are contractual agreements between government agencies and private entities to provide transportation-related goods or services to the public (Cambridge Systematics, 2006). TP3 initiatives allow the private entities working with the government agencies on non-highway transportation projects. These special partnerships enable government agencies and private firms to cooperatively finance, construct, or operate non-highway transportation projects that enhance the State's transportation system.

2.3.3 Private Sector

Many private companies have been involved into TOD process by developing the lands around Metro Stations with WMATA and by taking the projects of transit facility construction.

WMATA's real-estate development department worked closely with the private sector on the station-area land development in Bethesda. There WMATA provided system interface¹³ and development rights to private developers. The success

¹³ "System interface" projects: Projects that have direct connections between WMATA's facilities and adjacent development owned by others. These projects are

of Bethesda Metro Station project is a showcase of TOD and attracts more private developers into WMATA joint development projects.

Cooperation with the private sector has also been expected in transit facility construction and rehabilitation. Ballston Partnership, Inc., was created in 1985 to attract investors and businesses to the area. Several of the partnership's committees focused on issues like urban design, public safety, and real estate development. Such public-private partnerships can also be found in Clarendon and Rosslyn in Arlington County, Virginia. Clear Channel Outdoor Inc. works with Montgomery County to improve the bus service quality by supplying bus shelters with advertising spaces it controls.

2.3.4 Non-Governmental Organizations

The Interim Policy on Public Involvement issued by FHWA and FTA ensures State DOTs, MPO, and transit agencies develop localized TOD policies with proactive public involvement. For local government, public outreach and community involvement have been a key part of Arlington County's TOD success. Business partnerships and alliances, neighborhood conservation groups, and individual residents are frequently invited to express their opinions. These groups influence the planning process through a number of forums, including neighborhood meetings, workshops, and interactive web pages.

Arlington County's citizens get involved in TOD planning through a citizen advisory board – Arlington County Planning Commission. The commission reviews

managed by WMATA's Office of Station Area Planning and Asset Management (SAAM) under separate procedures established by the Board.

the County's Comprehensive Plan (including the General Land Use Plan) every five years and makes ongoing land-use recommendations to the County Board. It often holds public hearings to solicit feedback and input from citizens about development in the County.

For some 40 years, the Neighborhood Conservation Program has drawn thousands of local residents into the planning process in Arlington County. Organized groups of citizens, with the help of County staff, are able to create and implement a Neighborhood Conservation Plan. These Plans, which usually address issues like zoning and transportation, are adopted by the County Board and serve as a guide for the Board and staff members when making decisions about future development or land use changes in a neighborhood. Over 40 neighborhoods have joined the program, giving those citizens a voice and power to influence changes in their community (Arlington County Board, 1996).

Some organizations have programs to encourage employees to choose alternative travel modes. These programs aim to market local, State, and federal commuter benefits and tax incentives to employers. In Montgomery County, Maryland, Urban Partnership (BUP) helps manage the traffic in Bethesda by promoting alternative transportation such as Metrorail, bus, carpools, and biking. The Bethesda Urban Partnership (BUP) is a quasi-public organization established by Montgomery County in 1994. BUP provides transit service information and transit or other non-auto modes commute solutions. Bethesda Transportation Solutions (BTS) is administered by the Bethesda Urban Partnership and is led by the Transportation Management District (TMD) Advisory Committee through a grant agreement with the County Department of Transportation (DOT). BTS focuses on traffic assessment, pedestrian

safety, parking and the need for capital improvements in the business district. A major emphasis is placed on promoting programs for transit and ridesharing with employers and employees in the Bethesda urban district. The TMD Advisory Committee advises BUP's Board of Directors and DOT on local transportation needs.

In the next Chapter, the metropolitan planning and transit agencies and local municipalities will be discussed. The regional transit system operator – Washington Metropolitan Area Transit Authority (WMATA) and county-level agencies – Arlington and Montgomery County directly participate in station area planning and development. Their work, together with the support of federal and state institutions, NGOs and the private companies, has developed many metro station and the immediate areas. The case studied transit nodes – Ballston and Court House in Arlington County and Bethesda in Montgomery County will be generally introduced at the end of Chapter 3 which shows the history of Metrorail alignment and how these areas were initially planned.

Chapter 3

TRANSIT STATION AREAS IN WASHINGTON D.C., METROPOLITAN AREA

3.1 Metropolitan Planning Organization and Transit-Oriented Development

All TOD projects with components involving federal funds must have those components approved by the metropolitan planning organization (MPO) for inclusion in the metropolitan transportation plan and the Transportation Improvement Programs (TIP) and State Transportation Improvement Programs (STIP). MPOs are situated politically and geographically to be able to promote TOD. Many MPOs control a large portion of the state transportation funds and, therefore, often have more resources available to fund programs than state DOTs (FHWA & FTA). Although MPOs do not have direct authority over land use planning, MPOs nevertheless represented an entire metropolitan area and are, therefore, positioned to coordinate with both local and state agencies.

In Washington D.C., Metropolitan Area, National Capital Region Transportation Planning Board (TPB) is the federally designated Metropolitan Planning Organization (MPO) and plays an important role as the regional forum for TOD implementation. TPB was associated with the Metropolitan Washington Council of Governments (COG) in 1966. Its staff is provided by COG's Department of Transportation Planning, while TPB is independent.

3.1.1 The Metropolitan Washington Council of Governments

COG is an unusual multi-governmental agency. COG's membership is comprised of 300 elected officials from 22 local governments, the Maryland and Virginia state legislatures, and U.S. Congress.

COG has some programs that foster carpooling and telecommuting. Commuter Connections is one of them which has been helping commuters find carpools for over 20 years. The Commuter Assistance Program (CAP), through the Commuter Connections Ridematching Service, can match at no cost individual residents interested in carpooling, or help set up a ridematching program at residential property. Taxicabs are often an important supplement or link for people who carpool or used public transportation. Taxicab stands are provided at or near all Metrorail stations to facilitate intermodal travel. The Telework Centers are operated by Commuter Connections. The Telework Centers offer a variety of work settings (e.g., cubicles, shared work stations, and private offices), computer and telecommunications equipment, and support. Other services such as photocopying, faxing, Internet access, and video conferencing are also available.

COG also has created the Guaranteed Ride Home (GRH) program. It is designed to provide commuters who regularly vanpool, carpool, bike, walk, or take transit with a reliable ride home when unexpected emergencies arise. Commuters can use the GRH benefit for personal emergencies and unscheduled overtime up to four times per year. The ride home by cab, rental car, bus, or train is free (excluding gratuity, fuel, and insurance charges as they apply). As an added benefit to employees, residents, or guests, employers can provide their own GRH program to supplement MWCOG's program.

3.1.2 The National Capital Region Transportation Planning Board

3.1.2.1 Institutional Structure of TPB

The TPB was created in 1965 by the region's local and state governments to respond to federal highway legislation in 1962 that required the establishment of a "continuing, comprehensive and coordinated" transportation planning process in every urbanized area in the United States. The TPB's planning area covers the D.C. and surrounding jurisdictions. In Maryland these jurisdictions include Frederick County, Montgomery County, and Prince George's County and the St. Charles urbanized area of Charles County, plus the cities of Bowie, College Park, Frederick, Gaithersburg, Greenbelt, Rockville, and Takoma Park. In Virginia, the planning area includes Alexandria, Arlington County, the City of Fairfax, Fairfax County, Falls Church, Loudoun County, the Cities of Manassas and Manassas Park, and Prince William County. Policies are set through the COG Board of Directors, the National Capital Region Transportation Planning Board, and the Metropolitan Washington Air Quality Committee.

3.1.2.2 TPB & TOD Promoting Activities

The TPB supports TOD by preparing TOD plans and programs that the federal government must approve in order for federal-aid transportation funds to flow to the Washington region. The TPB does not exercise direct control over funding and does not implement projects, but it does perform a range of activities that promote an integrated approach to transportation development.

The TPB ensures compliance with federal laws and requirements. The federally mandated metropolitan planning process requires all MPOs to produce two basic documents — a long-range plan, which in the Washington region is called the

Financially Constrained Long-Range Transportation Plan (CLRP), and a Transportation Improvement Program (TIP), which lists projects and programs that will be funded in the next six years¹⁴. In order to receive federal funding, transportation projects must be included in the CLRP and the TIP. While the inclusion of a project in the region's adopted TIP ensures its eligibility for federal funding, the responsible transportation agency such as MDOT, VDOT or WMATA must follow federal-aid financing procedures to obtain the federal funds to implement it (Turnbull, 2006).

The TPB provides a regional transportation policy framework which facilitates sustainable development and a TOD transportation pattern. While federal law and regulations drive much of the region's regular transportation planning activities, the TPB has also developed a policy framework which is intended to guide the region's transportation investments.

The TPB provides technical resources for decision-making and works in coordination with transit agencies. The TPB staff work in close coordination with the staffs from the local and state jurisdictions and WMATA, as well as with outside consultants, to produce numerous studies and analyses (Turnbull, 2006). This technical information is essential for the decisions made by the TPB itself and for the decisions of the jurisdictions comprising the region to facilitate TOD. Technical data produced by the TPB staff are also used by other jurisdictions and agencies. The Virginia and Maryland DOT and WMATA use TPB data on a regular basis to plan the land around Metro stations and operate transit services and facilities (TPB, 2006).

14 Metropolitan Washington Council of Governments webpage:
<http://www.mwcog.org/transportation/tpb/roles.asp>

3.2 Major Transit Agency in Washington D.C., Metropolitan Area

3.2.1 General Introduction of WMATA Metrorail System & The Stations

Most of the TOD nodes in Washington D.C., Metropolitan Area are concentrated along the Metrorail service lines. Thus, Washington Metropolitan Area Transit Authority (WMATA), as the Metrorail service provider, has great influence on TOD implementation in Washington D.C., Metropolitan area.

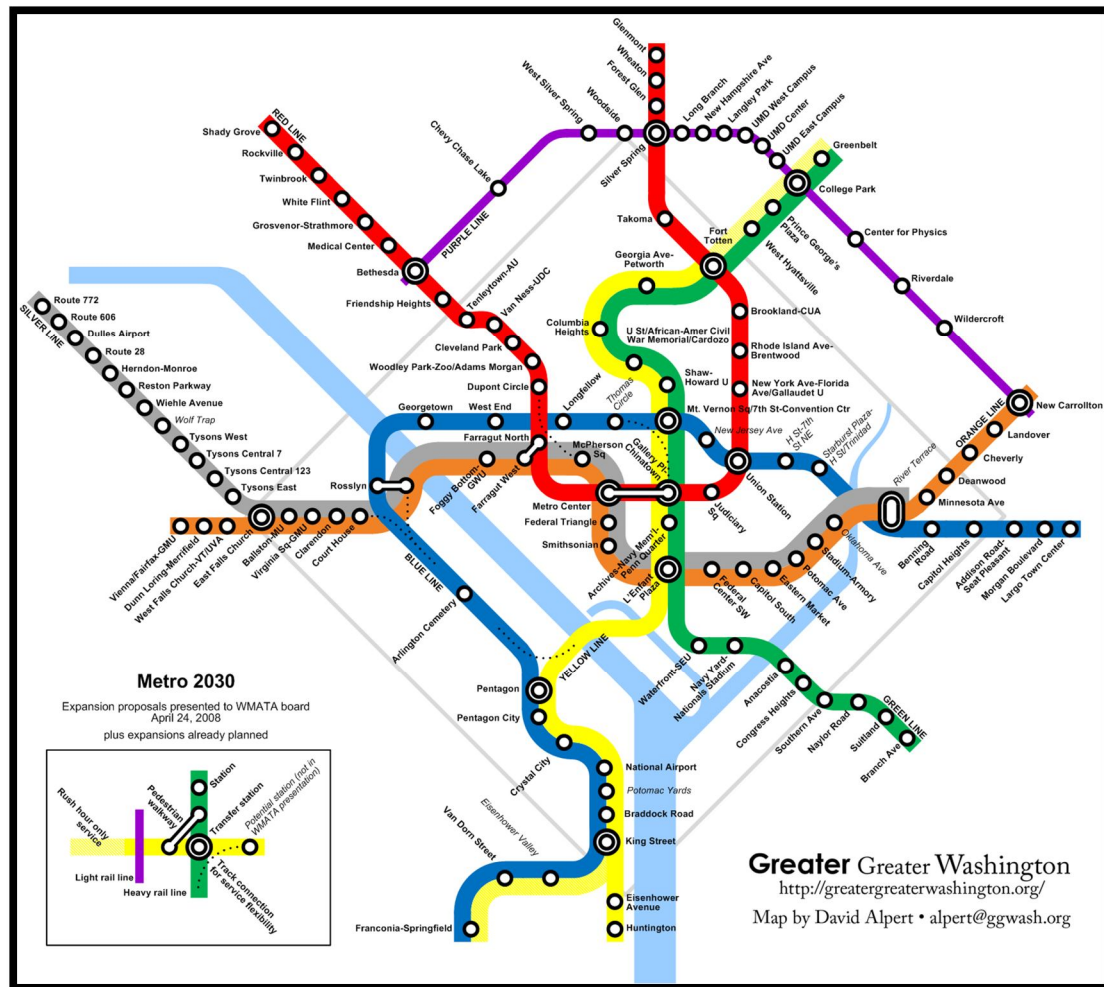




Figure 3.1: WMATA Metrorail Service Lines and Transit Nodes¹⁵

The 103-mile, 86-station Metrorail system is the centerpiece of the region's transit network. These station nodes are located on five lines, as shown on Figure 3.1. Two new lines – Purple and Silver are under construction and will be opened in 2016 and 2020, respectively (Table 3.1).

Table 3.1: Washington Metrorail System

| Line Name | Opened | Stations | Termini |
|---|-----------------|---------------|--|
|  Red Line | 1976 | 27 | Shady Grove - Glenmont |
|  Blue Line | 1977 | 27 | Franconia–Springfield - Largo Town Center |
|  Orange Line | 1978 | 26 | Vienna/Fairfax-GMU - New Carrollton |
|  Yellow Line | 1983 | 17 | Huntington - Fort Totten / Mt Vernon Sq/7th St-Convention Center |
|  Green Line | 1991 | 21 | Branch Ave - Greenbelt |
|  Silver Line (under construction) | 2016 planned | 29 planned | Route 772 - Stadium-Armory |
|  Purple Line (under construction) | 2020 planned | 21 planned | Bethesda – New Carrollton |

Source: WMATA.

The weekday boarding rates have increased in most of the metro stations over the past 30 years¹⁶. Significant growth can be found in the stations on Rosslyn-Ballston Corridor, with an average of 91 percent increase from 1980 to 2010

¹⁵ Source: Greater Greater Washington, by David Alpert.

¹⁶ Please check Appendix A for details.

(WMATA, 2012). Fairfax County shown little interest of TOD, and its station only had a 32.3 percent increase (WMATA, 2012). Two transit nodes – Silver Spring and White Flint in Montgomery County had negative changes in weekday boarding (WMATA, 2012). Part of the reason is that TOD plans in these areas have been lacked developer interest and citizen opposition.

3.2.2 The Institutional Structure of WMATA

Transit agencies are a direct beneficiary of TOD when it serves to boost transit ridership or generate revenue for the agency through the sale or lease of property. WMATA is an independent regional transportation authority created by an Interstate compact that involves the States of Maryland and Virginia and the District of Columbia. The actual area involved includes Arlington County, Virginia; Montgomery County, Maryland; and the D.C. It is considered a model of multi-jurisdictional coordination (WMATA, 2003). As the major regional transit agency, WMATA plays an important role on initiating and implementing TOD policies, as wells as providing transit services. WMATA and the federal government are partners in transportation. Since WMATA's inception, the federal government has contributed 65 percent of the capital costs (WMATA, 2003). Fares and other revenue fund 57.6 percent of the daily operations while state and local governments fund the remaining 42.4 percent (WMATA, 2003).

WMATA's primary goal, like that of most transit agencies, is moving people, which in turn helps battle congestion and improve air quality. It provides three types of transit services: heavy rail/subway (known as Metrorail), bus (Metrobus), and paratransit (MetroAccess).

WMATA's structure, in particular its Board, is not based on a private sector corporation model. Rather, it is probably best viewed as following a public utility model. This is not unique to WMATA. Most U.S. transit properties operate on some sort of public utility model. The interstate compact created WMATA as a regional body charged with the goal of building and operating the Metrorail system. It has no taxing powers and has limited regional transportation planning powers in the Washington metropolitan area. The compact created a multi-jurisdictional Board of Directors to oversee the Metrorail construction process and to create an operating agency for the rail system.

The Board of WMATA largely reflects the political concessions needed to reach agreement on moving Metrorail construction forward (Schrag, 2006). Although the compact has been amended to incorporate Metrobus and operating environment changes, the governance structure of the Board is not changed. The Board is made of eight persons from D.C., Maryland, and Virginia, and the federal government. Two of the board members are appointed by the D.C.'s City Council, two appointed by Maryland's Washington Suburban Transit Commission, two by the Northern Virginia Transportation Commission and two are appointed by federal General Services Administration. The most recent board members are shown in Table 3.2.

Table 3.2: WMATA Institutional Structure

| Jurisdiction | Director | Status | Comments |
|--|-----------------------|---------------------------------------|--|
| District of Columbia (appointed by the Council of the District of Columbia) | Tommy Wells | principal member | Chair DC Committee on Public Works and Transportation |
| | Tom Downs | principal member and First Vice Chair | former Amtrak President |
| | Michael A. Brown | alternate | Washington D.C. politician |
| | vacant | alternate | |
| Federal government (appointed by the General Services Administration): | Mortimer Downey | principal member and 2nd Vice Chair | |
| | Marcel Acosta | principal member | Executive Director of the National Capital Planning Commission |
| | Anthony R. Giancola | alternate | P.E. |
| Maryland (appointed by the Washington Suburban Transit Commission): | Michael D. Barnes | principal member | Montgomery County |
| | Alvin Nichols | principal member | Prince George's County |
| | Artis Hampshire-Cowan | alternate | Prince George's County |
| | Kathy Porter | alternate | Montgomery County |
| Virginia (appointed by the Northern Virginia Transportation Commission): | Mary Hynes | principal member | Arlington County |
| | Catherine Hudgins | principal member and Chairman | Fairfax County |
| | William D. Euille | alternate | City of Alexandria |
| | Jeffrey C. McKay | alternate | Fairfax County |

Source: WMATA website.

3.2.3 WMATA's TOD Efforts

Because of the region's extraordinarily complex political landscape, WMATA has no dedicated funding source, relying instead on a mix of various allocations from state and local governments, as well as passenger fares. This makes the agency take joint development opportunities very seriously. WMATA, like all transit agencies, is subject to FTA project approvals and the fair market value rule. Metro had attempted an affordable housing project on the grounds that it did not meet the regulations for spending federal funds. WMATA has developed its own TOD guidelines, aimed at attracting new riders and helping expand the local tax base (TRB, 2004). Some of the guideline's principles include maximizing the use of transit, linking land use with transit (physically or functionally), providing a diversity of housing types, emphasizing mixed uses in high density developments, and creating special places.

FTA's new joint development policies also prompt changes in how WMATA goes about its business. Before the policy changes, WMATA entered into unsubordinated long-term leases because the agency had to repay the federal treasury if land that was purchased with FTA funds was sold. Lease revenues, on the other hand, could be kept. Many developers prefer instead outright ownership. With the new rulings that allow an agency to sell and keep the proceeds, WMATA has shifted to fee-simple sales, something that has attracted stronger developer interest. This has increased the pool of developers responding to Request for Proposals (RFPs). Generally, WMATA's joint development projects have been more remunerative with the support of this new FTA policy.

WMATA's leaders realize the importance of promoting adjacent development to generate riders and revenues. Metro Board Chairman, Christopher Zimmerman, noted, "When we talk about the great success of public transportation in this region,

we generally talk about bus and rail ridership. But transit oriented development is the real unsung hero of our operation. Due to the tremendous success of this program, our region has benefited from land use which attempts to maximize the value of our \$9 million investment in our regional Metrorail system.” (WMATA, 2002) WMATA has taken a very active role in promoting TOD by getting involved in real estate development.

Creating a real-estate development department within WMATA in its infancy was a vital step in moving joint development activities forward (TRB, 2004). Staff with backgrounds in real-estate development were hired and given the resources to build a portfolio of land-holdings (TRB, 2004). Their private-sector experience helped to create a more entrepreneurial approach to land-use issues than is found in most transit agencies.

Rather than simply waiting and reacting to developer proposals, staff aggressively seeks out mutually advantageous joint development opportunities. WMATA proactively purchases the land around new transit stations and works with local land use authorities to ensure that the TOD-supportive zoning regulations and other policies are in place to promote mixed-use and high-density development. The agency has also found it lucrative to sell properties adjacent to transit stations (e.g., park-and-ride lots) to private developers for conversion to TOD development.

WMATA takes joint development projects as an important way to attract Metrorail riders and raise money. At the same time, these joint development projects bring various types of development and increase employment opportunities at the station nodes. The board adopted policies and procedures that created a public/private land development program long before the rail system became operational. The first

private development project, Rosslyn (Virginia) Metro Center, was initiated in 1973, three years before the Metrorail system opened. By 2003, there were 52 joint development projects with a market value of \$4 billion, which deliver some \$6 million in annual revenues to the transit agency (WMATA website)¹⁷. In addition, these developments have generated an estimated 50,000 new transit riders and over 25,000 jobs (McNeal, 2003).

Coordination is needed not only in transportation planning issues but also on joint development issues. The agency needs to discuss the station area development plan with local governments. Some governments, such as Arlington County and Montgomery County, constantly refine TOD concepts and pursue parking-lot infill possibilities (Transportation Research Board, 2004).

One criticism leveled against WMATA's joint development efforts has been a lack of pro-active community engagement. Historically, the agency has interacted directly with the development community, leaving public participation matters to local municipalities. This hands-off approach makes some problems. In the case of the Takoma Station in Montgomery County, a mixed-use project was criticized (TPB, 2004). A community backlash over the project design and potential impacts on housing affordability prompted WMATA to institute a program that actively seeks community input into the planning and design of future joint development projects.

¹⁷ Please check Appendix B for more information about WMATA joint development projects implemented in specific Metro stations.

3.3 Other Transit Agencies in Washington D.C., Metropolitan Area

WMATA is the largest but not the sole provider of rail public transit service in the Washington D.C. Metropolitan Area. According to data published by the American Public Transportation Association (APTA), WMATA accounted for about 88 percent of public transit trips in the Washington region in 2007 (APTA, 2009). The other agency, Virginia Railway Express (VRE), provides commuter rail, a type of transit not provided by WMATA. Moreover, many jurisdictions have established their own local bus services to supplement WMATA's bus and rail service.

- Virginia

VRE is a transportation partnership of the Northern Virginia Transportation Commission (NVTC) and the Potomac and Rappahannock Transportation Commission (PRTC). VRE provides commuter rail service linking the Northern Virginia suburbs to Alexandria, Crystal City and downtown Washington, D.C. NVTC is a strong advocate of adequate, stable, and reliable funding to finance public transit. It allocates over \$120 million in state, regional, and federal transit assistance each year among the member jurisdictions (NVTC, 2007). Its budget is funded primarily by the Commonwealth of Virginia and by its local governments.

Virginia Department of Rail and Public Transportation (DRPT), a State agency reporting to the Secretary of Transportation, works closely with VDOT and concerns about transportation management issues. The three primary areas of DPRT activity are rail, public transportation, and commuter services. DRPT supports both passenger and freight rail initiatives through funding options, expert advice, research, and advocacy.

3.4 Municipal Governments

In the suburbs in Washington D.C., Metropolitan area, local policy is influential in shaping development around Metro stations. The local jurisdictions vary in their commitment to TOD.

3.4.1 Arlington County & TOD

3.4.1.1 Introduction

Arlington County with a transit system dating to the 1970s has a long history in TOD promotion. Arlington County is well-known for its TOD efforts along the Rosslyn-Ballston WMATA Orange Line corridor. Since the 1970s, the county has been successful in creating and sustaining a TOD vision and implementing policies to support this vision. The result has been significant quantities of high-density, mixed-use development in four contiguous station areas, with densities stepped down to transition into neighboring residential areas.

3.4.1.2 How Arlington County Government Defines and Participates into TOD Process

One key tool used to promote TOD along Arlington County's Metrorail Corridors is the preparation of a General Land Use Plan (GLUP). The GLUP sets the broad policy framework for guiding all development decisions along targeted growth axes.

Between 1961 and 1996, the GLUP was revised eight times. Each revision promoted higher density development along the Metro Corridors while maintaining lower residential density elsewhere in the county. Adding "mixed-use" designations, introducing market-responsive land use changes along the Metrorail corridors, and

elevating the importance of urban design keep the GLUP relevant and garnered steady political support (TPB, 2002).

In addition, individual sector plans are introduced that orchestrate development activities within the quarter-mile “bulls-eyes” of each Metrorail station. The sector plans specify not only land use and zoning ordinances, but also urban design, transportation, and open-space guidelines. Likewise, the station Sector Plans have been included in the County’s plan revision process. In 1989, the County Board initiated a mid-course review of the Rosslyn-Ballston Corridor to determine how well development outcomes had matched the goals set for each station and the County. At that point, the many stations were 50 percent built out (DCPHD, 2003). County officials wanted to gauge the progress and rethink station-area policies. As a result of the review, Rosslyn, Courthouse, and Clarendon Sector Plans were approved. Arlington County’s review and revision of the land use plans demonstrates the importance it gave to evaluating progress and adapting to changes while maintaining a vision for TOD.

3.4.1.3 Institutions Participating in Transportation Planning

The Transportation Planning Bureau in Arlington County focuses on transportation planning area. It aims to plan, program, and implement infrastructure and transportation options in collaboration with neighborhoods, the County, and region to foster a livable community now and in the future.

Some institutions function as transportation advisory counselors. Arlington County Commuter Services (ACCS) is a bureau of the Arlington County Department of Environmental Services. ACCS serves people who live, work, or engage in recreation in Arlington. ACCS programs are designed to encourage the use of mass

transit, carpooling and vanpooling, bicycling, walking, teleworking, and other alternatives to driving alone. These programs and services aim to make people's life easier to get around without a car.

Arlington Transportation Partners (ATP), a division of ACCS, introduces transportation expertise to businesses, residential communities, developers, and hoteliers in the County. ATP's innovative programs and expert knowledge base have made it the leading transportation demand management specialists in the Country. In operation since July 1998, ATP has assisted over 600 businesses, 300 residential communities, all 42 hotels, and 33 site plan properties located in Arlington County to improve their transportation amenities and benefits (ATP website¹⁸).

The Transportation Commission is also an advisory body to Arlington County Board on transportation related items. The Transportation Commission generally proposes issues of streets, transit, pedestrian, taxicabs and bicycle modes and discusses their relation to site plans, sector plans and the Master Transportation Plan.

3.4.1.4 Institutions Participating in the Integration of Land-Use and Transportation

There are also agencies focusing on integrating land-use and transportation issues which promote high-density and mixed land-use development in transit nodes.

In Arlington County government, most of TOD related issues are planned and managed by Department of Community Planning, Housing and Development

18 ATP webpage address:

<http://www.greenconnected.com/CompanyInfo.aspx?CompanyName=Arlington+Transportation+...&CompanyId=1DADA0439F3F79C90988FB0051F32ED27FFE31EB157A2C96D6D74320CCDE7A3F4CEADBE1B552A05F>

(DCPHD). DCPHD is dedicated to promoting the improvement, conservation and revitalization of Arlington's physical and social environment. Four divisions which include planning commission, zoning office, housing division and neighborhood services division in DCPHD foster local TOD from different perspectives. The Planning Division is responsible for guiding and regulating Arlington's short and long-range development by working with the community to develop the Comprehensive Planning for Arlington County area. The Planning Division seeks to concentrate high-density, mixed-use development along transit corridors, while preserving and enhancing Arlington's existing single-family and apartment neighborhoods. The Zoning Office interprets the regulations contained in the Zoning Ordinance. Some of the central TOD issues, such as the land uses and density of development permitted, the number of parking spaces required, and other land use regulations are regulated by this office.

The Housing Division helps Arlington County preserve and enhance existing affordable housing. The Neighborhood Services Division reinforces the County Board's commitment to healthy and vibrant neighborhoods where residents are active in civic and neighborhood affairs and where services are tailored to meet the needs of neighborhoods.

3.4.2 Montgomery County & TOD

3.4.2.1 How Montgomery County Defines and Participates into TOD Process

Montgomery County invests in transit assets including TOD projects expecting more transit ridership and economic development. Montgomery County participated in TOD implementation process by building up land-use plans and adopting programs

which encourages less auto traveling. In 1970, as preparation began for the arrival of Metrorail, Montgomery County amended its Master Plan by reducing the size of the Central Business District (CBD) boundaries to concentrate development. The Master Plan also establishes a Commercial Transition Zone to provide a buffer between the Metro core and residential neighborhoods.

3.4.2.2 Institutions Involved into TOD Process

Transportation management organizations manage transportation demand and promote carpooling and use of public transportation in Montgomery County.

Montgomery County's land-use planning issues, including TOD relative issues, are managed by the Maryland-National Capital Park and Planning Commission (M-NCPPC) which is a bi-county agency created by the General Assembly of Maryland in 1927. The Commission operates in Montgomery County through a Planning Board appointed by and responsible to the county government. All local plans, recommendations on zoning amendments, administration of subdivision regulations, and general administration of parks are the responsibilities of the Planning Boards.

Montgomery County Department of Planning is a part of the M-NCPPC. It strives to balance provision of opportunities for commercial and economic development, housing, and public facilities with protection of open space and the environment. Work efforts include master planning that creates blueprints for well-designed communities and development review services that promote Smart Growth, including TOD (M-NCPPC, 2014). In winter 2010, the Planning Department reorganized to improve the Department's ability to respond to the needs of the

community¹⁹. The Department now operates in multi-disciplinary geographic teams with regulatory as well as community planning functions. It results in better integration and flexibility and leads to faster and more balanced decision-making. The Planning Department's Functional Planning and Policy Division undertakes projects that span more than one geographic area, including transportation networks and zoning text amendments (M-NCPPC, 2014).

Montgomery County's Department of Housing and Community Affairs (DHCA) has administered the Housing Initiative Fund (HIF) since 1998. HIF is encouraged to be used in neighborhood stabilization and improvements, such as sidewalks, parks, and other facilities needed for high quality, non-auto mobility. The Master Plan enhances pedestrian friendly neighborhoods and increases the affordable housing in areas served by public transportation. The regulatory system seeks to link provision of housing to nonresidential development by encouraging mixed use or a fee-in-lieu payment to the County's Housing Initiative Fund.

Since the State cannot leverage property tax revenues or issue impact fees, local governments largely take the lead in value capture. The State has partnered with local jurisdictions on certain transit-oriented development (TOD) projects where commuter parking garages have been constructed for the State. Chapter 182 (House Bill 300) of 2009 authorized the Maryland Economic Development Corporation (MEDCO) to enter into agreements with Montgomery County government to use proceeds from a special taxing district, including TIF, to pay debt service on bonds issued by MEDCO for TOD (Maryland State, 2009).

19 Montgomery County Planning Department webpage:
<http://www.montgomeryplanning.org/departments/>

3.5 Institutional Structure for Transit Nodes

Three nodes, Ballston, Court House from Arlington County, Virginia, and Bethesda from Montgomery County, Maryland are selected as case studies in this dissertation. They represent the successful TODs in Washington D.C., Metropolitan Area with different development types and functions.

The responsibilities of the involved jurisdictions and organizations and the effectiveness of their work highly affect the results of TOD. In order to better examine the policies and programs and better understand the successful experience of TOD in studied areas, it is necessary and important to have a clear idea about the institutional framework of TOD implementation in Washington D.C., Metropolitan Area.

This section explores TOD institutional environment in two major policy implementation regions: transportation and land-use since the TOD concept is about the combination of public transit and station area land-use development.

3.5.1 Transportation Policy Implementation in Washington D.C., Metropolitan Area

In transportation region, institutions are categorized by the areas of the policies or programs applied and supported which include financial support, transportation planning, public transit service, and advisory service. The specific institutional structure for transportation policy implementation is shown in the following Table 3.3.

Table 3.3: Transportation Policy Implementation in Washington D.C., Metropolitan Area



In Washington D.C., Metropolitan Area, most of the transportation funding supporting public transit and other travel alternatives is from federal governments. State agencies have some transportation investment on transit facilities as well. Montgomery County, as a local government, has a tax credit program to foster telework, which indirectly decrease the traffic on the road. This county level funding policy is very rare in D.C., Metropolitan region. WMATA is the major transit service provider in this region. There are also some transit agencies and non-profit organizations run bus and rail services. Transit agencies, MPO, State DOTs, County

governments, and the NGOs work closely on transportation planning. The cooperation among these agencies is essential to enact and implement policies which benefit both local communities and the region. Advisory service work helps and encourages local residents to be familiar with the public transit service and enjoy the benefits.

3.5.2 Land-Use Policy Implementation in Washington D.C., Metropolitan Area

In the land-use region, institutions are categorized into four areas by their functions which are financial support, mixed land use planning, affordable housing development and reservation and public realm planning. The detailed institutional structure for land use policy implementation is represented in the following Table 3.4.

Table 3.4: Land Use Policy Implementation in Washington D.C., Metropolitan Area

| | | | |
|--|---|---|---|
| <p>Financial Support</p> <ul style="list-style-type: none"> • HUD - HOME & CDBG • U.S. Treasury - NMTC & LIHT • County Government (Montgomery) | <p>Mixed Land Use</p> <ul style="list-style-type: none"> • WMATA (real-estate development department) • State DOT (Maryland DOT: Office of Real Estate; Office of Planning & Capital Programming) • State Agency (M-NCPPC) • County Government (Arlington: GLUP, the Sector Plan, Arlington County Comprehensive Plan, DCPHD, DPW, AED, Zoning Office; Montgomery: Department of Planning) | <p>Affordable Housing</p> <ul style="list-style-type: none"> • State Agency (M-NCPPC) • County Government (Arlington: DCPHD Housing Division, Planning Commission; Montgomery: Department of Planning) | <p>Public Realm</p> <ul style="list-style-type: none"> • State DOT (Virginia DOT:- working with Arlington County) • State Agency (M-NCPPC) • Government (Arlington: DCPHD, DPW, Planning Commission; Montgomery County) |
|--|---|---|---|

3.6 The Importance of Cooperation

TOD is a broad smart growth concept in general and with local preference in application. As discussed in the previous sections, many entities have been involved. To accomplish the goals of TOD, cooperation with each level of government, transit agencies, non-profit organizations and the private companies is especially essential. Public involvement is necessary and important as well.

3.6.1 Government Cooperation

All major transit developments require regional collaboration. At federal level, the cooperation between FTA and FHWA provides broad program direction and guidance to these State and metropolitan agencies which ensures implementation of the policy priorities and program requirements. FTA encourages local governments, transportation agencies, employers, building owners and managers, and public and private developers to work together to implement policies and strategies that will support transit use in daily activities as well. At regional level, TPB works together with State DOTs and WMATA to ensure their eligibility for federal funding. At the State level, Virginia DOT assists TOD implementation by assembling a group of governments to discuss local transportation and land-use development issues. Maryland DOT is actively involved in partnership establishment. The agency coordinates transit investment planning with municipal land use planning. Maryland DOT also makes efforts in cooperating with modal administrations and agency engineers to improve TOD implementation. WMATA dedicates to working with the local governments for zoning and transportation planning at Metrorail Station areas which ensures the station area planning consistent with TOD concepts.

3.6.2 Public-Private Cooperation

Public-private partnerships in Arlington County metro nodes serve as forums for community and business related concerns.

3.7 Introduction of TOD Case Studies

3.7.1 Metro Nodes & Transit-Oriented Development

National, regional and local leaders in Washington D.C., Metropolitan Area recognized early on that a transit network was more than a people mover. A transit system should also shape regional growth (Cervero, 2004).

The high density and ample public transit services build the precondition for TOD implementation. The potential for TOD positively influencing the Washington, DC Metropolitan region is established in part by the recognition on the part of the area's local, regional, and national leaders that transit should shape growth in the region. Numerous housing projects have broken ground which has taken advantage of Metrorail's proximity in Washington D.C., Metropolitan Region. Traffic congestion beyond the Beltway, a robust and fairly resilient job market, and new downtown amenities boost infill and redevelopment in the District and inner-ring suburbs near Metrorail stations (WMATA, 2002).

The complexity of jurisdictions in Washington Metropolitan area has compelled WMATA to establish a comprehensive joint development program which has been working with local jurisdictions for station area planning. Although WMATA has the authority to develop land directly, it is still dependent on local jurisdictions for supportive land use policies.

Arlington County and Montgomery County were especially early in recognizing the benefits of developing around transit. They began orienting land use planning to WMATA service before rail operations began (WMATA, 2003). After nearly 40-year development, the growths of Rosslyn-Ballston Corridor and Bethesda have been recognized as a symbolic TOD success in U.S.

The successful TOD nodes in Washington D.C., Metropolitan Area have some properties in common. First, they are all aware that the real estate investment will need time to get the payback and they are prepared for it. To obtain the optimum development potential for a TOD site, the stakeholders may have to be prepared to wait for the market to improve before they see profit-making opportunities at that site. While some interim development may be possible, or even desirable, at a transit station, successful TOD often results from a conscious policy by the local government to wait for the market. Further, the public sector may have to assist with site assembly and provide initial financing or other assistance to make the project area really attractive to the development community.

Arlington County bypassed or rejected numerous proffers and development proposals for stations in its Metrorail Development Corridors, preferring to wait for the market cycle to attract developers who were willing and able to provide mix and densities of land uses that were envisioned in its development corridor plans. Montgomery County also denied or deferred development proposals for the Bethesda, Grosvenor and Silver Spring Stations on the Metrorail Red Line, until the projects being proposed were consistent with the TOD that was envisioned in its comprehensive and local area plans.

Second, these successful transit nodes have specific and effective TOD plans to facilitate mixed land use and non-auto travel modes in Metro station areas.

But TOD is very site-specific. Each transit station area has unique opportunities and each area presents unique or particular problems that require innovative solutions and policies. Successful TOD projects are usually very closely tailored to the physical, socioeconomic and demographic particulars of the station

areas and their adjoining communities. These plans were drawn up by County agencies with consideration of their own local features. Arlington and Montgomery County take different strategies with consideration of the geographic factors and their own planning goals. Arlington County facilitate TOD by emphasizing the development along two corridors – Rosslyn-Ballston and Jefferson-Davis; while Montgomery County focuses on the Metro Core areas in each node and explores the maximum potentials of public transit usage and local revitalization.

Arlington County is a national leader in TOD, affordable housing, transit and street design. The Rosslyn and Ballston areas of Arlington County have been models of TOD. Arlington's success started when it decided to construct Metro's Orange Line under the Rosslyn-Ballston (R-B) corridor, rather than above ground in the middle of I-66, and created their "bull's-eye" plan for the Metro stations.

Arlington County's ability to promote and sustain growth for some 40 years is a result of maintaining the original vision while adapting to the changing needs of their communities. The ongoing revision of plans, adoption of new policies, and commitment to citizen participation in the planning process have allowed Arlington County to maintain an active portfolio of development activities along Metrorail corridors. In addition to the two Metro corridors, the County is implementing transit-oriented communities along Columbia Pike, in Shirlington, and at the East Falls Church Metro Station.

Older suburban downtowns in Washington D.C., Metropolitan Area such as Bethesda, and, more recently, Silver Spring in Montgomery County have undergone a TOD facelift (WMATA, 2002). Unlike Arlington County's corridor strategies, Montgomery County have set up city and county policies, including zoning, density

bonuses and flexible parking codes, which have encouraged TOD in many Metro nodes.

Not all TOD proposals have been approved at the beginning of Metro service. Comparing to Bethesda, the other nodes on the Metrorail Red Line were slower to develop. Silver Spring accepted the TOD planning ideas in the late 1990s, nearly twenty years behind. And not all counties in Washington D.C., Metropolitan Area show their interests of the potential of Metro to shape and serve development. Fairfax County and Prince George's County are lack of TOD-supportive policies and programs.

The reasons for Fairfax and Prince George's Counties lagged in transit-oriented planning are different.

Fairfax showed little interest in the potential of Metro to promote the development at the beginning of 1980s. Some large employment centers in the County were left without Metrorail service. Fairfax's housing policy is an issue as well. It has explicitly encourages less affordable housing. The County policy is needed to support affordable housing in commercial corridors like Fairfax Boulevard and Route 1 keeps increasing where people can more easily use transit and reduce their transportation costs in the future (Artemel, 2012).

By 2000, Fairfax County realized that TOD could help revitalize local communities. The county government actively engaged in supporting and facilitating Metrorail riding and development around Metro stations. For the purpose of providing a standardized definition and set of guiding principles for TOD, the Fairfax TOD Commission was established in 2006. The Commission sponsors an open and visible

process to gather input on a consensus vision and guidance on Fairfax County Transit-Oriented Development.

Prince George's County has 15 Metro stations. The County does not encourage TOD as actively as Montgomery County. One reason is that the immediate area around many of these stations includes industrially zoned land and industrial land uses (Dempwolf, 2008). The county might have some concerns about whether TOD will affect the industrial land uses. Because TOD is based on principles of mixed use and increased density and intensity of development in the immediate station area, rezoning through the creation of transit overlay districts is likely and appropriate. In many cases, such overlays are already in place.

The other reason is that most regional job growth occurs on the western side of the region in western D.C., Arlington, Fairfax and Montgomery. This imbalance causes Prince George's County workers to have some of the longest commutes in the regions.

3.7.2 Metrorail Alignment Planning in Arlington and Montgomery County

In the early 1960s, both Arlington County and Montgomery County had significant debates about whether the counties should accept the regional transit system proposed by the National Capital Transportation Agency (NCTA). NCTA was the predecessor of WMATA. NCTA's November Report of 1962 aimed to minimize costs by routing most suburban extensions as surface lines alongside railroads or in highway medians (Rannells, 1963). Arlington and Montgomery were no exception.

For Arlington County, the Report proposed the line in the median of the planned Interstate 66 highway (WMATA, 2011). Arlington County officials did not agree with this alignment, since they believed that a transit line close to the highway

would either wither for lack of patrons within walking distance of its stations or tempt high-density developments to the highway area (NCTA, 1963). Also, the NCTA-proposed I66 transit line would not serve the dense concentration of apartments, shops, and offices that the County planned for Wilson Boulevard, an arterial road running parallel to the Interstate, about half a mile to the south. Arlington officials complained to the NCTA that the I66 proposal will not work. In November 1962, the NCTA stated that the precise location of the Metro route in Arlington required further study and consultation with Arlington officials (NCTA, 1963). In early 1963, an appendix of the NCTA indicated that the NCTA was continuing the studying of the Metro route Arlington County and considering one along Wilson Boulevard from Rosslyn to Glebe Road rather than in I-66 (NCTA, 1963).

Within the next few years, Arlington planners studied both the alignment and transit's role in their broader plans. By 1966, one report mentioned that Arlington County and the NCTA agreed to realign the Metro through high-density commercial-office-apartment areas along Wilson Boulevard instead of the I-66 freeway median since the freeway's alignment did not fit the County's future land use plans (NCTA-1). Arlington County finally got the agreement of the NCTA to locate five stations below the old commercial spine rather than three stations in a highway median (NCTA-1).

Montgomery County also had considerable conflict over Metro alignment. Different from Arlington County, the argument on transit planning was not between the County and the NCTA, but inside the County officials.

In the early 1960s, Montgomery County had been divided over development and transportation (Hanson, 1967). Some developers supported highways, while others opposed them (Hanson, 1964). In November 1962, highway-supportive Republicans

took power in Montgomery County Council and they pushed through highway growth measures (Montgomery County, 1967). The highway advocates lost their power in 1966 election. In early 1967, WMATA was created and took over the responsibilities of NCTA (WMATA, 2011) although NCTA was not formally ended until September 1967 (WMATA, 2011).

The new Montgomery council approved WMATA's Metrorail construction in Montgomery County and engaged in a debate on the Metrorail alignment. All members in the County Council agreed that transit planning was very important to the future (Hovsepian, 1988). One council member, Cleatus Barnett recalled, "We were building these lines for eternity. You're not going to pick them up and move them if you put them in the wrong place. They are there forever. And don't tell me anything about the cost. If it costs more, it costs more, but that's what we're going to do." (Barnett, 1988) The alignment was finally settled in March 1968. There were two routes on the County-proposed Red Line. One was from Friendship Heights to Shady Grove; the other was from Silver Spring to Wheaton in Montgomery County (WMATA, 2011). WMATA decided on the Red Line routing and stations, except for the extension beyond Rockville to Shady Grove in 1969 (WMATA, 1969).

Construction on the Orange Line in Arlington County and Red Line in Montgomery County began with a groundbreaking ceremony in 1969 (WMATA, 2011). WMATA began to provide Metrorail and Metrobus services to Arlington County in the 1979 (WMATA, 2011).

3.7.3 Metro Station Planning in Arlington and Montgomery County

Having selected the alignments by March 1968, Arlington and Montgomery Counties then faced the planning for Metro station areas. WMATA planners had their

ideas on Metro station area development, dating back to the NCTA. NCTA planner Williams had referenced the Scandinavian model and suggested concentrating housing and employment development around suburban transit stations (WMATA, 1969). Both Arlington and Montgomery County largely agreed with this vision.

They planned and developed their Metro station areas with their own concerns and emphases and both of them encountered residents' protest on dense station area planning. Dense station-area development was fiercely opposed by residents, while most planners thought it was necessary to make rapid transit a working alternative to the automobile. Arlington and Montgomery County governments in some cases agreed to mitigate Metro's impact. Both of them utilized zoning tools to ensure that building heights and densities would decrease as one got farther from a station. Such zoning helped establish a buffer between residential neighborhoods and commercial areas along Metro corridors.

Arlington County was more active and directly involved in building rail transit corridors for economic development. The County attempted to create different socio-economic and cultural characteristics and identities for station areas that did not exist in the past. In 1975, Arlington County board adopted a policy of designing station areas for dense but mixed-use development; in 1977, this policy entered the County's General Land Use Plan (Arlington County, 1989). The Orange Line is about 2.63 miles and connects five stations – Ballston, Virginia Square, Clarendon, Court House and Rosslyn in Arlington County. These closely located stations comprise the Rosslyn-Ballston (R-B) Corridor. In the 1980s, a Sector Plan was prepared for each individual Metro Station Area within the Rosslyn-Ballston Corridor with consideration of the local specialties (Arlington County, 1980). The careful, ongoing review and revision of

the General Land Use Plan (GLUP) and the sector plans has sought to ensure that planning activities for each station node area are up-to-date, market-responsive, and fit with changing community goals (TRB, 2004).

The theme for each transit node planned in Sector Plans were derived from the existing characteristics of each area including predominant retail offering, physical environment, civic or cultural amenities, as well as public policy and other forces that may guide future development. Each transit node's theme provided the basis for developing a specific TOD niche in the context of differentiating that area relative to the other transit nodes in Arlington County and in Washington D.C. Metropolitan Area. The market niche began to define the types of land-uses and amenities that were appropriate to promote each node as a unique destination.

Montgomery embraced the WMATA's TOD concept, a similar path to what Arlington County did; nevertheless, the County implemented several planning strategies different from Arlington (COG, 1984). Montgomery County used zoning, building codes and efforts to enhance non-auto but the policies and strategies implemented in the Bethesda Metro station in Montgomery County was based on well established historic role and up-scale identity rather than building new identities as Arlington County did for Ballston and Court House.

3.7.4 Why Choosing Ballston, Court House and Bethesda as Case Studied Areas

There are two major reasons for choosing Ballston and Court House from Arlington County and Bethesda from Maryland as case studied areas. One is that they are all successful TOD nodes in Washington D.C., Metropolitan area, served by the same transit system. The observation on the policy implementation in these three areas can contribute to our general knowledge for the planning and functions of TOD nodes.

Further, little attention or detailed research has been done on efforts and outcomes to create differently-oriented metro station areas within the same transit system.

Ballston, Court House and Bethesda have different socio-economic and cultural characteristics. Bethesda is traditionally a more affluent place with a larger area than Ballston and Court House. Ballston and Court House are two of the five small neighborhoods on Rosslyn-Ballston Corridor.

Arlington County deliberately created a distinct local identity for each neighborhood. Ballston has been rebuilt as a retail center with pedestrian friendly sidewalks and malls; and Court House has been designated as government center, home to the County government complex. On the other side, Montgomery County applied zoning strategies to concentrate development around Metro station, for an area with a well established and positive identity.

The contribution of non-government organization (NGO) in fostering the TOD node is very significant in Bethesda, which has not been the case in Arlington County. Bethesda Urban Partnerships, NGO, in Bethesda has taken an important role in promoting non-auto travel modes and walkable community in downtown area.

Based on these similarities and differences of Ballston, Court House and Bethesda, it is beneficial to select them as case studied areas. They make clear the fact that metro stations and the immediate areas around them can be deliberately planned and developed to create or to continue having quite specific and different socio-economic and cultural dimensions and quite different planning and management arrangements that can include actors from the private and non-profit as well as public sectors.

The case study chapters (Chapter 4 and 5) focus on how the three stations are different in character and the same and different in the mix of actors involved, and how the counties particularly foster policies that enhance the use of the Metrorail and other non-auto transportation options.

Chapter 4

DETAILED CASE STUDIES: BALLSTON AND COURT HOUSE, ARLINGTON COUNTY, VIRGINIA

4.1 Introduction of Arlington County

4.1.1 Political Debate for TOD Planning Arlington County

Arlington, Virginia, is an urban county of some 26 square miles which is located in the core of Washington D.C. region. By 2011, the population in Arlington County was 216,004, 32 percent increase since 1960 (US Census) (shown on Table 4.1).

Table 4.1: Arlington County Population Changes 1960-2011

| Census | Population | % change |
|--------|------------|----------|
| 1960 | 163,401 | 20.60% |
| 1970 | 174,284 | 6.7% |
| 1980 | 152,599 | -12.4% |
| 1990 | 170,936 | 12.0% |
| 2000 | 189,453 | 10.8% |
| 2010 | 208,900 | 10.3% |
| 2011 | 216,004 | 3.4% |

Source: U.S. Census Data: Virginia 1960-2011.

In the 1970s, some Arlington residents formed the Committee on Optimum Growth (Co-Opt) to oppose the dense station-area development. Their standpoint was to the contrary of most professional planners. Arlington County planners believed that

it was necessary to make rapid transit a working alternative to the automobile. The officials held to their policy of steering dense development to station areas and rejected Co-Opt's pleas to reduce the stations on Rosslyn-Ballston chain from five to four.

Arlington did not totally ignore the constituents of the protestors, and made some compromises to mitigate Metro's impact in some cases. Arlington adopted zoning to ensure that building heights and densities would taper rapidly as one got farther from a station, thus providing a buffer between residential neighborhoods and the commercial spine of the Rosslyn-Ballston and Jefferson-Davis corridors.

In 1966, WMATA was created to build and operate the Metrorail system in Washington D.C., Metropolitan Area. WMATA planned to develop the Orange Line of Metrorail in Arlington County. Arlington lobbied strongly for an underground route along its existing commercial corridor rather than along the median of future highway. A conscious decision by county planners, officials and citizens to locate the Metrorail along two major arterials (Wilson Boulevard and Fairfax Drive) instead of down the median of Interstate 66 created new opportunities for both public and private development. In 1979, the Orange Line from Rosslyn to Ballston was opened. The County made efforts to use transit to both redevelop an older commercial corridor and ensure future riders for the system.

4.1.2 Metro Station Area Planning & Development in Arlington County

In order to make the maximum benefits of the Metrorail system and revitalize the local economy, several County planning policies have been set up and implemented. Arlington County's master plan established the central planning concept which concentrated high and mid-density redevelopment along the Metrorail corridors

and tapered down to existing neighborhoods. Typically the redevelopment was shaped in a bull's eye pattern with the tallest and most dense development adjacent to the Metro Stations quickly tapering to lower buildings and single family neighborhoods within one quarter mile from the station entrance. Besides the corridor planning, Arlington County set up a Sector Plan for each transit node which emphasized combining local characteristics with their Metrorail access advantage. The County also encouraged a mix of uses and services in station areas. High quality pedestrian environments and enhanced open space were created in the Metrorail nodes. Plans sought to preserve affordable housing as well.

The TOD planning in Arlington County has been a major focus over the last 40 years. Over this time, the County has become an increasingly popular place to live, work, and shop due in part to high-density development along its two Metrorail focus areas: Rosslyn-Ballston and Jefferson Davis Corridors (TRB, 2004).

4.1.2.1 Rosslyn-Ballston Corridor

The Rosslyn-Ballston Metro Corridor (R-B Corridor), approximately three quarters of a mile wide and three miles long, is located along Wilson Boulevard between the Potomac River and North Glebe Road (Figure 4.1). Five Orange Line stations, which opened between 1976 and 1979, are on this corridor: Rosslyn, Courthouse, Clarendon, Virginia Square and Ballston. The R-B Corridor is also well served by major thoroughfares including Washington Boulevard, Glebe Road, Arlington Boulevard, Lee Highway, and the Custis Parkway (I-66).

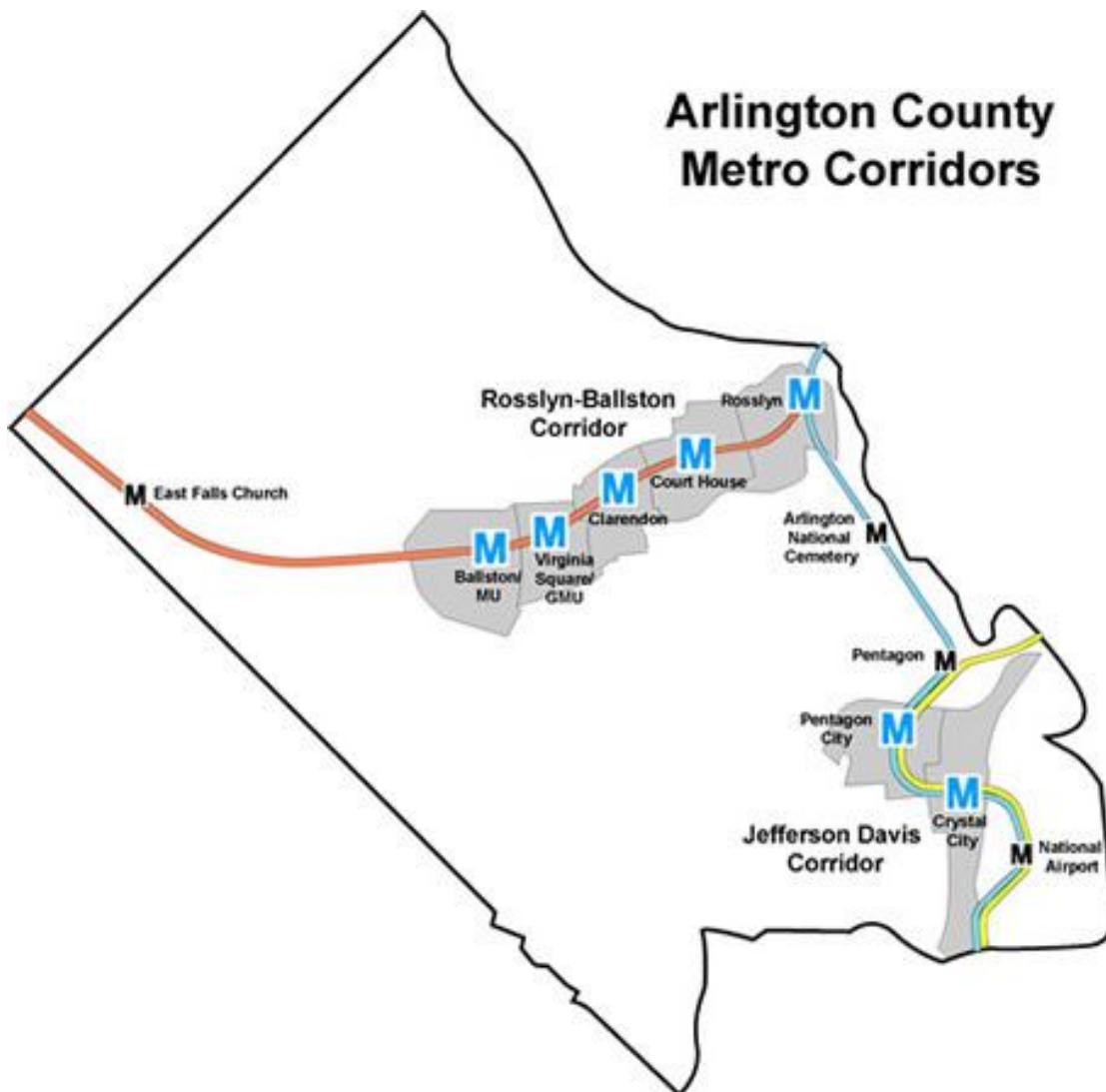


Figure 4.1: Arlington County Metro Corridors²⁰

²⁰ Source: Arlington County Website,
http://www.arlingtonva.us/departments/CPHD/planning/data_maps/Census/metro/CensusMetroMain.aspx

The Jefferson Davis Metro Corridor (JD Corridor) is the other Arlington's Metrorail transit corridor targeted for high-density development. It provides access to the Pentagon, National Airport and Washington, D.C. by way of several heavily traveled highways, Metro's Blue and Yellow lines and the CSX Railroad (WMATA, 2011). It is an area currently planned for future surface transit enhancements by way of bus rapid transit, transitioning ultimately to streetcars. Stable, single family residential areas include the Arlington Ridge and Aurora Highlands Neighborhood Conservation Areas. These cover a large portion of the land area in JD corridor. Mixed-use development is concentrated along Jefferson Davis Highway and around the Crystal City and Pentagon City Metro Station Areas.

Basic planning for the R-B Corridor involved a twelve year (1972 to 1984) intensive effort by citizens, staff and County officials. During this period, several policy planning studies were adopted, including RB 72: Rosslyn-Ballston Corridor, Alternative Land Use Patterns; Arlington Growth Patterns (1974); A Long Range County Improvement Program (1975); and Rosslyn Ballston Corridor; Recommended General Land Use Plan (1977), Ballston Sector Plan (1980), Court House Sector Plan (1981), Virginia Square Sector Plan (1983) and Clarendon Sector Plan (1984) (Arlington County, 1989).

Throughout the R-B Corridor, the General Land Use Plan (GLUP) concentrates the highest density uses within walking distance of Metro stations; tapers densities, heights and uses down to the existing single family residential neighborhoods; and provides for a mix of office, hotel, retail and residential development. GLUP for metro corridor indicates the county's willingness to rezone for higher density but to retain some land remained zoned for fairly low density.

Arlington County intentionally produced plans to create interrelated Metro stations within the Rosslyn-Ballston Corridor that were designed to serve different socio-economic, cultural and governmental functions. These five station areas complement one another and constitute an urban corridor of increasing importance to the greater Arlington community. In the R-B Corridor, Rosslyn is an office and business center; Court House is Arlington County's government center; and Clarendon is planned as an "urban village." The Virginia Square Station Area contains a concentration of residential, cultural and educational facilities, while Ballston is intended to be Arlington's "new downtown" retail center. The unique quality planned for each station area is reflected in the Sector Plans developed for each Metro station.

After 40 years, both Metro corridors have made significant progress in office, residential and retail development. For Rosslyn-Ballston Corridor, in 2008, there were 20.8 million sf. of offices and 26,572 housing units development, nearly triple the 1970 level (Table 4.2). The R-B Corridor provided 90,000 jobs in 2008, which showed a growth from 22,000 jobs in 1970 (Arlington County, 2010). The corridor development success in Arlington raised the land value as well. Forty-eight percent of assessed land value in the county is in the metro corridors which is 11 percent of total land (Arlington, 2010).

Table 4.2: Rosslyn-Ballston Corridor Development

| | 1970 | 2008 | % Change |
|---------------------------|-----------|------------|----------|
| Office (sf) | 5,568,600 | 20,822,000 | 274% |
| Residential (unit) | 7,000 | 26,572 | 280% |
| Retail (sf) | 865,507 | 2,842,169 | 228% |

Source: Arlington County, 2010.

Ballston and Court House areas are selected as case studies because they are socio-economically successful TOD nodes with totally different development functions. The detailed research on these two nodes can present a picture of how policies implemented by transit agency, multi-level governments and non-government organization can intentionally produce station areas in the same Corridor following general TOD model, but still can be tailored with distinct local themes and functions.

4.1.2.2 The Introduction of Ballston & Court House Metro Station Areas

According to Arlington County, its seven “Metro Station Areas” (MSAs) have been carefully planned for mixed used development (generally retail, office, educational or institutional, and residential) to create vibrant nodes of activity (Figure 4.2). Their boundaries are based on a quarter mile radius (a suitable walking distance to and from a Metro station that is designed to include the area’s residential, retail or office buildings) and a combination of major transportation routes, Census tracts and space of adjacent neighborhood.

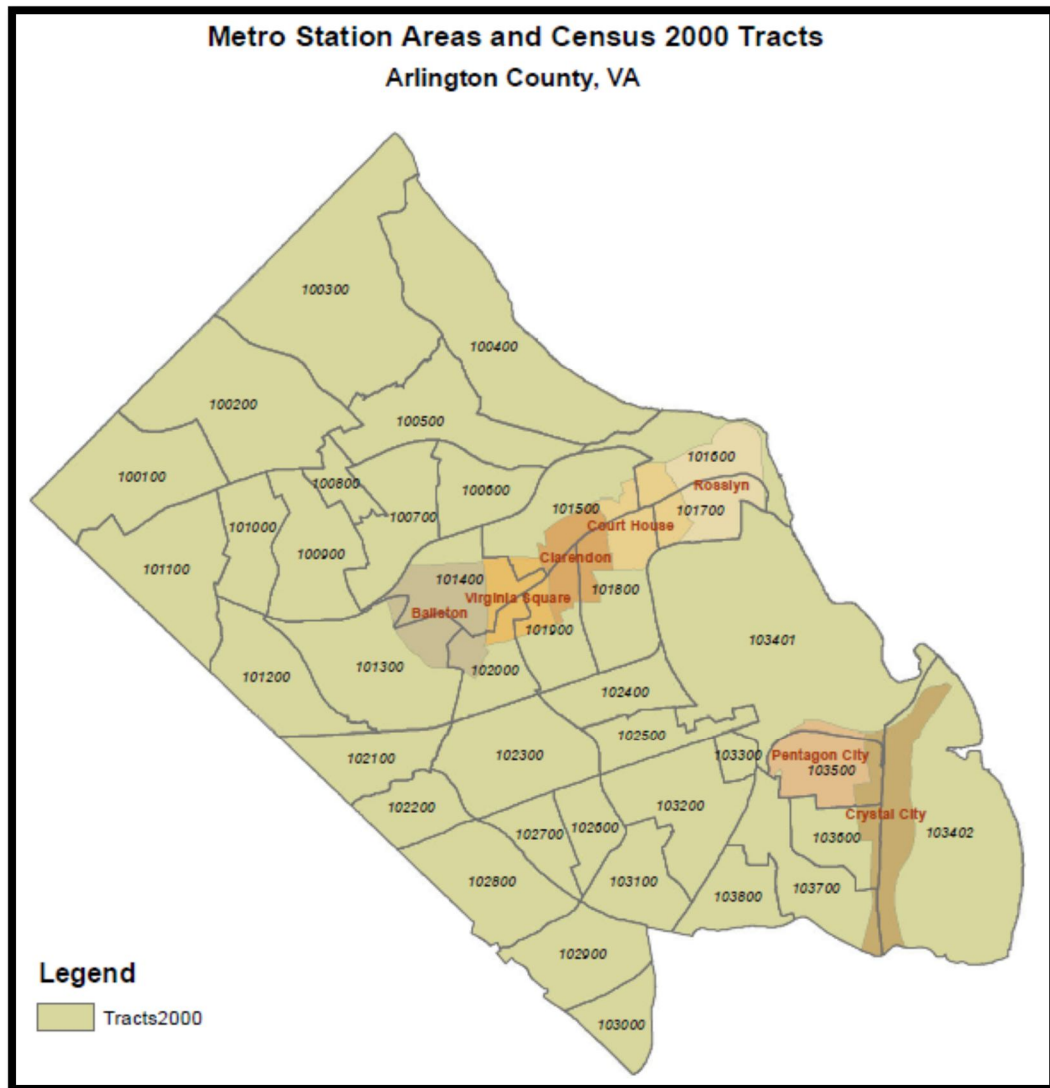


Figure 4.2: MSAs in Arlington County²¹

4.1.2.2.1 Ballston

Ballston is a rapidly growing retail center blending a mix of high-rise residential, office and hotel development supported by street level retail and

²¹ Source: Arlington County CPHD Planning Division, 2010.

entertainment around Metro station. The Ballston Metro Station Area comprises approximately 260 acres of land. It is the western terminus of the Rosslyn-Ballston Metro Corridor and is a major transportation center for the County. The Ballston Metro Station Area provides direct access to I-66, a regional transportation route, and to Glebe Road, the County's main north-south artery.

Locating government offices near Metro stations is one of Federal government's strategies to encourage Metrorail riding. Many U.S. government agencies and organizations facilities are situated at Ballston, which include Air Force Office of Science Research, Immigration & Naturalization Service, National Science Foundation, Office of Naval Research, and U.S. Fish & Wildlife Service.

Ballston is one of Arlington's earliest communities, and has been a major retail center since the 1950's, when the Parkington Shopping Center was first constructed. In the early 1970's, planning efforts began for the area along the proposed subway line between Rosslyn and Ballston. County citizens and elected officials studied each future subway station area and enacted regulator tools that would guide development around each station.

Table 4.3: Ballston Population and Employment Data

| Ballston | 1990 | 1995 | 2000 | 2005 | 2010 |
|-------------------|-------------|-------------|-------------|-------------|-------------|
| Population | 6,443 | 10,209 | 11,061 | 11,800 | 12,616 |
| Employment | 12,938 | 17,749 | 24,207 | 27,000 | 28,600 |

Source: US Census 2000, 2010; Arlington County DCPHD, 2010.

As shown on Table 4.3, the population increased 96 percent between 1990 and 2010 (U.S. Census, 2010). Employment increased 121 percent from 1990 to 2010

(U.S. Census, 2010). According to Metropolitan Washington Council of Governments (COG), growth in Ballston's population and employment will continue facilitating the local economy and enhance community livability (COG, 2010).

Retail in Ballston is currently concentrated within the Ballston Common Mall with a gathering of restaurants and food venues emerging along Fairfax Drive. Given the growing resident and daytime populations within the Ballston Metro Station area, Ballston captures more of the local evening and weekend trade (Arlington County 2001).

4.1.2.2.2 Court House

Court House is Arlington's government center, home to county offices and the civic plaza. This Metro Station Area comprises approximately 150 acres of land containing a mixture of residential, government, office, and commercial development.

As the Arlington County government center, Court House Metro station is surrounded by a balanced mix of government buildings with high-density residential and office uses. The central space – Court House Plaza – is the result of the concentration of major activity nodes and landmarks, such as Court House Justice Center, County's administration offices and a farmer's market. Court House Plaza as a focal point is also the representative of public/private partnership. Besides intense residential and high density office development, cultural facilities such as a performing arts center and theaters can be found in this area which enhances the image of Court House as the government and cultural center in Arlington County.

Court House, as a government center, also served Arlington County area as a civic center. The development of new facilities included two multi-purpose theaters with 500 and 200-seats, respectively, which are very close to Court House Metro

Station. A Government Reference branch of the Arlington County Public Library is located in the County office building in Court House Plaza. This branch offers government documents and research assistance, an on-line card catalog, internet connections, and the ability to order materials from any other County library branch.

In the Court House area, many public spaces have been provided. Rocky Run Park, with a total of 2.3 acres, is the major open space site (Arlington County, 2012). The park was designed for the space joining the Justice Center and the Arlington Court House Plaza. The County leases garden plots south of the park, known as Barton Park, to the public by application on a space available basis. The Key Elementary School grounds and McCoy Park with 1.7 acres on North 21st Street comprised the public open space north of Wilson Boulevard. In addition, the public plaza and fountains in the Arlington Court House Plaza serve the area's residents, visitors, workers, and customers.

As shown on Table 4.4, from 1990 to 2010, the population and employment in Court House have increased 39 percent and 52 percent, respectively (U.S. Census, 1990, 2000, 2010; Arlington County, 2010).

Table 4.4: Court House Population and Employment Data

| Court House | 1990 | 1995 | 2000 | 2005 | 2010 |
|-------------------|--------|--------|--------|--------|--------|
| Population | 8,984 | 10,553 | 9,765 | 10,300 | 12,479 |
| Employment | 10,098 | 13,161 | 11,770 | 16,100 | 15,300 |

Source: US Census 2000, 2010; Arlington County DCPHD, 2010.

Historically, retail in Court House has been local oriented convenience goods and services located in the older commercial buildings along Wilson Boulevard and

Court House Road. New office and residential development has provided space resulting in an expansion of retail offerings to service its daytime and resident populations. This, plus its being within walking distance of the Clarendon Metro station and just up the hill from Rosslyn and D.C.'s Georgetown, Court House boasts a growing array of restaurants, coffee shops, pubs and lounges, a movie theater, and book stores just steps from Metro (Arlington County, 2001). On Saturdays, visitors can stroll through the Arlington Farmers Market and Arlington Urban Village Market for locally produced foods and a variety of crafts and antiques. Rosslyn-Ballston Metro Corridor Retail Action Plan indicated that future hotel development in Courthouse Plaza would provide further support for convenience goods and services as well as restaurants (Arlington County, 2001).

The Court House is also home to major associations and technology businesses with over 15,000 employees (Arlington, 2010). National Science Teachers Association is located in Court House. Sapient, a leading technology consulting and service firm, has offices here. The Washington Post's online operations are headquartered here as well as the Navy League of the United States.

4.2 Planning the Metro Station Areas in Arlington County, Virginia

4.2.1 Building up TOD Communities in Arlington County

4.2.1.1 Concentrating Development on Metro Station Areas

In Virginia, land-use planning is a local decision. As noted, the Arlington County Board has endorsed a land use policy that focuses on high-density development within the Metro subway corridors and preserving lower-density residential areas throughout the County (Arlington, 1989). Organizing community

development and redevelopment around high quality and high capacity transit has been a long-established policy of the County for Arlington's Rosslyn-Ballston and Jefferson Davis Metro Corridors.

As indicated in the Master Transportation Plan (MTP), the integration of transit and land use has been a foundational policy for the Metrorail corridors in Arlington County. Throughout the R-B Corridor, the County development guidelines provide for a concentration of density around each Metro station that tapers down to existing single-family residential neighborhoods (Arlington County, 1989; 2007). The goal of this approach, outlined in the Metro Station Sector plans, was to ensure that high density development would be effectively linked to the Metro system to maximize the efficiency of the County's transportation network, and to minimize the effect of new development on established residential neighborhoods (Arlington County, 1981-2006).

Arlington County's Comprehensive Plan, approved by the County Board between June 1995 and June 2005, was established in order to foster a safe, healthy, convenient and prosperous community and an attractive place in which to live, work and play, with stable or expanding values and potentialities for growth and continued economic health in Arlington County (Arlington County, 2011).

In accordance with the county planning, WMATA's joint development projects in Ballston and Court House encourage focusing development around Metro stations and to foster Metro use. Generally, WMATA has had two major elements in its joint development program – transfer of development rights and system interface (WMATA, 2008).

In Ballston, the development rights of Ballston Metro Center were transferred by lease, or by sale, of excess WMATA-owned or controlled real property interests, including air rights. This joint development project was proposed in 1986 when Ballston's value as a bus transfer station ended. Even before the Orange Line extension, Arlington County officials had been planning the redevelopment of the Ballston area into the county's new "downtown." Ballston station quickly emerged as the centerpiece of the Ballston area redevelopment program. To facilitate and participate in Ballston's redevelopment, WMATA sold 15,000 square feet, and leased 72,118 square feet of the former bus transfer lot to the developers of what would become Ballston Metro Center. Private developers had assembled land near the station and construction had begun on several office, retail, and residential projects.

Ballston Metro Center completed in 1989, consists of a 28-story mixed-use building. In addition to office space, this \$87 million project contains 200 hotel rooms, 284 condominium units, retail space, and a health club. Also included in the project were seven Metrobus transfer bays (TPB, 2004). High density office and residential uses with a regional shopping facility form a new downtown in Ballston.

In general, WMATA joint development projects have been successful for nearly 30 years in contributing to its capital and operating expenses and fostering Metrorail use (Carlton, 2007). WMATA receives revenues in the form of base rent plus a percentage of rent for the portion of WMATA-owned land leased to the developer. WMATA receives annual rental payments of \$200,000 for the site at Ballston (Carlton, 2007). Already a commercial success, Ballston Metro Center has served as a catalyst for additional office, residential, and retail development.

WMATA applied a different form of joint development— station connection fees (SCF) in Court House to help foster the high density development around Metro station is well-connected with Metro service. The retailer and office developers pay WMATA connection fees for the right to connect to Court House Metro Station. It is popular because the Metro station connection can deliver transit riders and potential shoppers to the ground floors of office and retail buildings at Court House Plaza.

In Court House, Arlington County has implemented some County/Private joint development projects on County-owned land around Metro station. Arlington County, through Arlington Economic Development, and Donohoe Companies have entered into a ground lease to develop the east end of Courthouse Plaza (AED website-1²²). The mixed-use development project eventually featured a hotel – Marriott Residence Inn and multiple restaurants. Arlington Economic Development agency worked with the private developer to ensure that County priorities were met including the pedestrian-friendly design and the improvement on the access and visibility of the existing street level retail around Court House Metro station (Arlington County, 2012). Marriott Residence Inn was opened in September, 2009 (AED website-2²³). As a hotel-restaurant complex, it features 176 guest rooms and space for restaurants and retail shops at the ground floor (AED website-2).

22 <http://www.arlingtonvirginiausa.com/development/major-projects/courthouse/>

23 <http://www.arlingtonvirginiausa.com/economic-update/2009/october/new-hotels-arrive-in-arlington/>

4.2.1.2 Zoning Ordinance to Promote Development & Affordable Housing at Metro Station Areas

In 1995 and 2002, the General Land Use Plan (GLUP) incorporated land use changes including the establishment of the additional Coordinated Mixed-Use Districts and Special Affordable Housing Protection Districts in Ballston and Court House. These special districts are aimed to promote significant development and affordable housing within the two station areas. The GLUP represents the Arlington County Board's policy for future development by establishing the overall character, extent, and placement of various land uses. The plan serves as a guide for future decisions and actions concerning development in the Ballston and Court House Metro Station areas. The GLUP established the basis for intense urban redevelopment in much of the central core.

Complementing the GLUP, Arlington County utilizes the Zoning Ordinance which defines the legal use of land by regulating the type of use, placement, height, bulk, and coverage of structures for each zoning district. The zoning code's provisions in the Arlington Metro station areas are intended to result in mixed-use and high density land use.

4.2.1.2.1 Coordinated Mixed Use Zoning (C-O-A) to Stimulate Desired Mix of Development

The "Special Coordinated Mixed-Use District" designation in Arlington County is established for larger sites where redevelopment may result in significant changes within a Metro Station Area (DCPHD website²⁴). Within the district, the

24

http://www.arlingtonva.us/departments/cphd/planning/docs/CPHDPlanningDocsGLUP_metrocorridors.aspx

GLUP provides for the development of substantial residential, office, hotel and retail facilities and open space (Arlington County, 1996). To stimulate and implement the desired mix of development, the County Board adopted, in May 1980, "C-O-A" zoning, with a special exception site plan process (Arlington County, 1996). "C-O-A" zoning encourages mixed-use development and property consolidation by setting maximum densities and heights based on site area and type of development. The C-O-A zoning is largely applied in Special Mixed-Use Districts (DCPHD -4, 2013).

Using zoning code provisions other than C-O-A in a Special Mixed-Use District allows various planning purposes. For Ballston, the Special Coordinated Mixed-Use Development District was approved by the County Board on December 2, 1978 (DCPHD website). The district was planned as the "downtown" center for Ballston for creating a balance between new residential development and employment opportunities (DCPHD website). North Quincy Street Coordinated Mixed-Use District was established on February 4, 1995 (DCPHD website). Affordable income housing and community, cultural, or public facilities have been developed in this area. The area designated "Medium" Office-Apartment-Hotel (C-O-2.5) allowed a base density of 1.5 FAR (floor area ratio²⁵) for office/commercial development, up to 72 apartment units per acre, or up to 110 hotel units per acre (DCPHD -4, 2013). A maximum density of C-O-2.5 is up to 2.5 FAR for office/commercial development, up to 115 apartment units per acre, or up to 180 hotel units per acre (DCPHD -4, 2013).

²⁵ FAR: Floor area ratio is the term for the ratio of a building's total floor areas (gross floor area) to the size of the piece of land upon which it is built. As a formula: $FAR = (\text{total covered area on all floors of all buildings on a certain plot}) / (\text{area of the plot})$.

For Court House, Fort Myer Heights North is the Coordinated Mixed-Use Development District (DCPHD website). It is a smaller scale, medium density residential community (DCPHD website). This special district is totally different from the one in Ballston. Fort Myer Heights North was established to promote a strategic balance of preservation and redevelopment (DCPHD website). The vision for Fort Myer Heights North emphasized the preservation of its historic core, characterized by garden style apartments that were among the first multifamily buildings in Arlington County (DCPHD website). In order to preserve the character of the neighborhood and its historic core along 16th Street North, a combination of regulations and incentives was provided in the Conservation Area within the Fort Myer Heights North Special District. In an effort to preserve historic buildings, open space and existing affordable housing, high-level building development was discouraged (DCPHD website).

4.2.1.2.2 High Residential Zoning (RA-H-3.2) for Low- & Moderate-Income Housing

In addition to simply satisfy the housing needs for the continuously increasing population in Ballston and Court House, the Arlington County has committed to providing affordable housing opportunities for residents. A key affordable housing policy step in Arlington County is to establish the "Special Affordable Housing Protection District" (SAHPD) (DCPHD website).

SAHPD was adopted by the County Board on November 17, 1990 (DCPHD website). The overall goal of the SAHPD is to provide opportunities for housing affordable to persons with low-and moderate-incomes within Metro Corridors (DCPHD website). The intent of this District is to ensure that existing low- and moderate-income apartment units where development density shown on the GLUP is

3.24 F.A.R. or more (DCPHD -4, 2013). RA-H-3.2 zoning code is widely used in SAHPD. In Ballston, Ballston Center was designated by the County Board as a SAHPD on January 26, 2002 (DCPHD website). In Court House, three places – the Odyssey, North Troy Street Residential and Rosslyn Commons were designated as SAHPDs in 2001, 2004, and 2008, respectively (DCPHD website).

Besides SAHPD, the Coordinated Preservation and Development District was established to preserve a substantial portion of the apartment complexes in Arlington. This district allows unused density and vacant land to be consolidated for new development adjacent to Metro Station areas (DCPHD website).

There is no Coordinated Preservation and Development District in Ballston. In Court House, the District was adopted for the Colonial Village garden apartment complex on April 23, 1977 (DCPHD website). In December 1979, the County Board approved a phased-development site plan that preserved 90 percent of the 1,000 existing units and provided for the long-term retention of some units for moderate-income housing (DCPHD website). Approximately 276 of the original apartment units were designated a Historic District, recognizing Colonial Village's significance as the first FHA-funded apartment complex in the U.S. (DCPHD website). The plan also permitted construction of three high-rise office buildings and over 600 new housing units (DCPHD website).

4.2.1.3 Street Design to Improve Non-Auto Travel & Accessibility to Metro Stations

Arlington County policy-makers used land use planning, master planning, sector planning and site plan negotiations to guide and facilitate the construction and rehabilitation of Metro station entrances through measures such as improving

sidewalks, adding new station entrances, and upgrading street crossings. Safety of pedestrian crossings of arterial streets was upgraded through the use of clearly marked crosswalks and traffic control devices at and near transit stops and stations. Metro stations, Metrobus and Arlington Transit (ART) stops were improved to provide amenities, such as adequate street lighting, a level concrete pad, reliable pedestrian access and route and schedule information.

On January 11, 1997, the County Board adopted the Arlington County Pedestrian Transportation Plan, which replaced the walkways element of the 1986 Master Transportation Plan – Part 1 (Arlington County, 1997). This document represented a comprehensive effort to address all conditions affecting pedestrians and strove to fully integrate the consideration of pedestrians into the planning, design, construction and operation of all transportation systems and land developments (Arlington County, 1997). In addition to the improvements of transit services and facilities, Arlington County has placed an emphasis on making transit more accessible and convenient to all through transit-oriented land-use and enhancements to vehicles, stations, stops, walkways and information. Several of the pedestrian improvement projects that have been done in Ballston and Court House Metro station areas, are shown in Table 4.5.

Table 4.5: Pedestrian Improvement Projects in Ballston and Court House

| Project Name | Type of Project | Neighborhood |
|---|--------------------------------------|--------------------------|
| Fairfax Drive – Sidewalk/Pedestrian Improvement | Sidewalk/Pedestrian Improvement | Ballston-Virginia Square |
| Glebe Road Pedestrian Safety Improvement | Pedestrian Safety Improvement | Ballston-Virginia Square |
| Kirkwood Road – Sidewalk Extension | Sidewalk Extension | Ballston-Virginia Square |
| Clarendon Blvd. at Court House Plaza Porkchop | New Sidewalk Construction | Clarendon-Court House |
| N 12 Street – N Barton St. to N Danville St. | Residential Street Light Improvement | Clarendon-Court House |
| N Barton Street – Part II – Fairfax Dr. to Clarendon Blvd. | Pedestrian Improvement | Clarendon-Court House |

Source: Arlington County, 2010.

Virginia DOT and Arlington County worked together to redesign the roads in Ballston and Court House to limit auto driving and create a more walkable communities. In Ballston, on Glebe Road from Fairfax Drive to Quincy Street, the travel lanes have been narrowed, medians have been widened. These strategies aimed to create a more pedestrian friendly environment and to support new retail development in Ballston. In Court House, Arlington County and Virginia DOT undertook streetscape and other improvements to the Metro block and 15th Street to better link the area with Court House Plaza and enliven the pedestrian environment around the Metro block by providing additional sidewalk space for sidewalk cafes. Wilson and Clarendon Boulevards between Veitch Street and Court House Road were narrowed in order to better connect Colonial Place with the rest of the Court House area.

The WALKArlington was initiated in March 2004. It is a program of Arlington County Commuter Services (ACCS), a bureau of Arlington's Department of

Environmental Services. WALKArlington offers one-stop shopping for commuter resources in and around Arlington (ATP, 2010). The Initiative studied a pilot area in Ballston. The recommendations made in this pilot study were used to advance the concepts of WALKArlington throughout the County.

Arlington attempted to create a more pedestrian-friendly environment, to support the connection to Ballston and Court House Metro Station, and to develop new retail opportunities. The leading organizations fostering such development were the Department of Community of Planning, Housing and Development (DCPHD), the Office of Support Services (OSS), and the Department of Economic Development (DED).

Arlington County implemented the Appearance Improvement Program and Façade Improvement Program to encourage building owners with retail fronts to undertake façade improvements (DCPHD, 2001). Such improvements made the building more inviting with a stronger street presence. Arlington County's DCPHD explored modifications to allow additional street front retail along Clarendon Boulevard for Court House. It encouraged additional façade improvements and business development on the remainder of the Metro block as an interim step prior to redevelopment.

In Ballston and Court House, walking around Metro stations is safer and gives access to more options. Restaurants, shopping places, parks, car and bike share services and other amenities are well connected to Metro station and can be reached within walking distance.

At a radius of one-quarter mile around the Ballston Metro Station area, there are sixteen shopping sites and three grocery stores. Ballston Mall which is only two

blocks from Metro station can be accessible via an enclosed skywalk. Two child care services can be found very close to the Metrorail station as well which gives great convenience to the commuters with children.

The Walk Score website defines both areas as walk paradise²⁶ (shown on Figure 4.3, 4.4). Walk Score measures walkability on a scale from 0 to 100 based on walking routes to destinations such as grocery stores, schools, parks, restaurants, and retail. The Walk Scores for Ballston and Court House are 95 and 92, respectively Walk Score Website²⁷.

²⁶ Walk Score uses a patent-pending system to measure the walkability of an address. The Walk Score algorithm awards points based on the distance to amenities in each category. Amenities within .25 miles receive maximum points and no points are awarded for amenities further than one mile. Walk Score uses a variety of data sources including [Google](#), [Education.com](#), [Open Street Map](#), and [Localeze](#). Walk Score is a number between 0 and 100 that measures the walkability of any address.

²⁷ Google map reference at: <http://www.walkscore.com/nearby/BALLSTON-METRO-STATION> and <http://www.walkscore.com/nearby/COURTHOUSE-METRO-STATION>

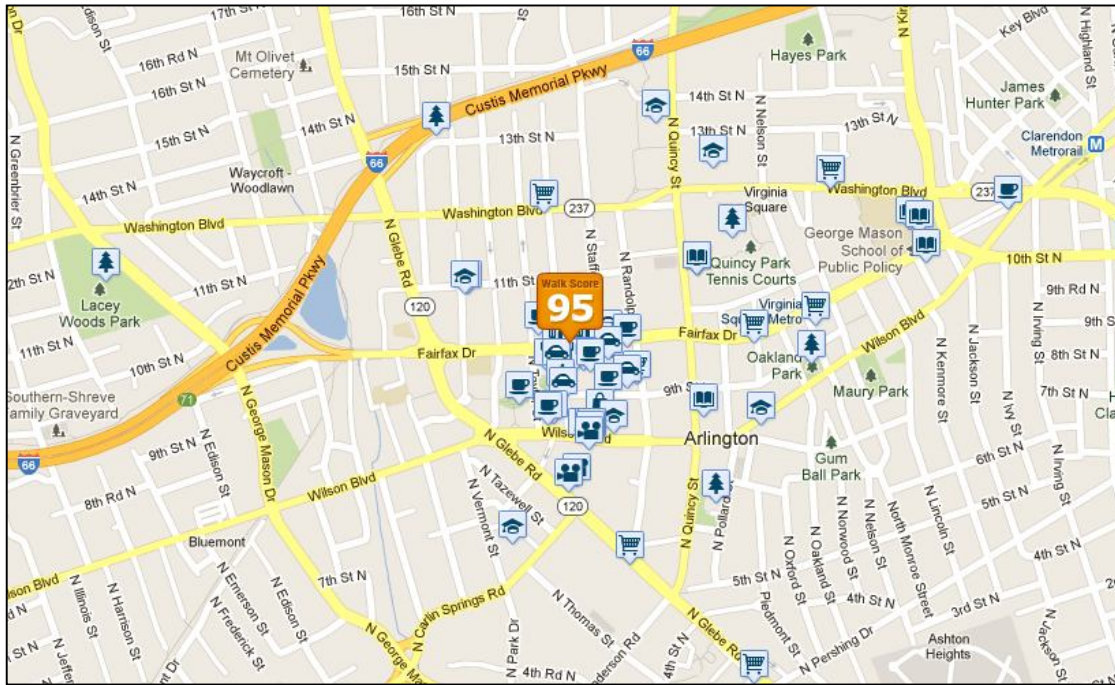


Figure 4.3: Ballston Metro Station Surrounding Amenities²⁸

Within the walking distance to Court House Metrorail Station, many food services and bars can be found that are used by people working at and around Court House Plaza. Three childcare centers located close to Metro station, again, are very useful for commuters who have children. Francis Scott Key Elementary School is also located close to the Metrorail station. One wall of the Metrorail station was decorated with the pictures drawn by students from this elementary school. Two movie theaters and five book stores in this area enrich the life of Court House residents and help build the image of Court House as a regional civic center.

²⁸ Source: Walk Score website. Google Map 2013. Restaurants & Bars; Coffee; Groceries; Outdoor Places; School; Car & Bike Shares

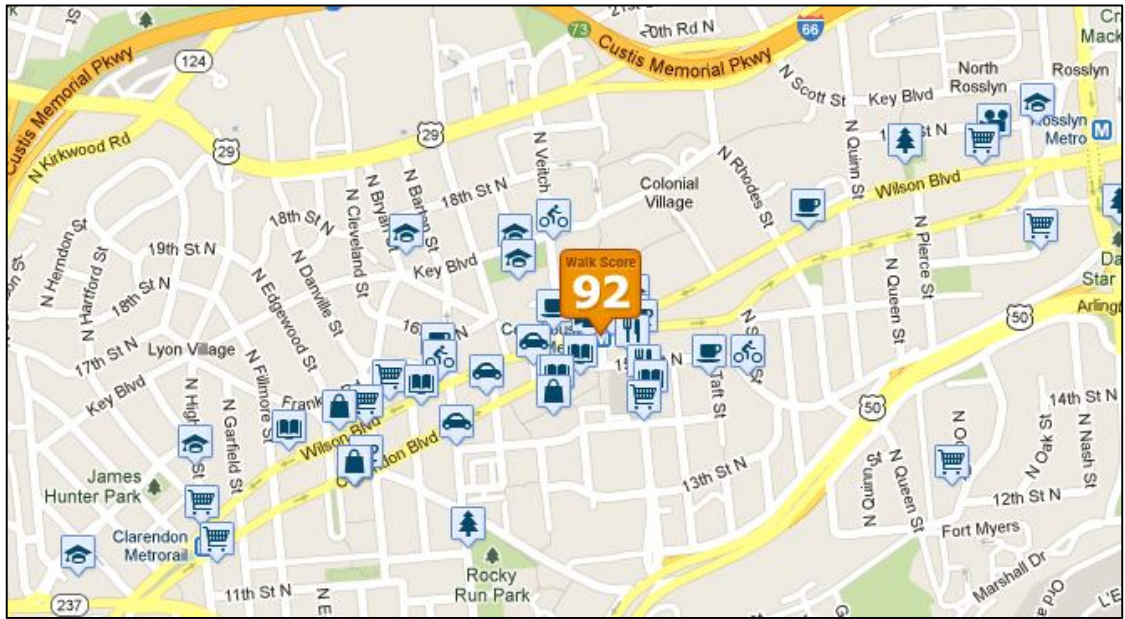


Figure 4.4: Court House Metro Station Surrounding Amenities²⁹

4.2.2 Building up Local Identity

Establishing Ballston as Retail Center in Arlington

Arlington County's goal for the development of the Ballston area, as indicated, is to create a "new downtown" in Central Arlington (Arlington County, 1980). The Ballston Sector Plan was adopted in 1980. The land use and development guidelines set for Ballston sought to facilitate the creation of a dynamic downtown area by ensuring that development would include a mix of commercial, office and residential uses (Arlington County, 1980). Initial planning efforts focused on the redevelopment of the Parkington Shopping Center to provide the commercial centerpiece for the

²⁹ Source: Walk Score website. Google Map 2013. Restaurants & Bars; Coffee; Groceries; Outdoor Places; School; Car & Bike Shares

station area. In 1986, the construction of the Ballston Common Shopping Mall was completed on the site of the Parkington Shopping Center. The development of Ballston Common and the associated office building stimulated much of the commercial revitalization occurring in the Ballston area today. Commenting on the importance of a station-area plan, one Arlington County senior planner remarked, “The Ballston Sector Plan represented a change in thought among County planners... a reduced bulk of development, streetlife, walking links to the transit station – all were elements reflecting new thinking about what makes a livable community.” (Arlington County, 1996)

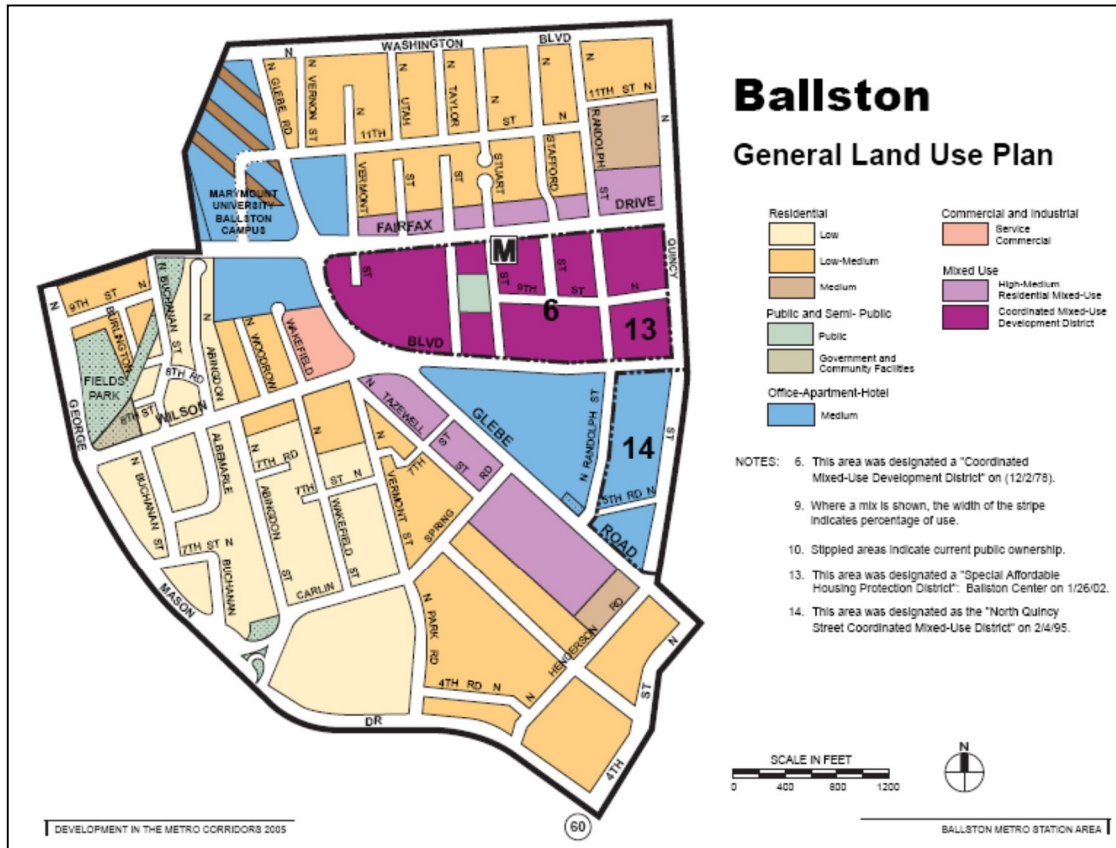


Figure 4.5: Ballston General Land Use Plan³⁰

From the GLUP map (Figure 4.5) shown above, the Ballston Metro station was to be the center of high-medium residential and coordinated mixed use development (Arlington Economic Development Website³¹). The low density residential development was on the left rear of Ballston, relatively far from the core station area.

30 Source: Arlington County Department of Community Planning, Housing and Development.

31 <http://www.arlingtonvirginiausa.com/submarkets/ballston/ballston-general-land-use-plan/>

These planning policies offered Ballston the opportunity to expand its position as a principal shopping destination in the region. The considerable inventory of under-utilized sites along Glebe Road and Randolph Streets provided the opportunity to introduce new retail concepts, such as large space or multi-story retail facilities, to support and complement the goods and services provided by the Ballston Common Mall. Stuart Street offered the opportunity to establish a lively pedestrian connection between the shopping in and around the Ballston Common Mall and the restaurant activity along Fairfax Drive.

In addition to regional shopping, dining and entertainment, Ballston's growing resident and office populations presented opportunities to expand the local convenience goods and services market. Neighborhood streets such as 9th Street, Randolph Street and Taylor Street provided opportunities for convenience goods and personal and business services to flourish in an attractive and active neighborhood setting.

Arlington County emphasized the concept of well-defined local themes. It attempted to encourage partnerships to help develop educational or other programs for property owners/brokers to lease to appropriate tenants in support of local features. Ballston as the retail center in Arlington County had policies and incentives that emphasized a retail concentration and retail environment improvement to increase local competitiveness (Arlington County, 1991). In Ballston, the County focused on building a core retail area as defined by Glebe Road, Fairfax Drive and Quincy Street (Arlington County, 1991). Street front retailers were encouraged to operate in a cooperative manner with common hours of operation, store maintenance standards, common advertising and similar programs and policies. Buildings on Glebe Road had

community oriented retail businesses (such as drugstores, hardware, etc.) to serve the adjacent residential base.

4.2.2.2 Establishing Court House as Government Center in Arlington

Court House is the home of Arlington County government and courts as well as several high rise office, residential buildings and theaters.

Since the Court House Metro Station opened in 1979, a balanced mix of private office and high-density residential buildings has been developed within a quarter mile of the Metro station, surrounding the government core (Arlington County, 2000). Older and well-established neighborhoods in the peripheral areas are being preserved. The 1981 Court House Sector Plan provided a detailed examination of existing conditions at the Court House Metro Station Area (Arlington County, 2000). It included a concept plan which illustrated the type of environment envisioned in this area emphasizing a balance of high density residential and office uses surrounding the local government center. An addendum to the Court House Sector Plan in 1993 generally confirmed the goals and recommendations of the original Plan (Arlington County, 2000). The purpose of the Court House Sector Plan Addendum was to establish an overall vision for the Court House Area so that individual projects can be designed to fit better within the general Metro Station scheme (Arlington County, 2000). It sought to make Court House Metro Station Area an individual place of particular significance to the community as the County's Government Center. To achieve this vision, the Addendum included a refined concept plan, an illustrative plan, site or area specific design recommendations, urban design guidelines and an action plan (Arlington County, 2000).

The central area of Court House Metro station is surrounded by High and Medium Office-Apartment-Hotel Mixed, High Residential, and Government and Community Facilities development (Figure 4.6). The low density development is further from the core station area.

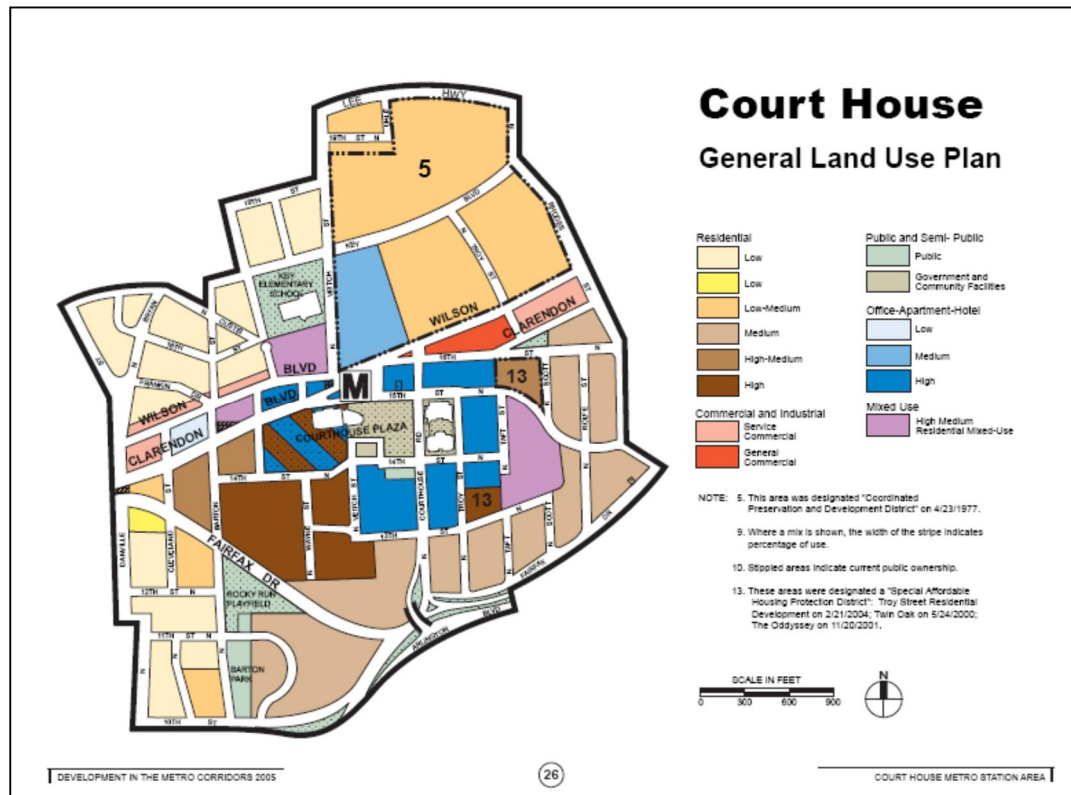


Figure 4.6: Court House General Land Use Plan³²

32 Source: Arlington County Department of Community Planning, Housing and Development.

Most Arlington County government services, including voter registration, housing services, building permits, the employment center, and some human services, are provided in the government center at Court House Plaza. An attractive, semi-circular fountain and a linear water feature located at the Plaza's center create a popular gathering place that also is well-connected to the residential buildings around the Plaza. The Justice Center, built in 1994, is also located at Court House Plaza. The Justice Center provides modern facilities for the County courts, the Police Department, and the Detention Center (AIRE, 2010).

The County's plans to establish a multi-purpose performing arts center adjacent to Court House Plaza set the stage for building up a performing arts dimension in the area (Arlington County, 2000). AMC Courthouse Plaza 8 Theater is located only 0.06 mile away from the Metro station which adds to the downtown culture of the Court House area. The theater also provides opportunities for the development of coffee shops and a variety of dining and other entertainment ventures that appealed to late night theater goers (Arlington County, 2001).

4.3 How Metro Station Area Design Foster Public Transit & Other Travel Alternatives

4.3.1 Encouraging Transit Public Taking

4.3.1.1 Increasing the Level of Public Transit Services in Ballston & Court House

The Metrorail and Metrobus are the major public transit services in Arlington County. The County and WMATA have worked together to plan and establish a Metro-taking friendly environment for each Metro station area. They have also done several facility improvement projects in Arlington in order to increase the level of

transit service and encourage Metrorail riding (GAO 2001). To help accommodate passengers in stations and boarding in Arlington, WMATA has purchased new rail cars, created new station entrances and upgraded elevators and escalators (GAO 2001). Transit programs, such as Ballston Station Improvement and Ballston Commuter Store were also carried out. In 2006, Ballston became the first Orange Line station in Arlington to have multiple elevators on the station's mezzanine level (Arlington County, 2010).

Transit use and multimodal travel are also enhanced by improvements to the stations immediate surroundings. Some projects of WMATA focused on improving multimodal access to stations, particularly pedestrian and biker access to the stations through better street markings and crossings, wider sidewalks, elimination of obstructions in the walkways, and adding bike parking. Ballston and Court House currently provided 54 and 25 bicycle racks at the Stations, respectively.

In Ballston, the Metrorail passenger weekday boarding rate increased 33 percent between 1980 and 2009 (WMATA, 2009) (Figure 4.7). In Court House the increase was greater in terms of percentage (Figure 4.7). From the spring of 1980 till the summer of 2009, the boarding rate at Court House increased 161 percent, from 2,825 to 7,385 passengers per weekday (WMATA, 2009) (Figure 4.7).

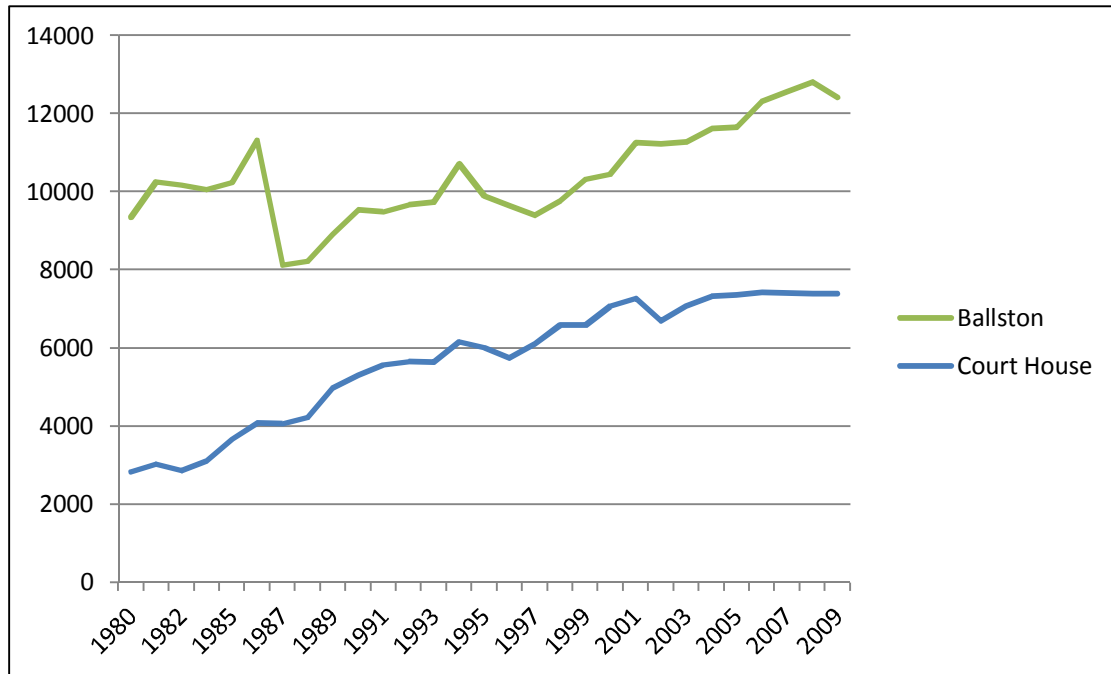


Figure 4.7: Ballston and Court House Metrorail Station Weekday Boarding 1980-2009³³

Besides Metrorail service, Arlington is served by several bus routes which are operated by WMATA, Arlington Transit (ART), and other public or private carriers. Several bus projects have been implemented in order to provide public transportation services to accommodate the needs of Arlington residents, commuters and visitors for community access and mobility to sustain full, active and affordable lifestyles independent of a requirement to operate or own a personal automobile. Most of the bus services are well connected to Metro stations and make transit transfer convenient for commuters.

³³ Source: WMATA, Metrorail Boarding by Station 2009

WMATA's Metrobus service operates 25 major Metrobus lines and approximately 100 individual route variations in Arlington County (Arlington County, 2010). On average, about 50,000 people board Metrobus each weekday in Arlington (Arlington County, 2010). The most heavily used routes are Route 16 serving Bailey's Crossroads and Pentagon city area, Route 7 serving North Fairlington and Pentagon area, and Route 1 serving Ballston and Seven Corners area.

Besides public transit lines served by WMATA, Arlington County provides an easy-to-use local bus service – Arlington Transit (ART). The fleet of 21 primarily CNG-fueled (compressed natural gas) buses operates on 11 routes, complementing the 25 Metrobus lines serving Arlington (Arlington County, 2010). Most of the ART services in Ballston and Court House connect these two areas with other Metro stations in Arlington County. ART buses have been available at the Ballston and Court House stations since 1999. The specific routes and serving areas can be seen in Table 4.6.

Table 4.6: ART Service in Ballston and Court House

| Stop | Route | Serving Area |
|--------------------|--------|---|
| Ballston | ART 42 | Ballston-Pentagon |
| | ART 51 | Ballston-Virginia Hospital Center |
| | ART 52 | Ballston-Virginia Hospital Center-East Falls Church |
| | ART 53 | Ballston Metro-Old Glebe-East Falls Church Metro |
| | ART 75 | Wakefield H.S.-Carlin Springs Rd.-Ballston |
| Court House | ART 61 | Rosslyn-Court House Metro Shuttle |
| | ART 77 | Shirlington-Lyon Park-Court House |
| Both | ART 41 | Court House-Ballston-Columbia Pike |
| | ART 62 | Court House Metro-Lorcom Lane-Ballston Metro |

Source: ART website: <http://www.arlingtontransit.com/pages/routes/>.

These are also other public and private carriers within Arlington County providing services that access Ballston and Court House. The following Table (4.7) lists the bus service providers and their functions.

Table 4.7: Other Public Transit Services in Arlington County in 2009

| Bus Service | Provided by: | Purpose | Service Area |
|----------------------------|---|---|---|
| OmniRide | Potomac and Rappahannock Transportation Commission (PRTC) | Weekday commuting service to downtown Washington D.C. | From eastern Prince William County and the Manassas area to downtown Washington and Rosslyn-Ballston corridor |
| ArlingtonSTAR | Arlington County | An option for Arlington residents who need some travel assistance; also a paratransit service | Arlington County area, especially Metro stations |
| Airport Bus Service | The Washington Flyer | Airport commute | National and Dulles airports from points around the region |
| Shuttle Service | Marymount University, the federal government, and several private property owners | Student shuttle service | Shuttle from Ballston Metro station to Marymount University |

Source: Arlington County, 2009.

For attracting more riders, ART has increased the frequency of bus service in Ballston and Court House Metro station areas and supplemented the regional Metro system by providing service to neighborhoods not served by Metrobus. Since its inception in 1999, ART ridership has increased almost 1000 percent (Arlington

County, 2009). In 2008 the system served more than 1,200,000 riders (Arlington County, 2009).

Many routes of Metrobus and ART stop at the bus bays which are within walking distance to Metro stations. The locations of these bus bays is intended to be a convenience for commuters and help increase the user rates of both Metrobus and Metrorail and decrease car-driving (Arlington County, 2010). Commuters can find eight bus bays close to Ballston and seven close to Court House Metro stations and have the opportunities to take Metrobus or ART bus (Arlington County, 2009).

4.3.1.2 Strategies to Encourage Non-Auto Travel Alternatives in Ballston & Court House

4.3.1.2.1 Subsidizing Public Transit Taking

The Arlington County Government supported its goal of increased transit use by subsidizing Metrorail and bus fares for its County employees (Arlington County website³⁴). The County subsidizes up to 80 percent of each employee's commuting costs up to \$75 per paycheck. The County employees can use the subsidy for Metrorail, Metrobus, and other local transit such as MARC, VRE, OmniRide and Ride-On bus. For employees taking Metrorail, Arlington County issues the monthly benefit onto a SmarTrip Card. Approximately 323 employees participated in the program in 2009 (Arlington County, 2009).

34

<http://www.arlingtonva.us/departments/HumanResources/HumanResourcesEmployeeProfiles.aspx#transit>

Arlington County Commuter Services (ACCS) also developed CommuterDirect.com® Corporate Services to make Federal Internal Revenue Service (IRS) tax-free transit benefits easy to administer and manage. CommuterDirect.com had a section for employers to manage transit benefits for their employees. Fully compliant with IRC 132(f), CommuterDirect.com® can help save employers thousands of dollars on business taxes and save employees hundreds on income taxes (TRB, 2003). Tax-free transit benefits can be implemented through a CommuterDirect.com® Corporate Services Account. This program's simple online enrollment and account management features save hours of administrative time. Once employers enroll their employees, the order is automatically placed each month. Employers can then chose to have the passes delivered directly to the office or employees' homes or chose to have Smart Benefits automatically uploaded to employees' SmarTrip® cards which saves the time needed for distributing paper passes. CommuterDirect.com® is the only online service that covers all major transit provider including Metro, MARC, VRE, Ride-On, DASH, and ART, in the Washington, D.C., Metropolitan region.

Parking benefits are provided through a pre-tax parking program for commuters in Arlington. Arlington Transportation Partners (ATP), a program of Arlington County Commuter Services (ACCS) and a bureau of Arlington's Department of Environmental Services, works with the employers in Arlington County to develop strategies to reduce the demand for costly parking spaces at their worksite (ACCS, 2012). ATP provides assistance to setup a pre-tax parking program and the federal parking "Cash-Out" program. "Cash-Out" parking program has been available to employers nationwide in 1998 after the Taxpayer Relief Act of

1997 was amended (EPA, 2001). With the help of ATP in setting up these programs, an employer can give transit-taking employees the option to accept taxable cash income instead of a free or subsidized parking space at work (ATP website-1³⁵).

4.3.1.2.2 Travel Advisory Services in Ballston & Court House, Arlington

In Arlington, transit use is promoted through direct marketing to residents and employers and by providing real-time information at transit stops and via the internet, cell phones, and other devices. Arlington County provides multiple public transit information services to facilitate public transit taking. These services are mostly provided by Arlington Transportation Partnerships (ATP).

ATP offers specially designed information display units ranging in size from tabletop to freestanding floor models. Maps can be customized to the location with sponsorship name and “You Are Here” arrows. Neighborhood maps include building outlines, transit routes with the individual stops highlighted, taxi stands, car-share parking spaces, and other detailed information. County-wide maps included all rail, bus transit, and HOV routes within or coming into Arlington County.

Besides providing the general public transit service information, ATP has a program called Commute Planners which is a customized commute planner available to employees or residents in Arlington County. This program gives individualized transportation information based upon each person’s home and work addresses. Arlington County residents can also establish and administer a car-sharing program

35 <http://www.arlingtontransportationpartners.com/pages/business/commuter-benefits/parking-management/>

with the help of ATP (ATP website-2³⁶). ATP provides information on car-sharing programs, explains implementation choices, and helps design the best car-sharing program for individual needs (ATP website-3³⁷).

Arlington County Commuter Services (ACCS) is the Transportation Demand Management Agency of Arlington County. The Brochure Service of ACCS is available to employers, residential complexes, and hotel properties located in the County. The complimentary services are designed to help employers, residential property managers, and hotel general managers improve the ease of commuting and traveling in the Washington metropolitan area for their employees, tenants, and guests. ACCS also operates the Commuter Store at Metro stations. The Ballston Commuter Store is located in Ballston Common Mall, one block from the Ballston Metrorail station. Besides transit information service, many retail and food services can be found in the Store which represents the specialty of Ballston as retail center in Arlington County. There is no Commuter Store in Court House.

4.3.2 Providing Carpooling & Carsharing Choices around Metro Stations

Car-sharing provides persons with occasional access to private vehicles without the need for auto ownership. Surveys have found that access to car-sharing allows its users to sell, or not purchase personal vehicles and leads to higher rates of travel by transit, carpool, walking, or bicycle (LDA & SIR, 2007). The construction

36 <http://www.arlingtontransportationpartners.com/pages/business/commuter-benefits/walking/>

37 <http://www.arlingtontransportationpartners.com/pages/business/commuter-benefits/car-sharing/>

and preservation of High Occupancy Vehicle (HOV) lanes is one of the most important policies in Arlington County. HOV lanes greatly shortened commute time for carpoolers, and they also shorten commute time for everyone else on the road, by reducing the volume of traffic.

Arlington County residents can set up their carpool programs with assistance from ATP. ATP provides services such as recommending ridesharing programs and incentives, providing information on park-and-ride locations where residents can meet their carpool, and planning and executing carpooling events at specific locations (Arlington County, 2008).

In Arlington County, car sharing is a system of shared access to vehicles parked in user's community or at transit stations. Most Metro stations, including Ballston and Court House, have reserved spaces for car-share vehicles, while daily parking spaces are rare. Arlington seeks to provide convenient access to car-sharing and bike-sharing vehicles at all transit stations.

Although Arlington has demonstrated the transportation benefits of carpooling, Arlington County sometimes has to compromise with TPB and Virginia DOT on highway expansion decision. The regional planning agency – TPB influences the inter-state highway planning in Arlington County. By the approval of the Constrained Long-Range Transportation Plan (CLRP) on November 17, 2010, 44 highway improvement projects have been conducted in Virginia which reflected the 2010 Update to the CLRP (TPB, 2010). Fifteen of them are about highway construction and reconstruction; 24 of them are about widening lanes; and only 5 are about HOV (High-Occupancy Vehicle)/HOT (High-Occupancy Toll) related projects (TPB, 2010). Virginia DOT's policy on widening I-66 one-step-at-a-time toward a possible

expansion of the entire highway to six lanes has also been questioned. It ignored more cost-effective solutions to relieve traffic including converting to HOV-3 from HOV-2, HOV in both directions, express bus service, and how the shift of new development to the Metro Silver Line stations would help shift workers to transit (VDOT 2011).

WMATA offers car sharing at select Metrorail stations and around the region at locations convenient to Metrobus through a partnership between Zipcar and WMATA (Figure 4.8).



Figure 4.8: Zipcar Service Locations in Ballston & Court House³⁸

³⁸ Zipcar Website, http://www.zipcar.com/dc/find-cars?zipfleet_id=94434.

A private company, Zipcar provides car-sharing opportunities to residents and employers in the Washington, D.C. region. WMATA launched its initial car-sharing program in December 2001 to expand transportation options for those without cars and aid in the reduction of traffic and parking congestion in and around the Washington DC metropolitan area. Zipcar works on a membership basis. Membership with the car-sharing service includes gas, maintenance, insurance, and parking. Zipcar provides car-sharing short-term rentals to their more than 3,000 Arlington County members. Membership fees vary based on how people plan to use the service.

A joint survey conducted by WMATA and Zipcar in 2005 showed that the program has become a catalyst for change that has increased awareness and utilization of both car rental and Metrorail alternative transportation options (Zipcar, 2005; Price & Hamilton, 2005). In the survey, 59 percent said that Zipcars being placed at Metro stations was a key factor in their decision to join the program, 53 percent said that joining Zipcar has delayed their decision to buy a new car and members reported net increase of 32 percent Metro Rail use and 14 percent Metro Bus use (Zipcar, 2005). The Figure 4.8 above indicated the locations of Zipcar services in Ballston and Court House. It is obvious that Zipcar rental services are focused on Metro stations and along Metro corridor.

4.3.3 Convenience for Bikers in Metro Station Areas

In April 1994, the County Board approved the Arlington Bicycle Transportation Plan. This Plan replaced the Hiking, Biking and Jogging Trails section of the Master Transportation Plan. The Arlington Bicycle Transportation Plan defines the transportation policy principles regarding bicycle facilities. The goal of this element of the Master Transportation Plan is to improve the County's bicycling

environment through the development of specific bikeway facilities throughout the County. The federal Bicycle Commuter Act of 2009 added reimbursement for bike commuting to the IRS' list of qualified transportation fringe benefits in 2009 (IRS, 2009). Arlington employers can contact ATP for assistance in setting up federal tax-free transit benefits for their employees through CommuterDirect.com® Corporate Services.

BikeArlington is an initiative of ACCS, with the purpose of encouraging more people to bike more often. The website of BikeArlington presents information including bike commuting, bike shops, bike parking, and bikesharing, etc., for people who are now biking or considering biking as an alternative (BikeArlington website³⁹). According to ACCS 2011 BikeArlington Study Survey, BikeArlington facilitated biking commutes and steadily made progress over years in attracting users (SIR, 2011). There were 868 respondents in total in this study (SIR, 2011). The 2011 study showed that BikeArlington program had become more accepted in Arlington. Seventy-seven percent of total respondents indicated that they were aware of BikeArlington program. Thirty-seven percent of who said they were aware of the program reported that they were familiar with the program. Familiarity has increased since the 2008 study showed only 19 percent reported being familiar with it (SIR, 2011). Seventy-nine percent of 463 respondents who have used BikeArlington were satisfied with the service. More than half (54 percent) of BikeArlington users have already recommended the program to someone else.

39 <http://www.bikearlington.com/pages/about/>

Several bike shops can be found around the Ballston and Court House areas to serve the needs of a bikeable community. Some of the shops, such as Big Wheel Bikes and Revolution Cycles – City Hub, also offer bike rentals.

If not interested in buying or renting a bike, people in Ballston and Court House can use a bike-sharing service – Capital Bikeshare. Capital Bikeshare serves Washington, D.C., Arlington County, and the city of Alexandria, also in Virginia. It opened in September, 2010. Participants can pick up the bikes at one Metro station and return them to any Metro station near their destinations.

The bicycles are owned by the participating local governments and operated in a public-private partnership with Alta Bicycle Share. Planning and implementation costs for Capital Bikeshare totaled \$5 million, with additional first-year operating costs of \$2.3 million for 100 stations in 2010 (Kaplan, 2010). Arlington County's operating cost share of the plan was \$835,000 for the first year, funded by public contributions including a grant from the Virginia Department of Rail and Public Transportation as well as subsidies from Arlington County Transportation, Crystal City Business Improvement District, and the Potomac Yard Transportation Management Association (Arlington County, 2012).

Capital Bikeshare has put 1100 bicycles at over 110 stations across Washington, D.C. and Arlington, VA. Arlington County expanded Capital Bikeshare throughout the Rosslyn-Ballston corridor from 2010 to 2012, more than doubling its number of stations from 18 to 41 and bikes from 123 to 286 (Arlington County, 2012) (Figure 4.9).



Figure 4.9: Ballston Celebrates Bikeshare Stations, Bike to Work Day⁴⁰

In 2012, Arlington's portion of the Capital Bikeshare service had \$411,000 in revenues from memberships, user fees, and sponsorships and \$473,000 in operations expenses, plus \$170,000 in management and marketing – totaling \$643,000 in expenses (Arlington County, 2012).

Arlington County has sought to increase bike parking on a regular basis at a rate that at least matches growth in system ridership and plans to achieve a 50 percent increase in the amount of high-quality bicycle parking provided at Arlington transit stations by 2015 (SIR, 2011). Arlington County has required new office, residential,

⁴⁰ Source: Arlington-va.patch.com, <http://arlington-va.patch.com/articles/photos-ballston-bid-celebrates-new-bikeshare-stations#photo-9980798>

and retail development to provide sufficient bike parking, shower, and locker facilities since 2008 (Arlington County, 2008). It is one of the most progressive requirements of its kind (Arlington County, 2008). Bike parking is available at both Ballston and Court House Metro stations. On-street bike parking locations can also be found all around these two station areas.

Arlington County Government's effort in building a bicycle-friendly environment has been acknowledged. Arlington County won a Silver award in 2013 from the League of American Bicyclists (Bike League, 2013). The County is among only three local governments across the country receiving a Bicycle Friendly Business (BFB) designation award from the League (Bike League, 2013). In addition, there were five new awards for Arlington businesses. Until this announcement, Revolution Cycles in Clarendon was Arlington's only BFB. With a total of seven recognized BFBs, Arlington County is now one of the leaders in the United States in this category.

4.4 Results of Transit-Oriented Development Planning & Implementation in Arlington

4.4.1 Establishing Environment Fostering Non-Auto Travel Modes

The Metro station areas in Arlington County are planned with the purpose of providing safe and multiple travel alternatives and making public transit taking easy and convenient to residents and employees. Metrorail taking, carpooling and other non-auto travel modes are highly promoted by County government and WMATA.

Some traffic decrease trends have been observed in Arlington. As shown in Table 4.8 below, three major streets in Arlington County – Lee Highway-Rosslyn, Washington Blvd-Virginia Square, and Wilson Blvd-Clarendon, had over a 10 percent traffic decrease from 1996 to 2006 (Arlington, 2010).

Table 4.8: Traffic Trends on Arterial Streets

| Street Segment | Street Type | 1996* | 2001* | 2006* | % ± 1996-2006 |
|--|--------------------------|--------|--------|--------|---------------|
| Lee Hwy - Rosslyn | EW 6-lane arterial | 37,770 | 33,632 | 32,428 | -14.1% |
| Wash. Blvd - VA sq. | EW 4-lane arterial | 20,469 | 19,478 | 18,069 | -11.8% |
| Clarendon Blvd. | EW 2-lane 1-way arterial | 13,980 | 14,199 | 14,539 | 4.0% |
| Wilson Blvd. - Clarendon | EW 2-lane 1-way arterial | 16,368 | 16,265 | 13,797 | -15.8% |
| Arlington Blvd. | EW 6-lane arterial | 55,865 | 63,272 | 60,223 | 7.8% |
| Glebe Road - Ballston | NS 6-lane arterial | 35,230 | 39,409 | 35,900 | 1.2% |
| G. Mason Drive - west of Ballston | NS 4-lane arterial | 20,002 | 22,578 | 23,386 | 16.9% |

Source: Arlington County, Department of Community Planning and Development, 2008. *The numbers in the columns indicate the traffic volume cars/hour on the street.

The built-up environment at Metro Station areas encourages people to choose non-auto travel modes. Based on WMATA Metrorail Station Access and Capacity Study, 4,841 and 3,296 persons on average accessed to Ballston and Court House in the morning rush hours in 2005, respectively (WMATA, 2008) (Table 4.9). Ninety-three percent of surveyed commuters at Court House and fifty-seven percent at Ballston entered the Metro Station by walking (WMATA, 2008). Park & Ride was the second popular way for surveyed people to reach both Ballston and Court House stations (WMATA, 2008).

Table 4.9: AM Peak Period Mode of Access to Ballston and Court House Metro Stations

| Station | Peak Period | AM Peak Period Mode of Access | | | | | | | | |
|--------------------|-------------|-------------------------------|-----------|---------------|---------|-------------|-------------|---------|------|-------|
| | | Metrobus | Other Bus | Commuter Rail | Bicycle | Kiss & Ride | Park & Ride | Carpool | Taxi | Walk |
| Ballston | 4,841 | 14.0% | 3.0% | 0.0% | 1.0% | 9.0% | 15.0% | 1.0% | 0.0% | 57.0% |
| Court House | 3,286 | 0.0% | 0.0% | 0.0% | 0.0% | 1.0% | 5.0% | 1.0% | 0.0% | 93.0% |

Source: WMATA 2008.

According to 2005 WMATA Development-Related Survey, Metrorail and auto driving were the two major travel modes for Ballston and Court House surveyed residents ⁴¹(Table 4.10) (WMATA 2006). Metrorail has been the most popular travel mode for residents at surveyed residential sites at Ballston and Court House, about 10 percent higher than driving

⁴¹ The residential survey was designed to capture information about the travel characteristics of the residents at 18 residential sites with more than 8,200 total units located at distances from Metrorail stations varying from 150 to 2,800 feet. More than 7,800 survey forms were distributed, which resulted in an average response rate of almost 12 percent. Surveyed residential sites at Ballston station area are Lincoln Towers (714 units) and Randolph Towers (509 units); surveyed residential sites at Court House station area are Arlington Courthouse Plaza (564 units) and Courtland Towers (575 units).

alone (WMATA, 2005). Metrobus and other transit service were not the significant travel alternatives for residents based on the survey results (WMATA 2006).

Table 4.10: Mode Share for All Trips by Residential Site in 2005

| Residential Site* | Metrorail | Metrobus & Other Transit | Auto | Walk & Other |
|-----------------------------------|-----------|--------------------------|------|--------------|
| Ballston | | | | |
| Lincoln Towers | 50% | 2% | 38% | 11% |
| Randolph Towers | 45% | 1% | 40% | 15% |
| Court House | | | | |
| Arlington Courthouse Plaza | 58% | 0% | 29% | 14% |
| Courtland Towers | 46% | 0% | 39% | 15% |

Source: WMATA Survey 2005.*Residential site in the survey represent the apartment development in Ballston and Court House station areas.

For the purpose of travel, very similar pattern could be observed in Ballston and Court House surveyed residential sites (Table 4.11). Most people chose Metrorail to go to work places and schools. This survey also reflected that the employment centers and schools in Washington D.C., Metropolitan Region had good connections to Metrorail. People inclined to drive for dealing with personal business since auto-driving mode was time flexible and manageable. The only difference in travel mode choices between Ballston and Court House was found in the travel purpose for meals or snacks. Most residents in Ballston chose to drive; while most residents in Court House chose to walk. The sufficient dining services around Court House residential development area would be one of the reasons.

Table 4.11: Mode Share at Residential Sites by Travel Purpose

| Residential Site | Mode | Work/ School | Personal Business | Meal/ Snacks | Shopping | Recreation | Social |
|--------------------|-----------------------------|-----------------|----------------------|-----------------|----------|------------|--------|
| Ballston | Metrorail | 64% | 18% | 27% | 23% | 42% | 51% |
| | Metrobus & Other Transit | 1% | 0% | 0% | 2% | 0% | 2% |
| | Auto | 28% | 59% | 55% | 50% | 36% | 46% |
| | Walk & Other | 8% | 24% | 18% | 25% | 22% | 2% |
| Court House | Metrorail | 67% | 26% | 24% | 30% | 49% | 48% |
| | Metrobus & Other Transit | 1% | 0% | 0% | 0% | 0% | 0% |
| | Auto | 27% | 56% | 32% | 37% | 41% | 41% |
| | Walk & Other | 6% | 18% | 45% | 33% | 11% | 12% |

Source: WMATA Survey 2005.

The 2005 WMATA Survey also asked about the mode share for midday trips which represented the travel behavior of people at the surveyed office sites⁴² (Table 4.12). Various differences were observed from the results between these two studied nodes. The reason might partially relate to their distinct local features. In Ballston, walking was the major travel mode for shopping and recreation purposes. Except for these two purposes, auto-driving was the major travel mode. In Court House, auto driving was the major travel mode only for the purpose of shopping. Most of employees in Court House walked around for personal business, meal, and recreation. Such results could be explained by the local development themes for each station area. Ballston, as a TOD shopping center, has good walkable connections from residential areas to shopping places. On the other hand, Court House as a government and civic center, developed office buildings and theaters around Metro station area. There is no shopping mall in Court House. Most people had to drive if they planned to go shopping.

⁴² Surveyed office sites at Ballston station area are 3 Ballston Plaza (932 surveys) and Ballston One (267 surveys); surveyed office sites at Court House station area are 2100-2200 Clarendon Blvd. (850 surveys) and Courtland Towers (500 surveys).

Table 4.12: Mode Share for Midday Trips by Trip Purpose – Office Site

| Residential Site | Mode | Work Related | Personal Business | Meal/Snacks | Shopping | Education | Recreation | Other |
|--------------------|-------------------------|--------------|-------------------|-------------|----------|-----------|------------|-------|
| Ballston | Metrorail | 25% | 27% | 4% | 0% | 50% | 25% | 0% |
| | Metrobus& Other Transit | 1% | 4% | 8% | 13% | 0% | 0% | 0% |
| | Auto | 62% | 65% | 50% | 32% | 50% | 25% | 50% |
| | Walk & Other | 13% | 5% | 38% | 57% | 0% | 50% | 0% |
| Court House | Metrorail | 48% | 10% | 17% | 36% | 69% | 0% | 0% |
| | Metrobus& Other Transit | 1% | 1% | 0% | 0% | 0% | 0% | 0% |
| | Auto | 34% | 38% | 32% | 58% | 31% | 40% | 42% |
| | Walk & Other | 18% | 51% | 52% | 7% | 0% | 60% | 58% |

Source: WMATA Survey 2005.

4.4.2 Metrorail Connection to D.C., Metropolitan Region & Local Revitalization

The Metrorail system and other public transportation services can easily transfer people from Ballston and Court House to D.C. central area, corridors, and other transit nodes in Washington Metropolitan Region. Besides transit connection, the easy access to I-66, Glebe Road, Rt. 50 and other major arterials provided convenient way to a very large and generally high-income (based on per capita income) market base within and outside the Arlington County. Such transportation connectivity amplified both employment and leisure choices to local people.

4.4.2.1 Local Revitalization in Ballston

Ballston has had public funding components that have bolstered commercial office and station area development. The Ballston Common Mall has sparked nearby office and supportive commercial development. Arlington County issued industrial development bonds that co-financed a 3,200-car parking garage for Ballston Common.

DED developed a retail attraction plan to establish community oriented retail (such as drugstores, hardware stores, etc.) to serve adjacent residential areas in Ballston. Working together with DCPHD, DED encouraged retail uses that were consistent with the retail market niches identified in the retail action plan, including retail equivalent uses such as theaters, art galleries, artisan shops and other cultural facilities.

A variety of community facilities serving the Ballston and Court House are located in or near the Metro Station areas. Such civic and cultural development made these two metro nodes not just the transit centers, but places for gathering people.

In Ballston, Arlington County Department of Parks, Recreation and Community Resources (DPRCR) and Partnerships of Arlington Economic Development (AED) worked with property developers/owners together to activate plazas and other open spaces with live performances, special events, etc. (Arlington County, 2001). They promoted Stuart Park and other public spaces as community gathering places through special events, concert and performance series. A number of community entertainment options were pursued for Stuart Street as the “festival street” (Arlington County, 2001). These efforts supported the intent of the Sector Plan and enhanced the amenity of the Ballston neighborhood (Arlington County, 2001).

4.4.2.2 Local Revitalization in Court House

In Court House, DED led its developing a retail attraction/retention plan to encourage and support the shift of financial and business service firms on Clarendon Boulevard to elsewhere in the area and to replace them with businesses such as restaurants. These changes animated the street and supported theater development. Furthermore, it encouraged expansion of the farmer’s market in conjunction with development of the new civic plaza. DPW was engaged in several initiatives that enhanced the pedestrian environment and advanced the retail and other economic development in Court House area.

4.5 Conclusion

4.5.1 Complex Policy Making Environment & Cooperation among TOD Participants

TOD policies are implemented under a complicated institutional environment in Arlington County, and the cooperation among various levels of government agencies and public-private partnerships has been essential to the success of TOD.

The introduction of Metrorail highly influenced the development pattern in Arlington County. WMATA, as the operator of Metrorail and Metrobus, works closely with Arlington County and private companies to improve the transit services and implement joint development projects at Ballston and Court House Metro station areas.

Land-use planning is the responsibility of local government in Virginia. Arlington County and its policies for Metrorail corridor and station area planning has highly encouraged in establishing a walkable communities with high density, mixed land-use development and easy access to Metro stations in Ballston and Court House. Arlington County works together with VDOT to build a pedestrian and bicycle friendly neighborhoods around Ballston and Court House Metro stations.

Arlington County government has made significant efforts in assisting the residents and employers to apply and get federal tax benefits through CommuterDirect.com® Corporate Services and Cash-Out program.

Transportation planning is normally a regional decision, Arlington County sometimes has to compromise with TPB and VDOT for accepting some highway widening and lane-adding projects, even though such projects conflict with TOD concepts.

The County also cooperates with private companies, such as Zipcar and Alta Bicycle Share, to reduce auto travel and promote alternatives around station areas.

4.5.2 Specific TOD Planning with Focusing on Local Themes

In Arlington, the County fosters TOD by building up two Metrorail corridors, which are Rosslyn-Ballston and Jefferson-Davis. Even though Ballston and Court House are both on Rosslyn-Ballston Corridor, they are quite different in functions. The specific Sector Plan for each station area, zoning ordinance and some County retail and development policies assure that each station area establish and retain its own characteristics.

Ballston Metro Station Area has been successful built into a retail center in Arlington County and Washington D.C. Metropolitan Region as it planned since 1970s. When Metrorail services began in 1979, Ballston was a small commercial district in Arlington surrounded by single-family homes and garden apartments. Since then, Ballston has grown into one of the County's "new downtowns", surrounded by high-rise commercial towers and a shopping mall. Ballston's major joint WMATA/private development project was the Metro Center, located above the Metrorail station on what was earlier a major bus transfer lot.

Ballston is a vibrant, exemplary mix of high-density residential, retail, hotel and office developments. In many ways, it was easy to live or work in Ballston without owning a car. Access to shopping, recreation and other necessities of daily life were a quick walk, bike, or Metro bus or train ride away. Sidewalks were, for the most part, wide and welcoming.

Court House, as another successful transit node on Rosslyn-Ballston Corridor in Arlington County, has the distinctive properties from Ballston. Forty years after the adoption of the transportation and land-use policies, the Court House Metro Station Area's identity as an urban government center surrounded by a balanced mix of high density residential and office development has been achieved. The majority of

residential projects were built on the southern portion of the Court House Metro Station Area, described in the Sector Plan as a residential area with a mixture of dwelling unit types.

Intensive redevelopment has taken place within the central core around the Metro station, and established residential uses in the periphery have been preserved. Court House Plaza, a mixed-use development of office, commercial, hotel, and residential uses privately developed on County-owned land is the visual focal point of this Metro Station Area. It is a plaza and promenade tying together the government and private office buildings, retail space, theaters, and the residential structure located at the center of the complex.

Overall, Arlington County working closely together with WMATA and other agencies has successfully fostered diverse TOD implementation. Ballston and Court House, as two transit nodes on Rosslyn-Ballston Corridor have been developed as TODs encouraging public transit taking and high density mixed land-use at stations and the immediate areas. Besides facilitating general concepts of TOD, Arlington County has designed each Metro station with specific economic or civic function in the County and in the Metropolitan region with considering station's own socio-economic and cultural characteristics. This kind of design gives each station a special identity which makes the station distinct from the others and adds diversity and flexibility in TOD planning.

Chapter 5

DETAILED CASE STUDY: BETHESDA, MONTGOMERY COUNTY, MARYLAND

Bethesda has a variety of distinctive demographic and socio-economic features from Ballston and Court House. Unlike Ballston and Court House, Bethesda is a historically well-established area and is much larger population. Montgomery County and WMATA have implemented a number of policies in fostering transit-oriented development in Metro station area, while with significant differences from Arlington County. The three primary differences are 1) the County land-use planning is administered by different type of agencies, 2) WMATA's interaction with private developer in building Bethesda's local image as a central business center in the region and 3) how Bethesda Urban Partnership (BUP) created by Montgomery County facilitate economic development and enhance Bethesda as a transportation center. Yet another difference is worth noting. It is Montgomery County efforts to create and maintain affordable housing for lower income workers accessible to the Metro core area.

At the same time, Montgomery County and Arlington County have similarities in policies implemented which concerns the use of Metrorail system and development of the station's core area. These policies include the strategies improving regional bus connections to Metro service areas, encouraging walking, carpooling, carsharing, biking, and telecommuting to foster TOD.

5.1 Introduction of Montgomery County

Montgomery County, Maryland is situated north of Washington, D.C. The population of Montgomery County was 971,177 in 2010 and it has only three incorporated cities, Gaithersburg, Rockville, and Takoma Park (shown on Figure 5.1). Thus most of the County's residents live in unincorporated locales (M-NCPPC, 2013).

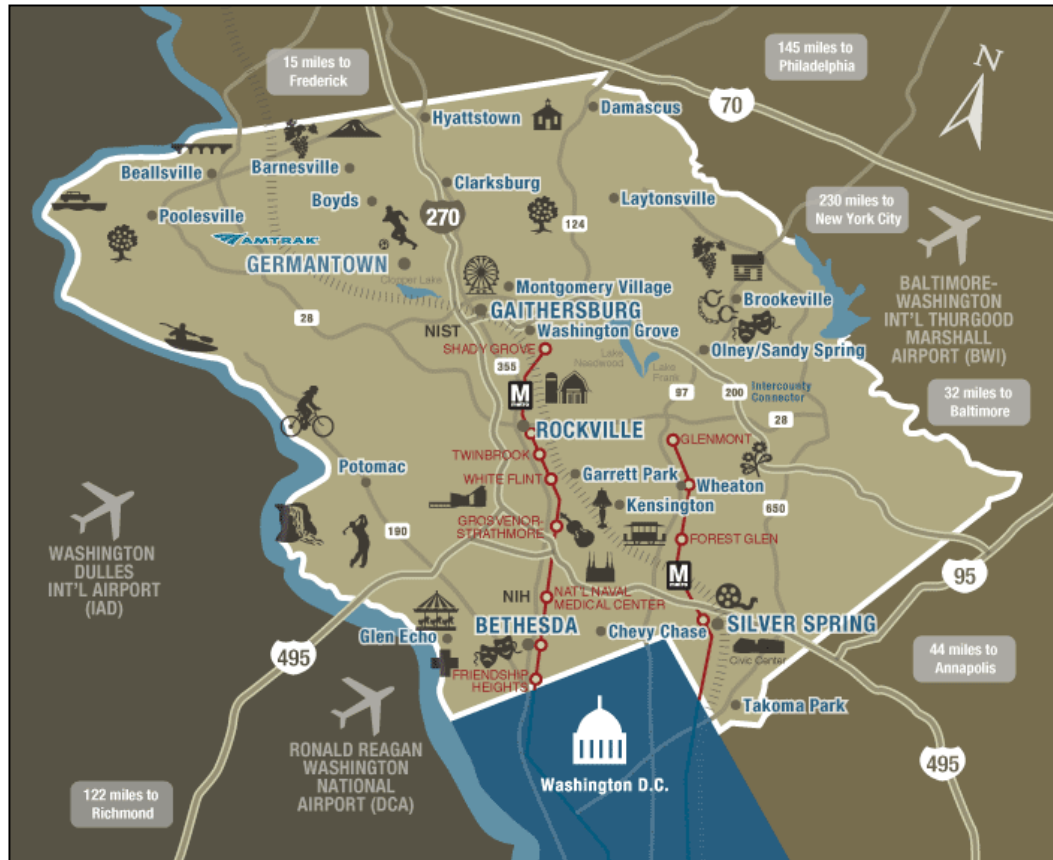


Figure 5.1: Montgomery County Map – Incorporated Cities & Unincorporated Locales⁴³

Table 5.1 shows the locales with population over 50,000 in the County. The most populous locales are Bethesda⁴⁴, Germantown, and Silver Spring (M-NCPPC, 2013).

43 Source: Visit Montgomery Website:
<http://www.visitmontgomery.com/images/map/lg-map2.png>

44 Bethesda here is defined by Montgomery County Department of Park and Planning, Research and Technology Center as the planning area of Montgomery County.

Table 5.1: Total Population of Montgomery County by Planning Place, 2000 and 2010⁴⁵

| Planning Place | 2000 | 2010 | change | %change | 2000 | 2010 |
|----------------------------------|----------------|----------------|---------------|--------------|---------------|---------------|
| Aspen Hill | 55,408 | 57,508 | 2,100 | 3.8% | 6.3% | 5.9% |
| Bethesda | 86,100 | 90,499 | 4,399 | 5.1% | 9.9% | 9.3% |
| Gaithersburg and Vicinity | 60,265 | 68,841 | 8,576 | 14.2% | 6.9% | 7.1% |
| Germantown | 66,440 | 86,395 | 19,955 | 30.0% | 7.6% | 8.9% |
| Rockville | 47,399 | 61,209 | 13,810 | 29.1% | 5.4% | 6.3% |
| Silver Spring | 68,303 | 71,452 | 3,149 | 4.6% | 7.8% | 7.4% |
| Wheaton | 52,236 | 57,798 | 5,562 | 10.6% | 6.0% | 5.9% |
| The Rest Areas | 437,190 | 478,075 | 40,885 | 9% | 50% | 49% |
| Total | 873,341 | 971,777 | 98,436 | 11.3% | 100.0% | 100.0% |

Source: U.S. Census: 2000 and 2010 Decennial Census, P.L. 94-171 Redistricting

Data \ Center for Research and Information Systems, Montgomery County Planning Department, M-NCPPC.

5.1.1 Introduction of Bethesda

As an unincorporated area in Montgomery County, Bethesda's boundaries have been differently defined by several sources. The U.S. Census Bureau defines it as the Bethesda CDP (Census Designated Place) whose center is located at 38° 59' north, 77° 7' west. The Maryland-National Capital Park and Planning Commission (M-

⁴⁵Planning Place data may differ from U.S. Census place-level data. Planning Place boundaries are set by planners to reflect long range community-level planning efforts. Unlike official U.S. Census place definitions--which may change from time to time--Planning Place boundaries are consistent across time. This enables Planning Department demographers to more accurately track and analyze population and housing changes within each community.

NCPPC) defines Bethesda as a planning area which compromises the zip codes 20180, 20811, 20813, 20814, 20815, 20816 and 20817 (see Figure 5.2).

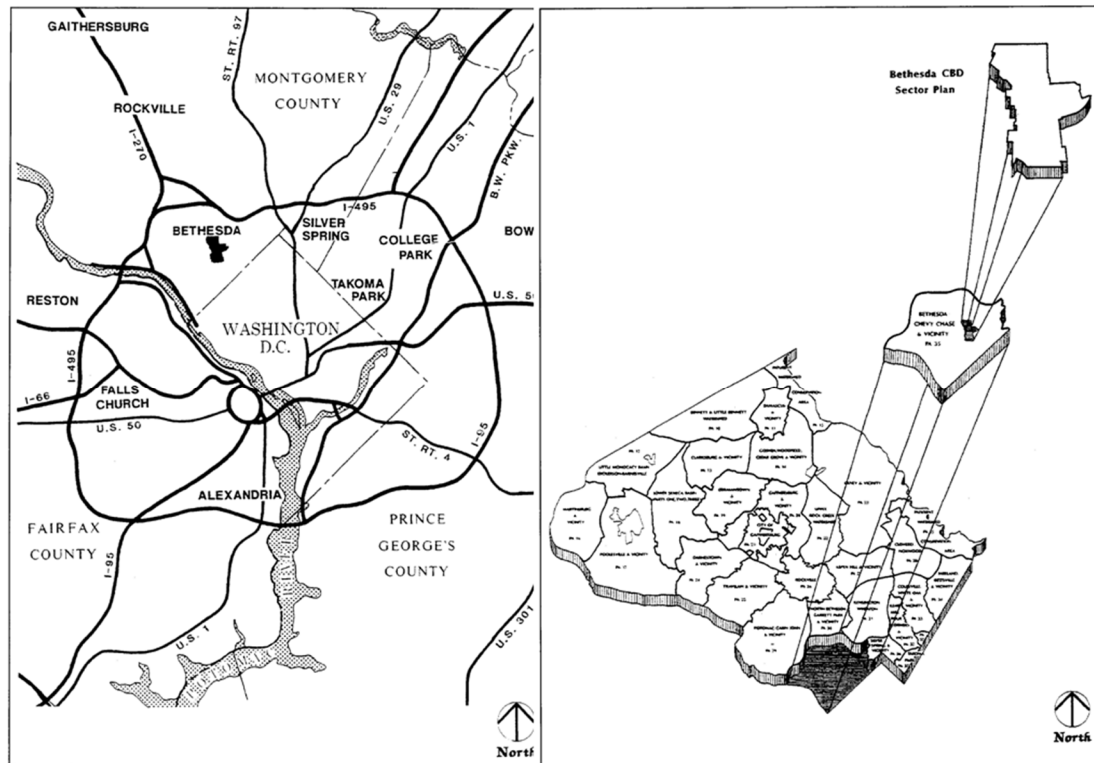


Figure 5.2: Bethesda in Montgomery County, Maryland⁴⁶

Located in the lower-end of western Montgomery County, the Bethesda community has evolved from the tobacco plantations of the 18th century to an important commercial center serving a large, affluent suburban residential community.

⁴⁶ Source: M-NCPPC.

Initially, retail activity was clustered near the intersection of Wisconsin Avenue, Old Georgetown Road, and East-West Highway – the location of the Metro station.

The rapid suburbanization of metropolitan Washington during the two decades following World War II found the Bethesda functioning as an important convenience and service retail center meeting the daily needs of the relatively large, affluent residential population and its strategic location, provided the basis for the development of office space in the area. By the early 1960's, for all practical purposes, the Bethesda community was fully developed.

In the 1980's, the Bethesda Central Business District (CBD) was one of the three major CBD's in Montgomery County – Silver Spring, Bethesda, and Wheaton (Montgomery County, 1994). It was also one of the two commercial centers located in the Bethesda-Chevy Chase Planning Area (the other being the more intensively developed Friendship Heights⁴⁷ area which is located about one and one-half miles south of the Bethesda CBD at the District line along Wisconsin Avenue).

As of the Census of 2010, there were 90,499 people residing in Bethesda, 10 percent higher than 2000 level (Census, 2010) (Table 5.2). Its population, even for Montgomery County, is very wealthy and well-educated. In 2010, the median income for a household in Bethesda was \$136,513, while in United States the average level was \$52,762 (Census, 2010). Also, in 2010, 83.4 percent of people in Bethesda had a

⁴⁷ Friendship Heights is a residential neighborhood in southern Montgomery County, borders not clearly defined. Besides the headquarters, a concentration of broadcast median including the studios of WMAL, WMAL-FM, and WTTG (Fox 5) is located in the neighborhood.

Bachelor's or higher degree, in comparison to the Maryland State level of 35.7 percent and the U.S. level of 28.2 percent (Census, 2010).

Table 5.2: Bethesda Demography Data

| Year | Bethesda 2010 | Maryland 2010 | U.S. 2010 |
|------------------------------------|---------------|---------------|-------------|
| Population | 90,499 | 5,773,552 | 309,330,219 |
| Median household income | \$136,513.00 | \$70,647.00 | \$52,762.00 |
| Bachelor's degree or higher | 83.4% | 35.7% | 28.2% |
| Race | | | |
| White | 79.5% | 58.2% | 72.4% |
| Black or African American | 3.2% | 27.4% | 12.6% |
| Asia | 8.1% | 5.5% | 4.8% |
| Hispanic or Latino | 6.4% | 8.2% | 16.3% |

Source: U.S. Census: 2000 and 2010 Decennial Census, P.L. 94-171 Redistricting Data \ Center for Research and Information Systems, Montgomery County Planning Department, M-NCPPC.

The County is an important biotechnology center in the mid-Atlantic region. Biomedical research is carried out by institutions including Johns Hopkins University's Montgomery County Campus (JHU-MCC), and the Howard Hughes Medical Institute. Federal government agencies engaged in related work include the Food and Drug Administration (FDA), the National Institutes of Health (NIH), Walter Reed Army Institute of Research and the Howard Hughes Medical Institute (HHMI). Many large firms are based in the County, including Discovery Communications, Coventry Health Care, Marriott International, and GEICO. Downtown Bethesda and

Silver Spring are the largest urban business hubs in the County (Montgomery County, 2011).

Several research institutions and medical and health care companies are based in Bethesda. Important institutions include the National Institutes of Health campus, the Walter Reed National Military Medical Center, and managed health care company Coventry Health Care.

5.1.2 Metro Stations in Montgomery County

Montgomery County has been served by Metrorail and Metro bus services since the 1980s. All thirteen Metro stations in the County are located on the Metrorail Red Line (shown on Figure 5.3). It takes thirty minutes or less for commuters to travel from any Montgomery County Metro station to the heart of Washington D.C. (Montgomery County website⁴⁸).

48 <http://www.visitmontgomery.com/plan-visit/transportation>

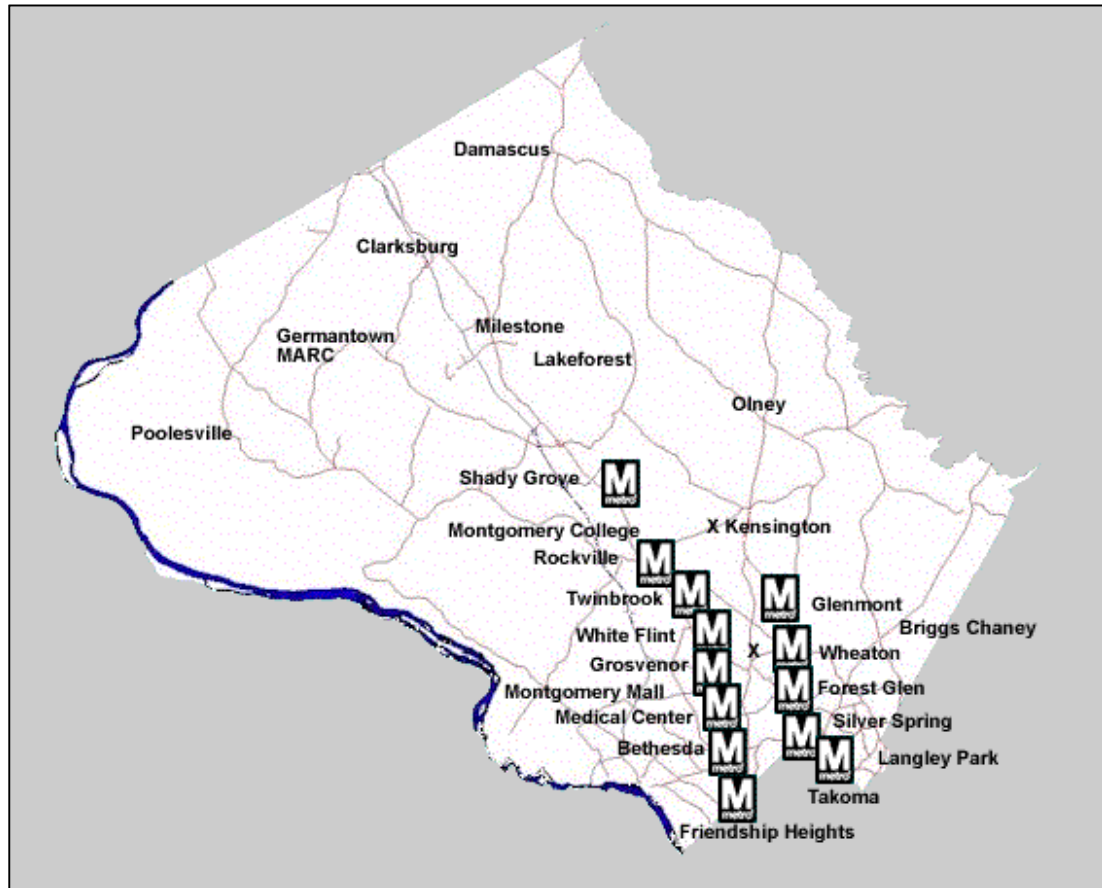


Figure 5.3: Metro Stations in Montgomery County, Maryland⁴⁹

In Bethesda, at the end of the 1950s, Montgomery County planners considered a highway to attract private investment (Hanson, 1967). The planning concept changed when WMATA decided to construct the Metrorail Red Line (Hovsepian, 1988). The County government selected Bethesda as a transportation hub in the system and focused high density development at the Metro station area. The success of TOD in

⁴⁹ Source: Montgomery County website, www.montgomerycountymd.gov.

Bethesda today has depended on strong support of Montgomery County policies as well as WMATA policies.

Bethesda Metrorail station was opened on August 25, 1984, located at the corner of *East-West Highway* and *Wisconsin Avenue* (shown on Figure 5.4). It was primarily a commercial area, containing both retail and office uses. The County's policy in the Bethesda area sought to ensure that the projects approved within it are of a high-quality design and fit the goals of transit-oriented, compact development (M-NCPPC, 1994).

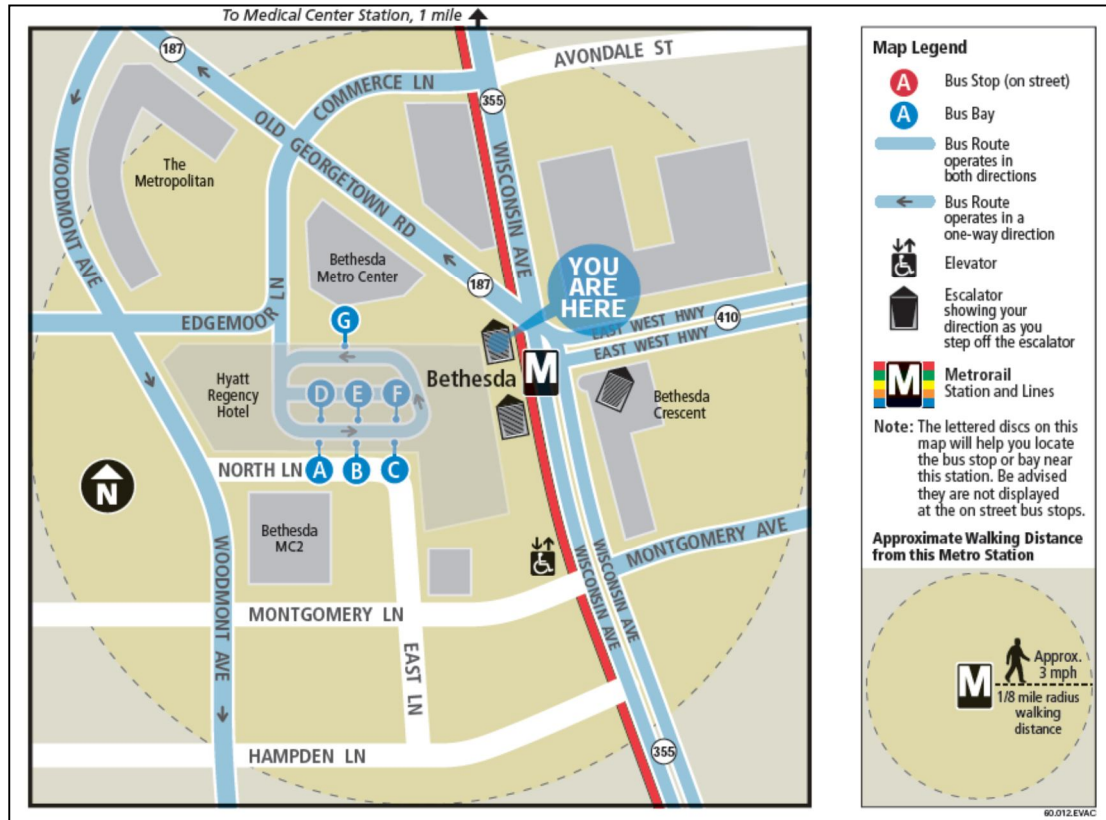


Figure 5.4: Bethesda Metro Station Area⁵⁰

5.2 Planning Bethesda Metro Station Area

5.2.1 History of Planning Metro Station Areas in Montgomery County

There are four major local actors in planning Metro station areas which are Montgomery County, WMATA, and Bethesda Urban Partnerships, along with the State of Maryland.

⁵⁰ Source: WMATA,
http://www.wmata.com/rail/station_bus_maps/PDFs/Bethesda.pdf

At the beginning of Metro planning, the County faced similar local opposition in some places as in Arlington County with its plans to locate stations in their communities and foster high density development (Hovsepian, 1988). Although the officials preferred high density development at the station areas, the County downzoned the area around some of the Metro stations. Thus, some high density development proposals around Metro stations did not get approved in Montgomery County due to lack of developer interest and citizen opposition (Hovsepian, 1988). For example, the Forest Glen Station was canceled by Montgomery County because of angry residents' protests (Hovsepian, 1988). In Silver Spring, a transit node on Metrorail Red line, the County Planning Board had to reject a proposal of 2-million-square-foot American Dream megamall around the Metro station in 1996 (Washington Post, 2001). A 4000-member Silver Spring citizen group – Citizens for Sensible Development, had attacked the mall project for its potentially negative impact on traffic, crime and the environment of the middle-class community (Washington Post, 2001). Only in the late 1990s, Silver Spring seemed ready to accept TOD and a development proposal was approved that combined residential, employment, retail, and entertainment, all within a few walkable blocks around the Silver Spring Metro Station (Washington Post, 2001). Overall, Montgomery County council members followed basic TOD goals in station planning. They stated that the needs of the county as a whole outweighed the desire of one neighborhood and confirmed their determinant of promoting TOD (Hovsepian, 1988).

5.2.2 Preparing for Bethesda Metro Station Opening

Montgomery County carefully planned the Bethesda Metro Station area in 1970s to be well prepared before the opening of the station in 1984. There were three

major planning and public policy documents that were officially adopted to guide and regulate the nature, scale and timing of new development in the Bethesda since 1970 (Praful Shah & Associates, 1986):

- The 1970 Master Plan for the Bethesda-Chevy Chase Planning Area;
- The 1976 Sector Plan for the Bethesda Central Business District; and,
- The 1982 Amendment to the Bethesda Central Business District Sector Plan.

The Montgomery County Planning Board of the Maryland-National Capital Park and Planning Commission (M-NCPPC) adopted a Master Plan for the entire Bethesda-Chevy Chase Planning Area in 1970. In many respects, this document set the stage for subsequent changes in land use, zoning, development densities, and other policy dimensions regulating development in Bethesda. The 1970 Master Plan located the Metro station and at the same time raised important questions with respect to the potential impact of the Metro on the Bethesda CBD and surrounding areas, including the issues relating to managing and channeling the growth. It also reduced the size of Bethesda CBD from 195 acres to 153 acres to concentrate development around Metro station (Montgomery County, 1970).

The 1976 Bethesda Central Business District (CBD) Sector Plan represented a critical milestone in the planning of “New Bethesda” (Praful Shah & Associates, 1986). It made use of new analytic techniques developed by the Planning Board to establish a development scale and zoning envelope in reasonable relationship to the ability of the public facilities, particularly the transportation system, to support TOD planning. In 1976, the Sector Plan study area outside the CBD consisted of an additional 253 acres. Thus, the Bethesda Study area (the entire Sector Plan Study area) totals some 406 acres.

The following map (Figure 5.5) shows the boundaries of the Bethesda Sector Plan Study area, the CBD, the “core” area and transit-station residential district – the areas of focus for ongoing and planned (approved) new private sector development initiatives under the Optional Method project⁵¹ concept. Such concepts allowed high density development with residential or transit mixed uses in the planning areas (M-NCPPC⁵²).

⁵¹ M-NCPPC defines “Optional Method of Development” as a zoning procedure used in Central Business District (CBD), Residential mixed-use (RMX) and Transit mixed use (TOMX and TMX) zones that encourage land assembly and mixed-use development. Under the optional method, higher densities are allowed in exchange for significant public amenities and facilities to support that additional density.

⁵² <http://www.montgomeryplanning.org/departments/glossary.shtm#o>

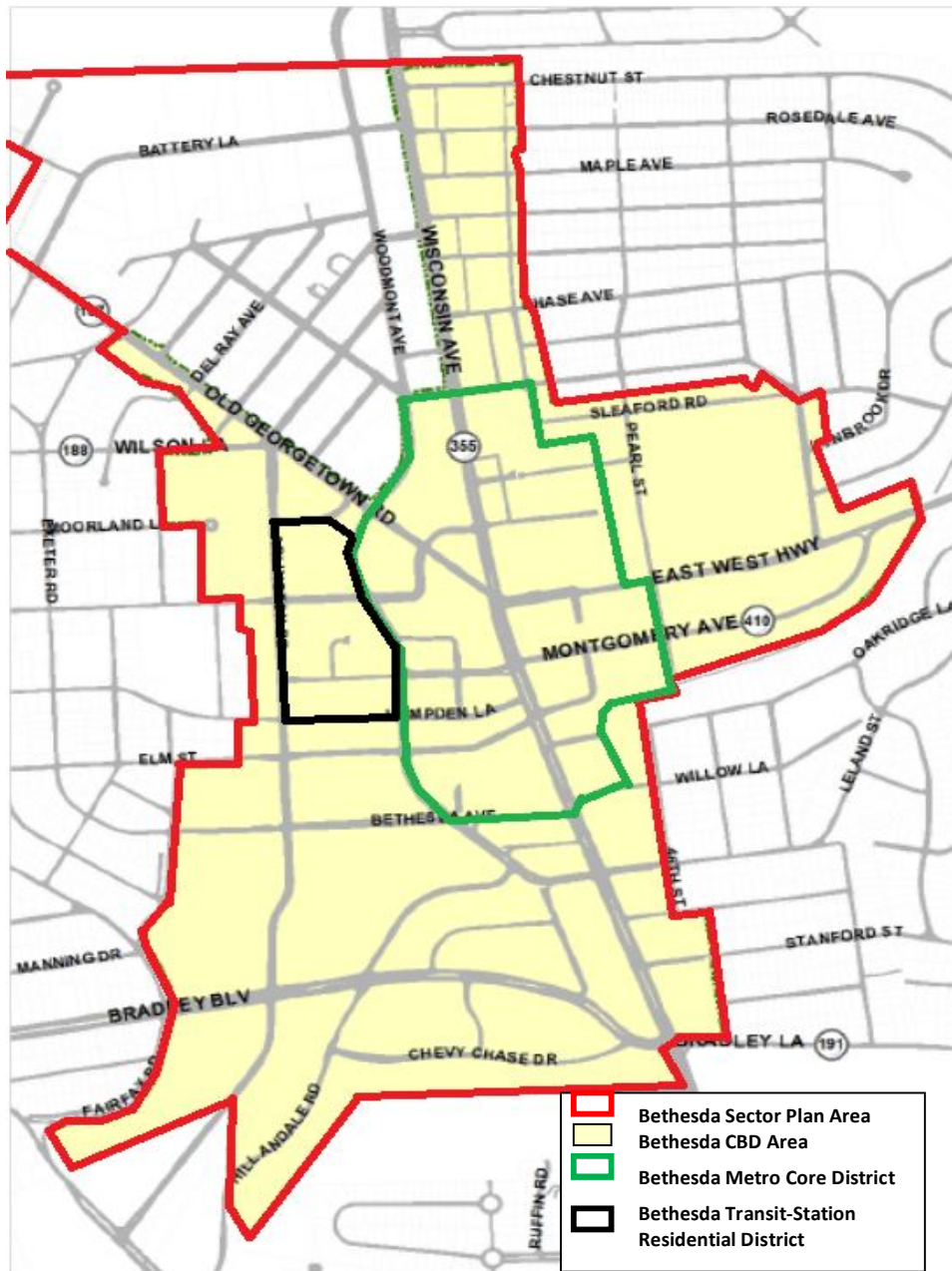


Figure 5.5: Bethesda Sector Plan Study Area & Its Components⁵³

⁵³ Source: M-NCPPC, 2013.

The 1982 Amendment to the Bethesda CBD Sector Plan ensured that the projects approved within the area's core maintained a high-quality design and complied with the community goals, including transit-oriented, compact development (Montgomery County, 1982).

Maryland State government actively supports TOD by allowing Maryland DOT to use department resources on TOD projects with the authorization of the legislation, recorded at Section 7-101(m) of the Transportation Article. Maryland State government has also worked together with Montgomery County to support TOD projects. Maryland State Chapter 182 (House Bill 300) of 2009 authorized specified local governments to finance the costs of infrastructure improvements which support TOD (Maryland State, 2009).

5.2.3 Establishing Special Districts in Bethesda to Foster TOD

There are six special districts established to concentrate development around the Metro station and promote travel alternatives. Three of the six, including Metro Core District, Transit Station-Residential District, and Bethesda Central Business District, are managed by Montgomery County; the other three, the Bethesda Urban District, Parking Lot District and Transportation Management District, are managed by BUP which will be discussed in details in Section 5.3.2.2.

5.2.3.1 Metro Core District

The 1976 Bethesda Central Business District Sector Plan recommended that development in the Metro Core occur in the early years of the planning period, and that the Metro Center should be the first part of the Metro Core to be developed with a concentration of density office, retail and hotel buildings (M-NCPPC, 1994).

The 1976 Sector Plan provided for the development and redevelopment of the Bethesda CBD to occur in three sequential stages. Stage I permitted optional method projects to occur initially in the 5.95 acre central core and some adjacent areas. Stage II allowed development to occur in the balance of the CBD, except the Montgomery Triangle area, after net new development of 1.5 million square feet was committed in the core area. Stage III was started when 2.5 million square feet of development was committed. By this staging approach, the Sector Plan designated early development priority to the core area. In line with the recommended development, most approved projects in the core area of Bethesda's CBD were permitted to achieve a FAR of up to four, while the balance of the CBD was to carry FAR's of one and two.

The Metro Core District is the center of downtown Bethesda. It is also the major transportation hub since it is centered by the Bethesda Metro station. The Core contains the highest intensities of building and the largest concentration of employees. The district extends from Cheltenham Drive on the north to Bethesda Avenue on the south (shown on Figure 5.6).

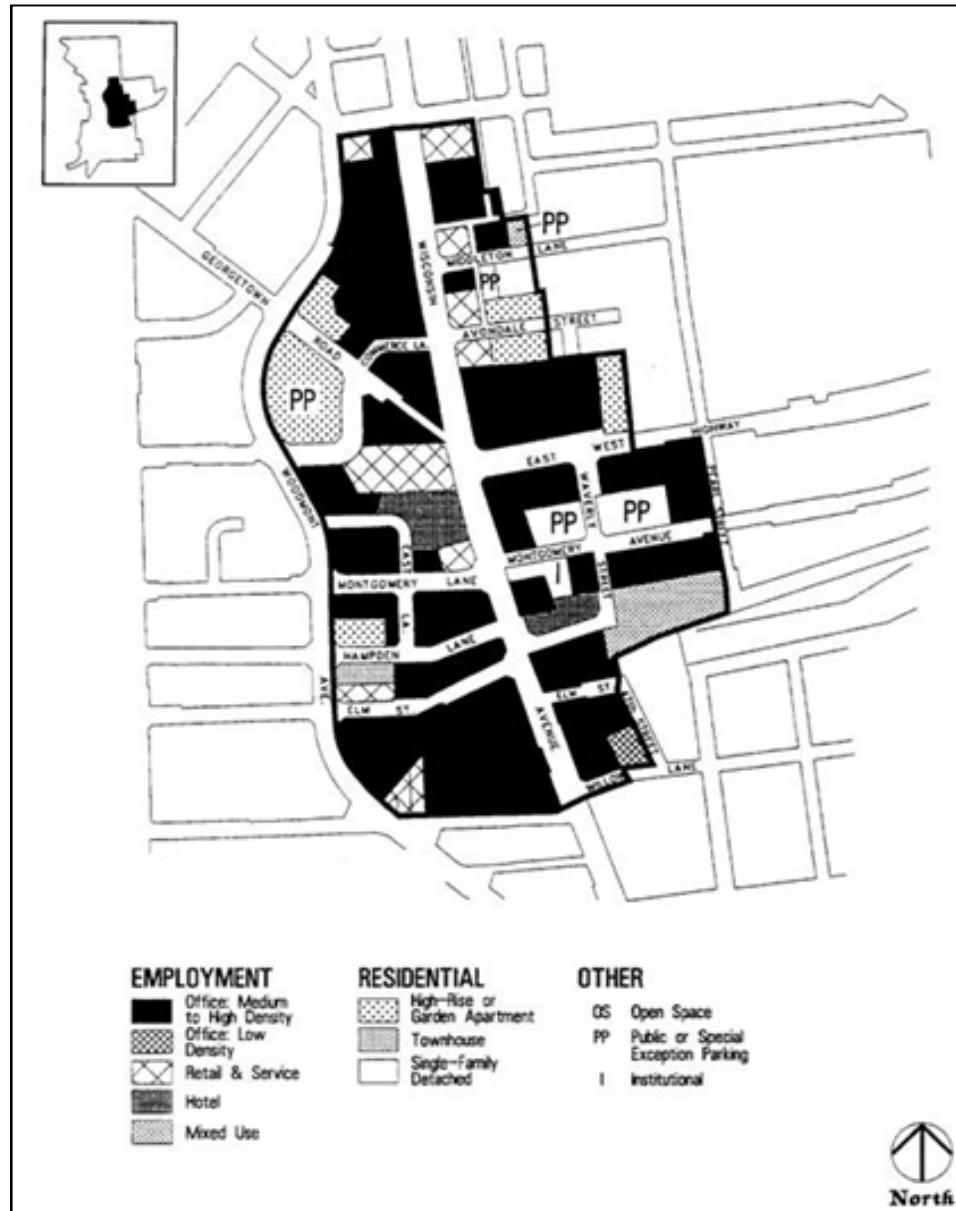


Figure 5.6: Metro Core District⁵⁴

⁵⁴ Source: M-NCPPC, 1994.

The Metro Core District, consistent with adopted planning principles, has the tallest buildings. In the block containing the Metro Center, individual properties need to be provided with the overall density of the area retaining an average of 4 FAR, including streets, open space, and public facilities (M-NCPPC, 1994). A number of smaller sites also qualify for optional office development or standard method development.

The largest residential areas in the Metro Core are Bethesda Place, Hampden Square, Waverly House, and some townhouses. Building heights step down from the 200-foot Clark Building to the surrounding 143-foot heights allowed in the CBD-2 Zone (M-NCPPC, 1994). Optional method residential use is also allowed at 5 FAR (M-NCPPC, 1994).

5.2.3.2 Transit Station Residential (TS-R) District

A Transit Station-Residential zone to the west of the Metro station was established in the 1976 Bethesda CBD Sector Plan for the eventual construction of up to 1,500 residential units. It also became a major goal of County housing policies to have some residential development near the Metro station in order to reduce the need for the use of cars. Now, most residential development in Bethesda is distributed on the margin of Metro Core area and the Transit Station Residential (TS-R) District that will be discussed in more detail in Section 5.3.3.1.

5.2.3.3 Central Business District

The Bethesda Central Business District (CBD) is a planning area established by the Maryland-National Capital Area Park and Planning Commission (M-NCPPC) for downtown Bethesda. The 1994 Sector Plan for the Bethesda CBD and its 2006

amendment to the Woodmont Triangle area aim to establish a core development area around the Bethesda Metro Station that includes diverse commercial and residential property; encourages cultural activities, improves streetscapes; and addresses transportation and pedestrian needs (Montgomery County, 1994 & 2006).

The Central Business District is the largest in area of the six special districts. It encompasses the entire Transportation Management District (TMD) (will be discussed in detail in the following section), but also extends south to Nottingham Drive and Willett Parkway, west to Tilbury St., and includes the area between Pearl St. and the Bethesda Urban District.

5.2.4 Planning & Emphasizing Development in Bethesda Metro Station Area

Different from Arlington County, Montgomery County has not deliberately planned the station area to develop into something it has not traditionally been. The intent is to continue concentrating high density development around the area that now has the Metro station. The earlier plans set up a zoning ordinance for special districts by recommending land uses, densities, and streets that helped define the district areas and boundaries (M-NCPPC, 1976). The 1976 CBD Sector Plan addressed the issues of where and when this new development should take place in Bethesda (Montgomery County, 1976). After a careful evaluation of three alternate development concepts, the Sector Plan recommended the “center” concept to achieve a desirable new urban form of development, with the Metro station as the focal point, around which new development with higher densities should concentrate (Montgomery County, 1976).

On August 25, 1984, five stations on Red Line (including Bethesda) began operating. In order to benefit more from Metro station development, the Bethesda-

Chevy Chase Master Plan⁵⁵ and Bethesda CBD Master Plan were approved and adopted in 1990 and 1994, respectively.

The 1990 Bethesda-Chevy Chase Master Plan was designed to achieve a significant shift in travel from auto to transit and other mobility alternatives in the Bethesda CBD and Friendship Heights CBD policy areas. The 1994 Bethesda CBD Master Plan included several amendments to other plans of Montgomery County. There include the amendment of 1976 Bethesda CBD Sector Plan, amendment of 1978 Master Plan of Bikeways, amendment of 1979 Master Plan for Historic Preservation, and amendment of the 1990 Bethesda-Chevy Chase Master Plan. The 1994 Bethesda CBD Master Plan emphasized the development of Bethesda Metro station area and promoted non-auto travel modes. It also promoted walking in the area and other non-auto ways of access to the Metro station to attract more people to take the Metrorail (M-NCPPC, 1994). The 1994 Bethesda CBD Sector Plan was amended in 2006 to reconsider how redevelopment could provide more opportunities for housing close to the Metro station. As shown on Figure 5.7, Bethesda Metro Station area contains a TOD mix of land uses in a suburban downtown environment. Retail exists on the first floor of most commercial structures as a pattern of mixed-use.

⁵⁵ Bethesda-Chevy Chase Policy Area includes the Bethesda CBD and Friendship Heights CBD Policy Area.

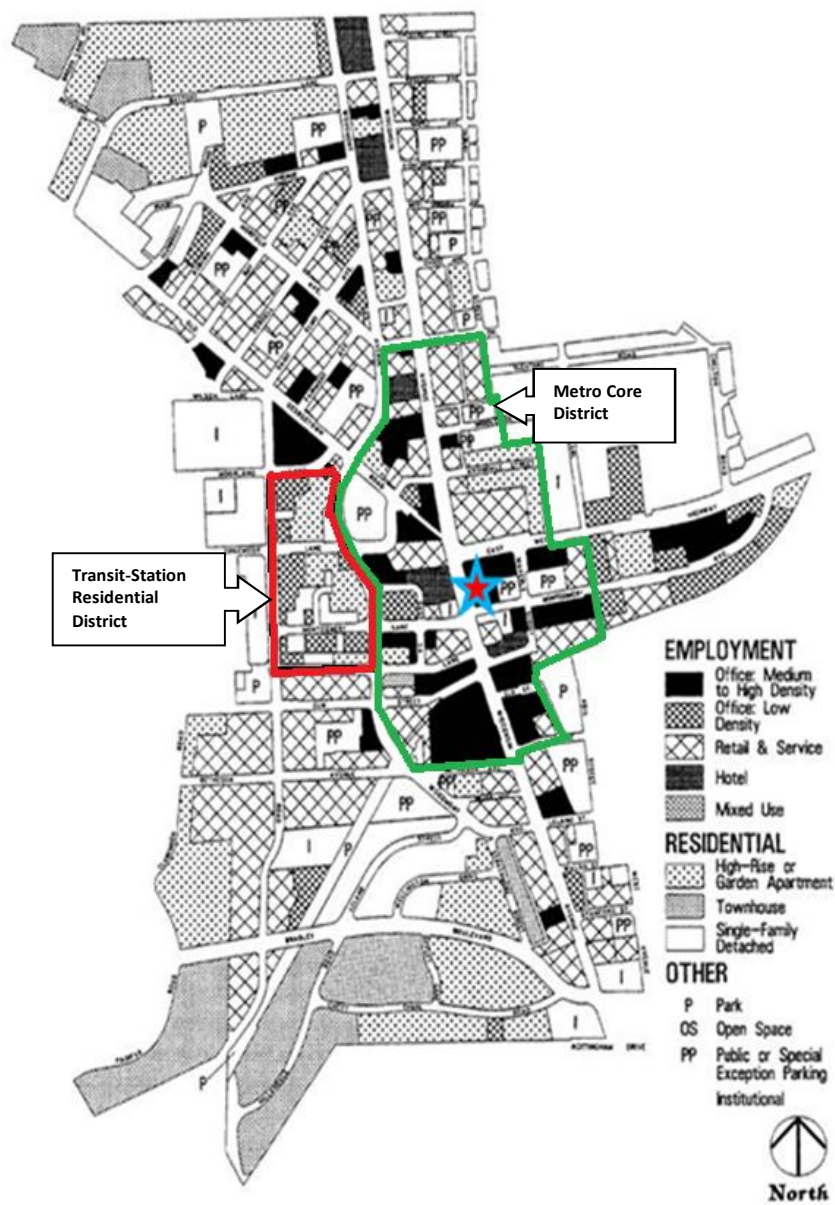


Figure 5.7: Bethesda Land-Use Planning Map⁵⁶

⁵⁶ Bethesda Metro Station is marked with a “blue star” on the map; source: M-NCPPC, 1994.

5.3 Differences in Developing Metro Station Area between Montgomery and Arlington County

There are three major differences between Montgomery and Arlington County in developing and managing the Metro station area which include the types and organization of County-level land use planning agencies, WMATA's essential work in developing Bethesda Metro station, the active participation of a quasi-public organization – BUP in promoting and managing Bethesda downtown area, and the efforts of Montgomery County in providing housing accessible to Metro service and some affordable housing.

5.3.1 Montgomery County Planning Agency for Developing Bethesda

Unlike Arlington County, the land use planning is formally done within a bi-county agency, the Maryland National Capital Parks and Planning Commission (M-NCPPC). The M-NCPPC was formed in 1927 by the State of Maryland to assemble and maintain a regional parks system, and now has the responsibility of preparing and administering a general plan for the physical development of the two Washington, D.C.-area Maryland counties – Montgomery and Prince George's. The M-NCPPC is composed of ten appointed members, five from Montgomery County Planning Board and five from Prince George's Planning Board who serve four-year term. Under the administration of M-NCPPC, the planning borders of both Montgomery and Prince George's Counties regulate the land use of municipalities and unincorporated areas within. Administration and operating expenses of the planning board are financed by property tax levied by Montgomery County.

In Montgomery County, members are appointed by the County Council and confirmed by the County Executive. And in the membership from each county, no more than three may be of the same political party. Montgomery County names the

planning board chair. The Commission chair alternates each year between the two planning board chairs; the alternate becomes vice-chair. The members of two Counties' operate with considerable independence from one another, sharing a small bi-county staff for mostly administrative matters.

The planning board divides Montgomery County into three areas (shown on Figure 5.8). Bethesda is in Area 1. Montgomery County Planning Board makes zoning recommendations to its county council. To enact zoning ordinances and change the zoning map, the planning board has exclusive responsibility for subdivision approval, location and grades of streets, location of public buildings and utilities, and street naming and house numbering. The Master Plan and Sector Plan are created for Bethesda planning area in order to create a view of land use and transportation trends and future development as well as address zoning, housing, transit use, and pedestrian issues.

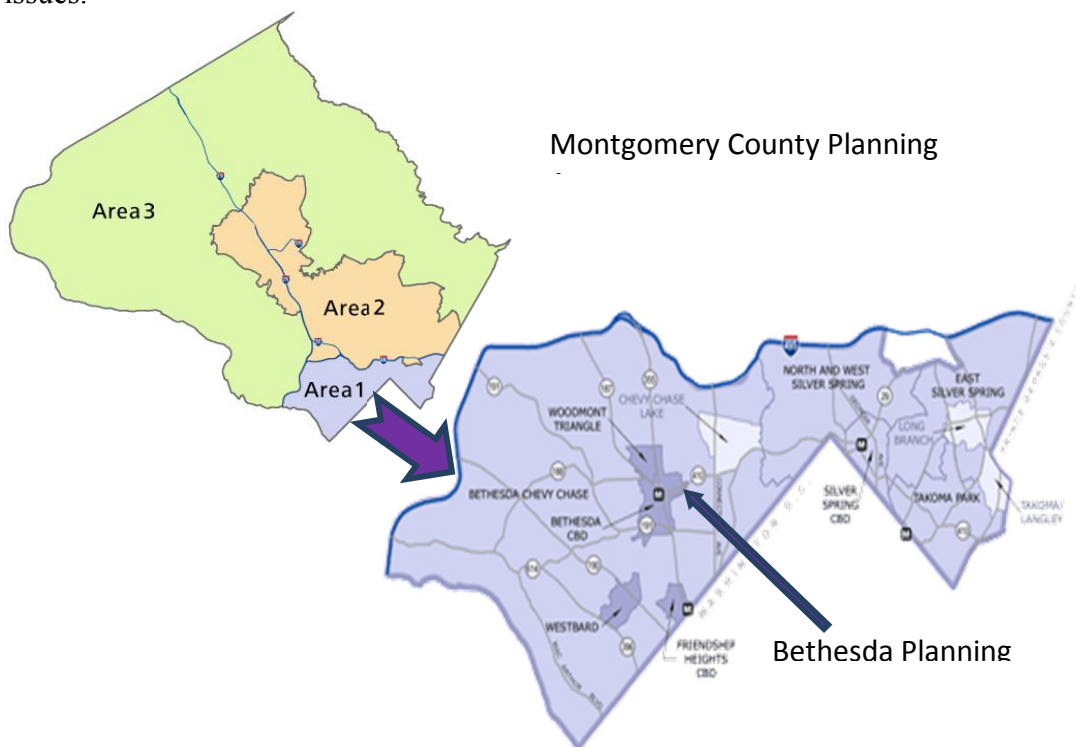


Figure 5.8: Bethesda Planning Area Defined by Montgomery Planning Board⁵⁷

5.3.2 Developing Bethesda Metro Station Area

5.3.2.1 WMATA's Joint Development Project in Bethesda

WMATA's joint development initiatives at Bethesda station were a major factor in attracting development. In 1980, Montgomery County and the WMATA board approved a \$100 million proposal by developers Allan Rozansky and Alan Kay (R & K Associates) to build on 3.5 acres of WMATA-owned land above the planned Bethesda Station. The joint development project –Bethesda Metro Center, is a project that involved the leasing of air rights, and operating cost sharing and capital cost sharing for a three-building office, hotel, and retail complex (TPB, 2002). WMATA prepared land use provisions, conducted the initial environmental review, as well as provided development rights to R & K Associates. The total space leased by WMATA includes 378,000 square feet of office space and 60,000 square feet of retail space (WMATA, 2002). This type of mixed-use joint development is similar to the WMATA's project conducted in Ballston, but covers a much larger space. These initiatives made station-linked joint development attractive for the private sector.

Bethesda Metro Center established WMATA's precedent for effective joint development and showcased its benefits for both surrounding businesses and transit ridership. The Bethesda Metro Center, completed in 1985, is comprised of a 17-story office building, a 12-story hotel, a 3-story retail arcade, a public plaza and the parking

57 Source: Montgomery County Board - <http://www.montgomeryplanning.org/community/>.

lots. The success of the project has triggered other office, retail and residential development within walking distance and also a restaurant and entertainment district. The primary types of retail in this district are restaurants (26 percent) and banking and real estate services (24 percent) (Praful Shah & Associates, 1986).



Figure 5.9: Bethesda Metro Center⁵⁸

The Center provides a town center that is a major community gathering place in Bethesda and focus of activity, like the Courthouse Plaza in Arlington County

⁵⁸ Source: Montgomery County Board - <http://www.montgomeryplanning.org/community/>.

(Montgomery County, 1994) (Figure 5.9). As an attractive pedestrian environment it contributes to building up an active and lively place. Community and entertainment events are often held in the Center. Daytime and evening use of restaurants, shops, and cinemas also added activity to the center.

WMATA itself – which retained ownership of the land – obtains approximately \$1.6 million in annual rent, the highest earnings for any such single joint development project in the U.S. (M-NCPPC, 2010; TPB, 2004). The joint development also offers secondary benefits or societal improvements in Bethesda Metro station area (TPB, 2002). It has built up a safer environment around station, and facilitates establishing a more aesthetically pleasing place to live, work, and visit near transit stations and terminals. In turn, these further attract private developers (TPB, 2002).

5.3.2.2 Encourage Civic & Cultural Activities in Bethesda Metro Station Area

Montgomery County's planning agency cooperated with WMATA to prepare the urban design guidelines for Metro Center. They encourage walking and social interaction, and provide a setting for public life, especially around Metro Station. The 1976 Sector Plan's vital goal for the Bethesda core area was to build pedestrian shopping and activity. To create a healthy downtown a series of design objectives were promulgated to foster development which could best enhance the pedestrian pathway system and transit usage by linking and extending outward from the Metro station. The Planning Board recognized the need to locate "stimulating" land uses along the major pathways, with pedestrian-oriented retail and food service preferred. The sidewalk environment was to be enhanced by use of specific materials, landscaping, lighting, street furniture, etc. An effort was made to encourage foot

traffic for shoppers and to create “people places” that would generate pedestrian activity. The ultimate result was intended to be the creation of a sense of identity and place in the core area of Bethesda.

Montgomery County’s efforts to enrich civic and cultural activities in Bethesda also include making the Metro Station area accessible to parks, open spaces, and a public library. As new development occurred in the Metro Station area, the network of urban open spaces and parks expanded to meet the growing needs. The County is committed to foster new Bethesda streetscape improvements taking into account limited public financial resources and to include private sector participation (M-NCPPC, 2011).

The Bethesda Library⁵⁹, a branch of the Montgomery County Public Library System, moved to 7400 Arlington Road near Metro station in 1976. The Bethesda CBD Sector Plan recommended creating and encouraging opportunities for the Bethesda Library to provide expanded services to the community at appropriate locations in Bethesda (M-NCPPC, 1994). Staffed “mini-libraries” or unstaffed information kiosks at Bethesda Metro Station provide electronic access to community and collection information, reserved book picking up, and a small selection of lending paperbacks.

There were also concerns about the traffic issues brought by public service expansion. The Maryland State and Montgomery County governments work together to find strategies which can mitigate traffic impacts and retain local amenities. For the

⁵⁹ Bethesda Library joined Montgomery County Public Library System in 1952. The Bethesda Library moved into its current location at 7400 Arlington Road near Metro station in 1976. It was closed for renovation in 2001 and reopened in 2003.

case of the National Naval Medical Center expansion in Bethesda, the Maryland State Highway Administration (SHA) and the Montgomery County DOT developed plans for nine transportation-related improvements (MDOT, 2009). Those development plans provided the Planning Board an opportunity to make recommendations on federal, state and local public facility projects such as roads, schools and libraries.

5.3.3 Establishing Bethesda Urban Partnership which Fosters TOD in Downtown Bethesda

5.3.3.1 Organizational Structure of Bethesda Urban Partnership

Montgomery County created the Bethesda Urban Partnership (BUP) in 1994 and charged it with landscaping, maintenance and the creation and promotion of special events in the Bethesda Urban District in downtown Bethesda (BUP website⁶⁰). BUP, as an independent, non-profit organization, plays an important role in fostering TOD. The Partnership also established the Bethesda Transportation Solutions (BTS) in 2000 and started managing a free CBD transit service in 2006.

BUP is governed by an 11-member board of directors drawn from the business and residential communities that Bethesda serves (BUP website⁶¹). The board of directors is appointed by Montgomery County Executive and confirmed by the County Council. Four members own businesses in the Bethesda Urban District; two members are nominated by the Bethesda-Chevy Chase Chamber of Commerce; four are members who live in or near the Bethesda Urban District; and an ex-officio, non-voting member is the County Executive's designee (BUP website). The Board is

60 <http://www.bethesda.org/>

61 <http://bup.sandglass.com/bethesda/board>

responsible for all aspects of the program, management, and finances of BUP (BUP website). It may establish rules of procedure, and adopts bylaws for the corporation.⁶²

5.3.3.2 Funding Resources of Bethesda Urban Partnership

Most of the funding for BUP comes from Montgomery County through five contracts with County departments (Renkema & Downie, 2008). The majority of the funds for the County's contracts with the Partnership annually come from parking revenues in county-owned garages and a special Urban District Tax on downtown Bethesda businesses (Renkema & Downie, 2008). The Bethesda Parking Lot District (PLD) Fund receives revenue from a property tax on commercial and non-commercial property in the PLD, parking fees and fines collected within the PLD, and investment income. By law, these funds may be used to operate, construct, and renovate parking facilities in Bethesda and fund the Urban District and transportation management activities in Bethesda. The Bethesda Urban District Fund receives revenue from an urban district tax on real and personal property, transfers from the Bethesda PLD, and maintenance charges paid by optional method developers.

BUP's non-County revenue comes from event income and sponsorships, advertising on the Bethesda Circulator, and contracts that BUP holds with other entities (e.g., State Highway Administration, Imagination Stage) to provide services (Renkema & Downie, 2008).

BUP's total revenue was \$4.3 million in FY08 (Renkema & Downie, 2008). From FY05-FY08, 93 percent of BUP's revenue came from the County Government and 7 percent came from non-County sources (Renkema & Downie, 2008). BUP's

62 County Code § 68A-10 (d, f, g)

total expenditures were \$4.1 million in FY08 (Renkema & Downie, 2008). A large portion of this was the cost of running a free bus service – the Bethesda Circulator (\$710,000 in FY08), which was added to BUP’s expenditures in FY07 when BUP took over its management (Renkema & Downie, 2008).

5.3.3.3 Special Districts Administered by Bethesda Urban Partnership

BUP manages three special districts – Urban District, Transportation Management District and Parking Lot District through multiple contracts from Montgomery County. It engages in promoting economic development, as well as encouraging alternate modes of transportation in these districts. As shown on Figure 5-10, Parking Lot District is located inside Urban District and is the smallest in area of the three districts. The Transportation Management District is larger than the Urban District, extending farther west and including an area outside the Urban District north of East West Highway (Figure 5.10).

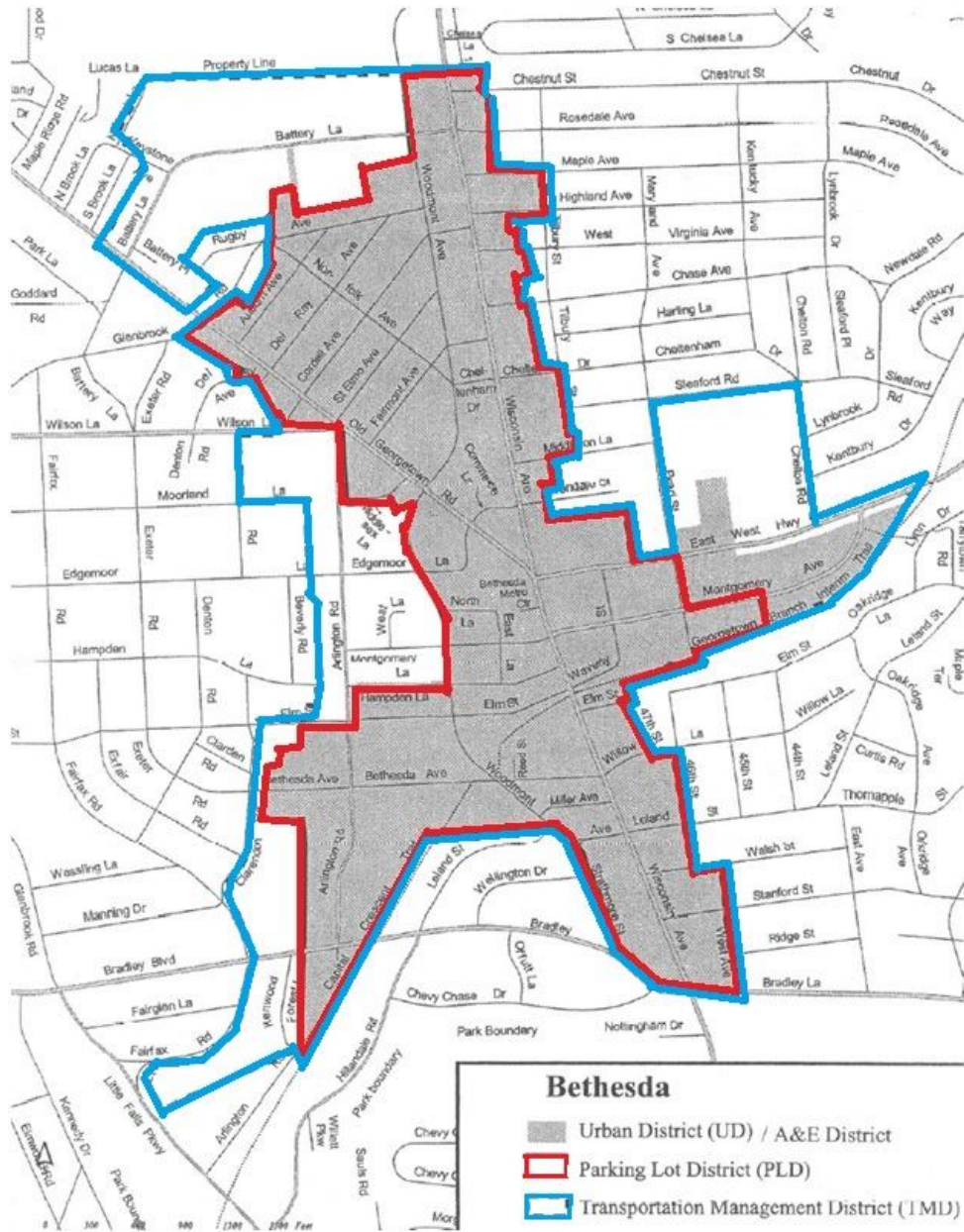


Figure 5.10: Special Districts Managed by BUP in Bethesda⁶³

⁶³ Source: Montgomery County DTS-GIS, October 21, 2003.

5.3.3.3.1 Bethesda Urban District

County Code Chapter 68A, Montgomery County Urban Districts, was adopted by the County Council in 1993. Urban districts are special taxing districts with diverse commercial, institutional, and residential development that the County desires to “maintain and enhance...as prosperous, livable urban centers.”⁶⁴ The map on Figure 6-10 shows the boundaries of the Bethesda Urban District. The Bethesda Urban Partnership is the urban district’s management agency.

5.3.3.3.2 Transportation Management District

A transportation management district (TMD) is established by the County Council to reduce traffic congestion. The goals of transportation demand management are to: “increase transportation capacity; reduce existing and future levels of traffic congestion; reduce air and noise pollution; and promote traffic safety and pedestrian access.”⁶⁵ The County Code allows the County Department of Transportation to sign sole source contracts with a transportation management organization to carry out transportation management programs in a TMD.⁶⁶

In 1999, the Council established a TMD in Bethesda, and the Bethesda Urban Partnership became the transportation management organization for it through a contract managed by the County Department of Transportation.

5.3.3.3.3 The Bethesda Parking Lot District

A parking lot district (PLD) is a legally designated geographic area defined in Chapter 60 of the County Code in which the County can assess a special property tax

64 County Code §68A-2(a)

65 County Code §42A-22(f)(1-4)

66 County Code §42A-23(c)

and collect parking fees (e.g., parking meter or permit fees) to acquire, build, maintain, or operate off-street parking facilities. In Bethesda, the Parking Lot District is slightly smaller than the Urban District, ending just east of Pearl Street. Parking fees may also be transferred to an urban district fund, transportation management district, or to the County Department of Transportation for transit-related activities within a PLD that does have a transportation management district. Any fees transferred to a transportation management district must not exceed the fees collected in that district. Taxes and fees must be used in the PLD where they were collected.⁶⁷

5.3.3.4 BUP's Efforts in Promoting Non-Auto Travel Modes

5.3.3.4.1 Providing Bethesda Circulator Service

Bethesda Circulator is another bus choice for people to travel around the central area of Bethesda free. In 2006, BUP took over operation of Montgomery County's Bethesda Trolley service, which eventually became the Bethesda Circulator bus⁶⁸. Since 2007, BUP manages the Bethesda Circulator services under a contract with the County Department of Transportation. BUP subcontracts operation of the Circulator to a private firm, but provides in-house marketing, customer service training for drivers, and maintenance of the signs and benches at Circulator stops.

Bethesda Circulator is convenient, dependable and free, running through downtown Bethesda with 20 stops. Its route has a stop at the Bethesda Metro station (bus stops are shown on Figure 5.11 as black spots).

67 County Code §60-16 (a,c)

68 County Code § 68A-9 (b)(2)

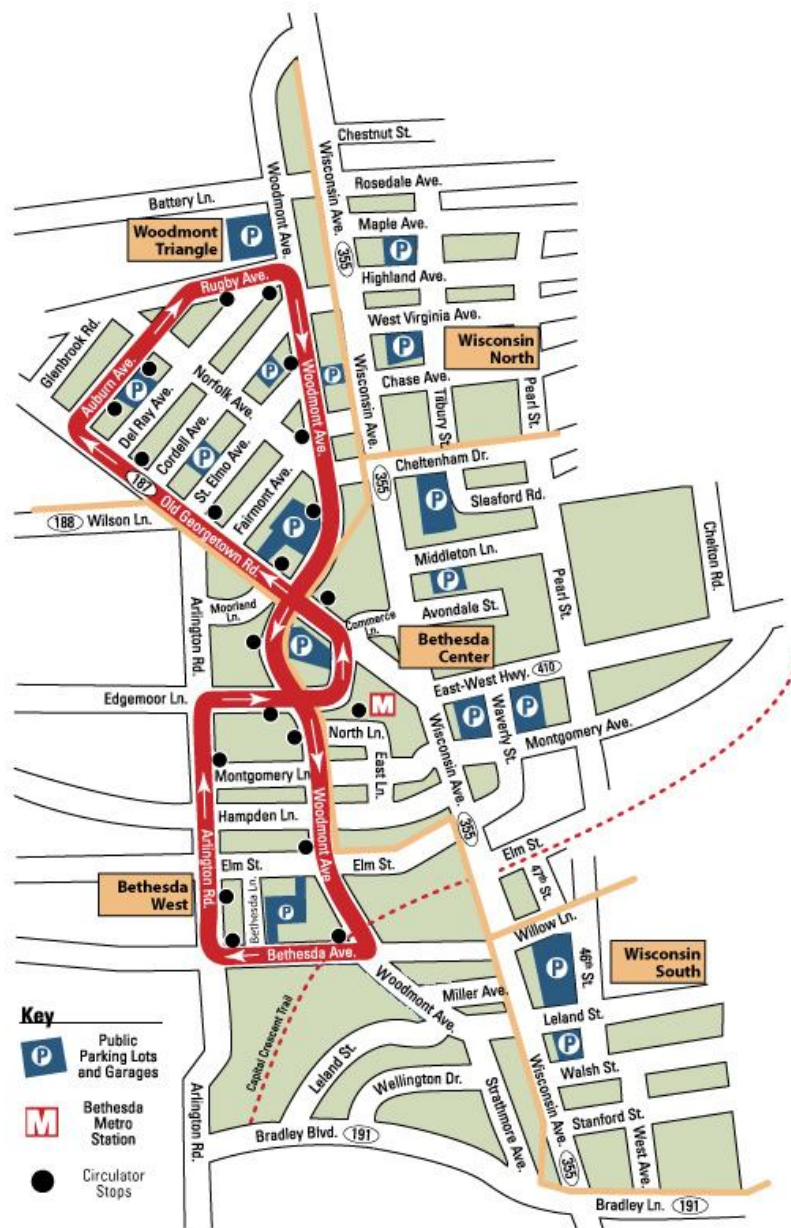


Figure 5.11: Bethesda Circulator Bus Service Map⁶⁹

⁶⁹ Source: BUP website. P icons on the map are the car parking lots.

In FY07, the trolley service was part of BUP's contract to manage the Bethesda Transportation Management District and the funding source became the Bethesda Parking Lot District (Renkema & Downie, 2008). In FY08, the weekday riders were 1,006; Saturday riders were 362; and monthly riders were 23,196.

Bethesda Circulation's primary goal is to improve accessibility to retail shops, but does contribute to traffic mitigation. It is a convenient service for Bethesda residents and visitors who prefer going around the Core or taking Metro rail without driving.

5.3.3.4.2 Providing Financial Incentives for Carpooling

BTS, a division of BUP, contributes to helping Bethesda residents and employees interested in carpooling and vanpooling get parking discounts. In Bethesda, a carpool with two occupants is eligible for reduced monthly parking rates in 16 Montgomery County parking lots when carpoolers are registered (BTS Website⁷⁰). There are eight public parking garages (blue spots on Figure 5.12) and eight public parking lots (green spots on Figure 5.12) in Bethesda Parking District.

70 <http://bethesdatransit.org/>

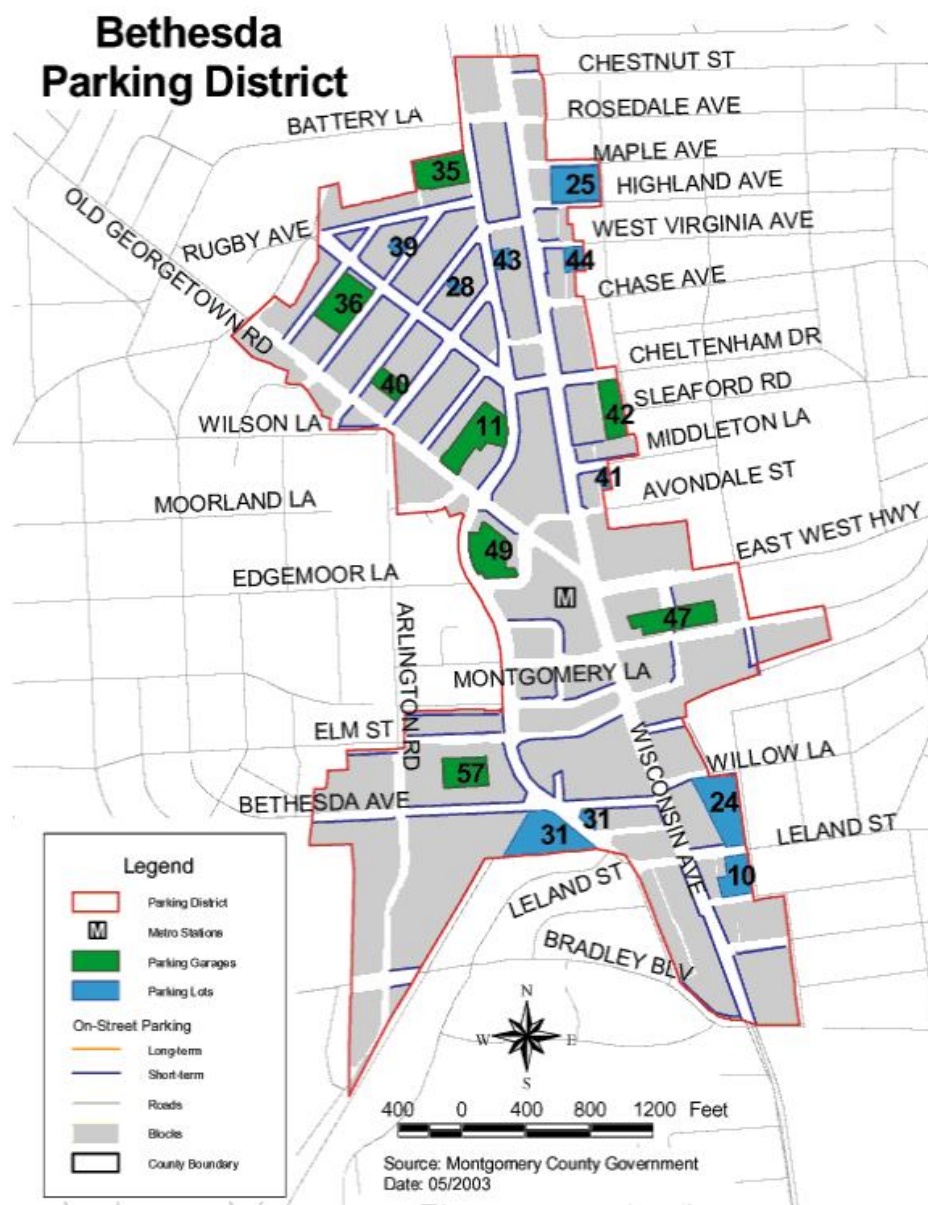


Figure 5.12: Bethesda Public Parking Garages & Lots⁷¹

⁷¹ Source: Bethesda Transit, <http://bethesdatransit.org/>

The price rate drops dramatically with the increase of persons in the car. It cost \$90 per month if there are two persons, while only \$13 per month if there are five persons or more (BTS Website⁷²). Carpoolers can save at least \$85 a month in parking alone (BTS Website). Considering all factors, such as gas and auto maintenance, the total savings can add up to hundreds of dollars a month (BTS Website).

Finally, BTS also reminds carpoolers to sign up with the Guaranteed Ride Home (GRH) program. This program, discussed in Chapter 2 and Chapter 3, is provided by Metropolitan Washington Council of Governments (COG) in order to ensure carpoolers have a free way home in the event of an unexpected emergency.

5.3.3.4.3 Encouraging Biking

BTS supports bicycle commuting by providing bike racks throughout Bethesda CBD, including Metro Station area and monitoring the demand for additional facilities. BTS has placed over 60 easy to use bike racks in Metro station area. More than one-third of bike racks are located at Bethesda Center and are just two blocks away from Bethesda Metro Station (BUP, 2009).

The red spots with numbers on Figure 5.13 show the locations of bike racks in Bethesda. The green route with yellow arrows on the graph represented the safe bike route. BTS also distributes printed information about bicycle safety and maps of bike routes.

72 <http://www.bethesdatransit.org/commuters-carpool-vanpool.shtml>



Figure 5.13: Bethesda Maps of Bike Routes⁷³

73 Source: BTS website, <http://www.bethesdatransit.org/biking-bike-rack.shtml>. P icons on the map are the car parking lots.

Annually, BTS sponsors “bike to work day” event in Bethesda to encourage bike commuting (BTS website⁷⁴). This event gives Bethesda Bicycle Spirit Awards to downtown Bethesda employees who strongly support bike commuting to work (BTS website).

5.3.3.4.4 Providing Free Travel Advisory Services in Bethesda

Unlike Arlington County, the travel advisory services in Bethesda are not provided directly by County government, but by Bethesda Transportation Solutions (BTS) which is one division of the Bethesda Urban Partnership. BTS works with employers, employees, and visitors to Bethesda to promote alternate modes of transportation.⁷⁵ BTS markets alternate transportation methods using a variety of strategies include a website introducing travel alternatives in Bethesda, offering the Commuter Information Day, distributing commuter newsletter, and, particularly useful, helping carpoolers and vanpoolers to find people to commute with and, as noted, providing financial incentives to carpoolers through parking discount. BTS’s website provides information to employers, employees, and the general public about public transit, biking, parking, and pedestrian safety (BTS website⁷⁶).

“Commuter Information Day” (CID) conducted by BTS provides news of the latest trends in commuting and service options to commuters and businesses. Public CIDs are held throughout the year. BTS can also hold meetings at business sites. Transportation management staffs make presentations to employees or set up an

74 <http://www.bethesdatransit.org/events.shtml>

75 County Code § 42A-24

76 <http://bethesdatransit.org/>

informational table in a building lobby to distribute information about alternate forms of transportation and about commuter programs.

BTS also provides information about commuter programs, tips on alternate modes of transportation, and information about events in a monthly transportation management online newsletter⁷⁷.

5.3.4 Housing Policies in Bethesda

5.3.4.1 The Transit Station Residential District: Preserving Residential Development Well Connected to Bethesda Metro Station

A Transit Station Residential (TS-R) District is located about two blocks from Bethesda Metro Station between Woodmont Avenue and Arlington Road and extended from Hampden Lane to Moorland Lane (shown on Figure 5.14).

⁷⁷ <http://bethesdatransit.org/n-newsletters.shtml>



Figure 5.14: Bethesda TS-R District⁷⁸

The objectives of establishing a TS-R district are to provide incentives for and remove barriers to achieve high-density housing in the TS-R District, and retain residential scale along Arlington Road (M-NCPPC, 1994). The Bethesda CBD Sector Plan includes the TS-R Zone to achieve this vision of a high-density “urban village.” Such an “urban village” steps down in height from 6 floors along Woodmont Avenue to 3 floors along Arlington Road, providing from 45 up to about 100 dwelling units per acre, and presenting a low-density office use for the properties at the corner of Woodmont Avenue and Edgemoor Lane and on Moorland Lane near Old Georgetown Road (M-NCPPC, 1994).

⁷⁸ Source: M-NCPPC, 1994

Since the TS-R Zone required 50 percent green space, buildings are forced to rise vertically rather than spread horizontally. The major form of new development had been mid- to high-rise apartments. Most houses along Arlington Road and some properties along Montgomery Lane were converted to offices, with their use limited to a few professional office categories.

Streetscape in the TS-R District distinguishes it as a residential district and creates a hierarchy of streets and pedestrian routes with well-planned connection to multiple public facilities as recommended in this Bethesda CBD Sector Plan (M-NCPPC, 1994). Montgomery Lane in the TS-R District becomes a link to the Metro Core.

Besides the establishment of TS-R District, several policies have been implemented to increase neighborhood connectivity by concentrating most new housing near public transportation and providing easy, multi-modal connections to jobs, schools, shopping, recreation, and other leisure activities.

5.3.4.2 Policies Support Residential Development Near Metro Service

Bethesda housing policies aim to accommodate the housing needs of the next generation for residential areas in communities that are balanced, convenient, and sustainable (M-NCPPC, 2007). The County's Bethesda area housing policy highlighted that new housing must be developed by rethinking the sustainable future of the County and by making the most of opportunities for housing near high quality transit service (M-NCPPC, 2007). As transportation costs grow, the cost of commuting can cancel out any reduction in suburban housing costs, not to mention the effect of increased miles of travel on both air quality and roadway congestion. Moreover, growing concern for the environment and the need to reduce the carbon

footprint of development generated a major shift in both the supply and demand for housing. The Montgomery County, M-NCPPC, Housing Opportunities Commission (HOC), the development community (profit and not-for-profit developers), State and federal agencies, and utilities all have varying degrees of involvement and responsibility in achieving infill developments.

Bethesda's housing market is strong. One of the reasons is that Bethesda is an attractive place to live – not just convenient to Metro – and a prestigious address. It also has the ambience of street life, shops, and restaurants. Montgomery County has concerns about the effect of neighborhood design on housing development. It aims to create more balanced, attractive, and walkable neighborhoods through regulatory reform of private developments and leadership in design of public projects (M-NCPPC, 1994). These policies believe that transit-oriented neighborhoods can provide a full range of housing opportunities, for work force employed in the transit corridor (M-NCPPC, 1994). The downtown is small enough and built-up enough so that it was difficult to increase the housing zoning capacity substantially without threatening these elements. Pedestrian-oriented public spaces support the needs of a diverse population. And refining guidelines of neighborhood design helped define quality public spaces and walkable communities (M-NCPPC, 1994).

5.3.4.3 Policies & Financial Incentives to Foster Affordable Housing around Metro Station

Beginning in the 1970s, the County responded to affordable housing need with one of the nation's most successful and highly regarded inclusionary housing programs, the Moderately Priced Housing Unit (MPDU) ordinance (Montgomery County, 2008). County-owned parcels in Bethesda (excluding parkland) that meet

appropriate housing site selection criteria are designated as locations for mixed-income housing. High land values add substantially to the cost of building housing in Bethesda. The elimination of all or part of the land cost for a new project by using land already owned by the County contributed to providing rental housing at affordable prices for moderate-income households (Montgomery County, 2008). The MPDU ordinance requires all new developments above a threshold number to provide a percentage of its units at prices affordable for households with incomes no greater than 60 percent of the area median (Rubin & Trombka, 2007). In 2005, the MPDU law was amended to lengthen it to 99 years (Montgomery County, 2008). During this period of time, an MPDU home must remain available at a below market price when transferred to a new owner or tenant (Montgomery County, 2008). The 2005 MPDU program was used to improve transit access to residential development and lower the household's costs of housing.

Further, in 2006, Montgomery County required that 10 percent of new market rate housing units built in areas served by Metro transit stations be available to "work force" households with incomes between 80 and 120 percent of the area median (M-NCPPC, 2007). The County also attempts to coordinate infrastructure investment in existing and new neighborhoods to create a high level of mobility options that connect people to where they live, work, shop, and play (M-NCPPC, 2007). Providing a sufficient supply of housing to serve Bethesda's existing and planned employment at or near their job sites has both reduced housing costs for employees as well as vehicle miles traveled (M-NCPPC, 2007).

5.4 Similarities in Policies Fostering TOD as Arlington County

5.4.1 Street Design to Improve Accessibility to Metro Stations

Since Bethesda Metro station is located within high employment concentration areas, the transit service connects residential areas to both Metro and the employment centers around Metro stations. Further, Bethesda Metrorail station serves commuters going in a northerly or southerly direction including major employment areas, such as D.C. area, the corporate headquarters of GEICO and the Ritz-Carlton hotel chain in Friendship Heights and National Institutes of Health (NIH). The intersection next to the Metro station has some of the highest levels of pedestrian crossings in Bethesda. Pedestrians generally travel either along the street to destinations on Wisconsin Avenue, such as the post office and the Metro Center food court, or to the Metro station using the tunnel under Wisconsin Avenue, or the escalator entrance at Metro Center. Montgomery County was highly concerned about the degrees of connectivity to Metro station as one of ways to increase Metro rail riding rate in Bethesda (M-NCPPC, 1994).

In Montgomery County, the built environment often discourages walking because street design makes walking dangerous and/or unpleasant. But in Bethesda, pedestrian systems are attractive and continuous. Bethesda transportation policy in the 1994 CBD Sector Plan indicated that sidewalks linking neighborhoods to facilities within a minimum one-half mile radius of Metro station areas should be given the highest priority (M-NCPPC, 1994). The 1994 Bethesda CBD Sector Plan also supported a transportation system that connected all transit modes to the Metro station and provided pedestrian, bicycle, and auto access to the station (M-NCPPC, 1994). Such policy fostered the expansion of pedestrian paths and bikeways to form a

network linking residential neighborhoods with public facilities (M-NCPPC, 2006). The pedestrian paths and bikeways expansion were important steps to reduce auto use and to provide transportation alternatives. It also recommended improvements included placing utilities underground; planting trees; and installing brick pavers, lighting, and wood benches (M-NCPPC, 1994). These policies mitigated the traffic condition at Metro Station area, and provided a safer and more comfortable walking environment for people who headed to the station.

Because of the significant number of destinations in the Metro Core District, especially on Wisconsin Avenue, major pedestrian routes are found along the streets serving the Metro Core. In the Bethesda Metro core area, a well-developed network of pedestrian pathways is critical to encourage use of transit and to encourage walking to local destinations. Seventy percent of the people boarding at the Bethesda Metro Station walked there (MTA Maryland, 2010b), demonstrating how TOD design can improve transit accessibility.

Evaluated by Walk Score website, Bethesda Metro station area gets a score of 94, similar to the scores previously noted for Ballston and Court House (Figure 5.15). All of the three areas are described as walking paradises (Walk Score website). With a centrally located transit center, a high-density mix of retail and business, and a network of sidewalks, Bethesda Metro Station area is a walkable community. Measure used by Walk Score, a quarter mile is defined as within the walking distance. Along with offices and hotels, there are twenty-one retail stores and twenty entertainment and food services. There are also four childcare facilities that make life easier for commuters who had children. All these amenities contributed to building up a vibrant and attractive walkable community at Bethesda Metrorail Station area.

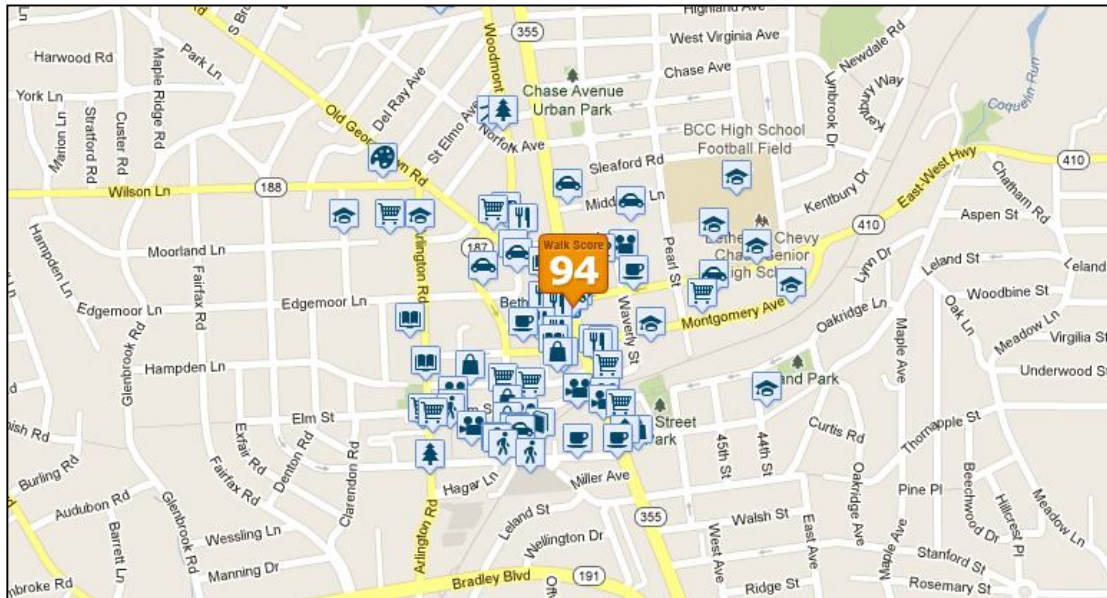


Figure 5.15: Bethesda Metro Station Surrounding Amenities⁷⁹

5.4.2 Encouraging Transit Public Taking

5.4.2.1 Increasing Level of Public Transit Services

With the efforts of Metro-related facility improvement and public transit promoting policies, the weekday boarding at the Bethesda station has increased greatly since the station opened. The average week boarding in 2009, 10,730, doubled that for 1985, the first full year Metro rail served the area (WMATA, 2009) (Figure 5.16).

⁷⁹ Source: Walk Score website. Google Map 2013. Restaurants & Bars; Coffee; Groceries; Outdoor Places; School; Car & Bike Shares

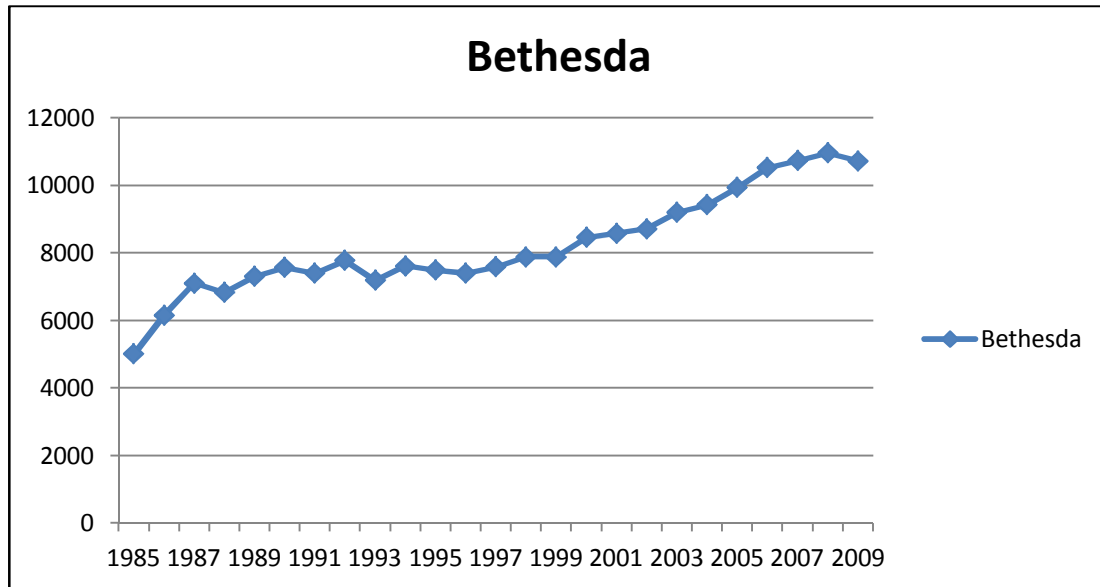


Figure 5.16: Metrorail Average Weekday Passenger Boarding 1985-2009⁸⁰

Three metro bus routes can be boarded at Bethesda Metrorail Station. They run between Silver Spring and Bethesda, College Park and Bethesda; the Lakeforest Transit Center and Bethesda, respectively. The Bus Bay is located at the ground level of Bethesda Metro station. These bus services connect the Metro Station with other transit, retail, and education centers which satisfies various travel needs. For the convenience of Metrobus and other public transit riders, the SmarTrip® card was started and promoted by WMATA in Bethesda. Riders can use SmarTrip® card instead of cash when taking the Metrobus. SmarTrip® card users can get free transfers to other Metrobus lines and also receive the discounted rates when transferring to Metrorail or other rail services.

⁸⁰ Source: WMATA, Metrorail Boarding by Station 2009

Since parking lots are well distributed in Bethesda and most employees are willing to accept a nine-minute walk, Montgomery County Planning Board suggested a careful study of the bus route which allowed buses to stop at parking lots close to the Metro Core to attract more public transit riders (WPI, 2010).

In addition to Metro transit services, people in Bethesda can also take Ride-On bus service to travel in the area. This system is owned and operated by Montgomery County. The bus system has a total of 80 routes and connects with 12 Metro stations, including Bethesda Metro. Nine routes of the Ride-On bus service can be boarded at the bus bays on the ground floor of Bethesda Metro station.

In order to improve bus services, Clear Channel Outdoor, Inc. (CCO) reached an agreement with the Montgomery County Council in April 2004, to provide a minimum of 500 standard bus shelters in the County and the County agreed to let Clear Channel Outdoor, Inc. place advertising in the Plexiglas panels of bus shelters (M-NCPPC, 2013). CCO also provides some “Super Shelters” which include heating and lighting, have larger capacity, four walls (with openings to enter and exit), and a higher level of design than standard shelters (M-NCPPC, 2013). CCO is responsible for the maintenance of all 500 shelters as well (M-NCPPC, 2013).

5.4.2.2 Strategies to Encourage Walkability & Non-Auto Travel Modes in Bethesda

5.4.2.2.1 Parking Policies to Encourage Public Transit Riding & Limiting Auto Commuting in Bethesda

Limiting the supply of employee parking in Bethesda was a major policy recommended in the Bethesda CBD Master Plan in 1994 to promote public transit riding and other non-auto travel modes (M-NCPPC, 1994). The limitation of the

Bethesda parking approach is the ability to locate acceptable parking lots to meet a variety of criteria. The construction of new parking lots in Metro station area could threaten the public transit taking, while the lack of adequate parking near retail or service development could discourage customers. Montgomery County suggested that the use of express bus service from the Metro station to Bethesda employment and retail centers could be explored as a method to reduce parking lot needs (M-NCPPC, 2012).

Providing enough park-and-ride facilities was another important policy, especially for employment centers, such as Bethesda's CBD (M-NCPPC, 1994). The employee parking supply is planned to serve the proportion of employees expected to arrive by automobile, including car or van pool. The projected parking demand varies, depending on how many people were expected to use alternative modes of transportation. The number of long-term spaces was set to meet the expected vehicle demand during the peak parking accumulation period, based on the non-auto-driver mode share of 37 percent during that period (Brecher & Schwartz, 2010). The Bethesda CBD Master Plan assumed provision of 500 spaces in the Bethesda Metro Core District as a safety valve for those who were expected to ride Metro (M-NCPPC, 1994). In the future, these spaces may be reassigned to meet an increased demand for employee parking spaces, unless an overriding need to serve transit riders existed (M-NCPPC, 1994).

In Bethesda, public transit and other travel alternatives have been highly encouraged. Twenty-seven employers in Bethesda had been recognized by the U.S. Environmental Protection Agency (EPA) for their outstanding commuter benefits in December, 2006 (BTS, 2008). In Bethesda, 9.7 percent of workers took public transit

to work in 2010, which was double the national average; and 74 percent chose to drive, which is 13 percent lower than the national rate (See Table 5.3) (Census, 2010).

Working at home was the second most common mode which was 12 percent, compared to 4 percent for the nation (Census, 2010).

Table 5.3: 2010 Transportation Mode to Work (Employees age 16+) for Bethesda, MD

| Mode of Transportation to Work | Bethesda | | Maryland | | United States | |
|--------------------------------------|----------|--------|-----------|--------|---------------|--------|
| Car, Truck, Van to Work | 5,719 | 73.88% | 2,444,239 | 85.60% | 125,034,525 | 87.32% |
| Public Transportation to Work | 752 | 9.71% | 198,146 | 6.94% | 6,356,526 | 4.44% |
| Other Transportation to Work | 339 | 4.38% | 92,577 | 3.24% | 5,727,496 | 4.00% |
| Work at Home | 931 | 12.03% | 120,601 | 4.22% | 6,068,117 | 4.24% |

Source: Census 2010.

5.4.2.2.2 Providing Car Sharing Choices around Metro Stations

As in Arlington County, WMATA works with Zipcar Company to provide convenient car-sharing services around Bethesda Metro Station area. A Zipcar can be reserved in Bethesda either online or over phone (BTS website⁸¹). Similar to the case in Arlington County, Zipcar allows individuals and businesses in Bethesda to save money, time and the environment because customers only pay for the time they use.

⁸¹<http://www.bethesdatransit.org/transit-zipcar-flexcar.shtml>

Furthermore, it can be returned to its designated parking space in Metro Station area (BTS website). In Bethesda, five Zipcar sites can be found at and around Bethesda Station area (Figure 5.17). Zipcar service allows commuters to choose car-sharing mode to access Metro station, and facilitates non-auto travel mode and Metrorail riding rates in Bethesda (BTS website).

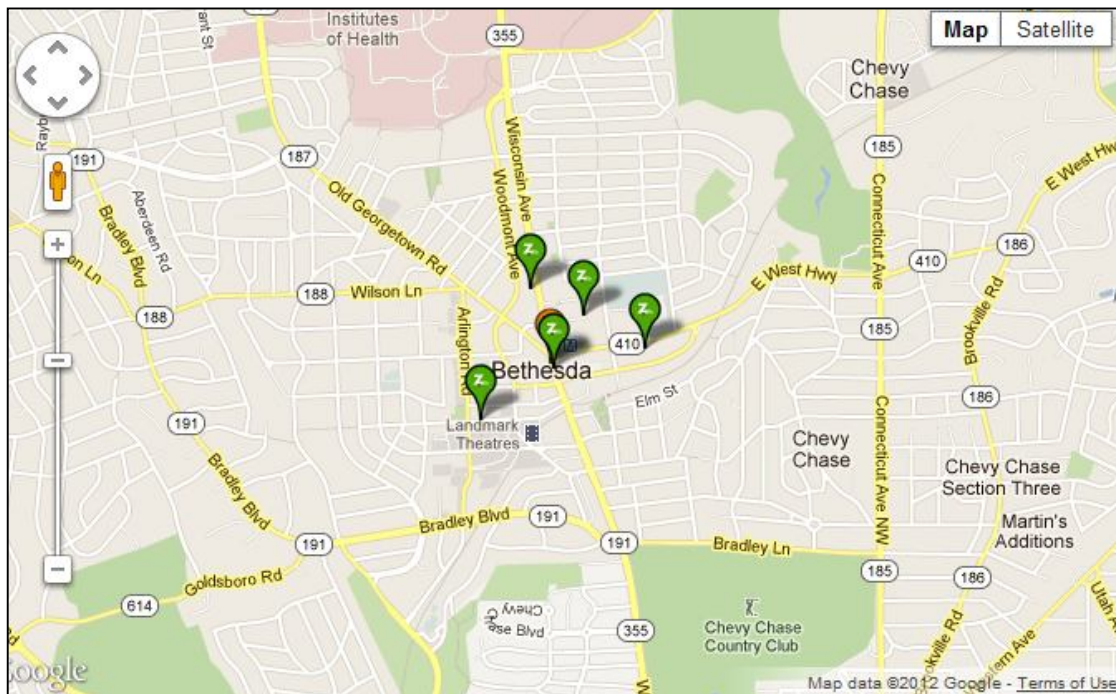


Figure 5.17: Zipcar Service Locations in Bethesda⁸²

5.4.2.2.3 Convenience for Bikers in Bethesda Metro Station Areas

Although bike share service provided by Capital Bikeshare cannot be found in Bethesda, many strategies have been implemented to encourage bike riding. The

⁸² Source: Zipcar website http://www.zipcar.com/dc/find-cars?zipfleet_id=94434

purpose of Bethesda biking policy is to create a bicycle network that provides connections to the Metro station and throughout Metro station area. The strategy for promoting biking is to make the existing street system serve as the basis of a bicycle network for non-recreational bike travel. Improved roadway accessibility is furthered by simple maintenance steps and selected improvements for critical routes between Metro Station and employment centers. Where necessary, certain sidewalks can be designated as bicycle paths, if appropriate width can be provided. Biker Friendly Areas (BFA) were established in the Transportation Plan of Bethesda CBD Sector Plan and administered by Montgomery County DOT (M-NCPPC, 1994). BFA provide continuity of bikeways through Bethesda and better access to Metro Station and stores. BFA are particularly appropriate where striped bike lanes are difficult to fit continuously because of space limitations and on-street parking needs. Bethesda Metro station is within the BFA.

In addition, bikers can access the Bethesda Metro Station by taking the Capital Crescent Trail (CCT) (shown on Figure 5.18).



Figure 5.18: Capital Crescent Trail⁸³

CCT is a popular car-free hiker-biker trail. It is about 11-miles long and is used by tens of thousands of people each week (CCT website⁸⁴). CCT is managed by an all-

83 Source: The Coalition for the Capital Crescent Trail, http://www.cctrail.org/CCT_Maps.htm.

84<http://bethesdatransit.org/biking-capital-crescent-trail.shtml>

volunteer organization – the Coalition for the Capital Crescent Trail since 1986. The trail serves downtown Bethesda and provides a biking link to the Washington D.C. central area (Figure 5.18). The CCT goes through Bethesda, within a few blocks of the Bethesda Metro. The Trail is used for both recreational and commuting purposes, connecting residential, commercial and employment centers.

5.4.2.2.4 Telecommuting

Telecommuting is another method that can decrease traffic on the road. Montgomery County promotes telework by providing a tax credit. The companies in Bethesda can take a credit against County taxes for computers purchased for their employees who telework (Montgomery County Website⁸⁵). Montgomery County pays up to 50 percent of the cost of each personal computer purchased, up to an annual total credit of \$2,000 (Montgomery County Website). In order to get the tax credit, employees must certify that the computers are used for business purposes and they work from home at least 1.5 days a week (Montgomery County Website).

5.5 Conclusion

5.5.1 Complex Policy Making Environment & Cooperation among TOD Participants

Based upon the cooperation among WMATA, Montgomery County, Maryland State and BUP, and the active involvement of the private sector and general public in the past 40 years, Bethesda continues being a vital retail and employment center, with expanded opportunities for new housing in the future. Large-scale commercial

85 <http://www.montgomerycountymd.gov/dot-transit/commuter/telework/index.html>

development characterizes the center of Bethesda surrounding the Metro station. Public facilities and amenities are provided from both public and private sources. Neighborhoods within and adjacent to the Metro Station area are protected. Comprehensive bicycle and walking networks are built up which establish connections to the Metro station, Capital Crescent Trail, and public, residential and commercial places in Bethesda. Travel alternatives and commercial activity in downtown Bethesda are well supported by BUP.

5.5.2 Montgomery County Emphasizing Bethesda Downtown Commercial Area Image

Montgomery County implemented several policies to foster economic development and non-auto travel in Bethesda through Montgomery Planning Board in a bi-county planning agency – M-NCPPC. All Bethesda Master Plan and Sector Plan are created by Montgomery Planning Board. In Maryland, an area Master Plan functions as an amendment to the County General Plan. Montgomery County approved the Bethesda-Chevy Chase Master Plan in 1970, which recommended the creation of a Bethesda CBD boundary around the station area to contain and guide the expected growth impacts of the new station.

The County government has treated Bethesda Metro station as an individual site for development rather than as part of a multi-station corridor. And unlike Arlington County, Montgomery County has not planned the station nodes on Metrorail Red Line with intension of establishing specific functions in the region. The County has adopted the CBD Sector Plan and utilized zoning ordinances to foster both economic concentration and affordable housing in the area. A number of districts and zones have been created by the County. The establishment of these districts represents

the TOD concepts of high-density, mixed-use development, and pedestrian friendly community. Furthermore, the built-up pedestrian access to Metro station environment has strongly encouraged public-transit taking and other non-auto travel.

Also different from Arlington County, Montgomery County established a non-governmental organization – BUP to manage the landscaping and promote travel alternatives in downtown Bethesda. By utilizing the funding through contracts from County government and tax revenue, BUP is a major actor in developing Bethesda as a pedestrian-friendly and economically viable community.

Chapter 6

CONCLUSION

6.1 Study on TODs in Metropolitan Area under Same Transit Major System

6.1.1 How This Study Related to TOD General Literature

Transit Oriented Development (TOD) is characterized by residential units alongside or above stores, restaurants, and offices and a design that allows residents to have multiple non-auto travel alternatives. TOD is valuable to individuals, developers, and local governments. Focusing shops, offices, parks, and homes within walking distance of rail stations can provide significant benefits, including urban revitalization, improved quality of life, and an increased tax base. TOD around a particular station in a metropolitan area can be strongly shaped by planning policies implemented and localized market forces. TOD principles in the planning can stimulate economic growth to both local and regional areas and promote social equity in the community.

Little detailed research has been done on efforts and outcomes to create differently-oriented metro station areas within the same transit system. The station nodes under the same major public transit system in metropolitan area can be different in physical size, development focus, socio-economic status, and the involvement of major actors in station area planning and management. This study has focused on the development of three quite different station nodes within the Washington Metropolitan Area Transit Authority (WMATA) service and the institutional structure and policy-making process which creates and operates stations in the metropolitan region.

This study provides the evidence and analysis for the three major research-focused areas discussed in Chapter 1. First, the planning and management in quite different metro stations – Ballston, Court House in Arlington County, Virginia and Bethesda in Montgomery County, Maryland have been identified and analyzed. Ballston and Court House are physically smaller transit nodes on Metro corridor – Rosslyn-Ballston Corridor than Bethesda. Both counties aim to promote TOD in their station areas, while with some different planning and development purposes. The study shows that TOD strategy can both enhance non-auto transportation and focus economic development by planning and building metro stations and the immediate areas around them that can have different socio-economic and cultural characteristics. The work, thus, contributes to general understanding of TOD in relation to how TOD planning can vary in different transit station areas due to deliberate design by the local governments involved.

Second, this study has presented the complexity of TOD institutional framework by discussing the involved actors in Metro station area development in D.C., Metropolitan area and their specific functions and strategies. Metropolitan regions cover large areas and have many distinct jurisdictions. Thus, the institutional environment within which TOD policies and strategies can be adopted and carried out in major metropolitan areas is normally quite complex. The alignment of transit stations is agreed upon by the transit agency and local governments. Local governments and the transit agency must also work with other governmental agencies, private sector firms, quasi-public agency and community groups to develop the land at transit stations and immediately adjacent areas.

At last, on the basis of the findings of this study on three transit nodes in Washington D.C., Metropolitan Area, a framework is constructed which indicates the actors and their dynamics in planning and managing individual station nodes and the TOD implementation process. The study provides a conceptual model that can be used and expanded for further research on TOD station development and design policies.

6.1.2 Variations among Stations under Same Regional Public Transportation System

In order to better understanding the station area planning and management in same metropolitan region, three very distinctive station nodes were selected for study which are Ballston and Court House in Arlington County and Bethesda in Montgomery County. The selected neighborhoods have been successful TOD station nodes and attracted economic and social development in their areas over nearly 40 years of operation.

As shown in Table 6.1, the three areas are different in several aspects.

Table 6.1: Demographic and Socio-Economic Data of Ballston, Court House, and Bethesda

| Station Area | Ballston | Court House | Bethesda |
|------------------------------------|----------|-------------|----------|
| Area (acre) | 345 | 201 | 8,448 |
| Population | 11,061 | 9,765 | 55,277 |
| Race | | | |
| White | 65.8% | 61.6% | 85.9% |
| African American | 3.5% | 8.4% | 2.7% |
| Asian | 11.2% | 9.9% | 7.9% |
| Hispanic or Latino | 16.5% | 15.7% | 5.4% |
| Bachelor's degree or higher | 65.3% | 71% | 78.9% |
| Median household income | \$68,938 | \$62,900 | \$99,102 |
| Employment | 24,207 | 11,770 | 32,228 |

Source: U.S. Census, 2000; M-NCPPC.

Geographically, Ballston and Court House are small nodes located on the same transit corridor – Rosslyn-Ballston Corridor planned by Arlington County. Bethesda is a traditional upscale commercial center in Montgomery County and is much larger in area and population and is a higher income area. As the Table 6.1 shows, the demographic difference among Ballston, Court House and Bethesda can be found. About 86 percent of Bethesda's population is white; nearly 79 percentages of its residents have a Bachelor's or higher degree; and its medium household income is the highest in the three studied areas (Census, 2000; M-NCPPC, 2000).

The Metrorail weekday passenger boarding in Ballston, Court House and Bethesda from 1985 to 2013 are shown on Figure 6.1. The overall trend for weekday boarding in Court House and Bethesda is upward. In Ballston, a significant drop in passenger boarding can be found from 1986 to 1987. In most recent years (2010-2013), the boarding rate in Ballston stopped increasing and started decreasing slightly.

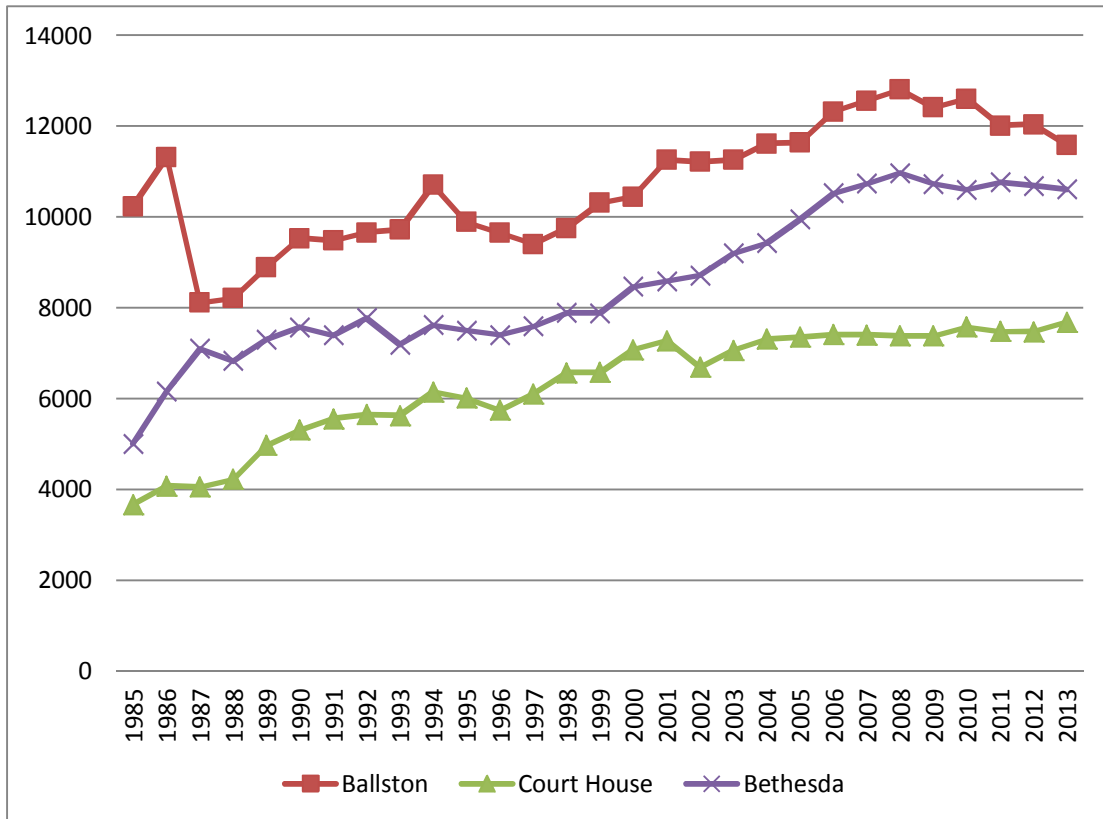


Figure 6.1: Metrorail Average Weekday Passenger Boarding in Ballston, Court House and Bethesda⁸⁶

6.2 Differences in Station Area Planning & Management in Same Metropolitan Region

6.2.1 Corridor vs Single Station Planning

Although Arlington County and Montgomery County are under same major transit system, the two counties apply different strategies in planning the station areas.

⁸⁶ Source: WMATA 2013, NOT from survey, counts taken by staff.

Arlington County has planned its station areas on a corridor scale; while Montgomery County has had a more single station orientation.

Arlington County has designed and developed two transit corridors within its boundaries, Rosslyn-Ballston (R-B) and Jefferson-Davis (J-D) Corridors. The County focused on how to locate and design the Metrorail lines to be built in terms of its overall development. Ballston and Court House are two transit nodes on Rosslyn-Ballston Corridor. The concept of a Rosslyn-Ballston Corridor was developed as part of the initial planning for Metrorail in the late 1960's as a result of Arlington County consideration of the optimum alignment of a proposed subway spur through the County's central region. The County sought to foster various types of development along the new Metrorail routes. Arlington County's General Land Use Plan (GLUP) was used to establish the Rosslyn-Ballston Corridor and emphasize development along the corridor. The GLUP provided supportive zoning to ensure high-density office or residential development to support transit on the corridor.

Instead of implementing a metro corridor development plan, Montgomery County has been more oriented to planning metro station areas as single units. For example, in Bethesda, the Montgomery County Planning Board has treated the Bethesda Metro station area as an individual site for development rather than as part of a multi-station corridor. The County Planning Board has utilized a Master Plan and a Sector Plan to design the Metro station area to be a hub for other non-auto alternatives as well as Metrorail. The Bethesda-Chevy Chase Master Plan has been used to locate the Metro station and to concentrate development around the station. The Bethesda CBD Sector Plan allowed high density development with commercial, residential and transit mixed uses in the Bethesda Metro station area.

6.2.2 Deliberately Planning Local Identity vs. Enhancing Existing Feature

Arlington County, in addition to its corridor orientation, has deliberately planned local identities for station nodes. The Sector plan for each station area helped establish its local theme. The stations on the R-B Corridor are relatively closely located to each other. Ballston has been a small retail center since 1950. The County planned to strengthen its local retail center identity by allowing more retail development around Metro station. In Ballston, Arlington County built a core retail area close to the Metrorail station. Ballston Common Mall is located in the center of this retail area. In addition to the Mall area, Ballston encouraged office and residential development with retail on their street level.

Court House has a totally different development focus. Arlington County has created a new identity for the area. Court House was planned as a County government and civic center. Arlington County government buildings have been concentrated at Court House Plaza with the Court House Metrorail Station at its center. A variety of projects have been used to promote civic and cultural development at the Plaza as well as to reinforce Court House's planned image. For examples, two theaters and a branch of the Arlington County Public Library have been developed around Court House Metro station.

Instead of establishing new local identity for the station area, policies and strategies in the Bethesda CBD Sector Plan have helped enhance Bethesda's historical identity in the region. The Montgomery County Planning Board has utilized various zoning ordinances to continue Bethesda as a compact and high density upscale market and office center and residential neighborhood. The established special Metro Core and Transit-Station Residential districts have encouraged public-transit taking and

mixed-use development and fostered affordable housing in Bethesda Metro station area.

6.2.3 WMATA: How the Transit Agency Acts Differently in Participating into Station Area Development

WMATA, as the major regional transit agency in D.C., Metropolitan area, proactively works together with local governments and private developers. It has used various strategies in order to develop the station areas and to promote Metro riding.

Bethesda Metro Center is mixed-use joint public-private development. It is the showpiece of WMATA's joint development. WMATA provided development rights of 3.5 acres of WMATA-owned land above Metro station to private developers – Allan Rozansky & Alan Kay Associates. The total development includes office space, retail space and a hotel. It is successful and identified as a model because this joint development project not only fosters transit ridership but also stimulates development within walking distance from Bethesda Metro station. This project is also lucrative for WMATA which gets approximately \$1.6 million in rent annually. Besides, Bethesda Metro Center provides a major community gathering place in Bethesda.

In Ballston, WMATA has transferred development rights for land at Metro station by sale and by lease to the private developers. The joint development project in Ballston, known as Ballston Metro Center, was completed in 1989. This project consists of mixed-use office, hotel, and condominium units and retail space. The high density office, retail and residential uses at Ballston Metro Center help facilitate both Metro uses and forming a new downtown in Ballston.

WMATA took a different form of joint development – station connection fees (SCF) in Court House. This involved direct pedestrian station access to and from

adjacent places of businesses. By using the SCF, WMATA helps facilitate development around the Metro station that is well-connected to the transit service. At the same time, Metro station connection brings transit riders to the commercial and office buildings which can foster retailing in Court House.

6.2.4 Different Strategies in Promoting Affordable Housing Around Metro Station Areas

Both Arlington and Montgomery have established special districts as a method to try to protect and foster affordable housing around Metro stations. For the case studied areas, Arlington's Special Affordable Housing Protection District and Montgomery's Transit Station Residential District have been used.

Nevertheless, residents in Montgomery County have more options for accessing affordable housing than in Arlington through both county- and state-level programs. Montgomery County has enacted the Moderately Priced Dwelling Unit (MPDU) program. The MPDU program is applied to fund new housing in transit-oriented locations and preserve the existing affordable housing near Metrorail stations.

Also in Maryland, two state legislative bills were passed which finance station area housing projects and foster public-private cooperation. Further, Maryland House Bill 300 in 2009 authorizes County governments to finance the costs of TOD-related infrastructure improvements.

6.3 Similar TOD Strategies within Differently Planned Station Nodes

Even though different design patterns were used for the stations, there are similarities related to strategies to foster mixed land use, high density development around Metro stations, improve the walking and biking linkages from commercial,

residential and business buildings to Metro stations, and providing multiple non-auto travel choices around Metro stations.

6.3.1 Encouraging Mixed Land Use

In Ballston, Court House and Bethesda, special zoning strategies were applied within Metro station areas to stimulate desired density mixed-development. Both Arlington and Montgomery County have built up special districts to concentrate development in Metro station areas. Arlington's Special Coordinated Mixed-Use District and Montgomery's Metro Core District have utilized zoning ordinances to foster high density, mixed land use development. Business, office and housing development are located at or close to and within walking distance to the Metro stations. Such design helps attract more employees and residents in Arlington and Montgomery County choosing Metrorail for travel around the Metropolitan region.

County government agencies also work together with State DOTs to build up walkable neighborhoods. They cooperated on road construction and rehabilitation projects to encourage walking and biking in local area. Both Arlington and Montgomery County have implemented strategies which include constructing sidewalks linking neighborhoods to facilities within one-quarter mile radius of Metro station areas, expanding pedestrian paths and narrowing auto lanes in order to establish walkable communities around Metro stations.

6.3.2 Providing Multiple Non-Auto Travel Choices at Metro Station Areas

WMATA is obviously the most important transit provider in D.C., metropolitan area. Metrorail and Metrobus service can be found in all three areas. Besides WMATA's Metrorail and Metrobus, other bus lines in Arlington and

Montgomery County are well connected to the Metro stations which attract more people taking the Metrorail. Arlington and Montgomery County run bus lines that operate within these areas and have bus bays at or very close to Metrorail stations which well connect the county-owned bus service with regional rail service. All three studied areas provide bike racks at and around Metro stations which makes it convenient for bikers to commute or go around in the areas.

Capital Bikeshare services can be found in several sites near Metro stations in Arlington County which makes bike-commuting to and from the stations very convenient. Although Bethesda does not have the Bikeshare service, Montgomery County has established Biker Friendly Areas with continuity of bikeways through Bethesda and access to Metro station. Bikers can also access Bethesda Metro station through the Capital Crescent Trail (CCT) which is managed by the Coalition, an all-volunteer organization. The CCT provides a biking link from Bethesda to D.C. area. Car-sharing services – Zipcar can be found close to Metro stations in all three areas. Both Arlington and Montgomery county governments have applied policies to limit site parking around metro stations, and to encourage walking and carpooling and decrease auto-driving.

6.4 Better Understanding the Institutional Environment for TOD Implementation

6.4.1 Multi-Level Actors Participating into Station Area Planning & Development

The TOD success in various Metro stations and immediate areas in the D.C., Metropolitan area has depended on effective planning and policy implementation. In order to fully understand the factors and processes involved in planning and operating

of these three metro station areas, it is necessary to more systematically identify the array of actors involved in TOD implementation and understand the roles and dynamics of these multiple actors. As noted they include the metropolitan transit agency, local governments with zoning and land use control powers, private developers and businesses, citizens and community groups, and non-governmental community business promotion organizations, as well as metropolitan planning agencies, state and federal agencies. They are identified in Table 6.2 for the Washington D.C., Metropolitan Area.

Table 6.2: Multi-Level Institutional Environment for TOD Implementation in Washington D.C., Metropolitan Area

| | |
|--------------|---|
| Federal | <ul style="list-style-type: none"> •Congress; Federal Transit Administration; Federal Highway Administration; Internal Revenue Service; U.S. Treasury; U.S. Department of Housing & Urban Development |
| State | <ul style="list-style-type: none"> •Maryland State Government; Maryland State Department of Transportation; Maryland Transit Administration •Virginia Department of Rail & Public Transportation; Virginia State Department of Transportation |
| Regional | <ul style="list-style-type: none"> •The National Capital Region Transportation Planning Board; Washington Metropolitan Area Transit Authority |
| County | <ul style="list-style-type: none"> •Arlington County: Department of Community Planning, Housing & Development; Planning Commission; Zoning Office; Arlington Transportation Partners; Arlington Economic Development •Maryland-National Capital Park & Planning Commission - Montgomery County Planning Board; Montgomery Ride-on bus service |
| Quasi-Public | <ul style="list-style-type: none"> •Bethesda Urban Partnership |
| Private | <ul style="list-style-type: none"> •Private developers (Donohoe Companies; Allan Rozansky & Alan Kay Associates); private non-auto travel service providers (Zipcar; Alta Bicycle Share; Clear Channel Outdoor, INC) |
| Community | <ul style="list-style-type: none"> •Arlington Citizen-Advisory Group; •Various Citizen Group in Montgomery County |

6.4.2 Primary & Secondary Actors in TOD Implementation in Washington D.C., Metropolitan Area

The actors outlined in Table 6.2 have different levels of involvement in fostering or opposing station area development. Actors are categorized as primary and secondary actors based on their inputs and whether they are directly involved in station area TOD implementation.

WMATA, local County government planning agencies, county transit agencies, Bethesda Urban Partnership (BUP) and private developers are considered as primary actors who have directly participated in providing public transit services, and in planning and operating of station areas. The secondary actors include the federal government agencies, the National Capital Region Transportation Planning Board (TPB), and Maryland and Virginia State governments, Arlington citizen advisory group, and community group in Montgomery County.

6.4.2.1 Primary Actors

By review of the Washington, D.C., region's strong TODs over the past four decades, it can be seen that WMATA has been critical in the TOD-oriented aspects of the region's growth.

WMATA, as the regional transit authority, operates Metrorail and Metro bus in the metropolitan region. All major transit investments require regional collaboration since the transit system runs across several states and counties. As described and analyzed in Chapter 3, the WMATA was created by the Congress and is managed by Board of Directors composed of persons from the federal government, District of Columbia and the States of Maryland and Virginia. Each of the governing entities has a major part to play in how WMATA can perform. WMATA also needs the approvals of local governments to locate the Metrorail lines and stations. Besides Metrorail and

Metro bus, Arlington and Montgomery County transit agencies and BUP provide bus services that well connect with the Metro stations. Financial incentives for encouraging non-auto commuting are applied in all three studied areas. Arlington Transportation Partners (ATP), a unit of the Arlington County government, assists Arlington companies and commuters in Ballston and Court House to apply and get federal benefits. Providing transit advisory services is an important strategy to encourage more people to choose non-auto travel modes. ATP is the main actor providing free transit advisory service. In Bethesda, employees get carpooling parking discounts not from County government agency, but from Bethesda Urban Partnership (BUP). BUP is also in charge of transportation advisory service.

WMATA actively and directly participates in station area planning and development beyond the station itself. WMATA works closely with private developers, construction firms, architects, real-estate professionals, and local planners to complete joint development projects. As the case studies indicate, WMATA has rented the land of Metro station areas to private developers for mixed land use development in Ballston and Bethesda and has allowed adjacent retail and office buildings to physically connect to Metro stations in Court House. WMATA's joint development projects are intended to foster mixed residential, office, hotel and retail developments that facilitate Metro riding. The two successful joint development projects, Ballston Metro Center and Bethesda Metro Center have attracted other developers and encouraged Metrorail travel.

As this study shows, local jurisdictions have a basic role in planning for station-area development. In this case, it is the County. In Virginia, it is Arlington County. For Bethesda, it is Montgomery County and its Planning Board which is part

of a bi-county planning agency – the Maryland-National Capital Park and Planning Commission (M-NCPPC). Even though M-NCPPC is a bi-county planning commission for Montgomery and Prince George’s County, the members from the two Counties operate with independence from the other. Arlington and Montgomery County work closely with WMATA to establish an environment promoting Metrorail use. Both counties apply zoning and building code revisions to facilitate TOD.

In Bethesda, BUP has taken major roles in attracting development in and around Bethesda Metro Center and in building a TOD downtown area. BUP is a quasi-public community-based organization. It was created in 1994 and funded by Montgomery County through providing services to special districts in Bethesda that include an Urban District, a Transportation Management District and a Parking Lot District. These and other contract services funded by the County help develop Bethesda as a pedestrian-friendly and economically viable community, and promote non-auto travel modes by BUP’s providing transit service, supporting biking commuting, and presenting free travel advisory services in downtown Bethesda. BUP has participated in parking management as well. Carpoolers in Bethesda can apply and get parking discounts from BUP.

6.4.2.2 Secondary Actors

There are several agencies from various levels of governments, and community groups who also have been involved in TOD implementation process through influencing the decision of locating Metro stations, providing financial options, and assisting infrastructure construction in Metro station areas.

After Metrorail was approved for construction by the Congress in 1965, some citizen groups in Montgomery County opposed locating Metro station in their local

neighborhoods which resulted in the cancelation of several initially proposed stations by the county. Where they supported TOD concepts, citizens in Ballston served on advisory committees for station area land-use and transportation projects.

Most of public rail transit funding has been provided by federal government, including Federal Transit Authority (FTA) and Federal Highway Authority (FHWA) (WMATA, 2011). The Internal Revenue Service (IRS) has provided tax-free transit benefits to employees up to \$230 per month to cover the cost of commuting on Metrorail, Virginia Railway Express (VRE), Maryland Area Regional Commuter (MARC), local and commuter buses, and carpools since 2001. The U.S. Department of Housing and Urban Development (HUD) and U.S. Treasury have programs which provide financial incentives to support affordable housing development near transit stations. People in Arlington can receive a subsidy from the Virginia Department of Rail & Public Transportation for telecommuting. In Ballston and Court House, the Telework!VA program allows participating companies to receive subsidies from the Commonwealth of Virginia.

The metropolitan planning organization (MPO) coordinates transportation plans of jurisdictions. The National Capital Region TPB is the MPO in D.C. Metropolitan Area which fosters the development of an affordable, safe and efficient transportation system for the region, and provides the forum through which local decision makers develop regional plans and programs. More broadly, the Virginia and Maryland State Department of Transportation (DOT) can promote balanced growth, which can include TOD, to reduce traffic congestion, save farmland, protect natural resources, use existing infrastructure, reinvest in communities and foster walkability in areas. However, highways and auto transportation are most central to these programs.

Montgomery County actively cooperated with a private company to improve transit service, which has not been found in Arlington. Montgomery County works with Clear Channel Outdoor, Inc. (CCO). By allowing CCO to put advertisements on bus shelters, this public-private cooperation has brought a minimum of 500 standard bus shelters and some super shelters built and maintained by CCO to Montgomery County.

6.5 Conceptual Framework for Analysis of Dynamics of TOD Station Planning & Management

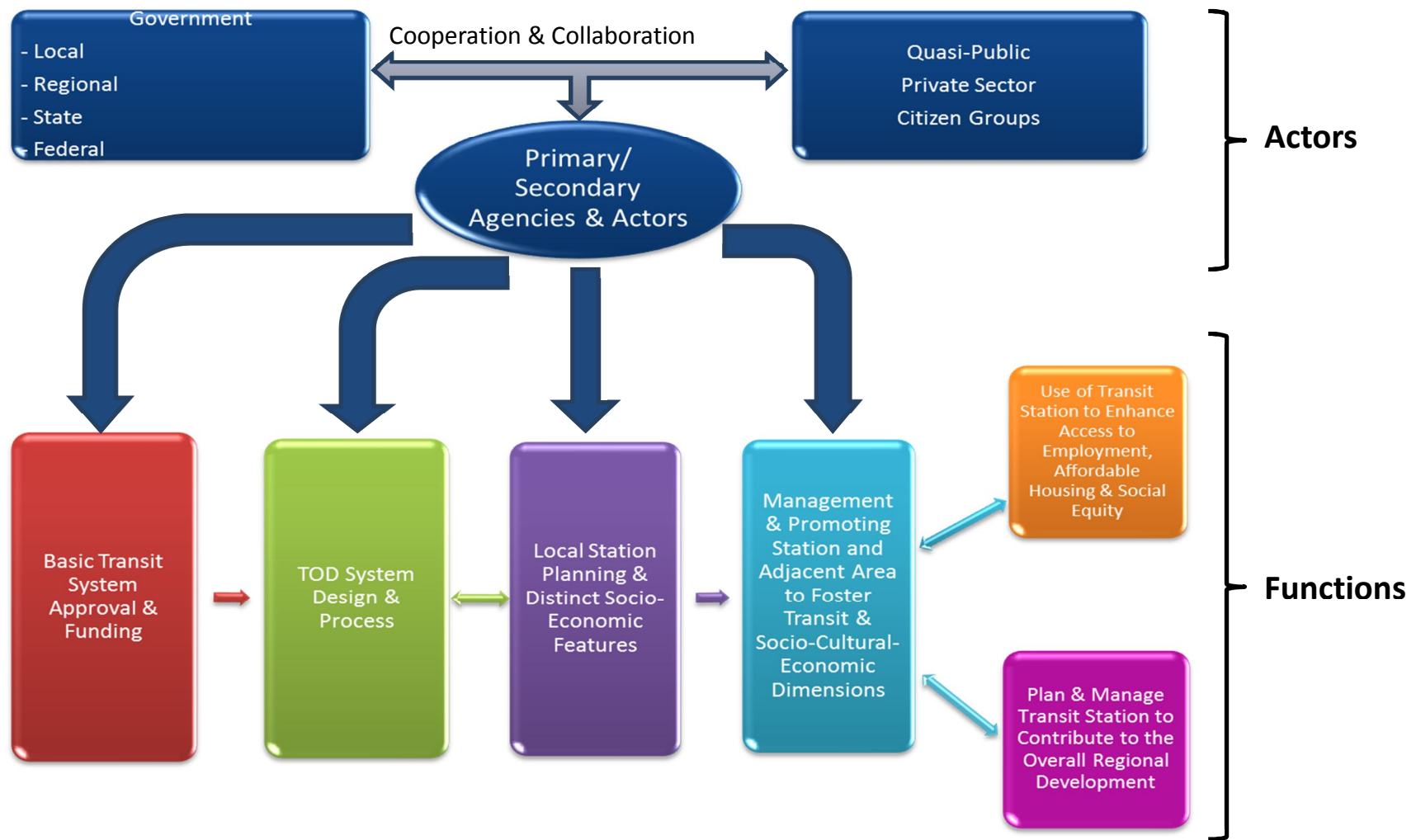


Figure 6.2: TOD Model of Dynamics

Given the many vested interests in TOD and joint development outcomes, there is a complex web of jurisdictions for TOD, in a metropolitan region (e.g. Washington, D.C., Metropolitan region in this study). Each involved jurisdiction is with its own agendas, boards, staffs, budgets, and constituents (Cervero, 2002). The decision of station area development requires the cooperation of transit agency, the multi-level of governments, the private sector companies, quasi-public agency, and community groups. Under such environment, the cooperation among these actors is critical to TOD success.

With this in mind, it is possible, based on the case studies and Figure 6.2, to construct a conceptual framework of the dynamics among actors in TOD station planning and management. This framework is set out in Figure 6-3 and can be used to further research on TOD stations.

6.6 Directions of Future Research

6.6.1 Research on Other Corridors or Stations in Arlington & Montgomery County

This study has provided detailed observations on three Metro station areas in Arlington and Montgomery County. Two studied areas – Ballston and Court House in Arlington County are on the same Rosslyn-Ballston Corridor. It will be useful to explore the planning and development of other transit nodes on Arlington’s Corridors – both Rosslyn-Ballston and Jefferson-Davis as well as of the corridors themselves.

WMATA Purple Line project will cover a 3.75-mile corridor from the Bethesda to Silver Spring Metro Stations (WMATA, 2009). The estimated total cost of the corridor line is \$371 million dollars (WMATA, 2009). This project is to be completed in 2015 (WMATA, 2009). It will be productive to observe the policies

adopted and implemented for planning these new metro station areas on the purple line in Montgomery County from the very beginning.

6.6.2 Research on Dynamic Actors in TOD Implementation

More general research can be undertaken on the dynamics of decision making and management environment of TOD process. The research can be conducted from several perspectives, such as how other metropolitan regions fit the planning and operational framework for station area development; how non-governmental or business improvement-type districts are used to operate similarly to BUP in station area development; and, if differences are found what are they and adaptations needed in the framework from this study.

6.6.3 Studying on Distinctive Station Area Planning & Enriching the Overall Standards of TOD Accomplishment

It will also be useful to extend the study on the differences of station area planning and management in metropolitan regions other than Washington D.C. in the United States. Such research can provide data to elaborate and modify the dynamic TOD model constructed in this study.

Thus, further research can be done in areas where there are deliberate efforts to create station differences, in areas with different cultural features and in areas with relatively lower income than the selected areas in this study. The three studied areas are relatively wealthy communities and commonly admitted as successful TOD transit nodes in the United States. Further research should also focus not just on relatively wealthier areas, but also in the low-income communities in other metropolitan regions. By examining neighborhood with distinct cultural and economic factors, how public transit services help improve the access to employment and education opportunities in

low-income transit nodes can be explored. It can also help evaluate TOD success from both economic growth and social equity perspectives.

REFERENCES

- Agnes Artemel and Artemel & Associates, Inc., (2012), “Impact of Local Regulatory Processes and Fees on Ability to Deliver New Housing Units”.
- American Association of State Highway and Transportation Officials (AASHTO) (2006). “The Role of State DOTs in Support of Transit-Oriented Development,” prepared by Cambridge Systematics, Inc. with Meyer, Mohaddes Associattes.
- American Association of State Highway and Transportation Officials (AASHTO) (2006). “Multi-State Metropolitan Planning Organizations: Approaches, Cases, and Institutional Arrangements,” prepared by Katherine F. Turnbull.
- American Public Transportation Association (APTA), (2009), Public Transportation Fact Book (Washington, DC, table 3 and 4, http://www.apta.com/gap/policyresearch/Documents/APTA_2009_Fact_Book.pdf), April 2009.
- Arlington County Board, (1989), “Rosslyn-Ballston Corridor - Early Visions”; (2007), “Rosslyn-Ballston Metro Corridor - Streetscape Standards,”.
- Arlington County Board, (1991), *Ballston Sector Plan*.
- Arlington County Board, (1993), *Court House Sector Plan*.
- Arlington County Board, (1996), *General Land Use Plan*.
- Arlington County Board, (1997), “Arlington County Pedestrian Transportation Plan.”
- Arlington County Board, (2001), “Rosslyn-Ballston Metro Corridor - Retail Action Plan”.
- Arlington County Board, (2008), “Arlington Master Transportation Plan – Bicycle Element”, July 2008.
- Arlington County Board, (2008), “Master Transportation Plan: Demand and System Management Element,” December 13, 2008.
- Arlington County Board, (2009), “Master Transportation Plan: Transit Element.”

Arlington County Board, (2010), “Arlington Transit - Arlington County FY2009 – FY2014CIP.”

Arlington County Board, (2010), “Comprehensive Plan Executive Summary.”

Arlington County Board, (2011), “Development in the Metro Corridors: 1st Quarter 2011.” The data is from 1960 to 1st Quarter of 2011 collected by Arlington County Department of Community Planning, Housing and Development, Planning Division, Planning Research and Graphics Team, VA, published in September 2011.

Arlington County Board, (2011), “Five-Year Review of Arlington County’s Comprehensive Plan 2005-2010.”

Arlington County Board, prepared by Connectics Transportation Group, (2010), “Arlington County Virginia Transit Development Plan Fiscal Year 2011-16.” December 14, 2010.

Arlington County Board. Reference at: <http://www.co.arlington.va.us/cbo>.

Arlington County Commuter Services, (2012), “Arlington Transportation Demand Management Strategic Plan: FY2013-FY2040.”

Arlington County Department of Community Planning, Housing and Development (DCPHD), (2000), “Courthouse Sector Plan Summary.”

Arlington County Department of Community Planning, Housing and Development (DCPHD), (2001), “Rosslyn-Ballston Metro Corridor - Retail Action Plan,”

Arlington County Department of Community Planning, Housing and Development (DCPHD), (2003), “The Rosslyn to Courthouse Urban Design Study,” at: <http://www.co.arlington.va.us/cphd/planning>.

Arlington County Department of Community Planning, Housing and Development (DCPHD), (2006), “Five-Year Review of Arlington County’s Comprehensive Plan: July 1, 2000 to June 30, 2005”.

Arlington County Department of Community Planning, Housing and Development (DCPHD), (2010), “Planning Research Brief #6: Round 8.0 Forecast”, reference at: <http://www.arlingtonva.us/PRAT>. Data Analysis and Research Team, Planning Division, DCPHD, based on Metropolitan Washington Council of Governments Round V Cooperative Forecasts.

Arlington County Department of Community Planning, Housing and Development (DCPHD), (2012), “40 Years of Smart Growth: Arlington County’s Experience with Transit Oriented Development in the Rosslyn-Ballston Metro Corridor.” December 6, 2012.

Arlington County Department of Community Planning, Housing and Development (DCPHD), (2012), “Courthouse Briefing Book: A Resource for the Courthouse Square Planning and Urban Design Study,” December 2012.

Arlington County Department of Community Planning, Housing and Development (DCPHD), (1989), “The Rosslyn-Ballston Corridor Early Vision.”

Arlington County Profile. Reference at:

<http://www.arlingtonva.us/departments/ManagementAndFinance/budget/file70513.pdf>

Arlington County Website on Ballston Station:

http://www.arlingtonva.us/Departments/CPHD/planning/data_maps/metro/ballston/index.htm.

Arlington County, Arlington County Commuter Services, Department of Environmental Services, (2012), “Arlington County FY12 Summary Report on Capital Bikeshare.” October, 2012.

Arlington Economic Development website. Reference at:

<http://www.arlingtonvirginiausa.com/index.cfm/5221>.

Arlington Initiative to Reduce Emissions (AIRE), (2010), “Arlington County Justice Center.”

Arlington Transit website reference at: <http://www.arlingtontransit.com/pages/routes/>

Arlington Transportation Partners website reference at:

<http://www.arlingtontransportationpartners.com/pages/about/>

Arlington Transportation Partners website: “cash-out” parking program,

<http://www.arlingtontransportationpartners.com/pages/business/commuter-benefits/parking-management/>

Arlington Transportation Partners, Arlington County, and WalkArlington, (2010), “WorkArlington Works: A Step-by-Step Guide to A Working Workplace.”

- Arrington and Brinckerhoff, (2012), "Light Rail and the American City State-of-the-Practice for Transit-Oriented Development," Transportation Research Circular E-C058: 9th National Light Rail Transit Conference.
- Arrington, G., & Parker, T. (2001). *Factors for Success in California's Transit-Oriented Development*. Sacramento: California Department of Transportation, Statewide Transit-Oriented Development Study.
- Arrington, G., et al. (2008), *Effects of TOD on Housing, Parking, and Travel*, Report 128, Transit Cooperative Research Program (www.trb.org/CRP/TCRP); at http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_128.pdf.
- Ball, W. (1994). "Commuting Alternatives in the United States: Recent Trends and a Look to the Future." U.S. Department of Transportation, Publication No. U.S.DOT-T-95-11.
- Barnes, G. (2005). The Importance of Trip Destination in Determining Transit Share. *Journal of Public Transportation*, Vol. 8, No.2.
- Barnett, interview by Zachary M. Schrag; Dickran Y. Hovsepian, interview abstract, 17 and 27 June 1988, Montgomery County Archives Project, Montgomery County Archives, Rockville, Maryland.
- Berkeley Institute of Urban and Regional Development (IURD), "Histories of TOD: Perspectives on the Development of the TOD Concept," Fall 2007.
- Bernick, M., & Cervero, R. (1997). *Transit Villages for the 21st Century*. New York: McGraw-Hill.
- Bethesda Transportation Solutions, (2008), "Bethesda Transportation Management District: Biennial Report," March, 2008.
- Bethesda Urban Partnership, (2009), "2009 Annual Review: Bethesda Urban Partnership, Inc."
- Bethesda Urban Partnership. Website reference at: <http://www.bethesda.org/parking/BethesdaCirculator.pdf>
- Boarnet, M., & Crane, R. (1997). L.A. Story: A Reality Check for Transit-Based Housing. *Journal of the American Planning Association*, Vol. 63, No.2, 189-204.

- Boarnet, M., & Crane, R. (1998). Public Finance and Transit-Oriented Planning: New Evidence from Southern California. *Journal of Planning Education and Research* , Volume 17, No. 3, 206-219.
- Brecher, S. and Schwartz, P. (2010). "Overview of Transportation Demand Management Montgomery County, Maryland," presentation to National Capital Region (NCR) Transportation Forum.
- California Department of Transportation.(2001). *Factors for Success in California's Transit-Oriented Development*. Sacramento: Technical Advisory and Policy Steering Committee.
- Caltrans, & Agency, B. T. (2002). *Statewide Transit-Oriented Development Study: Factors for Success in California*.
- Carlton, Ian, (2007). "Histories of Transit-Oriented Development: Perspectives on the Development of TOD Concept."
- Center for Neighborhood Technology and Center for Transit Oriented Development, Housing & Transportation Affordability Index project, www.brookings.edu.
- Center for Transit-Oriented Development (www.reconnectingamerica.org/html/TOD) supports transit investments that spur development to improve housing affordability and choice, revitalize downtowns and urban and suburban neighborhoods, and provide value capture and recapture for individuals, communities and transportation agencies.
- Center for Transit-Oriented Development, (2011), "Transit-Oriented Development Strategic Plan / Metro TOD Program," prepared for Metro.
- Cervero, R. (1994). Rail-Oriented Office Development in California: How Successful? *Transportation Quarterly* , Vol.48, No.1, 33-44.
- Cervero, R. (2004). Effects of Light and Commuter Rail Transit on Land Prices: Experiences in San Diego County. *Journal of the Transportation Research Forum* , Vol.43, No.1, 121-138.
- Cervero, R., S. Murphy, C. Ferrell, N. Goguts, Y. Tsai. (2004). *Transit Oriented Development in*
- Cervero, R., Sandoval, O. and J. Landis (2002). "Transportation as a Stimulus of Welfare-to-Work, Private versus Public Mobility." *Journal of Planning Education and Research* 22, 50-63.

- Chicago Area Transportation Study (CATS) Policy Committee. (2000). "Resolution 00-01: A Resolution Endorsing the Interagency Agreement for Regional Planning in Northeastern Illinois"
- City of Chicago, "CTA – Ridership – Annual Boarding Totals," City of Chicago data portal, retrieved on January 18, 2014.
- Council of Governments, "*Metrorail Station Area Planning: A Metrorail Before-and-After Study Report*," The Administration, 1984 - [Political Science](#) - 161 pages. [Metropolitan Washington Council of Governments, United States Urban Mass Transportation Administration. Office of Planning Assistance, Technology Sharing Program \(U.S.\)](#)
- Dempwolf, S. (2008). "Transit Oriented Development in Prince George's County and Montgomery County, Maryland: Further Evidence of the East-West Divide."
- Dill, J., (2008), "Transit Use at Transit-Oriented Developments in Portland Oregon Area," Transportation Research Record: Journal of the Transportation Research Board, No. 2063, Transportation Research Board of the National Academies, Washington D.C., pp. 159-167.
- Dunphy, R. T. (2004). *Developing around transit: strategies and solutions that work*. Washington, D.C.: Urban Land Institute.
- Employment, Business Activity, Property Values and Tax Revenues*, Victoria Transport Policy
- Evans, J., & Pratt, R. (2007), *Transit Oriented Development; Chapter 17, Travel*
- Ewing, R. (1996). *Best Development Practices-Doing the Right Thing and Making Money at the Same Time*. Chicago, IL: American Planning Association (in cooperation with the Urban Land Institute).
- Eyck, Z. (2003). "TRAX drawing development and new housing to Murray", *Deseret News*, Salt Lake City, Sunday, March 9, 2003.
- Federal Highway Administration & Federal Transit Administration, "The Transportation Planning Process Key Issues"; a publication of the Transportation Planning Capacity Building Program.
- Federal Highway Administration (2007). "The Transportation Planning Process: Key Issues, A Briefing Book for Transportation Decisionmakers, Officials, and Staff," publication number: FHWA-HEP-07-039.

- Federal Highway Administration. (2001). *Moving Ahead: The American Public Speaks about Roadways and Their Communities*. Washington, D.C.: Federal Highway Administration.
- Federal Program Inventory (2013). United States Department of Housing and Urban Development Programs,
<http://portal.hud.gov/hudportal/documents/huddoc?id=HUD-FPI-May2013.pdf>.
- Federal Transit Administration (FTA).(2002). National Transit Database. Online:
<http://www.fta.dot.gov/ntl/database.html>. Washington, DC: FTA.
- Federal Transit Administration website reference at:
http://www.fta.dot.gov/12347_134.html
- Federal Transit Administration, Innovative Financing Techniques for America's Transit Systems, FTA, Chapter 2.
- GAO, (2001), "Mass Transit: Many Management Successes at WMATA, but Capital Planning Could Be Enhanced", GAO-01-744, Jul 3, 2001
- Gatzlaff, D. and M. Smith. (1993). "The Impact of the Miami Metrorail on the Value of Residences Near Station Locations." *Land Economics* 69, 1: 54-66.
- Goldstein, D. (2007), *Saving Energy, Growing Jobs: How Environmental Protection Promotes Economic Growth, Profitability, Innovation, and Competition*, Bay Tree Publishers (www.baytreepublish.com); summary at www.ceel.org/resrc/news/07-02nl/09D_goldstein.html.
- Google map reference at: <http://www.walkscore.com/nearby/BALLSTON-METRO-STATION> and <http://www.walkscore.com/nearby/COURTHOUSE-METRO-STATION>
- Google map reference at: <http://www.walkscore.com/nearby/BETHESDA-METRO-STATION>
- Hanson, (1967), Politics of Metropolitan Cooperation, 54-57.
- Hedgpeth, D. (2001), "Development Planned near Silver Spring Metro," *Washington Post*, 21 June 2001.
- Holusha, J. (2003). New vitality around old railroad station. New York Times.
- Hovsepian, D., interview abstract, 17 and 27 June 1988, Montgomery County Archives Project, Montgomery County Archives, Rockville, Maryland.

- Institute (www.vtpi.org); at www.vtpi.org/econ_dev.pdf.
- Institute of Transportation Engineers. (2003). Trip Generation. Washington, D.C.: ITE.
- Internal Revenue Service (2010), "New Markets Tax Credit," LMSB-04-0510-016, <http://www.irs.gov/pub/irs-ut/atgnmtc.pdf>, May 2010.
- Internal Revenue Service, *Fringe Benefits*, <http://www.irs.gov/publications/p15b/ar02.html>.
- Kaplan, Melanie D.G. (2010). "D.C. unveils country's largest bike share program" (<http://www.smartplanet.com/people/blog/pure-genius/dc-unveils-country-s-largest-bike-share-program/4940/>). SmartMoney.com. retrieved 9 April 2011.
- Kawabata, M. (2003). "Job Accessibility by Travel Mode in U.S. Metropolitan Areas." Papers and Proceedings of the Geographic Information Systems Association 11, 115-120.
- Krizek, K. (2003). Residential relocation and changes in urban travel: Does neighborhood-scale urban form matter? *Journal of the American Planning Association* 69(3): 265-281.
- Landis, J., Guathakurta, S., and Zhang, M. (1994). Capitalization of Transportation Investments into Single-Family Home Prices. Berkeley: Institute of Urban and Regional Development, University of California, Working Paper 619.
- LDA Consulting & Southeastern Institute of Research. (2007). "2007 Arlington County Resident Internet Study Topline Report: Companion to Resident Telephone Report," prepared for Arlington County Commuter Services.
- Levine, J. (2006). *Zoned out: Regulation, markets, and choices in transportation and metropolitan land-use*. Washington, DC: Resources for the Future.
- Litman, T. (2006). "Planning Principles and Practices", Victoria Transport Policy Institute.
- Litman, T. (2009), *Evaluating Transportation Economic Development Impacts: Understanding How Transportation Policies and Planning Decisions Affect Productivity*,
- Maryland Department of Legislative Services, Office of Policy Analysis, (2009). "Update on Smart Growth and Planning Policy in Maryland."
- Maryland Department of Transportation website reference at: http://www.mdot.maryland.gov/Planning/TOD/TOD_Designation.html

- Maryland Department of Transportation, State Highway Administration, Regional and Intermodal Planning Division, (2009). “Traffic and Intersection Improvement Studies for Base Realignment and Closure.”
- Maryland Department of Transportation. (2009). “2009 Maryland Trails: Strategic Implementation Plan,”
http://www.mdot.maryland.gov/Office_of_Planning_and_Capital_Programming/Trails/Documents/pdfs/TSIP_Final.pdf.
- Maryland Department of Transportation. (2000). *Report to Governor Parris N. Glendening. From the Transit-Oriented Development Take Force.*
- Maryland State, (2009), CHAPTER 182 (House Bill 300), “Tax Increment Financing and Special Taxing Districts – Transit–Oriented Development”.
- Maryland Transit Administration, (2013), “Analysis of the FY 2014 Maryland Executive Budget, 2013.”
- Maryland Transit Administration, Maryland.(2010a). *Commuter choice*. Retrieved September 24, 2010, from <http://commuterchoicemaryland.com/taxcredit.htm>
- Maryland Transit Administration, Maryland.(2010b). *Commuter choice*. Retrieved December 3, 2010, from <http://commuterchoicemaryland.com/twoways.htm>
- McNeal, A., (2003). “Placemaking: Developing Town Centers, Transit Villages and Main Streets,” (presentation at Urban Land Institute Conference, Reston, Virginia).
- Metropolitan Washington Council of Governments. (2005). Panel on the Analysis of and Potential for Alternate Dedicated Revenue Sources for WMATA, *Report of the Metro Funding Panel*, p.17, <http://www.mwcog.org/uploads/committee-documents/pVxfXFs2005106084602.pdf>.
- Metropolitan Washington Council of Governments. (2010). “Round 8.0 Cooperative Forecasting: Employment Forecasts to 2040.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (2014). “Semi-Annual Report,” Spring 2014.
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (1970 & 1990), “Bethesda-Chevy Chase Master Plan.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (1994), “Bethesda CBD Master Plan.”

- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (1976), “Bethesda CBD Sector Plan.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (2006), “Bethesda CBD Sector Plan amendment.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (1994), “Bethesda Central Business District Sector Plan.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, “Bethesda Streetscape Plan 1994 (in 1994 CBD Master Plan).”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission. (2007). “Toward Sustainable Growth for Montgomery County: A Growth Policy for the 21st Century.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission. (2006), “Woodmont Triangle Amendment to the Sector Plan for the Bethesda CBD,” Approved and Adopted March 2006.
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, The Planning Board adopted new LATR/TPAR guidelines in January 2013. The Board requested some additions and changes to that report and the final guidelines were published in March 2013. “*Local Area Transportation Review (LATR) and Transportation Policy Area Review (TPAR)*.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (1984), “The Bethesda Streetscape Plan for the Metro Core District.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (1994), “Bethesda CBD Master Plan.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (1994). “The Bethesda Central Business District Sector Plan.”
- Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission, (2010). “Montgomery County Snapshot.”

Montgomery County Planning Board, The Maryland-National Capital Park and Planning Commission,. (1993). Zoning Ordinance, Chapter 59, Volume 4 of the Montgomery County Code, 260-6

Montgomery County, Maryland Comprehensive Annual Financial Report, for the Year ended June 30, 2011

Montgomery County, Maryland, (2008). “The Moderately Priced Dwelling Unit Ordinance.”

National Capital Region Transportation Planning Board. (2008). “*Metropolitan Washington Council of Governments, Independent Review of the Washington Metropolitan Area Transit Authority’s (WMATA) MetroAccess Service: Final Report*,” reference at: <http://www.mwcog.org/uploads/committee-documents/b15dWV5Z20081201124410.pdf>.

National Capital Region Transportation Planning Board. (2006). “Annual Review of Transportation Issues in the Washington Metropolitan Region,” *The Region*, Volume 45.

National Housing Trust and Reconnecting America, Preserving Opportunities: Saving Affordable Homes Near Transit, 2007, documented 100,000 expiring use units in proximity to transit in eight cities, including 23,000 Section 202 senior housing units.

NBCRT, (2005).THE NATIONAL BUSINESS COALITION FOR RAPID TRANSIT.“The Economic Importance of Public Transit.” November 2003. American Public Transportation Association web page, http://www.apta.com/research/info/online/economic_importance.cfm

NBCRT.(2003). THE NATIONAL BUSINESS COALITION FOR RAPID TRANSIT.“The Economic Importance of Public Transit.”

NCTA, Transportation in the National Capital Region, 39; NCTA, Appendix to November 1962 Report to the President, vol. 5: System Planning (1963), 104.

NCTA-1, Potential Rail Transit Corridors, 6.

Nelson & Nygnard Consulting (2002), *Housing Shortage/Parking Surplus*, Transportation and Land Use Coalition (www.transcoalition.org/southbay/housing_study/index.html).

- NVTC, (2007);
<http://www.thinkoutsidethecar.org/pdfs/KIT/2007/12.6.07/NVTC%20December%202007%20Complete.pdf>
- NYSMPO (2009), *Transit Supportive Development in New York State: A Guide For Communities*, New York State Association of MPOs (www.nysmpos.org); at www.nysmpos.org/pdf/TSD_Final_Report.pdf.
- Ohland, G., & Gorewitz, C. (2005). *Communicating the benefits of transit oriented development*.
- Pollard, T. (2003). Policy Prescriptions for Healthier Communities. *Journal of Health Promotion* , Vol. 18, No.1, 109-113.
- Porter, D. (1997), *Transit-Focused Development*, Transit Cooperative Research Program Synthesis #20, TRB (www.trb.org).
- Portland Metro. (2003). "The Portland Region: How Are We Doing?" (report brochure)
- PPS (1997), *The Role of Transit in Creating Livable Metropolitan Communities*, Transit Cooperative Research Program Report 22, TRB (www.trb.org); at http://gulliver.trb.org/publications/tcrp/tcrp_rpt_22-a.pdf.
- Praful Shah & Associates, Inc., and Hollander, Cohen Associates, Inc., "Bethesda Central Business District Issues and Opportunities," February, 1986, prepared for Division of Commercial Revitalization Montgomery County Department of Housing and Community Development.
- Price, J., and C. Hamilton, (2005). "Arlington Pilot Carshare Program. First-Year Report." Arlington County Commuter Services, Division of Transportation, Department of Environmental Services, Arlington, VA.
- Rannells, John, (1963), "Open Meeting of National Capital Regional Planning Council, 2:30-4:00pm, June 3, 1963," CDS, box 20, folder 16.
- Reconnecting America, C. f.-O. (2009). *Destinations Matter: Building Transit Success*.
- Renkema, Jennifer and Downie, Sarah, (2008), "2008 EVALUATION OF THE BETHESDA URBAN PARTNERSHIP, INC.", OCTOBER 7, 2008.
- Renne, J. & Wells, J. (2003), "Emerging European-Style Planning in the United States: Transit-Oriented Development", a paper for presentation at ACSP-AESOP, Leuven, Belgium.

- Renne, J. (2009), "From Transit-Adjacent to Transit-Oriented Development," *Local Environment*, Vol. 14, No. 1, pp. 1-15.
- RTD, Denver. (2007). Press Release.
- Rubin, L. and Trombka, A. (2007). "A Study of Moderately Priced Dwelling Unit Program Implementation."
- Sacramento Regional Transit. (2009). "Sacramento Regional Transit Master Plan: Chapter 3 – Existing Conditions: The regional transit audit."
- Sanchez, T., Shen, Q., and Z. Peng (2004). "Transit Mobility, Job Access and Low-income Labour Participation in US Metropolitan Areas." *Urban Studies* 41, No.7, 1313-1331.
- Schrag, Zachary M., "*The Great Society Subway: A History of the Washington Metro*" (Baltimore: John Hopkins University Press, 2006), pp. 101-103.
- Schrank, David, and Tim Lomax. (2005). The 2005 Urban Mobility Report. College Station, Texas: Texas Transportation Institute.
- Southeastern Institute of Research, (2011). "ACCS 2011 BikeArlington Study," sponsored by Arlington County Commuter Services.
- Still, T. (2002). Transit-Oriented Development: Reshaping America's Metropolitan
- The American Association of State Highway and Transportation Officials, (2006), "The Role of State DOTs in Support of Transit-Oriented Development (TOD)".
- The California Transit-Oriented Development Searchable Database at <http://transitorienteddevelopment.dot.ca.gov>
- The City Data website reference at: <http://www.city-data.com/neighborhood/Bethesda-Metro-Center-Bethesda-MD.html>
- The Coalition for the Capital Crescent Trail. Map reference at: http://www.cctrail.org/CCT_Maps.htm
- The League of American Bicyclists, (2013), "Full List of BFB Awards."
- The Maryland-National Capital Park and Planning Commission.(2007). Research & Technology Center housing development data.
- The Maryland-National Capital Park and Planning Commission.(2011). Fiscal Year 2011 Report.

- The National Capital Region Transportation Planning Board. (2010). "The Financial Constrained Long-Range Transportation Plan for the National Capital Region."
- Transportation Planning Board, (2004). 2003 Update to the Financially Constrained Long-Range Transportation Plan for the National Capital Region. Washington, D.C.
- Transportation Research Board, (2004). *Transit-Oriented Development in the United States: Experiences, Challenges, and Prospects*, Report 102, Transit Cooperative Research Program, (www.trb.org).
- Transportation Research Board, (2003), "Strategies for Increasing the Effectiveness of Commuter Benefits Programs."
- Transportation Planning Board, (2002), *Transit-Oriented Development and Joint Development in the United States: A Literature Review*, Report 52, Transit Cooperative Research Program.
- Transportation Research Board, (1996), *Transit and Urban Form*, Transit Cooperative Research Program, Report 16, Transportation Research Board (www.trb.org).
- U.S. Census Bureau (1980-2010). Data Reference.
- U.S. Census, American Community Survey 2005-2009. Data reference.
- U.S. Environmental Protection Agency, (2001), "Parking Cash Out: Implementing Commuter Benefits Under the Commuter Choice Leadership Initiative", September 2001.
- U.S. Environmental Protection Agency, (2006), "Parking Spaces / Community Places: Finding the Balance through Smart Growth Solutions," EPA 231-K-06-001.
- Virginia Department of Transportation, (2011), "I-66 Multimodal Study"
- Voith, R. (1993). "Changing Capitalization of CBD-Oriented Transportation Systems: Evidence from Philadelphia, 1970-1988." *Journal of Urban Economics* 33: 361-376.
- VTPI (2005), *Online TDM Encyclopedia*, Victoria Transport Policy Institute (www.vtpi.org).
- Washington Metropolitan Area Transit Authority. (2010). Proposed Fiscal 2011 Annual Budget, pp. 18-19, http://www.wmata.com/about_metro/docs/FY2011_Proposed_Budget.pdf

- Washington Metropolitan Area Transit Authority.(1969). “Financing Subway System for National Capital Region: Joint Hearings Before the Committee on the District of Columbia and the Subcommittee No. 4 of the Committee on the District of Columbia,” p. 129
- Washington Metropolitan Area Transit Authority.(2002). *WMATA Joint Development Policies and Guidelines* (Washington, D.C.: WMATA Office of Property Development and Management).
- Washington Metropolitan Area Transit Authority.(2003). “Metro Transit Oriented Development Program Marks a 26 Year History of Success,” press release (Washington, D.C.).
- Washington Metropolitan Area Transit Authority.(2006). “2005 Development-Related Ridership Survey.”
- Washington Metropolitan Area Transit Authority.(2008). “Joint Development Guidelines: Planning, Development and Real Estate Committee Board Action Item III-A,” January 10, 2008.
- Washington Metropolitan Area Transit Authority.(2008). “Metrorail Station Access & Capacity Study,” and Appendices, April 2008.
- Washington Metropolitan Area Transit Authority.(2009). “WMATA Facts,” http://www.wmata.com/about_metro/docs/metrofacts.pdf. Retrieved March 18, 2010.
- Washington Metropolitan Area Transit Authority.(2009). “WMATA, Metrorail Boarding by Station 2009”.
- Washington Metropolitan Area Transit Authority.(2011). ["WMATA History"](#) (PDF). Retrieved February 3, 2011.
- Washington Metropolitan Area Transit Authority.(2013). “WMATA 2012 Metrorail Boarding by Station Report.”
- Williams, T. and Schloss, W. (2010). “Federal Transit Administration’s New Starts and Small Starts Programs: Transportation, Livability, and Economic Development in a Changing World,” Journal Florida Engineering Society, November 2010.
- Worcester Polytechnic Institute. (2010). “Increasing Ridership on Montgomery County Public Transit: The Development of an Employer-Based Transit Pass Pilot Program.”

Zipcar Customer Survey Shows Car-Sharing Leads to Car Shedding. (2005). Press Release, Zipcar, reference at: www.zipcar.com/press/releases/press-21, accessed July 23, 2008.

Appendix A

METRO STATION WEEKDAY BOARDING IN WASHINGTON DC METROPOLITAN AREA

Table A.1 shows the average weekday boarding in Metro stations at D.C., Montgomery and Prince George's County, Maryland, and Arlington and Fairfax County, Virginia at Year 1980, 1990, 2000, and 2010. The percentage changes of Metrorail boarding in these Metro stations from 1980 to 2010 are shown on the last column of Table A.1.

Table A.1: Metro Station Weekday Boarding

| Station | State | County | 1980 | 1990 | 2000 | 2010 | %± |
|-------------------------|----------------------|--------|-------|-------|-------|-------|--------|
| Anacostia | District of Columbia | | | | 10131 | 7774 | -23.3% |
| Benning Road | District of Columbia | | | 3883 | 2999 | 3399 | -12.5% |
| Brookland-CUA | District of Columbia | | 6333 | 6976 | 5951 | 6858 | 8.3% |
| Capitol South | District of Columbia | | 6458 | 8383 | 7001 | 9639 | 49.3% |
| Cleveland Park | District of Columbia | | | 3864 | 4396 | 4656 | 20.5% |
| Columbia Heights | District of Columbia | | | | 3957 | 11900 | 200.7% |
| Congress Heights | District of Columbia | | | | | 2826 | |
| Deanwood | District of Columbia | | 2638 | 1903 | 1802 | 1909 | -27.6% |
| Dupont Circle | District of Columbia | | 15643 | 21631 | 21425 | 22907 | 46.4% |
| Eastern Market | District of Columbia | | 4545 | 5816 | 4452 | 6308 | 38.8% |
| Farragut North | District of Columbia | | 15087 | 24651 | 24885 | 24105 | 59.8% |
| Farragut West | District of Columbia | | 28891 | 28717 | 23404 | 23137 | -19.9% |
| Federal Triangle | District of Columbia | | 6774 | 8799 | 9302 | 10756 | 58.8% |
| Foggy Bottom- | District of Columbia | | 13528 | 19674 | 18200 | 21587 | 59.6% |

| Station | State | County | 1980 | 1990 | 2000 | 2010 | %± |
|---|----------------------|--------|-------|-------|-------|-------|--------|
| GWU | | | | | | | |
| Fort Totten - lower | District of Columbia | | 5294 | 5825 | 5121 | 7543 | 42.5% |
| Friendship Heights | District of Columbia | | | 8268 | 9089 | 9804 | 18.6% |
| Gallaudet University Metro Station | District of Columbia | | | | | 5673 | |
| Gallery Place - lower | District of Columbia | | 4057 | 7267 | 10563 | 25894 | 538.3% |
| Georgia Avenue - Petworth | District of Columbia | | | | 2909 | 5855 | 101.3% |
| Judiciary Square | District of Columbia | | 8527 | 9347 | 9402 | 9951 | 16.7% |
| L'Enfant Plaza - lower | District of Columbia | | 12929 | 20979 | 18712 | 22563 | 74.5% |
| McPherson Square | District of Columbia | | 13829 | 18918 | 15419 | 17370 | 25.6% |
| Metro Center - lower | District of Columbia | | 18516 | 25956 | 27457 | 29698 | 60.4% |
| Minnesota Avenue | District of Columbia | | 3556 | 2518 | 2703 | 3410 | -4.1% |
| Mount Vernon Square | District of Columbia | | | | 1635 | 3888 | 137.8% |
| Navy Yard - Ballpark | District of Columbia | | | | 1828 | 9156 | 400.9% |
| Potomac Avenue | District of Columbia | | 4779 | 6044 | 5353 | 4144 | -13.3% |
| Rhode Island Avenue - Brentwood | District of Columbia | | 4989 | 6328 | 4858 | 5651 | 13.3% |
| Shaw - Howard University | District of Columbia | | | | 3107 | 4290 | 38.1% |
| Smithsonian | District of Columbia | | 12427 | 11931 | 12241 | 12895 | 3.8% |
| Stadium - Armory | District of Columbia | | 4094 | 3942 | 3319 | 3559 | -13.1% |
| Takoma | District of Columbia | | 4809 | 6227 | 5595 | 6685 | 39.0% |
| Tenleytown - AU | District of Columbia | | | 5591 | 5966 | 7091 | 26.8% |
| U Street | District of Columbia | | | | 3497 | 7183 | 105.4% |
| Union Station | District of Columbia | | 12540 | 21946 | 27330 | 32745 | 161.1% |
| Van Ness - UDC | District of Columbia | | | 8747 | 6458 | 7155 | -18.2% |
| Waterfront | District of Columbia | | | | 4466 | 3974 | -11.0% |
| Woodley Park | District of Columbia | | | 6352 | 6643 | 7607 | 19.8% |

| Station | State | County | 1980 | 1990 | 2000 | 2010 | %± |
|-------------------------------|----------|-----------------|-------|-------|-------|-------|--------|
| Bethesda | Maryland | Montgomery | | 7572 | 8469 | 10605 | 40.1% |
| Forest Glen | Maryland | Montgomery | | | 1860 | 2366 | 27.2% |
| Glenmont | Maryland | Montgomery | | | 4619 | 5857 | 26.8% |
| Grosvenor - Strathmore | Maryland | Montgomery | | 3794 | 3551 | 5843 | 54.0% |
| Medical Center | Maryland | Montgomery | | 4501 | 4141 | 5574 | 23.8% |
| Rockville | Maryland | Montgomery | | 3944 | 3844 | 4927 | 24.9% |
| Shady Grove | Maryland | Montgomery | | 9106 | 9767 | 13945 | 53.1% |
| Silver Spring | Maryland | Montgomery | 16414 | 14857 | 11492 | 13421 | -18.2% |
| Twinbrook | Maryland | Montgomery | | 4515 | 3863 | 4587 | 1.6% |
| Wheaton | Maryland | Montgomery | | | 4001 | 4543 | 13.5% |
| White Flint | Maryland | Montgomery | | 4333 | 4050 | 4210 | -2.8% |
| Addison Road | Maryland | Prince George's | | 5703 | 6682 | 3759 | -34.1% |
| Branch | Maryland | Prince George's | | | | 6868 | |
| Capitol Heights | Maryland | Prince George's | | 2922 | 2324 | 2241 | -23.3% |
| Cheverly | Maryland | Prince George's | 1380 | 1655 | 1505 | 1571 | 13.8% |
| College Park | Maryland | Prince George's | | | 2709 | 4720 | 74.2% |
| Greenbelt | Maryland | Prince George's | | | 5786 | 7294 | 26.1% |
| Landover | Maryland | Prince George's | 2815 | 3856 | 3477 | 2570 | -8.7% |
| Largo | Maryland | Prince George's | | | | 5283 | |
| Morgan Blvd | Maryland | Prince George's | | | | 1674 | |
| Naylor Road | Maryland | Prince George's | | | | 3165 | |
| New Carrollton | Maryland | Prince George's | 6592 | 8786 | 8742 | 10287 | 56.1% |
| Prince George's Plaza | Maryland | Prince George's | | | 3389 | 5309 | 56.7% |
| Southern Ave | Maryland | Prince George's | | | | 5931 | |
| Suitland | Maryland | Prince George's | | | | 6668 | |
| West Hyattsville | Maryland | Prince George's | | | 2793 | 3809 | 36.4% |
| Ballston | Virginia | Arlington | 9352 | 9531 | 10450 | 12508 | 33.7% |
| Clarendon | Virginia | Arlington | 1899 | 3078 | 2752 | 4335 | 128.3% |
| Court House | Virginia | Arlington | 2825 | 5310 | 7079 | 7578 | 168.2% |
| Crystal City | Virginia | Arlington | 8204 | 13349 | 12108 | 14952 | 82.3% |
| Pentagon | Virginia | Arlington | 16123 | 20687 | 15548 | 16726 | 3.7% |
| Pentagon City | Virginia | Arlington | 3586 | 6650 | 11058 | 17197 | 379.6% |
| Rosslyn | Virginia | Arlington | 12752 | 13565 | 14672 | 18122 | 42.1% |

| Station | State | County | 1980 | 1990 | 2000 | 2010 | %± |
|------------------------------|----------|-----------|--------|--------|--------|--------|--------|
| Virginia Square | Virginia | Arlington | 1728 | 2312 | 2334 | 4103 | 137.4% |
| Dunn Loring | Virginia | Fairfax | | 4546 | 4216 | 5371 | 18.1% |
| East Falls Church | Virginia | Fairfax | | 4269 | 3756 | 4134 | -3.2% |
| Eisenhower Avenue | Virginia | Fairfax | | 2448 | 1108 | 2399 | -2.0% |
| Franconia-Springfield | Virginia | Fairfax | | | 7131 | 9665 | 35.5% |
| Van Dorn Street | Virginia | Fairfax | | | 3285 | 3792 | 15.4% |
| Vienna | Virginia | Fairfax | | 8353 | 10238 | 13967 | 67.2% |
| West Falls Church | Virginia | Fairfax | | 5568 | 6973 | 10836 | 94.6% |
| SUM | | | 293913 | 485693 | 541348 | 704257 | 139.6% |

Source: WMATA 2012 Metrorail Boarding by Station Report.

Appendix B

WMATA JOINT DEVELOPMENT PROJECTS

Table B.1 shows WMATA's joint development projects at Metro station areas in the Washington D.C., Metropolitan region. These projects have several types, such as leasing air rights or ground, sharing construction cost or operation cost, or collecting station connection fee, etc.

Table B.1: WMATA Joint Development Projects

| Station Area | Project | Type ⁸⁷ | Land Use |
|-------------------------|-----------------|--------------------|--|
| Ballston | | AR, GL, SC, SO | Mixed Commercial (office, retail, hotel) – Residential |
| Bethesda | Metro Center | AR, GL, SC, SO | Mixed Commercial (office, hotel, retail) |
| | Elm-Reed Street | GL | Office |
| Clarendon | | SCF | Office |
| College Park | | | Negotiations with selected developer were terminated. Site is offered in current Joint Development Solicitation. |
| Columbia Heights | | GL | Residential, retail |
| Court House | | SCF | Office, retail |

⁸⁷ Key: AR= air rights; GL= ground lease; S=sales transaction in which WMATA reserves the areas it requires for its facilities; SC= shared construction cost; SCF= station connection fee; SO= shared operating costs.

| Station Area | Project | Type ⁸⁷ | Land Use |
|--|-----------------------|--------------------|---|
| Dupont Circle | | GL | Retail |
| Farragut North | | GL, SCF | Office, retail |
| Farragut West | Hill Building Assoc. | SCF | Office, retail |
| | International Square | SC, SCF, SO | Office, retail |
| Fort Totten | | GL | Residential, retail |
| Franconia-Springfield (Greyhound Bus Kiosk) | | GL | Retail |
| Friendship Heights | MazzaGallerie | SCF | Retail |
| | May Department Stores | SCF | Retail |
| | Chevy Chase Pavilion | SCF | Retail |
| | Chevy Chase Land | GL | Retail/Office |
| Gallery Place | | S, SC, SO | Mixed Commercial (retail, residential, entertainment) – Residential |
| Georgia Avenue | | | Site was sold to the D.C. to accommodate government office building. Project was cancelled. Site is being reoffered for development by the District with WMATA oversight. |
| Greenbelt | | S, SC, SO | Mixed Commercial (office, retail, hotel) – Residential |
| Grosvenor | North Parcel | GL, SC | Residential, retail |
| | South Parcel | S | Mixed Commercial (retail, health club) – Residential |
| Huntington | North | GL | Office, retail |
| | South | S | Residential, open space (12 acre park to be dedicated to Fairfax County by developer) |
| | Montebello Connection | SCF | Residential |
| McPherson | | GL | Office, retail |

| Station Area | Project | Type ⁸⁷ | Land Use |
|------------------------------------|---|--------------------|--|
| Square | | | |
| Metro Center | Columbia Square | GL | Office, retail |
| | May Department Stores I | SCF | Retail |
| | May Department Stores II | SCF | Retail |
| Minnesota Avenue | | S, SC, SO | Office, retail |
| New Carrollton | Amtrak Ticketing/Waiting Room | GL | Retail |
| | Parking Garage | GL | Parking facilities shared with Amtrak |
| | Joint Development Project | | Negotiations with selected developer were terminated. Site is offered in current Joint Development Solicitation. |
| Prince George's Plaza | | GL | Mixed Commercial (office, retail) – Residential |
| Rhode Island Avenue | | GL | Residential, retail |
| Shaw-Howard University | Checkers Restaurant | GL, SO | Retail |
| | Howard University (contract negotiations still in progress) | S | Mixed Commercial (office, retail) – Residential |
| Silver Spring | | GL | Multi-modal Transit Center Mixed Commercial (office, retail) – Residential |
| Takoma | | S, SC | Residential, retail |
| Twinbrook (East & West) | | GL | Mixed Commercial (office, retail) – Residential |
| U Street | Parcels 1 and 9 | S, SC | Residential, retail |
| | Parcels 2 and 3 | S | Residential, retail |
| | Parcels 4, 5 and 6 | S | Residential, retail |
| | Parcel 7 | S | Office, retail |
| Union Station | | SCF | Retail, major railroad station |
| Van Dorn | | GL | Residential, retail |

| Station Area | Project | Type ⁸⁷ | Land Use |
|---------------------------|---------|--------------------|---|
| Van Ness | | GL | Office, retail |
| Vienna | | SCF | Office, residential |
| Western Bus Garage | | GL | Residential, retail over new bus garage |
| Wheaton | | GL, S, SC | Mixed Commercial (office, retail) – Residential |
| White Flint | West | S | County Conference Center, hotel |
| | East | GL | Mixed Commercial (office, retail) – Residential |

Source: Transportation Research Board, 2004