APPENDIX G.

BEST PRACTICES RESEARCH

The following Appendix summarizes research conducted as part of this project that looked at national and Virginia examples of best practices in multimodal planning.

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A. Introduction

Cities and states throughout the country are recognizing the importance of integrating multimodal transportation and transit-oriented development policies with land use planning and urban design. Many agencies and localities have implemented policies and guidelines aimed at providing multimodal transportation options and encouraging supporting development patterns. This document provides a summary of the best practices review of multimodal planning and design, transit-oriented development and multimodal corridor guidelines.

This review focused on identifying examples and best practices in the industry relative to:

- Multimodal Corridor Planning
- Multimodal Corridor Design
- Multimodal Districts
- TOD Typologies and Place Types
- Performance Measures relative to Accessibility and Multimodal Quality of Service

This review also sought to identify the commonalities between various efforts relative to the specific measures and methods for multimodal and TOD guidelines; and identify notable presentation and illustrative elements for effectively communicating information to a broad constituency. This literature review will aid in developing the statewide guidelines and best practices in planning for multimodal districts, corridors and TOD within the Virginia context.

Included in the last section (Section F) is a table summarizing all relevant plans, policies and other literature reviewed as part of this best practices research. From this master list, the study team conducted a more detailed review of select plans and guidelines for inclusion herein as an annotated bibliography.

B. State of the Practice Synthesis and Relevance to Virginia

Research Synthesis

Cities, regions, and national research institutions continue to probe into theories of land use and transportation interaction. The example resources demonstrate the variety of ways to approach land use planning and urban design to promote context sensitive design, enhance community character, maintain appropriate scale, support different transportation choices and grow strategically.

Generally, the context sensitive resources for multimodal design and TOD area plans follow a standard structure of defining land use context and roadway classification, and designing the road or surrounding area accordingly. This approach is consistent with the ITE recommended practice in *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*. This general structure can be used as a starting point for the Virginia Multimodal and Public Space Design Guidelines.

The example resources define land use contexts with a wide spectrum of methodologies. Each community is unique and places differ by many variables. Capturing these similarities and theorizing the structure and organization of how they fit together are challenging tasks. Most cities and metropolitan areas define TOD place types by levels of densities, land use composition, and transit type. Denver's TOD typology is organized in this fashion. Indianapolis's multimodal guidelines address these variables and give additional descriptive information. Utah's Wasatch Front avoids creating specific place types, but specifies the ways in which TODs differ, including place and location, development type, and transit type. The general place types outlined in Reconnecting America and the Center for Transit Oriented Development's *Station Area Planning* are defined by levels of density/intensity, typical uses, and transit type, as well as the reach of economic influence. *Station Area Planning* briefly addresses connections between place types. For example, urban neighborhoods are connected to urban centers and regional centers.

Creating a typology that incorporates all potential station areas within an entire state is a daunting task. The Florida Department of Transportation (FDOT) and the California Department of Transportation (CalTrans) are two state agencies that have made progress on this front, and both use a two-dimensional graph to illustrate the connections between the various scales. FDOT's *A Framework for Transit Oriented Development in Florida* approaches place types according to level of activity and accessibility, and transit type Community context is another major variable and represents a third dimension. CalTrans uses a similar approach but with regional accessibility as one scale and community design as the other. Different place types have different locations within the graph. For example, rural towns have strong community design but weak regional accessibility (see page 34 for image). Both methodologies reveal differences between urban and suburban place types, but this designation is not the primary variable. Accessibility inherently explains differences in urban place types. These methodologies both hold promise and relevance for the Virginia effort.

Metro Portland and the Center for Transit Oriented Development have also developed interesting approaches to place types with a two-dimensional graph, which may also be of use in developing guidelines for Virginia. Metro Portland places level of transit orientation along one axis and market strength along the other. The level of transit orientation assesses things like connectivity of sidewalks, concentration of activities, and mix of uses. Metro uses this methodology to prioritize stations in allocating funds from their TOD program. Of particular use to the Virginia effort may be the repackaging of the "Ds" of density into "Ps" of transit orientation: people (residents and employees per acres), places (retail and services that serve daily needs), pedestrian and bicycle connectivity (presence of sidewalks and low-stress bikeways), performance (transit frequency – bus and rail), and physical form (underlying block structure). In *Performance-Based Transit Oriented Development Typology Guidebook*, the Center for Transit Oriented Development (CTOD) places VMT along one axis and worker intensity along the other.

National resources also emphasize that transit oriented development does not just happen at the station area level. Transit corridors connect the station areas, and station areas fit within larger districts. The market shed of transit trips extends past the typical half-mile radius of a station area.

Ensuring that corridors and areas surrounding the station area are well-planned, context sensitive and provide for safe and convenient travel for all modes is critical.

Like place types, definitions of transit or multimodal corridors vary. Defining corridors and districts for the Virginia Multimodal Guidelines will be a critical task. In *Transit Corridors and TOD*, CTOD defines a transit corridor as the walkable areas around all of the stations along a transit line. However, multimodal corridors produce benefits even when a transit station is not within walking distance. Charlotte, NC, and Roanoke, VA, are two of many cities nationwide who (that?) are developing multimodal corridor guidelines to achieve "Complete Streets" throughout the city regardless whether that street is served by transit.

Multimodal corridors can vary in size depending on the transit type and function. A local bus corridor may be only one mile wide, since passengers typically walk to the transit station. A commuter transit corridor might be 3 to 5 miles wide depending on the speed of the mode that a passenger takes to reach the transit station. Even within one type of transit line, travel patterns between station areas will vary, as recognized in the WMATA *Station and Site Access Planning Manual*. Core stations are accessible by primarily walking, bicycling and bus, whereas passengers rely on non-walking modes to access mid-line and terminus stations. Addressing the complexities between different scales and different market sheds through corridors or districts will be a challenging endeavor and critical for understanding how the pieces fit together for the Virginia statewide effort.

The definition for multimodal transit corridors should also address the overlap between automobile demand and transit service. Within the statewide context, VTrans2035, Virginia's long range transportation plan has identified eleven corridors of statewide significance. Some of these corridors are interstates where high speed regional vehicular travel can be comparable to intercity rail. Other corridors of statewide significance are roads where higher speed regional and lower speed local traffic mix. The Virginia effort will need to address the competing needs of regional and local trips by creating new prototypes or hierarchy of multimodal corridors that accommodate the various modes at each scale. The guidelines will also need to address both the existing and future conditions of communities within Virginia relative to the evolution and growth of transit systems relative to growth of the community as a whole.

The concept of districts is less widely explored. The Indianapolis guidelines provide one way to define a district. A multimodal district is an area where daily destinations are within walking distance and usually within biking distance of a transit node. The concept of districts can bridge the gap between high density station areas and areas outside of the transit market shed.

Based on the best practices review, the Virginia guidelines should first identify the theoretical construct and typologies for station areas, corridors, and districts. From this will come specific design guidelines, measures and variables that can best support multimodal mobility within differing community place types. Determining the scale (in terms of level of detail for statewide prototypes) of recommendations will be a critical decision. The Florida and California statewide examples avoid detailed design guidelines like building transparency and garage treatments and address more macro issues like population and

employment densities. More specific design guidelines are likely best reserved for more detailed station area plans. Broad elements that should be addressed include land use mix and placement, circulation and connectivity, station access and parking and other measures of multimodal mobility and accessibility.

The most interesting example resources did not just focus on design aspects of TOD, but acknowledged that market conditions also play a significant part in actualizing TOD build out over time. Utah's Wasatch Front guidelines explain market conditions as the fourth context in which TODs differ. Metro Portland uses market readiness as a variable in prioritizing investments in TOD.

Implementation strategies varied across the plans reviewed, but were present in most works. Implementation steps provide the guidance on how to translate policies and recommendations into reality. The best policies provide action items/ next steps within an implementation plan, including assigning roles and responsibilities of different players (local governments, transit agencies, developers, and others), creating and adopting strategies (parking management, affordable/ mixed income housing in TODs, etc), developing funding tools, and developing performance measures to track success. This level of implementation guidance should be included in the Virginia work.

Based on the national best practices review, the Virginia Multimodal and Public Space Design Guidelines should include the following key elements:

1. Present overarching principles of values, vision and the reasons for encouraging more efficient land use and transportation patterns and the benefits of targeting growth into areas already served or to be served by transit.
2. Acknowledge variations in community/ land use contexts, and create a system of categorization or classification (typologies, place types, etc.) such that a range of rural to urban conditions are addressed.
3. Discuss the differences in corridor and roadway network functions, character, and influence on surrounding land use, and present a typology or classification for the corridors and multimodal transportation networks necessary to support transit oriented or pedestrian oriented development patterns while at the same time ensuring reasonable levels of vehicular mobility.
4. Provide design guidance for the possible combination of land use place types and multimodal corridor typologies.
5. Present implementation strategies and phased approaches to assist communities in evolving multimodal corridors and districts over time.

The Virginia Context

The Virginia Multimodal and Public Space Guidelines will fill a critical gap in the practices and policies of the Commonwealth. Virginia already has several key policies and resources for integrated multimodal planning and transit supportive development. VTrans2035 and the 2035 Virginia Surface Transportation Plan evidence the Commonwealth's commitment to approach transportation planning that integrates all modes from beginning to end. DRPT's *Transit Service Design Guidelines* provide a solid foundation for defining development levels supportive of transit and providing different options for modes such that all

communities could be served by some form of transit, even if it is only demand response bus. VDOT's policies on context sensitive design and integrating bicycle and pedestrian accommodations have adapted roadway design and construction projects to increase the safety and accessibility for pedestrians and bicyclists. WMATA's *Station Site Access Planning Manual* provides valuable information about how to design for efficient access that fits within the current design protocols.

With the Urban Development Area legislation, Virginia localities are also thinking more about how to focus growth into compact development areas that could also be prime locations for transit service. The Virginia guidelines will help bridge the gap between the generalities of the Transit Service Design Guidelines and the specificity of the Station Site Access Planning Manual. Localities will be able to use this resource to determine the ideal location for multimodal corridors and TODs within their jurisdiction. It will provide guidance on the densities, connections, and other urban design, land use and transportation considerations necessary to make it work, at the station area, corridor and district scales.

DRPT's Amtrak Area Plans provide excellent examples of how TOD can work in Virginia. Arlington County has set the precedent for transit oriented development through numerous policies and plans, and Loudoun County is following by creating new zoning categories for TOD and incorporating TOD language into its comprehensive plan. Other individual localities have initiated TOD planning on their own, namely Tysons' Corner in preparation for the Metro silver line extension and the City of Norfolk in anticipation of its new light rail system.

The lessons learned and best practices from these case studies will influence the development of the guidelines. The Multimodal and Public Space design guidelines will build upon previous Virginia efforts and incorporate exemplar methodologies and approaches from national sources. The ultimate goal of the Virginia guidelines is to provide a resource for transit agencies, localities and other interested parties to identify key land use, urban design and transportation plans, policies and guidelines to create the optimal conditions for getting the best return on their transit investments and syncing up local community growth visions with desired multimodal transportation options.

C. Annotated Bibliography of Select Best Practices

The lists below highlight the selected best practices included in the following pages as an annotated bibliography. Additional resources reviewed are also included in tabular format in the Section F.

Transit-Oriented Development (TOD) Policies and Guidelines:

Reconnecting America and Center for Transit-Oriented Development. *Station Area Planning: How to Make Great Transit-Oriented Places*. Feb 2008.

Reconnecting America and Center for Transit-Oriented Development. *Transit Corridors and TOD: Connecting the Dots*. Dec 2010.

Envision Utah. *Wasatch Front Transit Oriented Development Guidelines*. 2002.

City of Denver Community Planning and Development. *Transit Oriented Development Strategic Plan*. Aug 2006.

Center for Transit-Oriented Development. *Performance-Based Transit-Oriented Development Typology Guidebook*. Dec 2010.

Multimodal Transportation Guidelines:

Institute of Transportation Engineers and Congress for New Urbanism. *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach*. Mar 2010.

City of Charlotte. *Urban Street Design Guidelines*. Oct 2007.

Indianapolis Regional Center & Metropolitan Planning Area. *Multi-Modal Corridor and Public Space Design Guidelines.* Aug 2008.

Caltrans. *Smart Mobility 2010: A Call to Action for the New Decade*. Feb 2010.

City of Boulder. *Multimodal Corridors.*

TOD and Multimodal Transportation Policies and Guidelines in Virginia:

Virginia Department of Rail and Public Transportation. *Transit Service Design Guidelines*. Jul 2008.

Washington Metropolitan Area Transit Authority. *Station and Site Access Planning Manual*. May 2008.

Tysons Land Use Task Force, Fairfax County, Virginia. *Transforming Tysons: Vision and Area Wide Recommendations*. Sep 2008.

City of Roanoke. *Street Design Guidelines.* Jul 2007.

Arlington County's Transit Corridor Growth Strategy.

Virginia's Integrated Multimodal Planning Framework.

1. Station Area Planning: How to Make Great Transit-Oriented Places, *by Reconnecting America and Center for Transit-Oriented Development (Feb 2008)*

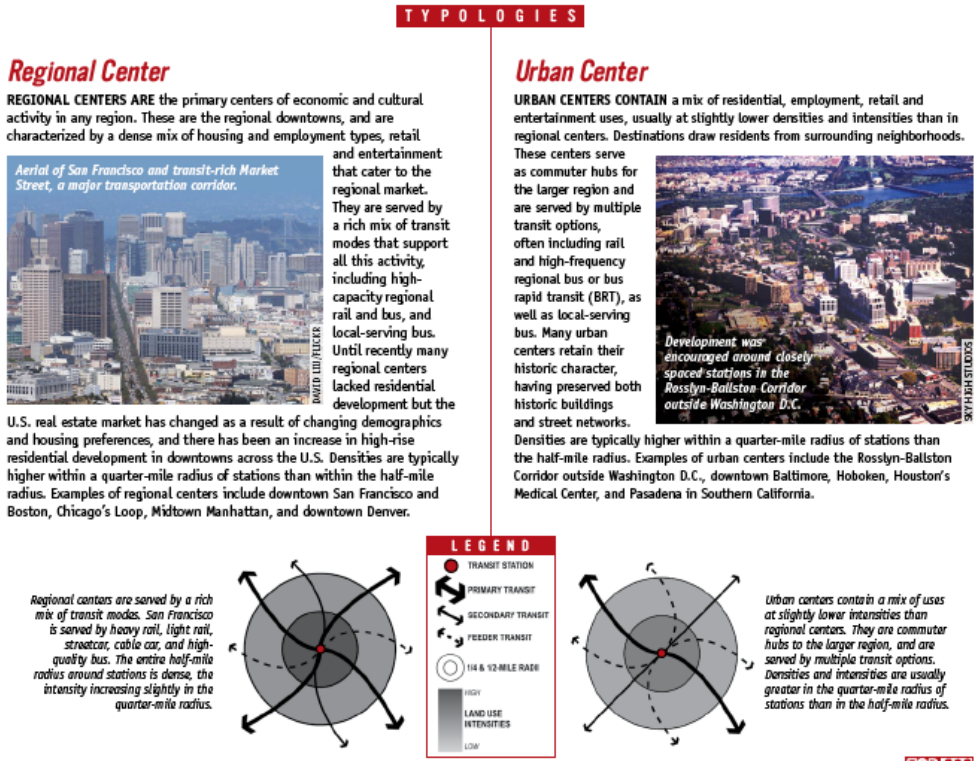
This brief document focuses specifically on TOD station areas and how to achieve TOD that maximizes ridership potential. It defines eight TOD place types and provides nine station area planning principles.

Transit-Oriented Places Typologies

Eight place types are defined: four centers (regional center, urban center, suburban center, and transit town center); three districts (urban neighborhood, transit neighborhood, and special use/ employment district); and one corridor (mixed-use corridor).

Place types are defined according to the type of development within the area, the type of transit that serves them and the characteristics of transit service. For example, a transit neighborhood has lower densities, economic activity is not concentrated around stations, and secondary transit service is less frequent, whereas an urban neighborhood has multiple transit options to regional and urban centers.

Each place type has a description and graphic showing typically how robust and connected the transit system is, and (?) the intensity of surrounding land use. The diagrammatic graphics show each place type with ¼- and ½-mile radius circles around the transit station. In this case, a center and a district have the same spatial scale; districts are neighborhood or special use land uses that are not in an economic 'center'. For example, the Pearl District in Portland and Greenwich Village in NYC are considered urban neighborhoods; they are outside of the huge booming center of the city but still have a robust transit network to facilitate TOD.



TYPOLOGIES

Regional Center

REGIONAL CENTERS ARE the primary centers of economic and cultural activity in any region. These are the regional downtowns, and are characterized by a dense mix of housing and employment types, retail and entertainment that cater to the regional market. They are served by a rich mix of transit modes that support all this activity, including high-capacity regional rail and bus, and local-serving bus. Until recently many regional centers lacked residential development but the U.S. real estate market has changed as a result of changing demographics and housing preferences, and there has been an increase in high-rise residential development in downtowns across the U.S. Densities are typically higher within a quarter-mile radius of stations than within the half-mile radius. Examples of regional centers include downtown San Francisco and Boston, Chicago's Loop, Midtown Manhattan, and downtown Denver.

Aerial of San Francisco and transit-rich Market Street, a major transportation corridor.

DAVID LIU/FLICKR

Urban Center

URBAN CENTERS CONTAIN a mix of residential, employment, retail and entertainment uses, usually at slightly lower densities and intensities than in regional centers. Destinations draw residents from surrounding neighborhoods. These centers serve as commuter hubs for the larger region and are served by multiple transit options, often including rail and high-frequency regional bus or bus rapid transit (BRT), as well as local-serving bus. Many urban centers retain their historic character, having preserved both historic buildings and street networks. Densities are typically higher within a quarter-mile radius of stations than the half-mile radius. Examples of urban centers include the Rosslyn-Ballston Corridor outside Washington D.C., downtown Baltimore, Hoboken, Houston's Medical Center, and Pasadena in Southern California.

Development was encouraged around closely spaced stations in the Rosslyn-Ballston Corridor outside Washington D.C.

SKYHIGHSTUDIOS

Regional centers are served by a rich mix of transit modes. San Francisco is served by heavy rail, light rail, streetcar, cable car, and high-quality bus. The entire half-mile radius around stations is dense, the intensity increasing slightly in the quarter-mile radius.

LEGEND
TRANSIT STATION
PRIMARY TRANSIT
SECONDARY TRANSIT
FEEDER TRANSIT
1/4 & 1/2-MILE RADII
HIGH
LAND USE INTENSITIES
LOW

Urban centers contain a mix of uses at slightly lower intensities than regional centers. They are commuter hubs to the larger region, and are served by multiple transit options. Densities and intensities are usually greater in the quarter-mile radius of stations than in the half-mile radius.

A matrix compares characteristics of each place type (transit mode, peak frequency, land use mix and intensity, and examples) to help readers identify under which category a specific place would fall. Another matrix provides standardized development guidelines (housing mix, density and FAR) within station area for TOD place types. This second matrix is prescriptive for TOD; the first is simply descriptive.

How To Identify A TOD Place Type

TYPOLOGIES

	CENTERS				DISTRICTS			CORRIDOR
	Regional Center	Urban Center	Suburban Center	Transit Town Center	Urban Neighborhood	Transit Neighborhood	Special Use/ Employment District	Mixed-Use Corridor
What are the characteristics of the station area?	Primary center of economic and cultural activity	Significant center of economic and cultural activity with regional-scale destinations	Significant center of economic and cultural activity with regional-scale destinations	Local center of economic and community activity	Predominantly residential district with good access to regional and subregional centers	Predominantly residential district organized around transit station	Local focus of economic and community activity without distinct center	Local focus of economic and community activity without distinct center
What is the transit mode?	All modes	All modes	All modes	Commuter rail, local/regional bus hub, light rail	Heavy rail, LRT/streetcar, BRT, commuter rail, local bus	LRT/streetcar, BRT, commuter rail, local bus	LRT/streetcar, BRT, potentially heavy rail	LRT/streetcar, BRT, local bus
What is the peak frequency of transit?	< 5 minutes	5-15 minutes	5-15 minutes	15-30 minutes	5-15 minutes	15-30 minutes	15-30 minutes	5-15 minutes
What is the land use mix and density?	High-density mix of residential, commercial, employment, and civic/cultural uses	Moderate- to high-density mix of residential, commercial, employment, and civic/cultural uses	Moderate- to high-density mix of residential, commercial, employment and civic/cultural uses	Moderate-density mix of residential, commercial, employment and civic/cultural uses	Moderate- to high-density residential uses with supporting commercial and employment uses	Low- to moderate-density residential uses with supporting commercial and employment uses	Concentrations of commercial, employment and civic/cultural uses, potentially with some residential	Moderate-density mix of residential, commercial, employment and civic/cultural uses
What are the retail characteristics?	Regional-serving destination-retail opportunity; need for local-serving retail	Regional-serving destination-retail opportunity; need for local-serving and community-serving retail	Regional-serving destination-retail opportunity; need for local-serving and community-serving retail	Community-serving and destination-retail opportunity; need for local-serving retail	Primarily local-serving retail opportunity; need for some community-serving retail	Primarily local-serving retail opportunity	Potential for community- and regional-serving retail but need to balance demands for access	Primarily local-serving retail opportunity; need for some community-serving retail
What are the major planning and development challenges?	Integrating dense mix of housing and employment into built-out context	Integrating high-density housing into existing mix of housing and employment to support local-serving retail	Introducing housing into predominantly employment uses and improving connections/access to transit	Increasing densities while retaining scale and improving transit access	Expanding local-serving retail opportunities and increasing high-density housing	Integrating moderate-density housing and supporting local-serving retail	Creating sustainable off-peak uses and accommodating peak travel demand	Expanding local-serving retail opportunities and high-density housing opportunities
Examples	Downtown San Francisco and Boston, Chicago's Loop, Midtown Manhattan, downtown Denver	Rosslyn-Ballston Corridor outside Washington D.C.; downtown Baltimore; Hoboken, New Jersey; Houston's Medical Center	Lindbergh City Center in Atlanta; Evanston, Illinois; Addison Circle outside Dallas; Stamford, Connecticut;	Prairie Crossing in Grayslake outside Chicago; Suisun City in the San Francisco Bay Area; Roslindale Village and Winchester outside Boston	Fruitvale in Oakland, Greenwich Village in New York City, the Pearl District in Portland, University City in Philadelphia	Orlone-Chynoweth outside San Jose; Plano, Texas; Barrio Logan in San Diego; Capitol Hill in Washington D.C.	South of Market in San Francisco, Camden Station in Baltimore, South Waterfront in Portland	International Boulevard in Oakland, Washington Street in Boston, University Avenue in St. Paul, Minnesota

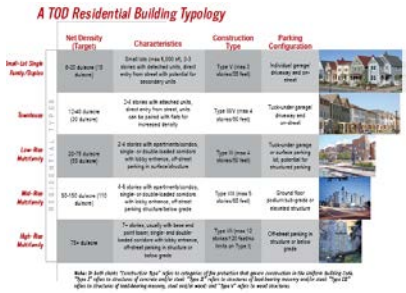
QUESTIONS ARE POSED In this table to help all the station area planning partners identify the areas they are planning within the place typology. The place types in the typology are generalized so as to highlight similarities and differences as well as the parameters that tend to define their land use mix, housing densities, and transit service. Because of this a particular place may not fit exactly into one of these types. All of the characteristics that are identified, defined and quantified are intended to be descriptive and not prescriptive, in the recognition that all places are unique.

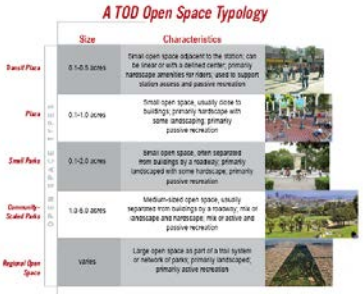
Note: The term "station area" typically refers to the half-mile radius around the station, about 500 acres in size. The term "primary transit mode" refers to the transit types that typically support the place type.

Development Guidelines For TOD Place Types

	CENTERS				DISTRICTS			CORRIDOR
	Regional Center	Urban Center	Suburban Center	Transit Town Center	Urban Neighborhood	Transit Neighborhood	Special Use/ Employment District	Mixed-Use Corridor
Housing Mix (New Development)	High-rise and mid-rise apartments and condos	Mid-rise, low-rise, some high-rise and townhomes	Mid-rise, low-rise, some high-rise and townhomes	Mid-rise, low-rise, townhomes, small-lot single family	Mid-rise, low-rise, townhomes	Low-rise, townhomes, small-lot single family, and some mid-rise	Limited residential potential; mid-rise and high-rise if appropriate	Mid-rise, low-rise, townhomes, with small-lot single family off the corridor
Station Area Total Units Target	8,000-30,000	5,000-15,000	2,500-10,000	3,000-7,500	2,500-10,000	1,500-4,000	2,000-5,000	2,000-5,000
Net Project Density (New Housing)	75-300 du/acre	50-150 du/acre	35-100 du/acre	20-75 du/acre	40-100 du/acre	20-50 du/acre	50-150 du/acre	25-50 du/acre
Station Area Total Jobs Target	40,000-150,000	5,000-30,000	7,500-50,000	2,000-7,500	NA	NA	7,500-50,000	750-1,500
Minimum FAR (New Employment Development)	5.0 FAR	2.5 FAR	4.0 FAR	2.0 FAR	1.0 FAR	1.0 FAR	2.5 FAR	2.0 FAR

The document also provides residential, mixed use/employment and open space building typologies that illustrate the options for achieving TOD density as specified in the place type development guidelines.





Station Area Planning Principles

The document also provides nine planning principles and describes several corresponding strategies for each principle in checklist form for planners to consider throughout the TOD planning effort. The nine planning principles are:

1. Maximize ridership with transit-oriented development
2. Generate meaningful community involvement
3. Design streets for all users
4. Create opportunities for affordable and accessible living
5. Make great public spaces
6. Manage parking effectively
7. Capture the value of transit
8. Maximize neighborhood and station connectivity
9. Implement the plan and evaluate its success

PRINCIPLES

JEFF WOOD/RECONNECTING AMERICA

The needs of pedestrians, bicyclists and transit users are prioritized over the convenience of drivers at this light rail station in downtown Portland.

Design streets for all users:

THE STREETS SURROUNDING transit stations need to support multiple transportation modes — automobiles, buses, pedestrians and bicyclists, taxis — and provide for the safety of all users. The design of intersections and crossings, sidewalks and transit stops should consider the safety of the young, the elderly, and the mobility impaired. This approach to designing streets may necessitate trade-offs due to space constraints, but the needs of pedestrians, bicyclists and transit users should be prioritized over the convenience of automobile drivers.

TOD PLAN CHECKLIST

☐ **Consider TOD-specific street design standards:**
Narrower travel lanes and slower design speeds are often appropriate in transit-oriented neighborhoods. They should be considered in the planning process and the advantages weighed against potential impacts such as lower bus operating speeds and higher operating expenses.

☐ **Consider multimodal performance standards:**
The planning partners should consider adopting performance standards such as levels of service for all modes, including bikes and pedestrians, and other TOD-appropriate standards that don't prioritize access by automobile at the expense of other modes.

☐ **Incorporate bike and pedestrian access:**
All streets in the station area should accommodate bicyclists and pedestrians with wide sidewalks, curb cuts and ramps, audible signals, bike lanes, trails, and bike parking appropriate for anticipated demand. Convenient and fully accessible paths of travel for wheelchair users and the mobility-impaired should be prioritized.

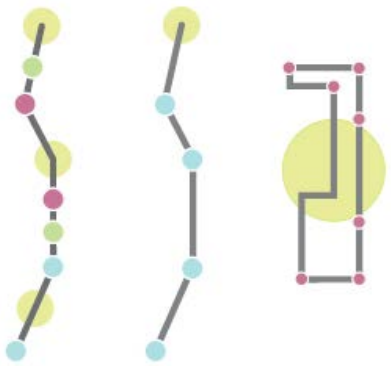
☐ **Prioritize safety and security:**
Plans should address the safety and security of users with design responses including lighting and providing visibility for users and for "eyes on the street."

2. Transit Corridor and TOD: Connecting the Dots
by Reconnecting America and Center for Transit-Oriented Development (Dec 2010)

This report synthesizes the importance of planning for TOD at a corridor scale. This is important because corridor planning integrates the regional and local contexts, creates momentum for TOD implementation, and increases efficient use of public and private resources. The organization of different types of corridors, and the objectives and strategies discussed may prove useful in the discussion of multimodal transit corridors for the statewide Virginia guidelines effort.

Corridor planning typically begins when a new transit investment is proposed. When planning for TOD, a transit corridor is best defined as the walkable areas around all of the stations along a transit line. Any transit technology can define a transit corridor – heavy or light rail, streetcar, trolley or bus. The TOD potential depends more on the design and quality of service than it does on the transit technology.

Three basic corridor types (destination connector, commuter, and district circulator) are defined by what it connects and how these connections influence the overall potential for TOD. A description, examples, and implications for TOD are provided for each corridor type.



Objectives and Strategies for Transit and TOD at the Corridor Level

Each of the following objectives and strategies are discussed and examples of case studies are provided.

Objective	Strategy
Guide growth and development	Understand potential market reaction to transit
Support regional economic growth	Connect residents to activity centers with transit
Enhance regional and local equity	Develop a mixed-income TOD strategy
Promote reinvestment and increase spending power	Create an economic revitalization policy
Invigorate stakeholder engagement and collaboration	Coordinate key stakeholders
Maximize TOD potential and benefits	Establish a phased TOD implementation and investment plan

3. Wasatch Front Transit Oriented Development Guidelines *by Envision Utah (2002)*

These TOD guidelines identify targeted areas for TOD within the Wasatch Front, a large urban area approximately 120 miles long and an average of five miles wide in which 80 percent of Utah's population reside. This resource is particularly relevant to the Virginia statewide guidelines effort as it provides qualitative guidelines for a large region with different types of transit systems and acknowledges variations in context. The report highlights several main concepts of TOD design including circulation, urban design, and parking and transportation demand policy, without providing quantitative parameters and standards for TOD place types. The report has a comprehensive section on implementation and focuses on economic feasibility of TOD.

The Utah Transit Authority operates a combination of bus and light rail service throughout the Wasatch Front region. After the development of the TOD guidelines, the FrontRunner commuter rail service began in 2008 in the northern portion of the region. The report identifies light rail and commuter rail stations as having the best opportunities for transit-oriented growth, as well as high-speed bus corridors and community hubs, places where bus lines, bikeways, trails and sometimes rail will meet.

Applying TOD to Different Contexts

The document outlines four ways in which TODs can differ: by place, by development type, by transit type, and based on economic analysis. General place types are identified, but not discussed relative to the other context variables, acknowledging that the four types of variables are independent of one another. The economic analysis discussion emphasizes the synergistic relationship between a locally appropriate public regulatory framework for TOD and private market forces. This content may be useful to the implementation piece of the Virginia statewide guidelines effort.

Place	Development Type	Transit Type	Economic Analysis
• Urban Core • Urban Neighborhood • Suburban Town Center/ Community Hub • Suburban Employment/ Retail Center • University or Institutional Campus • Park-and-Ride	• Redevelopment of Opportunity Sites (potential for large-scale redevelopment) • Incremental Infill/ Neighborhood Revitalization • New Growth Areas (Greenfields)	• Light Rail • Commuter Rail • Rapid and Feeder Buses	• Regional Economic and Demographic Trends and Projections • Local Real Estate Market Conditions • Specific Opportunity Sites

Ideal TOD Planning Area and Land Use Composition

The ideal planning area for TOD is the area within a half-mile circle around the station area. Barriers to achieving a 360-degree pedestrian oriented district may exist, and connections across such barriers should be maximized.

The document discusses different ways in arranging the land use around transit stations. The most intensely developed **mixed-use core** should loosely comprise the quarter-mile walking radius around the transit station. General guidance on building height and land use mix depending on place type is provided in narrative form. The area surrounding the mixed-use core needs properly designed

secondary employment and residential areas. Relatively lower intensities as compared to the mixed-use core will avoid competition between the same uses. This area should accommodate enough people to support the transit station, but at a smaller neighborhood scale. **Natural, open space and rural areas** are an important aspect in the regional growth picture and should be included in TOD planning. A variety of housing choices for a complete range of incomes is stressed.

General TOD Guidelines

The TOD guidelines provide underlying principles for circulation, urban design, and parking and transportation demand strategies that are applicable for all TODs. Several topic areas are discussed in detail, as listed below. The discussions focus on how these elements affect the station area, and provide general guidance. For example, the discussion of connected street systems emphasizes parallel roads and offers strategies on retrofitting contemporary cul-de-sac subdivisions. The report acknowledges that specifics of the how the guidelines apply will differ depending on the TOD context. These specifics are not provided; they will be addressed in specific station area plans.

Circulation

- Connected street systems
- Small block size
- Traffic calming
- Appropriate Roadway Standards
- Alleys
- Off-street Trails, Bicycle and Pedestrian Pathways

Site and Building Design

- Street-oriented building placement
- Visible and accessible entries
- Garage treatments
- Architectural variation
- Transparency
- Compatible height, massing and style

Public Space Design Strategies

- Streetscaping
- Civic Plaza at transit station
- Landmark features

Station Design

- Connections to adjacent spaces and buildings
- Station amentities
- Transit station as community landmark
- Parking and Loading Areas

Parking and Transportation Demand Policy

- Parking Maximums and Minimums
- Shared Parking
- District Wide Parking
- Parking Structures and On-Street Parking
- Car Sharing
- Parking Pricing
- Other Transportation Demand Management Strategies

The document acknowledges that roadway standards with traditional functional classifications (arterial, collector, and local) do not adequately differentiate between different types of access needs, neighborhood character, or the character of adjacent land uses. To better define the character and livability of a neighborhood or district, street types should be considered. The following chart shows the

differences in user needs and specifies several design characteristics that synthesize the speed and design of the road with the desired context depending on the street type and functional classification.

Functional Class	Street Type	Transit	Side-walks	Bike Facilities	Desired Speed	Traffic Calming	On-Street Parking	Planter Strip	Center Lane	Lane Width	Travel Lanes
ARTERIAL											
	Residential	Accom	5'-10'	Lanes	<35	Some	Yes	Yes	Plant,TL	11'-12'	6-Apr
	Main Street	Priority	10'+	Lanes	<25	Some	Yes	Yes	Plant,TL	11'-12'	6-Apr
	Mixed-Use	Priority	10'+	Lanes	<35	No	Yes	Yes	Paint,TL	12.5'-14'	6-Apr
	Commercial	Priority	5'-10'	Lanes	30-45	No	No	No	Paint,TL	12.5'-14'	6-Apr
COLLECTOR											
	Residential	Accom	5'-9'	Lanes	<35	Yes	Yes	Yes	Plant,TL	9.5'-10.5'	4-Feb
	Main Street	Accom	10'+	Lanes	<25	Possibly	Yes	Yes	TWTL	9.5'-10.5'	4-Feb
	Mixed-Use	Accom	10'+	Lanes	<30	Possibly	Yes	Yes	TWTL	11'-12'	4-Feb
	Industrial	Infreq	5'-6'	Lanes	<30	No	No	No	Paint,TL	12.5'-14'	4-Feb
LOCAL											
	Residential	Infreq	4'-6'	Route	<25	Yes	Yes	Yes	None	9.5'-10.5'	2
	Main Street	Accom	5'-6'	Route	<25	Yes	Yes	Yes	TWTL	9.5'-10.5'	2
	Mixed-Use	Accom	5'-6'	Route	<25	Yes	Yes	Yes	TWTL	11'-12'	2
	Industrial	Infreq	5'-6'	None	<25	No	No	No	None	12.5'-14'	2

Transit:

"Priority" = Regular bus or light rail service with short headways between buses and amenities such at bus stops

"Accomodate" = Regular bus service with longer headways and limited amenities at bus stops

"Infrequent" = Demand-responsive service, such as paratransit, on a limited basis

Center Lanes:

"Plant, TL" = Raised, planted median with turn lanes

"Plant, TL" = Painted median with turn lanes

"TWTL" = Continuous two-way turn lanes

The table in Section F contains several case studies of transit station areas where plans have been developed and the resulting future land use maps and photo renderings for future development.

4. Transit Oriented Development Strategic Plan
by City of Denver, Colorado: Community Planning and Development (Aug 2006)

Between the T-Rex line and FasTracks, Denver is planning 23 new transit station and five new transit corridors. This guide will help city staff to prioritize the planning and implementation activities for TOD. It provides background info on what TOD is and TOD in the Denver context; specific city-wide action strategies to implement TOD, and briefly identifies issues, opportunities and recommendations for transit corridors and station areas. Station area plans are completed or underway for most station areas as separate documents.

TOD Typologies

Recognizing that not all TODs look and function the same way, the Denver TOD typology defines basic station area place types by the overall character and vision without spelling out specific details. The two basic functions of the typologies are to (1) provide enough detail so that if development proposals are submitted prior to completion of the plan, there is some basis for evaluation of its appropriateness, and (2) form a shared vision from which planning process participants can work form to develop the specifics of a station area plan.

TOD Typology	Desired Land Use Mix	Desired Housing Types	Commercial/ Employment Types	Proposed Scale	Transit System Function
Downtown	Office, retail, residential, entertainment, and civic uses	Multi-family and loft	Prime office and shopping location	5 stories and above	Intermodal facility/transit hub. Major regional destination with high quality feeder bus/streetcar connections.
Major Urban Center	Office, retail, residential, entertainment	Multi-family and townhome	Employment emphasis, with more than 250,000 office & 50,000 sf retail	5 stories and above	Sub-Regional destination. Some Park-n-ride. Linked with district circulator transit and express feeder bus.
Urban Center	Office, retail, residential	Multi-family and townhome	Limited office. Less than 25,000 sf office. More than 50,000 sf retail	3 stories and above	Sub-Regional destination. Some Park-n-ride. Linked with district circulator transit and express feeder bus.
Urban Neighborhood	Residential, neighborhood retail	Multi-family townhome, small lot single-family	Local-serving retail. No more than 50,000 sf	2-7 stories	Neighborhood walk-up station. Very small Park-n-ride, if any. Local bus connections.
Commuter Town Center	Office, retail, residential	Multi-family townhome, small lot single-family	Local and commuter-serving. No more than 25,000 sf	2-7 stories	Capture station for in-bound commuters. Large Park-n-ride with local and express bus connections.
Main Street	Residential, neighborhood retail	Multi-family	Main street retail infill	2-7 stories	Bus or streetcar corridors. District circulator or feeder transit service. Walk-up stops. No transit parking.
Campus/ Special Events Station	University Campus, Sports Facilities	Limited multi-family	Limited office/retail	Varies	Large Commuter destination. Large parking reservoirs but not necessarily for transit.

Downtown

Major Urban Center

Urban Center

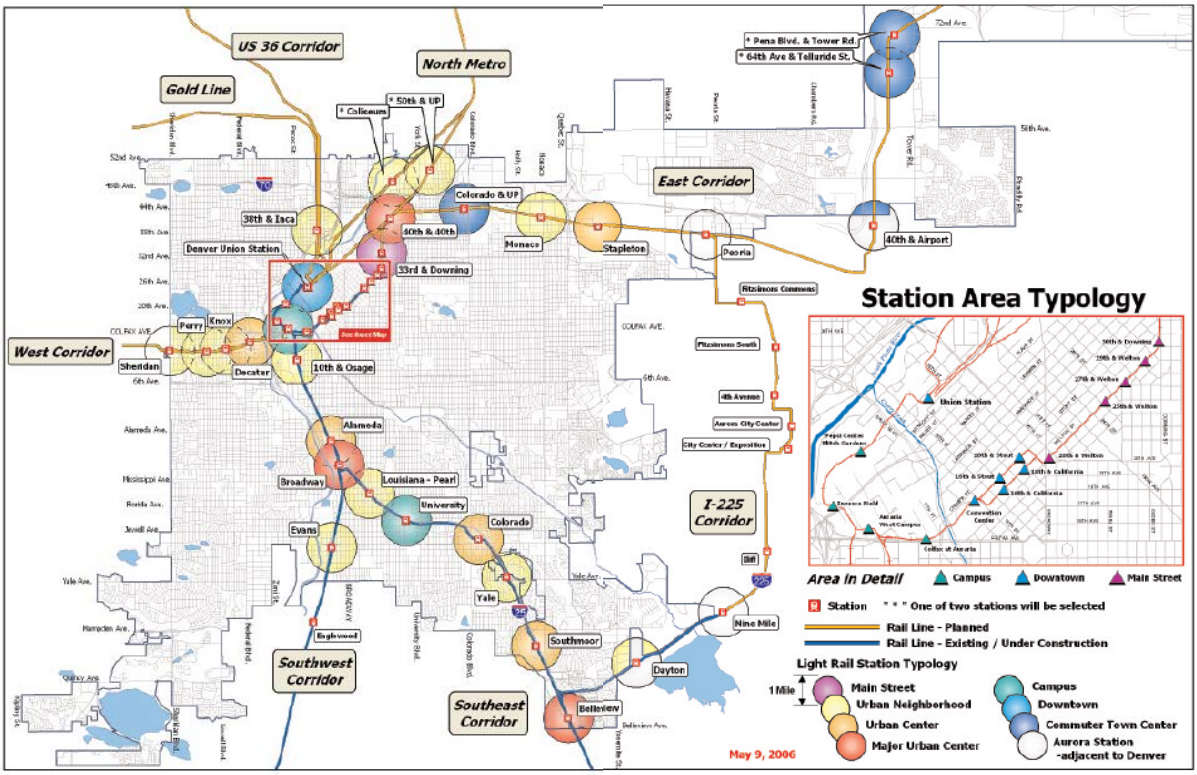
Urban Neighborhood

Commuter Town Center

Main Street

Campus/Special Events Station

Thirty-two existing and future transit station areas were assigned a TOD typology and priority. Issues, conditions and recommendations for each station area are identified. The discussion of station areas is organized by transit corridor.



Downing Street Stops

TOD Typology: Main Street

Priority: Monitor and Respond

Issues and Conditions: In addition to the station at 30th & Downing, one or two additional stations are anticipated to be added between 30th and 40th. Much of this land has an opportunity over a period of time to redevelop. It will be important for the City to ensure that new projects and the transit system respect the established character of the area.

Recommendations:

- Consider carefully the street cross-section in conjunction with the extension of light rail or alternatively, the use of a street car to assure that a pedestrian and development friendly atmosphere is created.
- Determine whether Main Street zoning should be applied to this corridor.
- Monitor and respond to opportunities as necessary.

30th and Downing Street

The document identifies six principles that should be addressed in each station area plan: design guidelines: land use mix & placement, circulation & connectivity, station access & station planning, public realm, and parking.

Citywide Policy and Action Recommendations

After a review of the City's plans and policies that recognize and support TOD principles, it identifies citywide policy and action recommendations to address policy gaps:

1. Fine-tune roles and responsibilities between the transit authority and the council of governments.
2. Adopt the TOD typology and encourage the region to embrace a common definition of TOD.
3. Engage in proactive planning and zoning.
4. Adopt a package of TOD parking and parking management strategies
5. Focus funding tools on TOD and create new tools
6. Prepare an affordable and mixed-income housing strategy for TOD
7. Develop a public housing renewal strategy

This plan provides a good model for incorporating necessary policies at the city-wide level and assessing economic market for each station area. Design recommendations for the corridors and station areas are lacking. There are no quantitative parameters or standards as these to be addressed in individual station area plans.

This document was completed in 2006. Since then, many station areas have completed station area plans. The progress is available online at http://www.denvergov.org/StationAreas/tabid/395230/Default.aspx.

5. Performance-Based Transit-Oriented Development Typology Guidebook *by Center for Transit-Oriented Development (Dec 2010)*

The purpose of this research effort was to develop a performance-based typology that TOD practitioners and decision makers can use to identify the different conditions that exist in places and to determine the form that TOD takes. This tool will help to answer questions like: What economic, environmental and social outcomes can we expect from investments in transit and TOD? What differentiates transit-oriented development from transit-adjacent development? What standards should be utilized in evaluating zoning for TOD or other policy interventions?

Rail TODs are organized into nine place types according to VMT and the percentage of workers to residents. The report compares other characteristics relative to the place types (e.g. auto ownership, transportation costs, commute travel behavior, employment proximity, and urban form). Case studies are provided for each place type. The report also includes scenario studies to analyze the effect of additional growth in reducing VMT. A template is provided for communities to assess station areas in comparison to others, and this tool can be used to determine how to lower VMT in an individual zone.

TOD Typology

The typology creates 15 distinct place types by identifying the number of miles the typical household within each transit zone will travel in a year and whether the area is primarily residential, employment, or a balance of the two. Understanding where an individual transit zone sits in this spectrum, or how all of the transit zones in a region compare to one another can make it easier for stakeholders to identify strategies to reduce VMT or to take advantage of existing low VMT places. The 15 place types are organized by VMT on the vertical axis and use mix on the horizontal axis.

Table 1. VMT Types

Household VMT Type	VMT Range
1 – Low	< 9,100
2 – Low-Moderate	9,100 to 11,600
3 – Moderate	11,600 to 14,300
4 – High-Moderate	14,300 to 17,200
5 - High	> 17,200

Table 2. Use Mix Types

Use Mix Type	Percentage of workers relative to workers and residents
1 primarily residential	33.3% or less
2 balanced	33.3% to 66.7%
3 primarily employment	66.7% or more

Figure 4: Performance-Based Place Types

The purpose of this typology is to compare place types within a system or across multiple systems. Putting transit zones into their regional contexts illuminates the differences in TOD performance. The report compares the station area place types within the Chicago region and between the Chicago and San Francisco Bay Area regions.

Figure 5: All Stations Sorted into Performance-Based TOD Typology

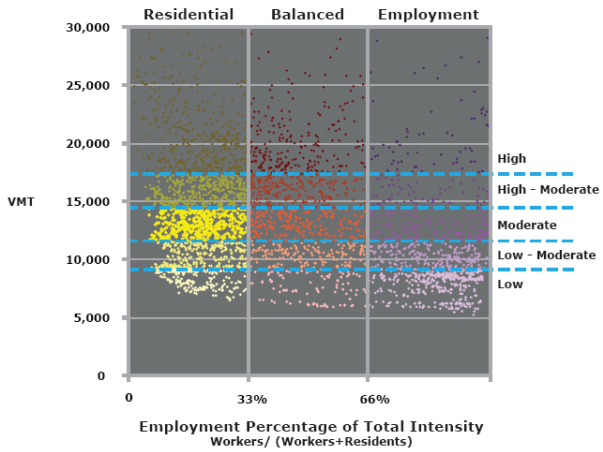


Figure 6. Chicago Region Place Types

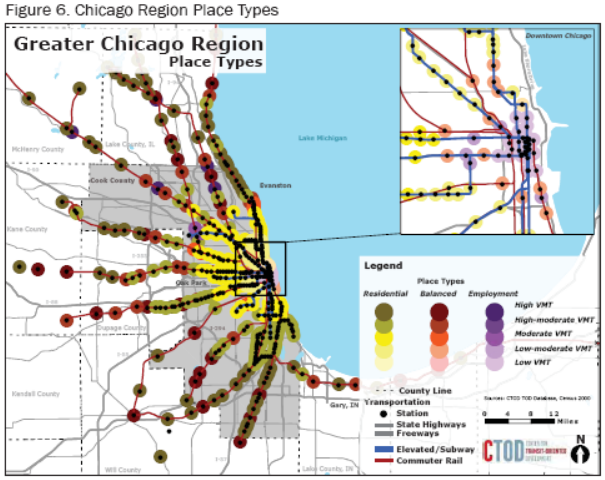


Table 4. Normative Metrics

Place Types	Residential Places					Balanced Places					Employment Places				
	Low VMT	Low-Mod VMT	Mod VMT	High-Mod VMT	High VMT	Low VMT	Low-Mod VMT	Mod VMT	High-Mod VMT	High VMT	Low VMT	Low-Mod VMT	Mod VMT	High-Mod VMT	High VMT
Total Intensity (residents + workers)	54,215	24,717	12,581	7,708	3,430	64,155	21,762	11,599	6,867	3,242	109,306	34,914	13,009	5,969	2,326
Residents	44,293	20,106	10,229	6,292	2,716	29,875	10,732	5,884	3,695	1,764	12,581	5,103	2,065	1,154	321
Workers	9,923	4,612	2,351	1,416	713	34,280	11,031	5,716	3,172	1,478	96,725	29,811	10,944	4,815	2,004
Workers/Residents	18.3%	19.5%	19.6%	20.3%	19.6%	51.6%	49.7%	48.2%	46.0%	46.2%	86.5%	83.9%	84.2%	83.0%	87.1%
Households	16,214	7,684	3,906	2,253	974	15,466	4,646	2,429	1,467	670	6,828	2,524	861	467	120
Household Size	2.71	2.61	2.62	2.71	2.68	1.95	2.21	2.41	2.43	2.60	1.58	1.67	2.22	2.28	2.64
Gross Density (units/acre)	50.0	21.6	10.3	5.7	2.2	48.7	16.4	7.6	4.0	1.9	28.5	10.3	4.6	2.2	0.9
Residential Density (units/acre)	53.2	23.6	12.1	6.7	3.4	55.6	20.9	10.5	5.8	3.5	51.4	20.6	10.8	6.0	2.9
Block Size (acres)	4.2	4.1	5.7	7.7	18.8	3.7	5.8	8.5	9.9	23.7	3.7	6.4	14.2	69.9	86.7
Monthly T Cost	$422	$563	$688	$781	$906	$394	$597	$721	$794	$900	$463	$613	$713	$793	$920
Yearly T Cost	$5,060	$6,752	$8,255	$9,377	$10,872	$4,732	$7,166	$8,647	$9,526	$10,796	$5,560	$7,360	$8,550	$9,518	$11,041
Average Median Income (1999)	$31,713	$35,643	$41,344	$53,492	$62,069	$43,997	$37,364	$43,395	$51,138	$65,544	$41,875	$34,183	$43,935	$40,985	$57,562
Travel Time to Work (minutes)	35.6	31.4	27.4	25.5	24.7	23.5	22.1	21.4	21.6	22.9	18.0	17.1	18.7	19.0	21.5
Employment Proximity	233,890	127,448	65,640	42,260	20,788	451,725	152,310	73,393	41,335	27,131	396,277	159,118	99,648	58,747	32,167
Transit Access Index	31	19	13	10	3	56	28	11	9	4	85	45	19	10	4
Autos/Household	0.45	0.82	1.18	1.47	1.71	0.52	0.87	1.22	1.41	1.68	0.48	0.74	1.11	1.18	1.61
Home Journey to Work Transit	58%	39%	23%	15%	8%	43%	25%	14%	10%	8%	25%	16%	13%	9%	5%
Home Journey to Work Walk/Bike/ Transit	68%	47%	27%	18%	10%	64%	40%	23%	15%	11%	58%	37%	24%	18%	9%
Workplace Journey to Work Transit	33%	20%	11%	7%	2%	38%	17%	8%	5%	3%	38%	16%	9%	5%	3%
Workplace Journey to Work Walk/Bike/ Transit	47%	30%	18%	12%	6%	48%	23%	12%	8%	5%	43%	19%	11%	7%	5%

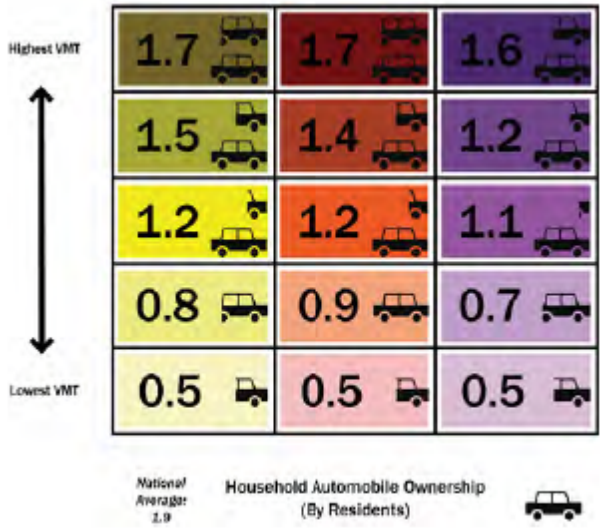
Normative Metrics

In addition to VMT and use mix, each place type has other characteristics such as travel time to work, average median income, auto ownership per household, and gross density that can be used to evaluate performance. These other characteristics are 'normative metrics.' When generalized by place type, they can identify common trends.

Key Findings

Auto Ownership & Transportation Costs:
Transit zones in low VMT places types tend to have low transportation costs and low rates of automobile ownership. Auto ownership in the lowest VMT places average 0.5 cars per household.

Commute Travel Behavior:
Low VMT place types exhibit more transit ridership and higher rates of walking and biking to work than high VMT transit zones. This finding is equally true of commutes by residents living in transit zones and commutes by workers who work in transit zones. Transit commute mode share in the lowest VMT place types is from 5 to 11 times greater than the national average.



Low VMT transit zones have lower car ownership rates

Employment Proximity:
Low VMT transit zones are located much closer to employment than high VMT transit zones. A typical low VMT place is proximate to ten times more jobs than the highest VMT places.

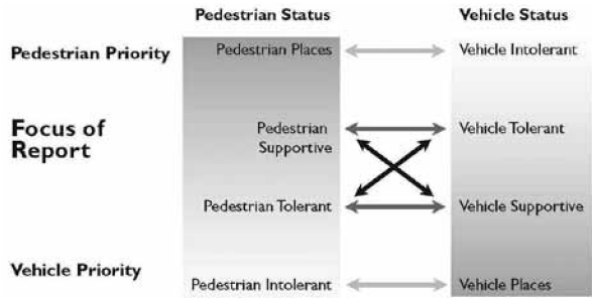
Urban Form:
Low VMT transit zones tend to have more intensity (residents + workers) and higher residential densities than high VMT transit zones. Residential densities in low VMT transit zones are over 15 times as high compared to high VMT transit zones. Additionally, transit zones have smaller block sizes.

Scenarios to Reduce VMT
Several scenarios were conducted to see how new development within station areas would impact VMT. The scenarios show broad pictures of VMT reductions possible with increases in housing and employment.

The typology tool can help prioritize areas for growth by showing where these changes can be most impactful. For example, researchers analyzed how adding 2,000 households to two different station areas in St. Louis would affect VMT. The overall VMT savings obtained from having new residential growth happen near transit stations is significant in both examples. But because the number of people living around Forest Park is much higher, the benefits from even small reductions in VMT are also higher.

6. Designing Walkable Urban Thoroughfares: A Context Sensitive Approach *by Institute of Transportation Engineers and Congress for New Urbanism (Mar 2010)*

This report provides guidance for the design of walkable urban thoroughfares in places that currently support the mode of walking and in places where the community desires to provide a more walkable thoroughfare, and the context to support them in the future. It focuses primarily on arterials and collectors. This document is the industry standard for Context Sensitive Solutions (CSS) and walkable thoroughfare design. It includes many details related to corridor design and process. Application is generally limited to low-speed, urban arterials and collectors, streets that require tradeoffs between pedestrian and vehicle priority. Separate sections highlight various elements of the planning and design process.



CSS in the Transportation Planning Process

The planning section contains chapters about transportation planning and project development process, addressing how CSS can be applied at each stage and how CSS can be applied at different scales (network, region, and corridor).

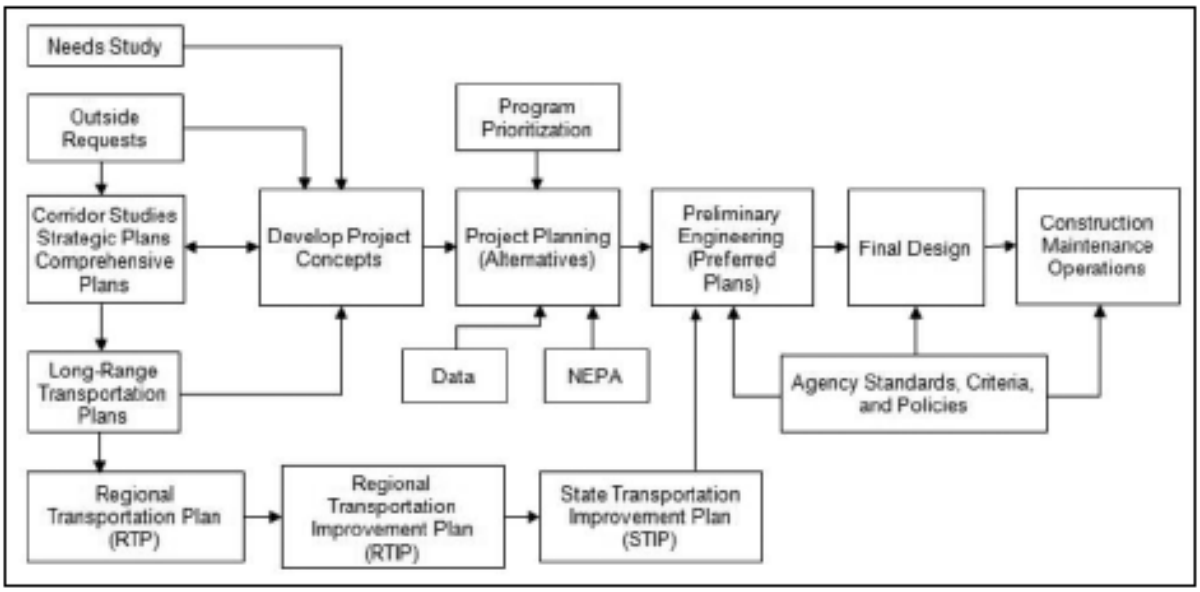


Figure 2.2 Transportation planning and project development processes. Source: Kimley-Horn and Associates, Inc.

Framework for Walkable Urban Thoroughfare Design

The process essentially boils down to three key steps:

1. Identify the roadway's context zone, functional classification, and thoroughfare type
2. Based on the decisions made in step one, establish parameters for the size and scale of the road, including the roadway's target/design speed and the design/control vehicle
3. Design the roadway to best fit the characteristics of its context zone and thoroughfare type, focusing on four major elements or "realms":
    a. Context (e.g. building scale, facades, and orientation)
    b. Streetside (e.g. sidewalks, landscaping, street furniture, and transit stops)
    c. Traveled way (e.g. bicycle, transit and vehicle lanes, and medians)
    d. Intersections (e.g. corner and mid-block crossings, signals, striping, and turn lanes)

Context zones describe the physical form and character of a place. Context zone is a primary consideration in selecting design parameters of urban thoroughfares. Context is defined by multiple parameters, including land use, density and design features.

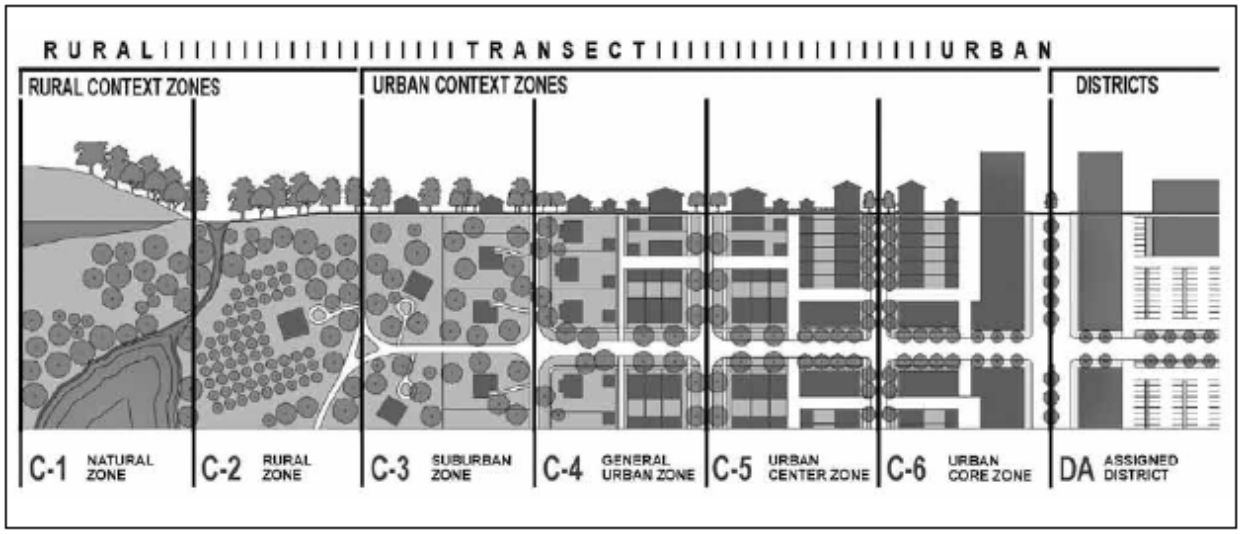


Figure 4.4 Illustration of a gradient of development patterns ranging from rural in Context Zone 1 (C-1), to the most urban in C-6. Source: Duany Plater-Zyberk and Company.

Functional classification defines a thoroughfare's function and role in the network and governs the selection of certain design controls. Functional class may determine continuity through a region and the types of places it connects, purpose and lengths of trips accommodated, level of land access and level of access management, type of freight service, and types of public transit services.

Thoroughfare type governs the selection of the thoroughfare's design criteria and, along with the surrounding context is used to determine the physical configuration of the thoroughfare.

Table 4.3 Relationship Between Functional Classification and Thoroughfare Type

Functional Classification	Thoroughfare Types						
	FREEWAY/ EXPRESS-WAY/PARK-WAY	RURAL HIGHWAY	BOULEVARD	AVENUE	STREET	RURAL ROAD	ALLEY/REAR LANE
Principal Arterial	■	■	■	■	■		
Minor Arterial		■	■	■	■		
Collector				■	■	■	
Local					■	■	■

Shaded cells represent thoroughfare types that are not addressed in this report

Table 4.4 Urban Thoroughfare Characteristics

Urban Thorough-fare Type	Number of Through Lanes	Desired Operating Speed (mph)	Transit Service Emphasis	Median	Driveway Access	Curb Parking	Pedestrian Facilities [1]	Bicycle Facilities	Freight Mvmt. [2]
Freeway	4 to 6+	45–65	Express	Required	No	No	No	Optional sepa-rated pathway or shoulder	Regional truck route
Expressway/ Parkway	4 to 6	45–55	Express	Required	No	No	Optional sepa-rated pathway	Optional sepa-rated pathway or shoulder	Regional truck route
Boulevard	4 to 6	30–35	Express and Local	Required	Limited	Optional	Sidewalk	Bike lanes or parallel route	Regional truck route
Multiway Boulevard	4 to 6	25–35	Express and Local	Required on access lanes	Yes from access lane	Yes on access roadway	Sidewalk		Regional route/ local deliveries only on access roadway
Avenue	2 to 4	25–30	Local	Optional	Yes	Yes	Sidewalk	Bike lanes or shared	Local truck route
Street	2	25	Local or none	No	Yes	Yes	Sidewalk	Shared	Local deliveries only
Rural Road	2	25–35	Local or none	No	Yes	No	No	Shared or shoul-der	Local deliveries only
Local Street	2	25	Local or none	No	Yes	Yes	Sidewalk	Shared	Local deliveries only
Alley/Rear Lane	1	5–10	None	No	Yes	No	Shared	Shared	Local deliveries only

Shaded cells represent thoroughfare types that are not addressed in this report

Notes:

[1] Boulevard, Multiway Boulevard, Avenue, and Street thoroughfare types have sidewalks on both sides. Sidewalk width varies as a function of context zone, fronting land use and other factors.

[2] Freight movement is divided into three categories: 1) Regional truck route, 2) Local truck route and 3) Local deliveries only. Cells show highest order of truck movement allowed.

The remainder of the document provides specific design standards, similar to those found in other road design manuals, for different combinations of context zones, thoroughfare types and predominant land uses. Design standards include not just parameters between the edges of the pavement, but also streetside parameters. Intersection design guidelines are also provided.

7. Urban Street Design Guidelines
by City of Charlotte, North Carolina (October 2007)

Charlotte's Urban Street Design Guidelines acknowledge conflicts between road users (pedestrians, motorists, neighbors, etc) and provide design guidelines and standards for road segments and intersections. These guidelines are intended to fit with the City's Transportation Action Plan (TAP) and the Centers, Corridors and Wedges growth framework.

Multiple Users

The document explains the often conflicting needs and desires of all road users including pedestrians, cyclists, motorists, transit and neighbors. An extensive matrix identifies the tradeoffs of design elements from different users' perspectives. For example, on-street parking helps shield pedestrians from moving traffic, yielding a positive impact for pedestrians and neighbors, but mixed impact for cyclists, motorists and transit because it slows traffic and opening car doors present potential safety hazards for cyclists.

		Pedestrians	Cyclists	Motorists	Transit*	Neighbors
Cyclists Want Safer Crossings						
Consider the following elements to increase cyclists' visibility:						
Bike Boxes	Brings cyclists into drivers' sight; allows cyclists a headstart through an intersection; should provide bike lane approaching intersection	◆	◆	◇	◇	◇
Drop Bike Lane at Intersection	Achieves same as bike box, but without designated space; casual cyclists may feel less comfortable, although it is considered safer to drop the lane and have cyclists merge earlier for left-turns if there is no bike box	◆	◇	◇	◇	◇
Leading Bike Signal	Allows cyclists a headstart through the intersection; requires driver and cyclist education	◇	◇	◆	◆	◇
Short Blocks	Create more intersections, but potentially smaller intersections; more opportunities to avoid high volume routes; can potentially calm traffic and allow more opportunities for safe crossing treatments	◆	◆	◆	◆	◆

◆ - Positive Impact ◆ - Negative Impact ◇ - Mixed Impact or Use With Caution ◇ - Neutral

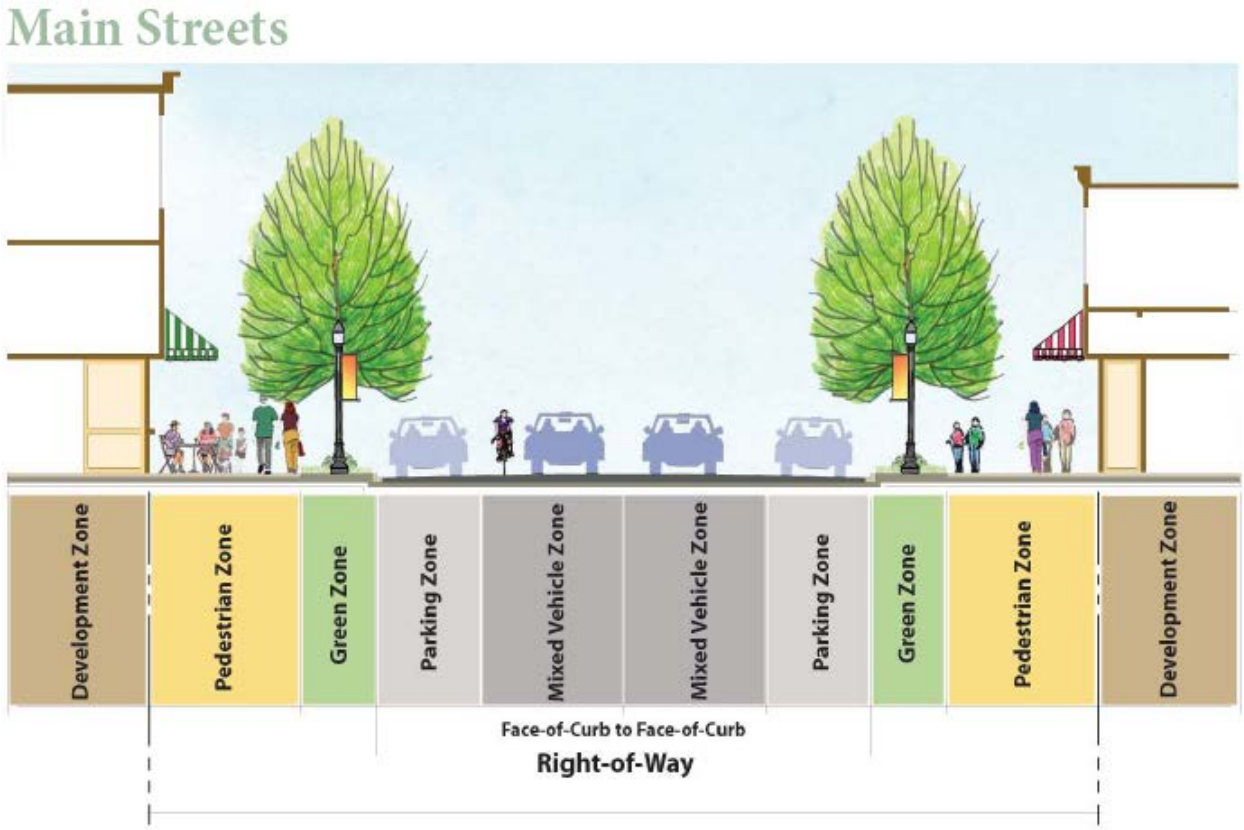
A six-step process is provided on how to apply these guidelines to reflect the appropriate context and provide for the safety and comfort of all users to the best extent possible.

1. Define Land Use Context
2. Define Transportation Context
3. Identify Deficiencies
4. Describe Future Objectives
5. Define Street Type and Initial Cross-Section
6. Describe Tradeoffs and Select Cross-Section

Steps 5 and 6 may be repeated if the initial cross-section should be refined to better address the transportation and land use objectives.

Detailed Guidelines

Chapters 4 and 5 contain the detailed guidelines for street segments and intersections. The segment guidelines are organized by street type, as specified in the Transportation Action Plan. The five street types (Main Street, Avenues, Boulevards, Parkways, and Local Streets) follow a continuum where main streets are the most pedestrian-oriented and parkways are the most auto-oriented. For each street type, the segment guidelines show a generalized cross-section with different zones and discuss a variety of design elements including posted speed, number of through lanes, lane width, sidewalks, on-street parking, curb extensions, lighting, block length, utilities, traffic calming, medians, pedestrian crossings, bus stops, bike lanes, planting strips, driveways and pedestrian refuges. The guidelines specify which design features are appropriate for each street type.



The intersection guidelines are organized by street type, similarly to the segment guidelines. The intersection guidelines contain a matrix that specifies which design elements are appropriate for different types of intersection approaches. For example, at a main street intersection, the pedestrian level of service (LOS) objective for the main street approach is LOS A, whereas it is LOS B for avenue or boulevard approaches. The design elements for intersections include pedestrian and bicycle LOS objectives, motor vehicle v/c threshold, median, pedestrian refuge, number of through lanes, left turn

lane, bike lanes, curb extensions, bus stops, curb radii, crosswalks, ADA ramps, traffic control, and lighting among others.

The final chapter is a glossary, which describes the purpose, benefits and design considerations for different elements within the guidelines. It includes graphics of many design elements.

The appendices define the methodologies for calculating pedestrian and bicycle level of service and contain design guidelines for curb return radii.

8. Multi-Modal Corridor and Public Space Design Guidelines *by Indianapolis Regional Center & Metropolitan Planning Area (Aug 2008)*

A multi-modal transportation system is a network of facilities designed for joint use with connections between two or more modes of transportation. This manual proposes recommendations for development of multi-modal facilities in order to realize the vision of a balanced transportation system.

Planning Guidelines

This section describes the planning concepts behind the development of the guidelines. The guidelines describe multi-modal district types and their proposed locations in the Metropolitan Planning Area. Then, a number of corridor typologies that serve the needs of the districts are described, corridor overlays (or special characteristics pertaining to certain districts or corridors) and some recommended transitions between multi-modal corridors.

Districts and Corridors

The basic corridor framework of the district is composed of placemaking corridors at the center containing the district node, thru corridors at the district edge and connector corridors connecting the two. Local corridors access the balance of the district.

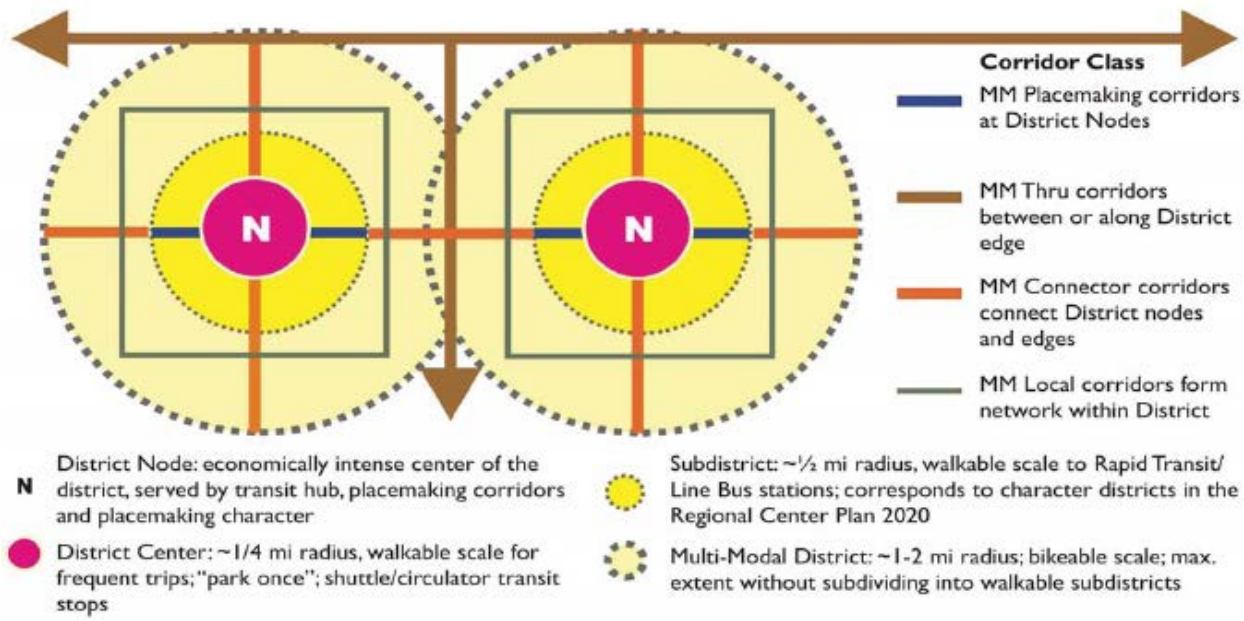
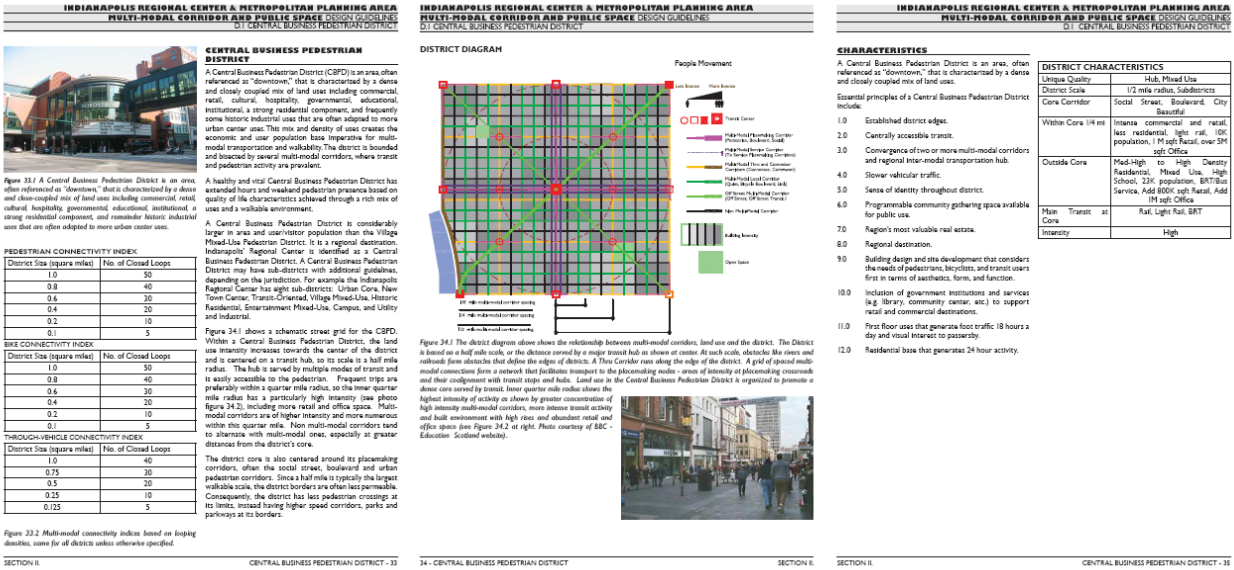


Figure ES.5 Schematic of the relationship between corridors and districts.

District Typologies

1. Central Business
2. Village Mixed-Use
3. Cultural
4. Campus
5. Transit-Oriented
6. Village Residential



INDIANAPOLIS REGIONAL CENTER & METROPOLITAN PLANNING AREA
MULTI-MODAL CORRIDOR AND PUBLIC SPACE DESIGN GUIDELINES
D1 CENTRAL BUSINESS PEDESTRIAN DISTRICT

CENTRAL BUSINESS PEDESTRIAN DISTRICT

A Central Business Pedestrian District (CBPD) is an area, often referenced as "downtown," that is characterized by a dense and closely coupled mix of land uses including commercial, retail, cultural, hospitality, governmental, educational, institutional, a strong residential component, and frequently some historic industrial uses that are often adapted to more urban center uses. This mix and density of uses creates the economic and user population base imperative for multi-modal transportation and walkability. The district is bounded and bisected by several multi-modal corridors, where transit and pedestrian activity are prevalent.

A healthy and vital Central Business Pedestrian District has extended hours and weekend pedestrian presence based on quality of life characteristics achieved through a rich mix of uses and a walkable environment.

A Central Business Pedestrian District is considerably larger in area and user/visitor population than the Village Mixed-Use Pedestrian District. It is a regional destination. Indianapolis' Regional Center is identified as a Central Business Pedestrian District. A Central Business Pedestrian District may have sub-districts with additional guidelines, depending on the jurisdiction. For example the Indianapolis Regional Center has eight sub-districts: Urban Core, New Town Center, Transit-Oriented, Village Mixed-Use, Historic Residential, Entertainment Mixed-Use, Campus, and Utility and Industrial.

Figure 34.1 shows a schematic street grid for the CBPD. Within a Central Business Pedestrian District, the land use intensity increases towards the center of the district and is centered on a transit hub, so its scale is a half mile radius. The hub is served by multiple modes of transit and is easily accessible to the pedestrian. Frequent trips are preferably within a quarter mile radius, so the inner quarter mile radius has a particularly high intensity (see photo figure 34.2), including more retail and office space. Multi-modal corridors are of higher intensity and more numerous within this quarter mile. Non multi-modal corridors tend to alternate with multi-modal ones, especially at greater distances from the district's core.

The district core is also centered around its placemaking corridors, often the social street, boulevard and urban pedestrian corridors. Since a half mile is typically the largest walkable scale, the district borders are often less permeable. Consequently, the district has less pedestrian crossings at its limits, instead having higher speed corridors, parks and parkways at its borders.

Figure 33.1 A Central Business Pedestrian District is an area, often referenced as "downtown," that is characterized by a dense and close-coupled mix of land uses including commercial, retail, cultural, hospitality, governmental, educational, institutional, a strong residential component, and remainder historic industrial uses that are often adapted to more urban center uses.

PEDESTRIAN CONNECTIVITY INDEX

District Size (square miles)	No. of Closed Loops
1.0	50
0.8	40
0.6	30
0.4	20
0.2	10
0.1	5

BIKE CONNECTIVITY INDEX

District Size (square miles)	No. of Closed Loops
1.0	50
0.8	40
0.6	30
0.4	20
0.2	10
0.1	5

THROUGH-VEHICLE CONNECTIVITY INDEX

District Size (square miles)	No. of Closed Loops
1.0	40
0.75	30
0.5	20
0.25	10
0.125	5

Figure 33.2 Multi-modal connectivity indices based on looping densities, same for all districts unless otherwise specified.

SECTION II. CENTRAL BUSINESS PEDESTRIAN DISTRICT - 33

INDIANAPOLIS REGIONAL CENTER & METROPOLITAN PLANNING AREA
MULTI-MODAL CORRIDOR AND PUBLIC SPACE DESIGN GUIDELINES
D1 CENTRAL BUSINESS PEDESTRIAN DISTRICT

DISTRICT DIAGRAM

People Movement

Figure 34.1 The district diagram above shows the relationship between multi-modal corridors, land use and the district. The District is based on a half mile scale, or the distance served by a major transit hub as shown at center. At such scale, obstacles like rivers and railroads form obstacles that define the edges of districts. A Thru Corridor runs along the edge of the district. A grid of spaced multi-modal connections form a network that facilitates transport to the placemaking nodes - areas of intensity at placemaking crossroads and their conjoinment with transit stops and hubs. Land use in the Central Business Pedestrian District is organized to promote a dense core served by transit. Inner quarter mile radius shows the highest intensity of activity as shown by greater concentration of high intensity multi-modal corridors, more intense transit activity and built environment with high rises and abundant retail and office space (see Figure 34.2 at right. Photo courtesy of BBC - Education Scotland website).

34 - CENTRAL BUSINESS PEDESTRIAN DISTRICT SECTION II.

INDIANAPOLIS REGIONAL CENTER & METROPOLITAN PLANNING AREA
MULTI-MODAL CORRIDOR AND PUBLIC SPACE DESIGN GUIDELINES
D1 CENTRAL BUSINESS PEDESTRIAN DISTRICT

CHARACTERISTICS

A Central Business Pedestrian District is an area, often referenced as "downtown," that is characterized by a dense and closely coupled mix of land uses.

Essential principles of a Central Business Pedestrian District include:

1.0 Established district edges.
2.0 Centrally accessible transit.
3.0 Convergence of two or more multi-modal corridors and regional inter-modal transportation hub.
4.0 Slower vehicular traffic.
5.0 Sense of identity throughout district.
6.0 Programmable community gathering space available for public use.
7.0 Region's most valuable real estate.
8.0 Regional destination.
9.0 Building design and site development that considers the needs of pedestrians, bicyclists, and transit users first in terms of aesthetics, form, and function.
10.0 Inclusion of government institutions and services (e.g. library, community center, etc.) to support retail and commercial destinations.
11.0 First floor uses that generate foot traffic 18 hours a day and visual interest to passersby.
12.0 Residential base that generates 24 hour activity.

DISTRICT CHARACTERISTICS	
Unique Quality	Hub, Mixed Use
District Scale	1/2 mile radius, Subdistricts
Core Corridor	Social Street, Boulevard, City Beautiful
Within Core 1/4 mi	Intense commercial and retail, less residential, light rail, 10K population, 1 M sqft Retail, over 5M sqft Office
Outside Core	Med.-High to High Density Residential, Mixed Use, High School, 23K population, BRT/Bus Service, Add 800K sqft Retail, Add 1M sqft Office
Main Transit at Core	Rail, Light Rail, BRT
Intensity	High

SECTION II. CENTRAL BUSINESS PEDESTRIAN DISTRICT - 35

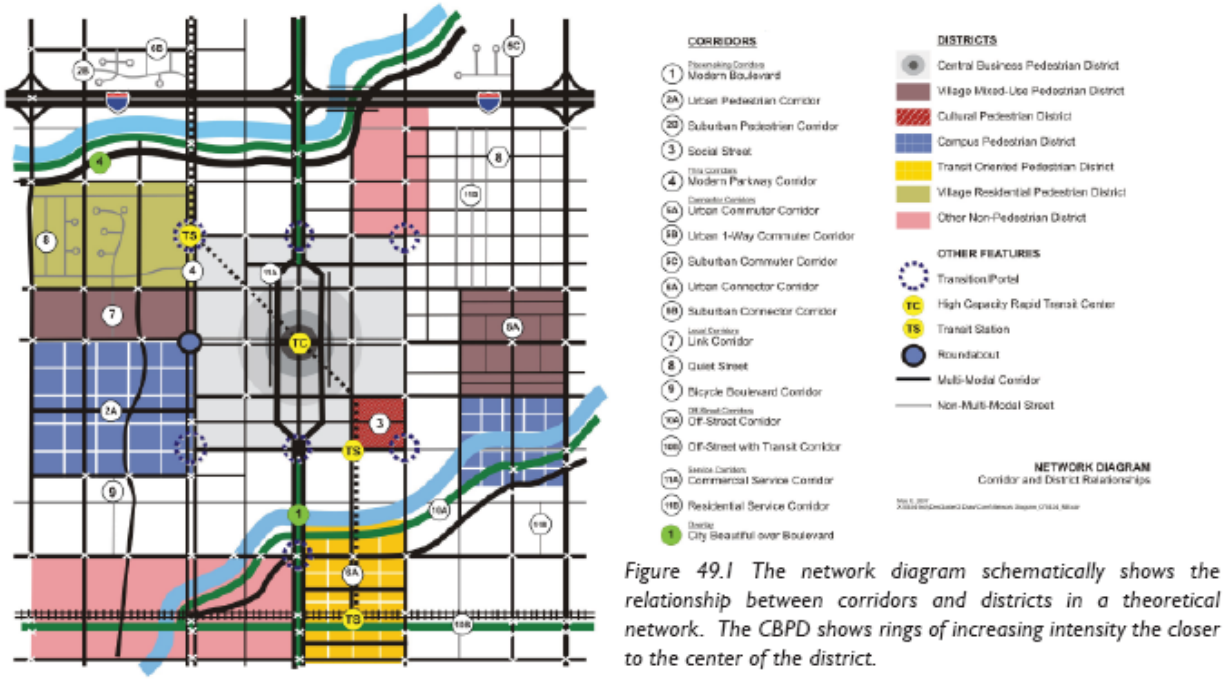


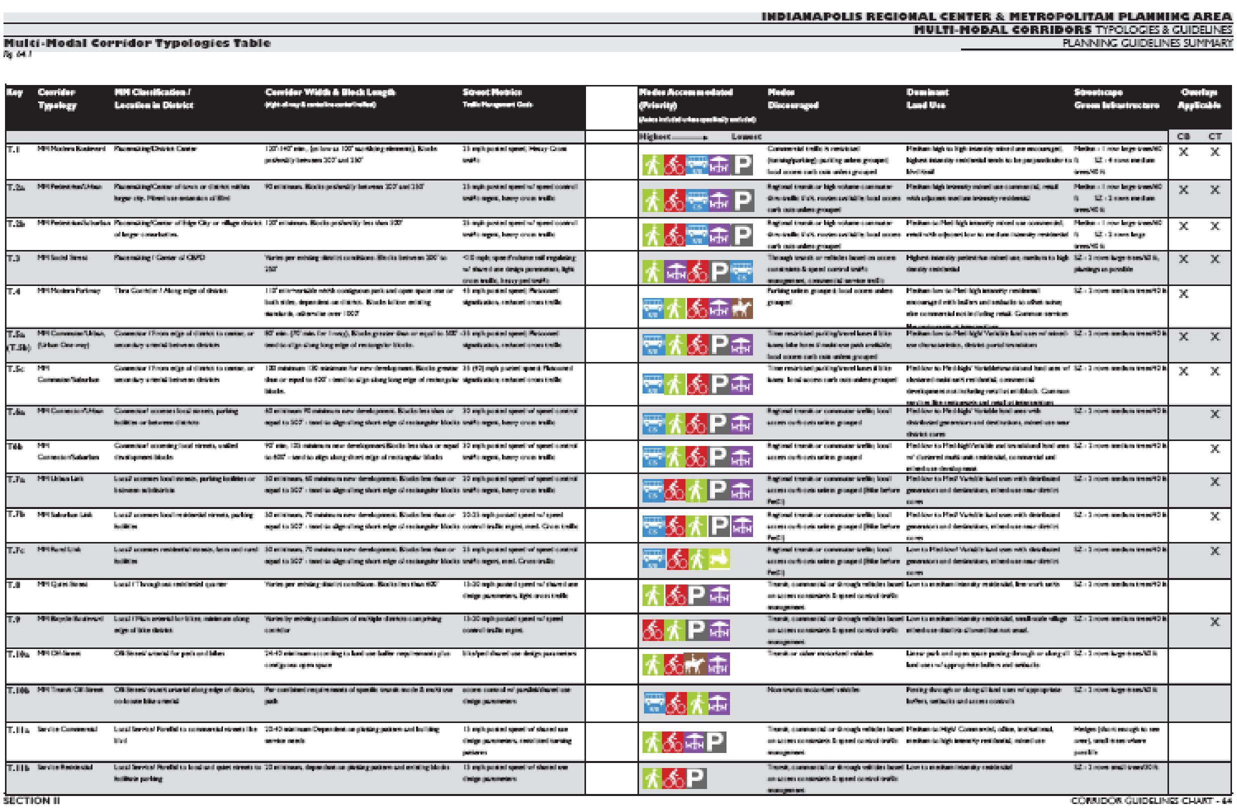
Figure 49.1 The network diagram schematically shows the relationship between corridors and districts in a theoretical network. The CBPD shows rings of increasing intensity the closer to the center of the district.

The different pedestrian districts for each locality within the Metropolitan Planning Area are shown in a map series.

Corridor Typologies

1. Placemaking Corridors
2. Thru Corridors
3. Connector Corridors
4. Local Corridors
5. Off-Street Corridors
6. Service Corridors
7. Overlays
8. Multi-Modal Transitions

There are several different typologies within each set. For example, there are four different corridor types under Placemaking Corridors: Multimodal Modern Boulevard, Multimodal Pedestrian/Urban, Multimodal Pedestrian/Suburban, and Multimodal Social Street. Each corridor type has a defined set of characteristics, including functional classification and location within district, ROW width, street geometrics and metrics, modes accommodated and modes discouraged, dominant land use pattern, facility determination (for pedestrian, bicycle and transit facilities), typical thoroughfare classification, streetscape and green infrastructure, and special design guidelines. These characteristics are summarized in matrix form.



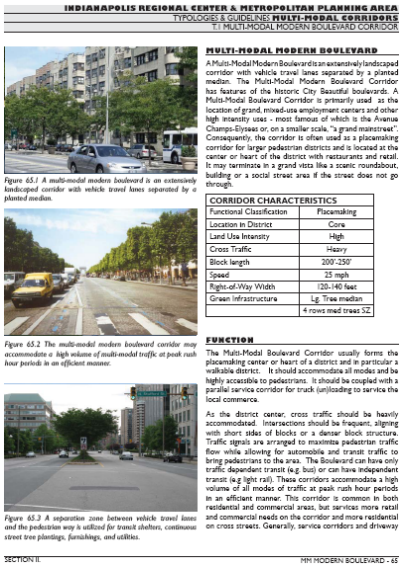
INDIANAPOLIS REGIONAL CENTER & METROPOLITAN PLANNING AREA
MULTI-MODAL CORRIDORS TYPOLOGIES & GUIDELINES
PLANNING GUIDELINES SUMMARY

Multi-Modal Corridor Typologies Table
Fig. 64.1

Key	Corridor Typology	MM Classification / Location in District	Corridor Width & Block Length	Street Metrics	Modes Accommodated (Priority) Highest → Lowest	Modes Discouraged	Dominant Land Use	Streetscape Green Infrastructure	Overlays Applicable CB	CT
T.1	MM Modern Boulevard	Placemaking/District Center	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	X	X
T.2a	MM Pedestrian/Urban	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	X	X
T.2b	MM Pedestrian/Suburban	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	X	X
T.3	MM Social Street	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	X	X
T.4	MM Modern Parkway	Thru Corridor / Along edge of district	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	X	
T.5a (T.5b)	MM Connector/Urban, (Urban One-way)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	X	X
T.5c	MM Connector/Suburban	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	X	X
T.6a	MM Connector/Urban	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		X
T.6b	MM Connector/Suburban	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		X
T.7a	MM Urban Link	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		X
T.7b	MM Suburban Link	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		X
T.7c	MM Rural Link	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		X
T.8	MM Quiet Street	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
T.9	MM Bicycle Boulevard	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		X
T.10a	MM Off-Street	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
T.10b	MM Transit Off-Street	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
T.11a	Service Commercial	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		
T.11b	Service Residential	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]		

SECTION II CORRIDOR GUIDELINES CHART - 64

Each corridor type has a 3-4 page summary that defines the function and characteristics and provides illustrations.



INDIANAPOLIS REGIONAL CENTER & METROPOLITAN PLANNING AREA
TYPOLOGIES & GUIDELINES: MULTI-MODAL CORRIDORS
T.1 MULTI-MODAL MODERN BOULEVARD CORRIDOR

MULTI-MODAL MODERN BOULEVARD

A Multi-Modal Modern Boulevard is an extensively-landscaped corridor with vehicle travel lanes separated by a planted median. The Multi-Modal Modern Boulevard Corridor has features of the historic City Beautiful boulevards. A Multi-Modal Boulevard Corridor is primarily used as the location of grand, mixed-use employment centers and other high intensity uses - most famous of which is the Avenue Champs-Elysees or, on a smaller scale, "a grand mainstreet". Consequently, the corridor is often used as a placemaking corridor for larger pedestrian districts and is located at the center or heart of the district with restaurants and retail. It may terminate in a grand vista like a scenic roundabout, building or a social street area if the street does not go through.

CORRIDOR CHARACTERISTICS	
Functional Classification	Placemaking
Location in District	Core
Land Use Intensity	High
Cross Traffic	Heavy
Block length	200'-250'
Speed	25 mph
Right-of-Way Width	120-140 feet
Green Infrastructure	Lg. Tree median
	4 rows med trees SZ

FUNCTION

The Multi-Modal Boulevard Corridor usually forms the placemaking center or heart of a district and in particular a walkable district. It should accommodate all modes and be highly accessible to pedestrians. It should be coupled with a parallel service corridor for truck (un)loading to service the local commerce.

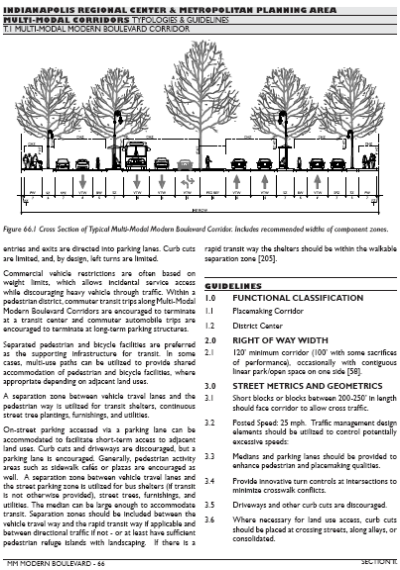
As the district center, cross traffic should be heavily accommodated. Intersections should be frequent, aligning with short sides of blocks or a denser block structure. Traffic signals are arranged to maximize pedestrian traffic flow while allowing for automobile and transit traffic to bring pedestrians to the area. The Boulevard can have only traffic dependent transit (e.g. bus) or can have independent transit (e.g light rail). These corridors accommodate a high volume of all modes of traffic at peak rush hour periods in an efficient manner. This corridor is common in both residential and commercial areas, but services more retail and commercial needs on the corridor and more residential on cross streets. Generally, service corridors and driveway

Figure 65.1 A multi-modal modern boulevard is an extensively landscaped corridor with vehicle travel lanes separated by a planted median.

Figure 65.2 The multi-modal modern boulevard corridor may accommodate a high volume of multi-modal traffic at peak rush hour periods in an efficient manner.

Figure 65.3 A separation zone between vehicle travel lanes and the pedestrian way is utilized for transit shelters, continuous street tree plantings, furnishings, and utilities.

SECTION II. MM MODERN BOULEVARD - 65



INDIANAPOLIS REGIONAL CENTER & METROPOLITAN PLANNING AREA
MULTI-MODAL CORRIDORS TYPOLOGIES & GUIDELINES
T.1 MULTI-MODAL MODERN BOULEVARD CORRIDOR

Figure 66.1 Cross Section of Typical Multi-Modal Modern Boulevard Corridor. Includes recommended widths of component zones.

entries and exits are directed into parking lanes. Curb cuts are limited, and, by design, left turns are limited.

Commercial vehicle restrictions are often based on weight limits, which allows incidental service access while discouraging heavy vehicle through traffic. Within a pedestrian district, commuter transit trips along Multi-Modal Modern Boulevard Corridors are encouraged to terminate at a transit center and commuter automobile trips are encouraged to terminate at long-term parking structures.

Separated pedestrian and bicycle facilities are preferred as the supporting infrastructure for transit. In some cases, multi-use paths can be utilized to provide shared accommodation of pedestrian and bicycle facilities, where appropriate depending on adjacent land uses.

A separation zone between vehicle travel lanes and the pedestrian way is utilized for transit shelters, continuous street tree plantings, furnishings, and utilities.

On-street parking accessed via a parking lane can be accommodated to facilitate short-term access to adjacent land uses. Curb cuts and driveways are discouraged, but a parking lane is encouraged. Generally, pedestrian activity areas such as sidewalk cafe or plazas are encouraged as well. A separation zone between vehicle travel lanes and the street parking zone is utilized for bus shelters (if transit is not otherwise provided), street trees, furnishings, and utilities. The median can be large enough to accommodate transit. Separation zones should be included between the vehicle travel way and the rapid transit way if applicable and between directional traffic if not - or at least have sufficient pedestrian refuge islands with landscaping. If there is a rapid transit way the shelters should be within the walkable separation zone [265].

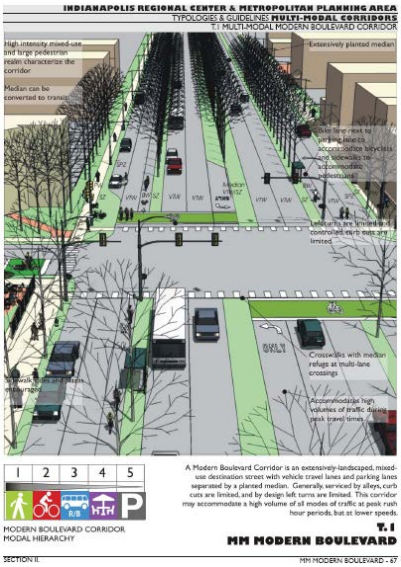
GUIDELINES

1.0 FUNCTIONAL CLASSIFICATION
1.1 Placemaking Corridor
1.2 District Center

2.0 RIGHT OF WAY WIDTH
2.1 120' minimum corridor (100' with some sacrifices of performance), occasionally with contiguous linear park/open space on one side [58].

3.0 STREET METRICS AND GEOMETRICS
3.1 Short blocks or blocks between 200-250' in length should face corridor to allow cross traffic.
3.2 Posted Speed: 25 mph. Traffic management design elements should be utilized to control potentially excessive speeds.
3.3 Medians and parking lanes should be provided to enhance pedestrian and placemaking qualities.
3.4 Provide innovative turn controls at intersections to minimize crosswalk conflicts.
3.5 Driveways and other curb cuts are discouraged.
3.6 Where necessary for land use access, curb cuts should be placed at crossing streets, along allays, or consolidated.

MM 66.1 MM MODERN BOULEVARD - 66 SECTION II.



INDIANAPOLIS REGIONAL CENTER & METROPOLITAN PLANNING AREA
TYPOLOGIES & GUIDELINES: MULTI-MODAL CORRIDORS
T.1 MULTI-MODAL MODERN BOULEVARD CORRIDOR

High intensity mixed-use and large pedestrian realm characterize the corridor

Median can be converted to transit

Extensively planted median

Curb lane next to parking lane to accommodate bicycles and sidewalks to accommodate pedestrians

Crosswalks with median refuge at multi-lane crossings

Accommodates high volumes of traffic during peak travel times

1 2 3 4 5

MODERN BOULEVARD CORRIDOR MODAL HIERARCHY

A Modern Boulevard Corridor is an extensively-landscaped, mixed-use destination street with vehicle travel lanes and parking lanes separated by a planted median. Generally, serviced by alleys, curb cuts are limited, and by design left turns are limited. This corridor may accommodate a high volume of all modes of traffic at peak rush hour periods, but at lower speeds.

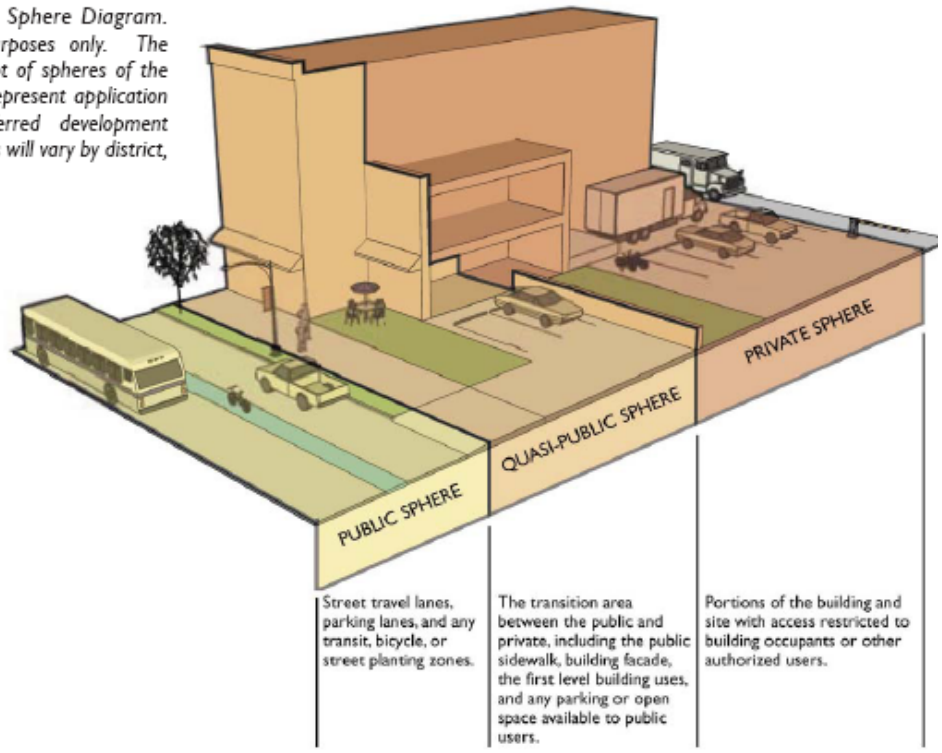
T.1
MM MODERN BOULEVARD

SECTION II. MM MODERN BOULEVARD - 67

Designing Guidelines

This section describes the concepts behind public, quasi-public and private spaces and the elements of the streetscape (called component zones) that constitute the public and quasi-public space and streetscape.

Figure 137.1 Built Environment Sphere Diagram. This figure is for illustrative purposes only. The diagram demonstrates the concept of spheres of the built environment and does not represent application of design guidelines nor preferred development arrangement. Locations of spheres will vary by district, corridor and use.



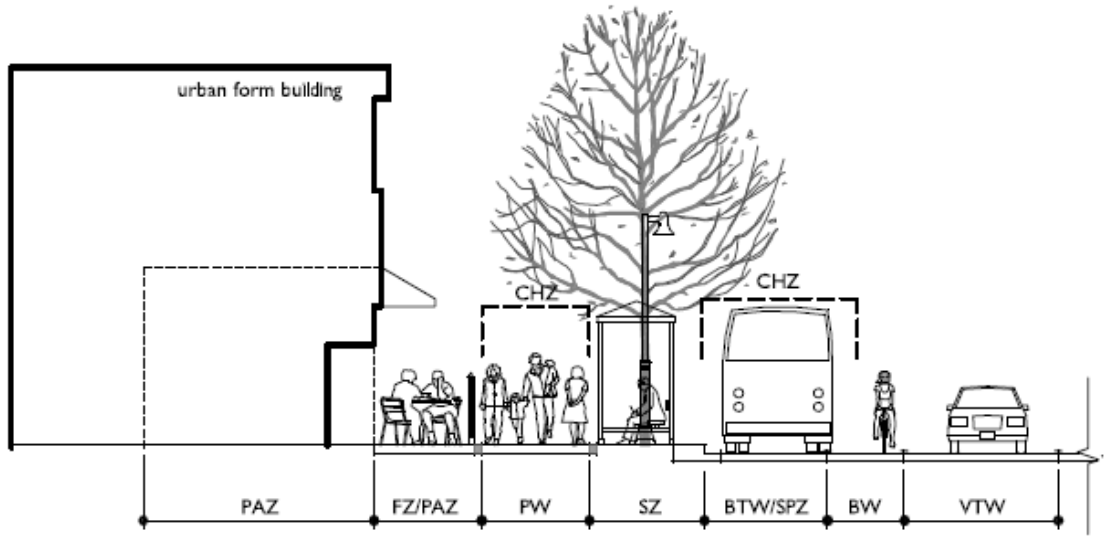


Figure 138.1 Component Zone Diagram. Definitiions are provided in the table below.

Component Zones

Within the guideline descriptions for both district and corridor typologies, additional detailed guidelines are further categorized into "Component Zones." These components fit into the "Built Environment Spheres" and are a way to abstractly apply design guidelines to both public and private development based on a "menu" of components that reflect real-world scenarios. It is possible that certain zones may be addressed differently depending upon the relevant district or corridor. For example, bike facilities can either be provided as a multi-use path to serve both pedestrians and bicyclists, or may be provided as a combination of on-street bike lanes and collector sidewalks. The component zones, classified as either a continuous "way" or as discontinous "zones", are defined below and represent toolkit options in realizing the district and corridor typologies.

Zone Diagram Definitions

BW	Bicycle Way: area where bicycles travel.
BTW	Bus Transit Way: area where bus transit vehicles travel or stop to load and unload.
CZ	Crossing Zone: area where pedestrians or other non-motorized modes interface with and traverse through motorized transportation zones.
CHZ	Clear Height Zone: vertical distance between a transportation facility and the lowest overhead obstruction. *Note: There is not a separate design guideline for the CHZ, rather, its requirements are addressed in all other zones.*
FZ	Frontage Zone: area of interaction between the pedestrian way and grade-level uses.
MUW	Multi-Use Way: area for shared use between multiple alternative transportation users.
PAZ	Pedestrian Activity Zone: area for public gathering in both the public, quasi-public, and private spheres.
PW	Pedestrian Way: area where pedestrians travel.
RTW	Rapid Transit Way: area where rapid transit vehicles travel or stop to load and unload.
SPZ	Street Parking Zone: area within the roadway where vehicles are permitted to stop, stand, or park, with various levels of permission and/or restriction.
SZ	Separation Zone: area of protection between the roadway and the pedestrian way that contains various utilities, signs, and streetscaping elements.
VTW	Vehicle Travel Way: area where motorized vehicles (automobiles, trucks, buses) travel.

Each of the component zones has several pages of design guidelines. A matrix at the end of the design guidelines section specifies minimum zone dimensions for each of the district and corridor typologies.

COMPONENT ZONE SUMMARY TABLE

Please note the following table indicates minimum component zone dimensions applicable to the Pedestrian Districts and Multi-Modal Corridors. Please refer to the full guidelines for recommendations, clarifications and exceptions. Note that guidelines are offered, even if the minimum option does not show the guideline in the text.

Key	Typology	BW Bicycle Way	BTW Bus Transit Way		CHZ Clear Height Zone		FZ Frontage Zone		MUW Multi-Use Way	PAZ Pedestrian Activity Zone	PW Pedestrian Way	SPZ Street Parking Zone		SZ Separation Zone	VTW Vehicle Travel Way	
MULTI-MODAL PEDESTRIAN DISTRICTS			R/B	S/C	VTW	BW/PW/ MUW	Next To PW	Next to MUW				Shared w/ VTW	Not Shared	SZ/Median	Curbside/ Plus Lane	Non Curbside
MMD1.CBD	Central Business	5'-0"	11'-0"	10'-6"	9'-0"	9'-0"	0'-6"	2'-0"	12'-0"	encouraged	10'-0"	10'-0"	8'-0"	7'/10'	10'-0"	11'-0"
MMD2.VMU	Village Mixed-Use	5'-0"	11'-0"	10'-6"	9'-0"	9'-0"	0'-6"	2'-0"	12'-0"	encouraged	6'-0"	10'-0"	8'-0"	7'/10'	10'-0"	11'-0"
MMD3.CUL	Cultural	5'-0"	11'-0"	10'-6"	9'-0"	9'-0"	0'-6"	2'-0"	12'-0"	encouraged	6'-0"	10'-0"	8'-0"	7'/10'	10'-0"	11'-0"
MMD4.CAM	Campus	5'-0"	11'-0"	10'-6"	9'-0"	9'-0"	0'-6"	2'-0"	10'-0"	encouraged	6'-0"	10'-0"	8'-0"	7'/10'	10'-0"	11'-0"
MMD5.TOD	Transit-Oriented	5'-0"	11'-0"	10'-6"	9'-0"	9'-0"	0'-6"	2'-0"	12'-0"	encouraged	8'-0"	10'-0"	8'-0"	7'/10'	10'-0"	11'-0"
MMD6.VRD	Village Residential	5'-0"	11'-0"	10'-6"	8'-0"	8'-0"	0'-6"	2'-0"	10'-0"	encouraged	5'-0"	N/A	7'-0"	5'/10'	26' c/c	N/A
MULTI-MODAL CORRIDORS																
MMT.1	MM Modern Boulevard	5'-0"	11'-0"	11'-0"	12'-0"	12'-0"	1'-0"	N/A	N/A	encouraged	7'-0"	N/A	7'-0"	5'/7'/20'	10'/8'	10'-0"
MMT.2a	MM Pedestrian/Urban	5'-0"	N/A	N/A	9'-0"	12'-0"	0'-6"	N/A	N/A	encouraged	10'-0"	10'-6"	8'-0"	7'/10'	10'-6"	11'-0"
MMT.2b	MM Pedestrian/Suburban	5'-0"	N/A	N/A	9'-0"	12'-0"	0'-6"	N/A	N/A	encouraged	8'-0"	N/A	8'-0"	7' (14'wBTW)	12'-0"	12'-0"
MMT.3	MM Social Street	shared roadway	N/A	N/A	9'-0"	9'-0"	1'-0"	1'-0"	shared roadway	encouraged	shared roadway	N/A	8'-0"	7'-0"	10'-0"	10'-0"
MMT.4	MM Modern Parkway	MUW recom.	11'-0"	10'-0"	12'-0"	12'-0"	N/A	2'-0"	12'-0"	allowed	N/A	N/A	9'-0"	7'/10'	12'-6"	11'-0"
MMT.5a(&b)	MM Commuter/Urban	5'-0"	11'-0"	8'-0"	9'-0"	9'-0"	0'-6"	N/A	N/A	allowed	6'-0"	9'-0"	8'-0"	5'-0"	11'-0"	11'-0"
MMT.5c	MM Commuter/Suburban	MUW recom.	11'-0"	8'-0"	9'-0"	9'-0"	0'-6"	2'-0"	12'-0"	transitional	8'-0"	N/A	N/A	7'-0"	12'-6"	11'-0"
MMT.6a	MM Connector/Urban	5'-0"	11'-0"	8'-0"	9'-0"	9'-0"	0'-6"	N/A	N/A	transitional	5'-6"	10'-0"	8'-0"	1'/10'	10'-0"	10'-0"
MMT.6b	MM Connector/Suburban	MUW recom.	11'-0"	8'-0"	9'-0"	9'-0"	0'-6"	2'-0"	10'-0"	transitional	8'-0"	N/A	8'-0"	7'-0"	11'-0"	11'-0"
MMT.7a	MM Urban Link	5'-0"	N/A	10'-0"	9'-0"	9'-0"	0'-6"	N/A	N/A	encouraged	6'-0"	9'-0"	7'-0"	7'-0"	10'-0"	10'-0"
MMT.7b	MM Suburban Link	MUW recom.	N/A	N/A	9'-0"	9'-0"	0'-6"	2'-0"	12'-0"	transitional	8'-0"	N/A	7'-0"	7'-0"	10'-0"	10'-0"
MMT.7c	MM Rural Link	MUW recom.	N/A	N/A	12'-0"	12'-0"	N/A	N/A	8'-0"	discouraged	8'-0"	N/A	7'-0"	0'	12'-0"	12'-0"
MMT.8	MM Quiet Street	shared roadway	N/A	N/A	9'-0"	9'-0"	N/A	N/A	shared roadway	allowed	shared roadway	N/A	8'-0"	5'-0"	10'-0"	N/A
MMT.9	MM Bicycle Boulevard	shared roadway	N/A	N/A	9'-0"	9'-0"	N/A	N/A	shared roadway	allowed	N/A	N/A	8'-0"	N/A	26' c/c (18') 8'	N/A
MMT.10a	MM Off-Street	MUW recom.	N/A	N/A	9'-0"	9'-0"	N/A	2'-0"	12'-0"	encouraged	N/A	N/A	N/A	5'-0"	N/A	N/A
MMT.10b	MM Transit Off-Street	MUW recom.	16'-0"	N/A	9'-0"	9'-0"			12'-0"	encouraged	N/A	N/A	N/A	5'-0"	varies	N/A
MMT.11a	MM Service Commercial	shared roadway	N/A	N/A	9'-0"	9'-0"	4'-0"	N/A	shared roadway	allowed	shared roadway	shared roadway	shared roadway	N/A	10'-0"	N/A
MMT.11b	MM Service Residential	shared roadway	N/A	N/A	9'-0"	9'-0"	7'-6"	N/A	shared roadway	allowed	shared roadway	shared roadway	shared roadway	N/A	10'-0"	N/A

Overview of Methodology

1. Determine multi-modal districts and corridors
2. Apply corridor and district typologies – understand their function, typology (characteristics and layout) and how they relate to each other
    a. Placemaking corridor
    b. Thru corridor
    c. Connector corridor
    d. Local corridor
    e. District Node
    f. District Center – ¼ mile radius around node
    g. Subdistrict – ½ mile radius around node
    h. Multi-modal District – 1 to 2 mile radius
3. Apply component zone guidelines
    a. Pedestrian Activity Zone
    b. Frontage Zone
    c. Pedestrian Way (sidewalk/path)
    d. Separation Zone (buffer)
    e. Bus Transit Way (bus lanes)
    f. Street Parking Zone (on-street parking)
    g. Bicycle Way (bike lanes)
    h. Vehicle Travel Way

9. Smart Mobility 2010: A Call to Action for the New Decade *by Caltrans (Feb 2010)*

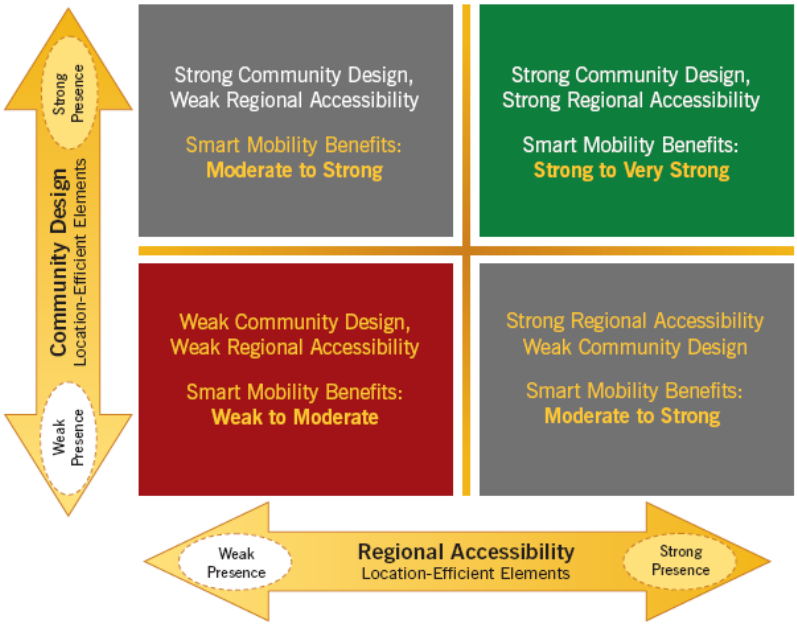
The Smart Mobility handbook represents an approach to integrating transportation and land use using the concept of location efficiency. It presents a methodology for understanding smart mobility within the context of location efficiency and identifies different place types throughout the state based on location efficiency potential. The place types create a distinct context for transportation investments and opportunities for mobility benefits. They are necessarily broad and should be applied at a general planning level of detail. Finer-grained analysis would show large areas characterized as one place type would actually consist of several subareas with characteristics of other place types.

The handbook provides multimodal performance measures for smart mobility, compares them to conventional Caltrans performance measures, and explains how the performance measures apply to different place types. This document has particular relevance to the Virginia statewide guidelines effort, as it represents an effort to classify areas within a state into different place types and may be helpful in defining multimodal districts for Virginia.

Location Efficiency: Community Design and Regional Accessibility

One of the six Smart Mobility Principles is Location Efficiency, which describes the fit between a specific physical environment and its transportation system and services. Location efficiency is defined by two elements: community design and regional accessibility. Community design consists of the characteristics of development use, form, and location that combine with the multimodal transportation system to support convenience, non-motorized travel, and efficient vehicle trips at the neighborhood and area scale. Regional accessibility describes similar characteristics at the regional, interstate and international scales.

Exhibit 6: Location Efficiency Factors and Smart Mobility Benefits



Place Types across California:

The report identifies seven place types, some of which are further broken down into subcategories:

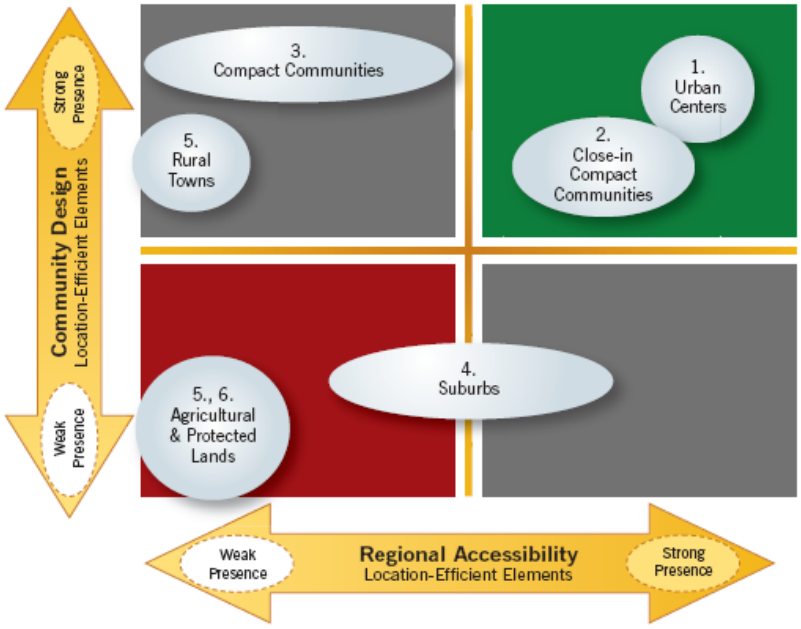
1. Urban Centers – further categorized into urban cores and urban centers
2. Close-in Compact Communities – further categorized into centers, corridors and neighborhoods
3. Compact Communities
4. Suburbs – further categorized into centers, corridors, dedicated use, and neighborhoods
5. Rural and Agricultural Lands – further categorized into rural towns and rural settlements & agricultural lands
6. Protected Lands
7. Special Use Areas

The handbook defines the levels of community design and regional accessibility for each place type, and shows how each place type fits in the location efficiency spectrum.

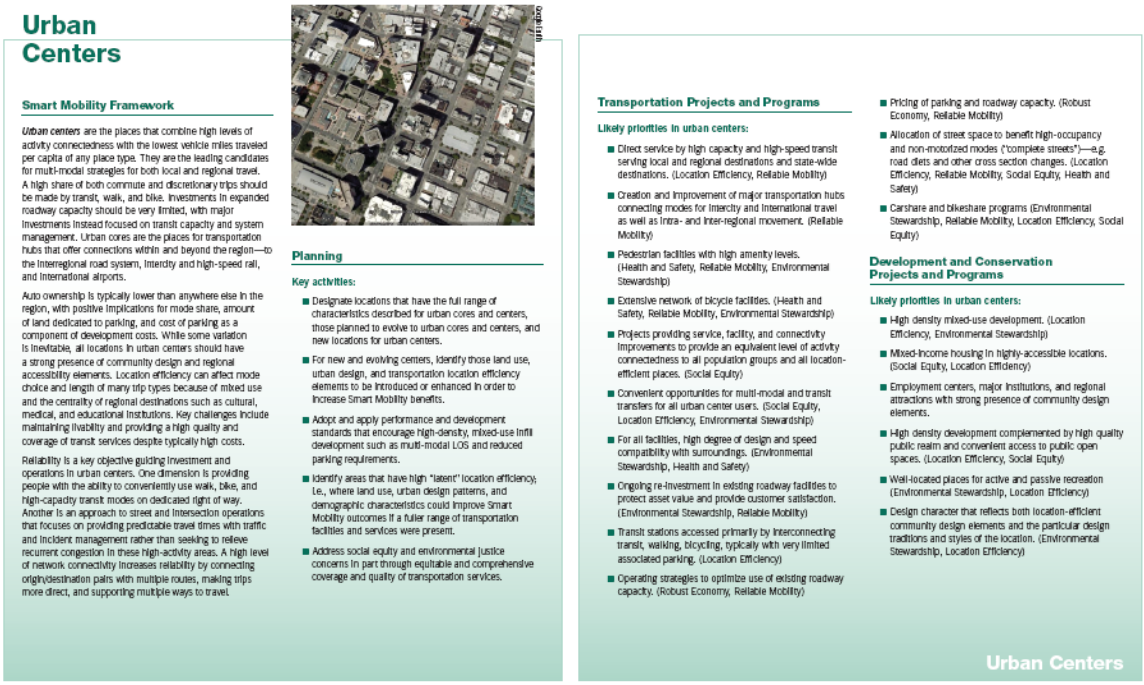
Exhibit 7: Smart Mobility Place Types

Place Type	Summary Description (existing or planned character)	Presence of Location Efficiency Factors: Community Design	+	Regional Accessibility	Examples
1. Urban Centers	High density, mixed use places with high jobs-housing ratios overall, well-connected street networks, high levels of transit service and pedestrian supportive environments. Transit-oriented development (TOD) fits into all of the urban place types.				
1a. Urban Cores	Central cities and large downtowns with full range of horizontally- and vertically-mixed land uses and with high capacity transit stations/corridors present or planned. Urban cores are hubs of transit systems with excellent transit coverage, service levels, and intermodal passenger transfer opportunities including convenient airport access.	Strongest	+	Strongest	Downtowns of Long Beach, San Francisco, San Jose, Sacramento, Los Angeles, San Diego, Oakland
1b. Urban Centers	Major activity centers with full range of horizontally- and vertically-mixed land uses and with high capacity transit stations/corridors present or planned.	Strong	+	Strong	Berkeley, Palo Alto, Pasadena, Walnut Creek, Santa Rosa, Century City, Fresno, Stockton, Bakersfield, Modesto
2. Close-In Compact Communities	Located near Urban Core or Urban Centers, close-in compact communities are comprised primarily of housing but with scattered mixed use centers and arterial corridors forming the skeleton of the transportation system. Housing is varied in density and type. Transit is available to connect neighborhoods to multiple destinations, with an emphasis on serving commute trips. Residents may think of these communities as suburban, but the Smart Mobility Framework differentiates them from suburban communities because of the greater presence of location efficiency factors. This place type includes:				
2a. Close-In Centers	Small and medium sized downtowns, Transit Oriented Developments, Institutions, lifestyle centers, and other centers of activity.	Moderate	+	Strong	Downtowns of San Rafael, Carlsbad, Orange, Santa Monica and Playa Vista, Uptown San Diego
2b. Close-In Corridors	Arterial streets with a variety of fronting development types, with frequent transit service and transfer opportunities.	Moderate	+	Strong	San Pablo Avenue, Alameda County,
2c. Close-In Neighborhoods	Walkable neighborhoods with housing in close proximity to shops, services, and public facilities, as well as good multi-modal connections to urban centers. Housing density varies from medium to high. Fine-grained circulation network of streets with high comfort for pedestrians and bicyclists.	Moderate	+	Strong	Midtown, Curtis Park, and Land Park Sacramento, Rockridge Oakland, Fillmore and Mission District SF, Little Italy San Diego

Exhibit 8: Smart Mobility Place Types and Location Efficiency Potential



Key planning activities and priorities for transportation, development and conservation projects and programs are identified for each place type. A brief discussion on place type transitions over time identifies places as either anchored or transitional to increase location efficiency.



Urban Centers

Smart Mobility Framework

Urban centers are the places that combine high levels of activity connectedness with the lowest vehicle miles traveled per capita of any place type. They are the leading candidates for multi-modal strategies for both local and regional travel. A high share of both commute and discretionary trips should be made by transit, walk, and bike. Investments in expanded roadway capacity should be very limited, with major investments instead focused on transit capacity and system management. Urban cores are the places for transportation hubs that offer connections within and beyond the region—to the interregional road system, intercity and high-speed rail, and international airports.

Auto ownership is typically lower than anywhere else in the region, with positive implications for mode share, amount of land dedicated to parking, and cost of parking as a component of development costs. While some variation is inevitable, all locations in urban centers should have a strong presence of community design and regional accessibility elements. Location efficiency can affect mode choice and length of many trip types because of mixed use and the centrality of regional destinations such as cultural, medical, and educational institutions. Key challenges include maintaining livability and providing a high quality and coverage of transit services despite typically high costs.

Reliability is a key objective guiding investment and operations in urban centers. One dimension is providing people with the ability to conveniently use walk, bike, and high-capacity transit modes on dedicated right of way. Another is an approach to street and intersection operations that focuses on providing predictable travel times with traffic and incident management rather than seeking to relieve recurrent congestion in these high-activity areas. A high level of network connectivity increases reliability by connecting origin/destination pairs with multiple routes, making trips more direct, and supporting multiple ways to travel.

Planning

Key activities:

- Designate locations that have the full range of characteristics described for urban cores and centers, those planned to evolve to urban cores and centers, and new locations for urban centers.
- For new and evolving centers, identify those land use, urban design, and transportation location efficiency elements to be introduced or enhanced in order to increase Smart Mobility benefits.
- Adopt and apply performance and development standards that encourage high-density, mixed-use infill development such as multi-modal LOS and reduced parking requirements.
- Identify areas that have high "latent" location efficiency, i.e., where land use, urban design patterns, and demographic characteristics could improve Smart Mobility outcomes if a fuller range of transportation facilities and services were present.
- Address social equity and environmental justice concerns in part through equitable and comprehensive coverage and quality of transportation services.

Transportation Projects and Programs

Likely priorities in urban centers:

- Direct service by high capacity and high-speed transit serving local and regional destinations and state-wide destinations. (Location Efficiency, Reliable Mobility)
- Creation and improvement of major transportation hubs connecting modes for intercity and international travel as well as intra- and inter-regional movement. (Reliable Mobility)
- Pedestrian facilities with high amenity levels. (Health and Safety, Reliable Mobility, Environmental Stewardship)
- Extensive network of bicycle facilities. (Health and Safety, Reliable Mobility, Environmental Stewardship)
- Projects providing service, facility, and connectivity improvements to provide an equivalent level of activity connectedness to all population groups and all location-efficient places. (Social Equity)
- Convenient opportunities for multi-modal and transit transfers for all urban center users. (Social Equity, Location Efficiency, Environmental Stewardship)
- For all facilities, high degree of design and speed compatibility with surroundings. (Environmental Stewardship, Health and Safety)
- Ongoing re-investment in existing roadway facilities to protect asset value and provide customer satisfaction. (Environmental Stewardship, Reliable Mobility)
- Transit stations accessed primarily by interconnecting transit, walking, bicycling, typically with very limited associated parking. (Location Efficiency)
- Operating strategies to optimize use of existing roadway capacity. (Robust Economy, Reliable Mobility)
- Pricing of parking and roadway capacity. (Robust Economy, Reliable Mobility)
- Allocation of street space to benefit high-occupancy and non-motorized modes ("complete streets")—e.g. road diets and other cross section changes. (Location Efficiency, Reliable Mobility, Social Equity, Health and Safety)
- Carshare and bikeshare programs (Environmental Stewardship, Reliable Mobility, Location Efficiency, Social Equity)

Development and Conservation Projects and Programs

Likely priorities in urban centers:

- High density mixed-use development. (Location Efficiency, Environmental Stewardship)
- Mixed-income housing in highly-accessible locations. (Social Equity, Location Efficiency)
- Employment centers, major institutions, and regional attractions with strong presence of community design elements.
- High density development complemented by high quality public realm and convenient access to public open spaces. (Location Efficiency, Social Equity)
- Well-located places for active and passive recreation (Environmental Stewardship, Location Efficiency)
- Design character that reflects both location-efficient community design elements and the particular design traditions and styles of the location. (Environmental Stewardship, Location Efficiency)

Urban Centers

Smart Mobility Performance Measures

The handbook defines 17 performance measures that relate back to the six Smart Mobility principles. These performance metrics are similar to conventional Caltrans metrics but redefined and reemphasized.

Exhibit 11: Smart Mobility Performance Measures

Goal	Performance Measure	Recommended Metrics
Location Efficiency	1. Support for Sustainable Growth	Consistency with regional Sustainable Communities Strategy or Alternative Planning Strategy meeting regional performance standards. Comparison of alternatives based on acres of land consumed, and relative reductions in induced VMT through: compact land use strategies, demand management, and network management.
	2. Transit Mode Share	Percentage of trips within a corridor or region occurring by bus, rail or by other form of high-occupancy-vehicle.
	3. Accessibility and Connectivity	Number of households within 30 minute transit ride of major employment center, within 20 minute auto ride of employment, within walking distance of schools. Weighted regional travel time and cost among trip producers and trip attractors.
Reliable Mobility	4. Multi-Modal Travel Mobility	Travel times and costs by mode between representative origins and destinations, aggregated over corridor or region.
	5. Multi-Modal Travel Reliability	Day-to-day variability of travel times between representative origins and destinations by mode, aggregated over corridor or region.
	6. Multi-Modal Service Quality (Level of Service: LOS)	Mode-specific and blended LOS measures of pedestrian and bicycle accommodation and comfort, transit availability and reliability, and auto travel efficiency.[1]
Health and Safety	7. Multi-Modal Safety	Collision rate and severity by travel mode and facility, compared to statewide averages for each user group and facility type.
	8. Design and Speed Suitability	Conformance with guidance identifying suitable design elements and traffic speed with respect to mix of modes and adjoining land uses and area character.[2]
	9. Pedestrian & Bicycle Mode Share	Percentage of trips within a corridor or region occurring by walking or cycling.
Environmental Stewardship	10. Climate and Energy Conservation	VMT per capita by speed range relative to State and regional targets.[3]
	11. Emissions Reduction	Quantities of criteria pollutants and GHGs
Social Equity	12. Equitable Distribution of Impacts	Impact of investments on low-income, minority, disabled, youth and elderly populations relative to impacts on population as a whole.
	13. Equitable Distribution of Access and Mobility	Comparative travel times and costs by income groups and by minority and non-minority groups for work/school and other trips.
Robust Economy	14. Congestion effects on Productivity	Time lost to congestion by trips that are economically productive and/or sustaining of essential mobility, measured as vehicle hours of delay (VHD).
	15. Efficient Use of System Resources	Additional VMT that are associated with economic productivity and/or sustaining of essential mobility compared with system expansion cost and impact.
	16. Network Performance Optimization	VHD per capita, per lane mile, per private vehicle mile, per freight vehicle mile, per transit revenue mile, and in total.
	17. Return on Investment	Person miles and revenue per lane mile of road, per transit revenue mile and per dollar invested (from all public and private funding sources). Comparison of alternatives based on benefits per dollar invested relative to: a) system user benefits (time and expense), and b) other Smart Mobility Performance Measures.

[1] Typical resource: Transportation Research Board 2010 Highway Capacity Manual.

[2] Typical resources: Caltrans DD64 Complete Streets guidelines; ITE practices on Context Sensitive Solutions.

[3] Targets set by California Air Resources Board under SB375. Rates of GHG emissions and fuel consumption both vary by speed range or "bin."

Specific planning and projected development processes into which the Smart Mobility performance measure can be implemented are identified. The handbook provides examples of agencies across the nation who have successfully implemented these metrics and outlines the guidelines, methods, and tools and data needs for each performance measure.

The handbook ties together the concepts of performance metrics and place types by specifying modal emphasis by facility type for each place type. This prioritizes performance measures based on facility type and place type. Some performance measures should receive high importance regardless of facility or place type (e.g. modal collision rates, speed suitability and travel time consistency). Others vary. For example, network performance optimization and speed management rank higher for arterials and urban freeways than for rural freeways and highways.

Exhibit 15: Framework for Integrating Place Type and Facility Type in Weighing Modal Priorities in Planning and Project Evaluation Criteria

▲ Weighting of modes within performance measures oriented toward truck and automobile modes and express buses, with primary emphasis on traffic flow efficiency.

■ Performance measures oriented toward equivalent prioritization of autos, trucks, and buses, while prioritizing basic safety comfort and convenience for non-motorized modes.

● Performance measure emphasis placed on safety, comfort and convenience for non-motorized modes and local transit. Lower emphasis on efficiency for autos and trucks.

Place Type		Freeway	Expressway	Arterial	Collector	Rural Hwy
Urban Centers	Urban Cores	▲	■	●	●	-
	Urban Centers	▲	■	●	●	-
Close-in Compact Communities	Centers	▲	■	●	●	-
	Corridors	▲	■	■	●	-
	Neighborhoods	▲	■	●	●	-
Compact Communities		▲	■	●	●	●
Suburban Communities	Centers	▲	■	●	●	●
	Corridors	▲	■	■	●	▲
	Dedicated Use Areas	▲	■	■	●	■
	Neighborhoods	▲	■	●	●	■
Rural	Towns	▲	■	●	●	●
	Settlements/Ag	▲	■	●	●	■
Protected Lands		▲	▲	●	●	●
Special Use Areas		▲	▲	▲	■	▲

10. Multimodal Corridors *by City of Boulder, Colorado (1996)*

The 1996 Transportation Master Plan identified 10 multimodal corridors within the City of Boulder. The 10 corridors were divided and prioritized into 42 segments. The Current Funding program specifies 11 segments that can be constructed with allocated funds. Additional funds identified in the Action plan would allow 21 of these corridor segments to be implements, while the Vision program builds out all 42 segments.

The City's website provides several general improvements for each mode that will be implemented in the 10 corridors:

Roadway

- Roadway reconstruction to reduce long-term maintenance liabilities;
- Improved operational and traffic flow through intersection enhancements focusing on system bottlenecks;
- Roadway improvements which support multi-occupant vehicle use;
- Roadway-related (functional efficiency/safety) improvements in priority corridors; and
- Signal coordination optimization based on current traffic flow patterns.

Pedestrian

- Complete segments of missing sidewalks to provide direct and continuous connections between destinations and to transit;
- Continue adding enhanced pedestrian crossings at strategic locations; and
- Continue installation of pedestrian signals and crossing count-down heads.

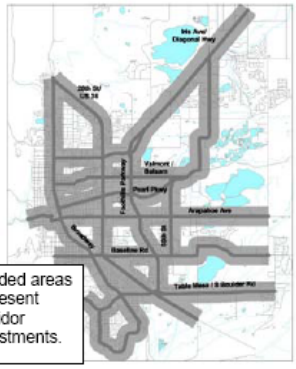
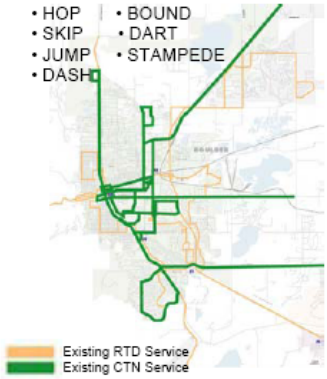
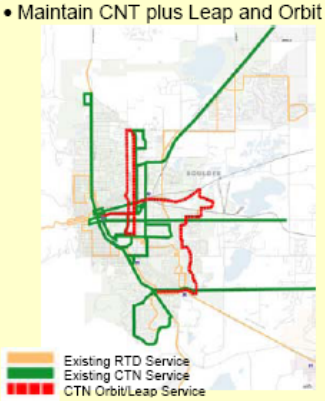
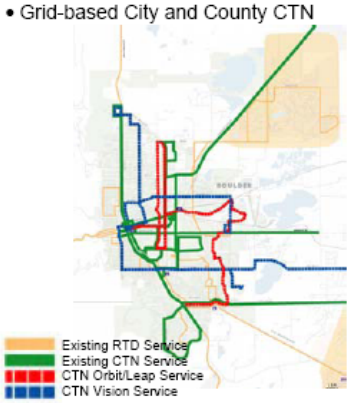
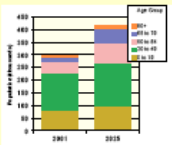
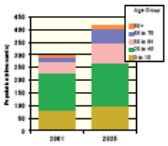
Bicycle

- Complete missing bicycle trails and bicycle lanes to provide direct and continuous connections;
- Construct needed underpasses at high volume locations to provide safe connections; and
- Provide bicycle route signage.

Transit

- Deploy the high-frequency Community Transit Network (CTN);
- Construct enhancements at key high-frequency transit stops to include, at a minimum, transit signs and pavement platforms. At higher demand transit stops, shelters, benches and trash receptacles will be provided; and
- Operational system efficiency improvements, such as bus bypass lanes, bus signal prioritization and other improvements to increase the efficiency of the CTN.

Multimodal Corridors

Current Funding	Action Plan	Vision
Multimodal Corridor Investments		
Shaded areas represent corridor investments.	Shaded areas represent corridor investments.	 Shaded areas represent corridor investments.
11 of 42 Corridor Segments	21 of 42 Corridor Segments	42 of 42 Corridor Segments
Transit		
• Maintain current CTN • HOP • BOUND • SKIP • DART • JUMP • STAMPEDE • DASH 	• Maintain CNT plus Leap and Orbit 	• Grid-based City and County CTN 
• Maintain existing Special Transit funding	• Increase funding to 25% of total Special Transit costs  • Web-based real time transit information 	• Increase Special Transit funding in response to growing aged population  • Web-based real time transit information for all buses traveling within the City of Boulder
Corridor Improvements		

Roadway
- Roadway reconstruction to reduce long-term maintenance liabilities
- Improved operational and traffic flow through intersection enhancements focusing on system "bottlenecks"
- Provide roadway improvements which support multi-occupant vehicle use
- Implement roadway-related (functional efficiency/safety) improvements in priority corridors

Pedestrian
- Sidewalks, pedestrian crossings, pedestrian signals improvements

Bicycle
- Trails, lanes, underpasses

Transit
- Stop enhancements, facilities, operation efficiency system

http://www.bouldercolorado.gov/index.php?option=com_content&view=article&id=355&Itemid=1624

11. Transit Service Design Guidelines *by Virginia Department of Rail and Public Transportation (November 2008)*

The Transit Service Design Guidelines were compiled by the Virginia Department of Rail and Public Transportation (DRPT) in 2008 in an effort to provide communities with guidance on starting new transit service. The guidelines are intended to help local governments, transit providers and citizens better understand the types of transit systems and services that are available to meet community and regional transportation needs, as well as helping DRPT in making recommendations to the Commonwealth Transportation Board for transit investment.

The guidelines are an excellent primer for anyone interested in basic information about how to plan for transit and key considerations for matching local needs with solutions. Some of the basic considerations include: local land use, trip patterns, affordability, economic development goals, environmental factors and many others. It describes various planning studies that a community might undertake to determine transportation needs, and describes what steps a community might take depending on their level of experience with transit. The document also outlines various other cost-effective, transportation demand management (TDM) options to consider before investing in transit. Examples include: Alternative Cash Incentive Program, Carpool and Vanpool Matching, Car Sharing and Bike Sharing Programs, Flexible Schedules, Guaranteed Ride Home, Parking Cash Out Programs, and Telecommuting.

Two sections of the document are particularly relevant for this study. The first is the section on land use considerations, which outlines transit supportive development levels by transit category. While adopted from FTA and ITE, these two tables can help provide a framework for understanding Multimodal Districts and TOD placetypes statewide.

Development Levels Supportive of Rail

Measure	Development Level
Population densities (persons per square mile)	6,667 - 15,000
Employment Served	125,000 - 250,000
Central Business District commercial floor to area ratio (FAR)	6.0 – 10.0
Other commercial floor to area ratio (FAR)	1.0 - 2.5
Residential dwelling units per acre	10 - 25

Sources: Federal Transit Administration: Guidelines and Standards for Assessing Transit Supportive Land Use – May 2004

Development Levels Supportive of Fixed Route Bus

Measure	Development Level
Population densities (persons per square mile)	2,500 - 4,000
Employment Served (per acre)	4 - 5
Commercial floor to area ratio (FAR)	0.35 – 1.0
Residential dwelling units per acre	4 - 5

Sources: Institute of Traffic Engineers, A Toolbox for Alleviating Traffic Congestion, 1998; Pushkarev and Zupan, 1977; Ewing, 1999; Cervero, et. al., 2004; TCRP Report 100, 2003.

Transit Service Guidelines

The second item of interest is the section on Transit Service Guidelines. This section of the guidelines provides an overview of specific modes within each of the four transit mode categories: Rail, Fixed Route Bus, Demand Response Bus, and Ferry. Individual modes range from small vans serving low-density rural areas to high capacity rail systems providing quick, convenient service for commuters traveling in high-density urban areas. For each mode, a brief description is provided, along with typical physical and operating characteristics of the system such as station spacing and frequency of the service. Typical physical and operating characteristics of each mode are presented in ranges. Information also is provided about how the service might be operated, and over what periods of time and days of the week. For the purposes of this study, this type of information will help to inform the composition of a multimodal district, and can further be linked to different land use characteristics associated with TOD.

Streetcar

New Orleans Regional Transit Authority

The Portland Streetcar

Description

Streetcars are rail transit vehicles designed for local transportation, powered by electricity received from an overhead wire. Streetcar systems are in operation in such locations as New Orleans, Portland, Oregon, and Seattle. Many other localities are considering streetcar systems to support downtown circulation needs.

Several others cities, such as Memphis, Little Rock, Tampa, and Kenosha, Wisconsin operate heritage streetcars, which combine local transportation with historical nostalgia. These systems are used frequently by tourists and visitors to travel to downtown areas.

Typical Characteristics

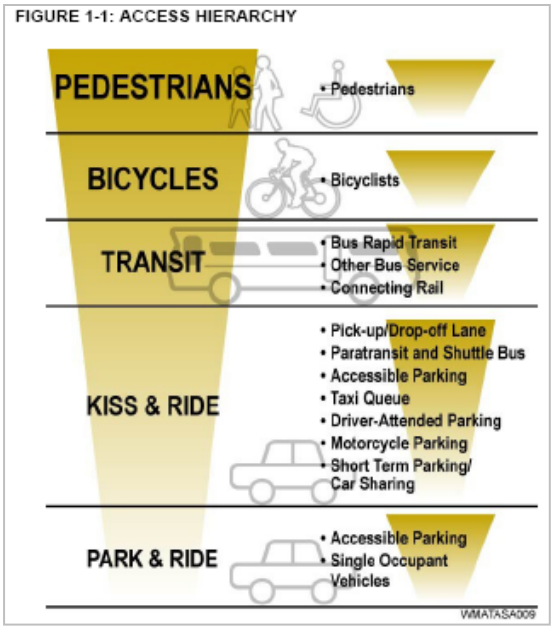
• Capital cost	$10 - $30 million per mile
• Operating cost	$.50 - $.85 per passenger mile
• Service distance	2 – 4 miles
• Streetcar stop spacing	0.10 – 0.25 miles
• Speeds (avg/max)	8 - 12 mph/45 mph
• Service frequency	8 - 15 minutes (peak)
	20 - 60 minutes (off peak)
• Span of service	7 days per week
	5:00 a.m. to 1:00 a.m. on weekdays
	6:00 a.m. to 1:00 a.m. on weekends
• Streetcar capacity	30 - 50 seated (plus standees)
• Typical loads	150 percent in peak
• Maximum capacity	565 passengers per hour
	(75 passengers per car/every 12 minutes)

12. Station Site and Access Planning Manual,
By Washington Metropolitan Area Transportation Authority (May 2008)

The Station Site and Access Planning Manual provides station area and facility design guidelines to maximize accessibility for all Metrorail passengers. It is intended to address physical design and operation issues that arise during the planning and design phases of development projects within transit station areas. Key transit access principles, approaches and parameters are provided to clarify transit access needs while serving as a flexible guide to allow designers to find the best solution for any situation.

The document acknowledges that all modes of access to a station cannot be given equal priority. As such, the station site facility design guidelines prioritize facilities based on mode, as illustrated in the access hierarchy, with pedestrian and sensory-impaired passengers having the highest importance, followed by bicycles, transit, Kiss & Ride and Park & Ride.

FIGURE 1-1: ACCESS HIERARCHY



Basic planning considerations tell designers what facilities should be provided for each access mode. Dimensional guidelines specify standards for these facilities and are accompanied by design illustrations.

Pedestrian facilities have the highest importance for access. Conflicts between pedestrians and other modes should be minimized through the provision of direct pathways designed for maximum pedestrian safety. Pedestrian design considerations include connectivity, walkway surfaces, elevation changes and intersection treatments. Bicycle access is the second highest priority, with a focus on enhancing connectivity and providing safe and convenient parking and storage. Transit has the highest priority of all motorized modes. Design considerations for transit include location and connection of bus stop relative to Metrorail station entrance and exit, transit priority improvements, walkway and stop canopies, and bus bay layout and location. Kiss & Ride and Park & Ride facility design considerations include pick-up and drop-off zones, parking layout, and revenue control.

FIGURE 2-1: SAMPLE SITE PLAN

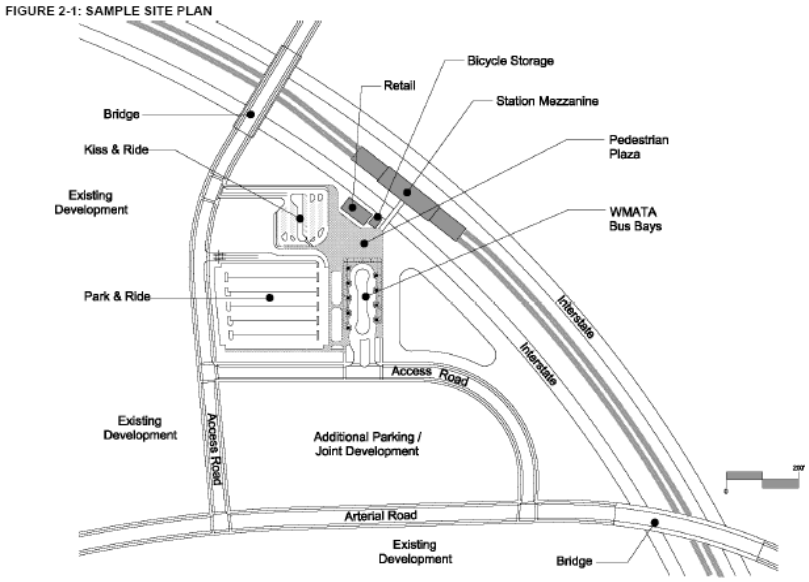


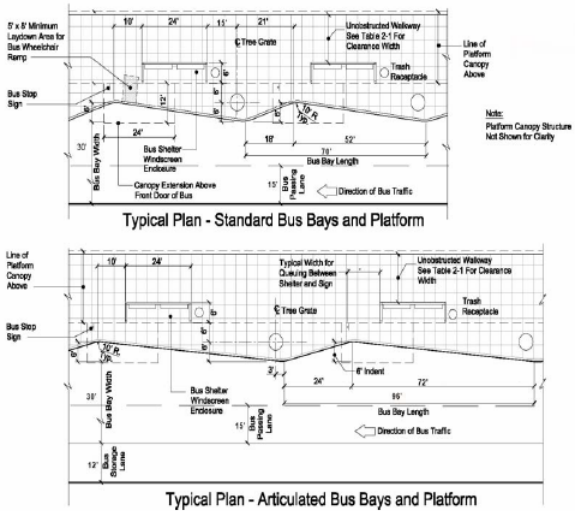
TABLE 2-2: SITE DESIGN STANDARDS

Ref. No.	Facility	Standard
2.1.1	Pedestrian Walkways	Width varies according to procedures described in Appendix D. The minimum width for walkways is 6'-0" plus an additional 1'-6" buffer from building edges or street curbs.
2.1.1 2.5.1-3 4.1.3	Pedestrian Waiting Areas at Bus Platforms	The minimum unobstructed walkway widths along bus platforms are as indicated in Table 2-1 and as shown in Figure 2-4. For bus platforms that share sidewalk space with non-bus passenger traffic, the minimum width must be calculated according to procedures described in Appendix D and with the minimum widths indicated in Table 2-1.
2.6.2 4.1.3	Pedestrian Waiting Areas in Kiss & Ride Drop-Off/Pick-Up Zones	Width varies according to procedures described in Appendix D. The minimum unobstructed sidewalk width is 6'-0" plus an additional 1'-6" buffer from building edges.
2.4.1	Bicycle Path	8'-0"-minimum width
2.4.2	Bicycle Lockers	3'-2" x 6' with a 6' aisle at either end (2 lockers back to back)
2.3.3	Crosswalks and Curb Cuts	Minimum width same as walkway required at all walkway/road intersections
2.5.2	Sawtooth Bus bays (Standard Bus)	70' length with 6' indent as shown in Figure 2-4
2.5.2	Sawtooth Bus Bays (Articulated Bus)	'96 length with 6' indent as shown in Figure 2-4
2.5.1	Tangent Bus Bay (Standard Bus)	15' x 44' + *48' taper at rear of bus bay array and 70' taper at front of bus bay array* (Figure 2-3)
2.5.1	Tangent Bus Bay (Articulated Bus)	15' x 66' + *48' taper at rear of bus bay array and 70' taper at front of bus bay array* (Figure 2-3)
2.5.1	Bus Lane Widths	15' through lane as shown in Figures 2-3 and 2-4. See Figure 2-5 for turning lane widths.
2.5.2	Bus Storage Bays	Same as tangent bays.
4.1.3	Bus Shelter	Minimum equivalent of one 6'x12' or 6'x24' shelter per bus bay, as directed by WMATA. (Fig. 2-4)
2.5.1	Bus Loop Radii	60' outside radius to curb, 45' centerline radius, 30' inside curb radius (Figures 2-5 and 2-6)
2.8.3	Automobile Turning Radii	23' outside curb radius on access roads, 15' curb radius in parking facilities
2.6.6	Motorcycle Parking Spaces	4' x 8'
2.6.2	Kiss & Ride Curb Side Pick-Up/Drop-Off Lane	Automobile spaces: 8' x 30'; Shuttle Bus spaces: 8 'x 25', Taxi spaces: 8' x 22'
2.6.3	Kiss & Ride Parking Spaces	ADA and Driver-Attended: 9' x 18' (45 degree); Short-Term: 8.5' x 18' (angled or 90 degree)

Directional guidance for the joint development of facilities illustrates how the station can best fit within the surrounding development and existing transportation network. Planners, developers and community members working together will create vibrant memorable places. Guidance in the Station Site and Access Manual includes procedural strategies to encourage coordination between planners and developers so both can effectively contribute to and benefit from transit station and create a transit-oriented community.

The design guidelines can be used by developers during joint development projects and should help clarify design expectations and ease coordination between developers, site designers, and transit planners in the review and approval process. Design considerations for joint development projects include: setbacks between transit alignments and buildings; location of bus stop transfer facilities; maintenance of pedestrian connectivity and provisions for pedestrian safety, street patterns, parking considerations, landscaping amenities, wayfinding signage and security features. Place making initiatives, like provision of open space and strategic grouping of public facilities, should be employed to allow the transit facility to serve as the catalyst for an activity center.

FIGURE 2-4: SAWTOOTH BUS BAY CONFIGURATION



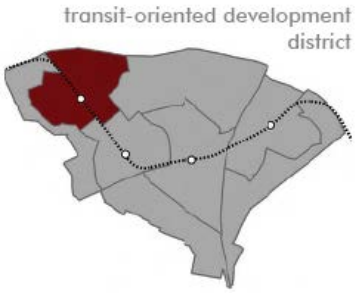
This document will help in developing prototypical station area designs, as it acknowledges the conflicts of access between modes and offers guidance for establishing priorities.

Most relevant to this study effort is the definition of different station area types. Stations located in a dense downtown area will have different characteristics than stations located at the end of the line or in a low-density area. Although not a primary focus of the document, the Station Area Access Manual defines three different area types. This classification serves as a guide to understanding which transit site facilities may be expected in a particular geographical area.

Core Stations: These are stations located in a high density, downtown areas, such as Washington DC, Rosslyn, and Crystal City, where other Metrorail stations serve the adjacent area. These stations are accessible primarily by walking, bicycling, and bus.	**Mid-Line Stations:** Mid-line stations are typically located in areas with low to medium density and are usually accessed by Park & Ride, Kiss & Ride, bus, bicycling, and walking modes. Mid-line stations are located in areas where other Metrorail stations are further away and serves a greater area, thus many customers must rely on the non-walking mode to access the station.	**Terminus Stations:** Terminus stations are located at the end of Metrorail lines. Typically, terminus stations are accessed by Park & Ride, bus, Kiss & Ride, then walking. However, comprehensive regional planning that improves pedestrian and bicycle access to the station could increase the walking and bicycle mode. Terminus stations typically serve a wide geographical area that normally extends beyond the greater Washington area, creating a high demand for Park & Ride mode.

13. Transforming Tysons: Vision and Area Wide Recommendations, Tysons Land Use Task Force, *by Fairfax County (September 2008)*

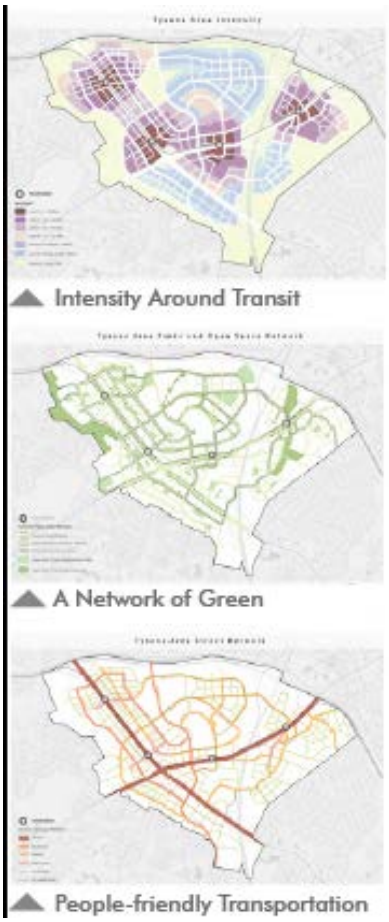
In 2005, the Fairfax County Board of Supervisors created the 36-member Tysons Land Use Task Force to gather community input and recommend a land use and transportation plan that would transform four future Metrorail stations in Tysons Corner proposed as part of the extension to Dulles Airport from suburban office parks into livable urban centers. Three years later, the task force presented its recommendations for an innovative vision and area plan for **land use**, **transportation**, **environmental stewardship**, **public facilities** and **urban design**.



Tysons is divided into eight districts, four surrounding the future rail stations and four creating a transition to adjacent communities. Land use designations within each district are articulately described and carefully selected to achieve a unique sense of place and logical layout of destinations and paths of travel.

The vision for Tysons consists of **six guiding principles**:

1. Create a people-focused urban setting which significantly increases residential opportunities;
2. Redesign the transportation network with a strong focus on transit, walking, and bikes;
3. Place a strong emphasis on the environment;
4. Develop a vital civic infrastructure of the arts, culture, recreation and the exchange of ideas;
5. Sustain and enhance the contributions of Tysons as the county's employment center and economic engine; and
6. Create an authority for implementation that provides the flexibility, accountability, consensus and resources necessary to achieve the vision.

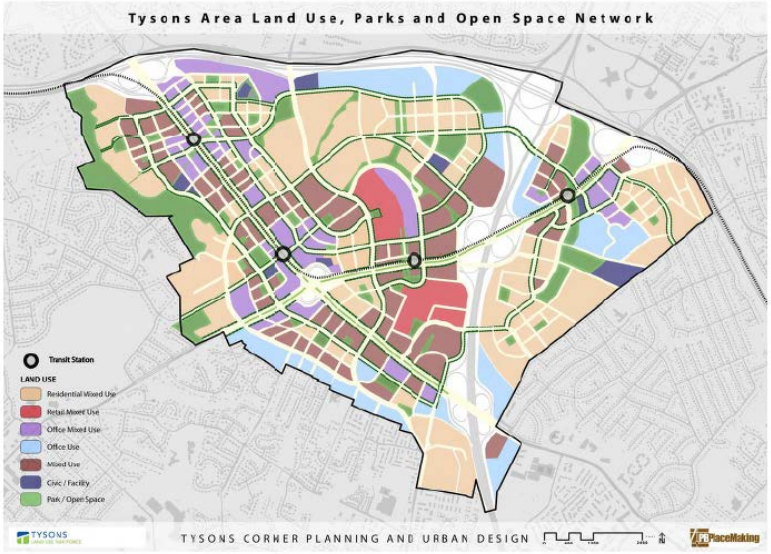


The area-wide land use and transportation plan emphasizes the working together of multiple elements to create a center with a sense of place. The land use designations and transportation recommendations are reinforced with connections, amenities, strategically located parking and a focus on a people-scaled environment.

The Tysons plan is an excellent example of a specific area plan that approaches the different aspects of transit-oriented planning and design from a holistic perspective. Each element (urban design, land use, transportation, etc) is viewed through a unique lens, but focuses on overarching guiding principles. The urban design designations are different from the land use designations and intensity designations, but all come together to achieve a unified pattern for intensity in the center with decreasing densities and a well thought-out circulation plan. The Tysons plan demonstrates how an individual locality might apply statewide recommendations at a smaller scale.

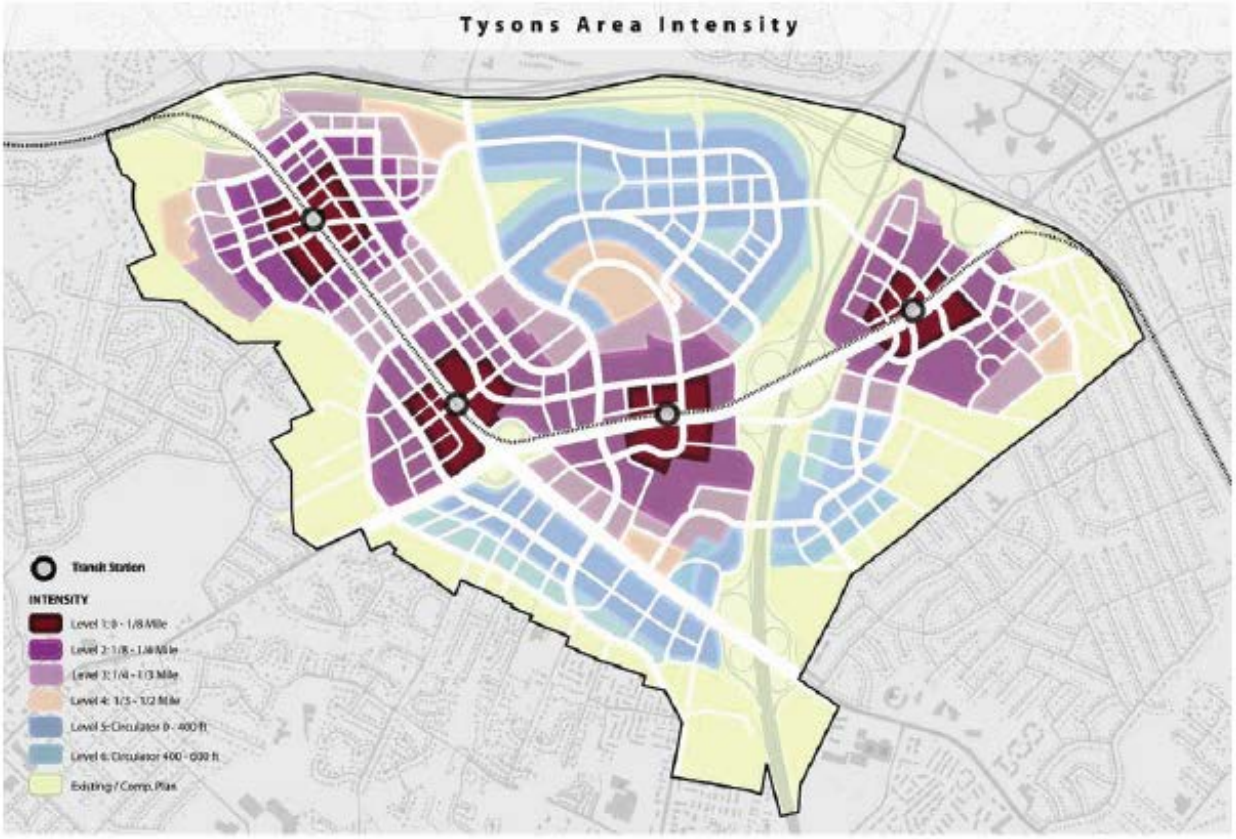
Land Use

The land use component stresses transit-oriented development, a balance of jobs and housing, defined neighborhoods, protection of the edges, and well-integrated community benefits. Over 95 percent of all development will be located within a half-mile of the rail stations or within 600 feet of the circulator, with transitions between the higher densities near the rail stations and the lower densities of the adjacent communities.



CONCEPTUAL MAP 1- The plan envisions a new Tysons transformed into a compact walkable urban center with a balance of jobs and housing focused around transit.

In addition to the traditional land use map with categories like residential mixed use and office mixed use, the area is also subdivided into intensity categories.



CONCEPTUAL MAP 2: The greatest densities are located within an easy walk of Metro stations.

This section on intensity may be of particular use to the Virginia statewide effort as it contains specific definitions and standards. The intensity categories are based on distance from transit (Metro and circulator). Each category has a range of allowable densities, expressed by a minimum and maximum FAR to allow the flexibility to respond to market changes while ensuring all development will be consistent with the vision and support the transit investments. Areas closest to the Metro stations have the highest densities, and densities decrease incrementally as you move away from the Metro stations.

The tiered density approach is coupled with requirements for a mix of uses and infrastructure to guarantee other livability factors are in place. Land use guidelines include considerations for affordable and workforce housing, parcel consolidation and coordinated development plans, and existing uses and buildings.

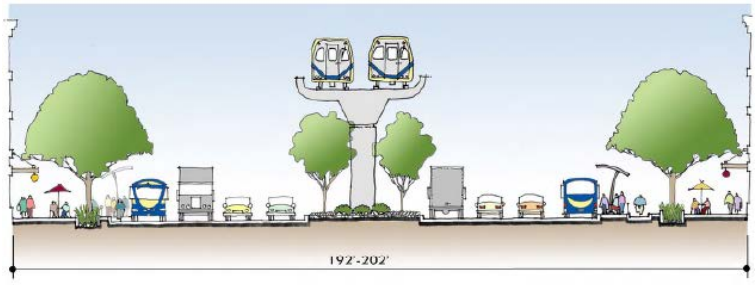
TABLE 1: Maximum Allowable Floor Area Ratios

	Non-Residential Development FAR		Residential Development FARs		
Distance Category	Allowable Maximum Before Bonus	With green building bonus: LEED Silver 6% LEED Gold 8% LEED Platinum 10%	Allowable Maximum Before Bonus	With offset for required affordable/ workforce housing	With offset and green bonus: LEED Silver 6% LEED Gold 8% LEED Platinum 10%
0 – 1/8 mile from Metro	6.0	6.36 6.48 6.6	6.0	7.2	7.56 7.68 7.8
1/8 – 1/4 mile from Metro	4.0	4.24 4.32 4.4	4.5	5.4	5.67 5.76 5.85
1/4 – 1/3 mile from Metro	2.0	2.12 2.16 2.2	3.0	3.6	3.78 3.84 3.9
1/3 – 1/2 mile from Metro	1.75	1.86 1.89 1.93	2.75	3.3	3.47 3.52 3.58
0 – 400 feet from circulator	2.5	2.65 2.7 2.75	2.5	3.0	3.15 3.2 3.25
400 – 600 feet from circulator	1.5	1.59 1.62 1.65	1.5	1.8	1.85 1.92 1.95

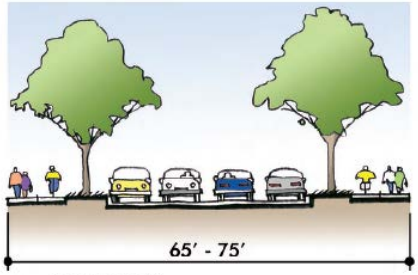
Note: In the case of residential FAR, the bonus and offset will be each applied to the allowable maximum before bonuses; they will not be compounded. For mixed-use development, the allowable intensity will blend the residential and non-residential FARs proportionally.

Transportation

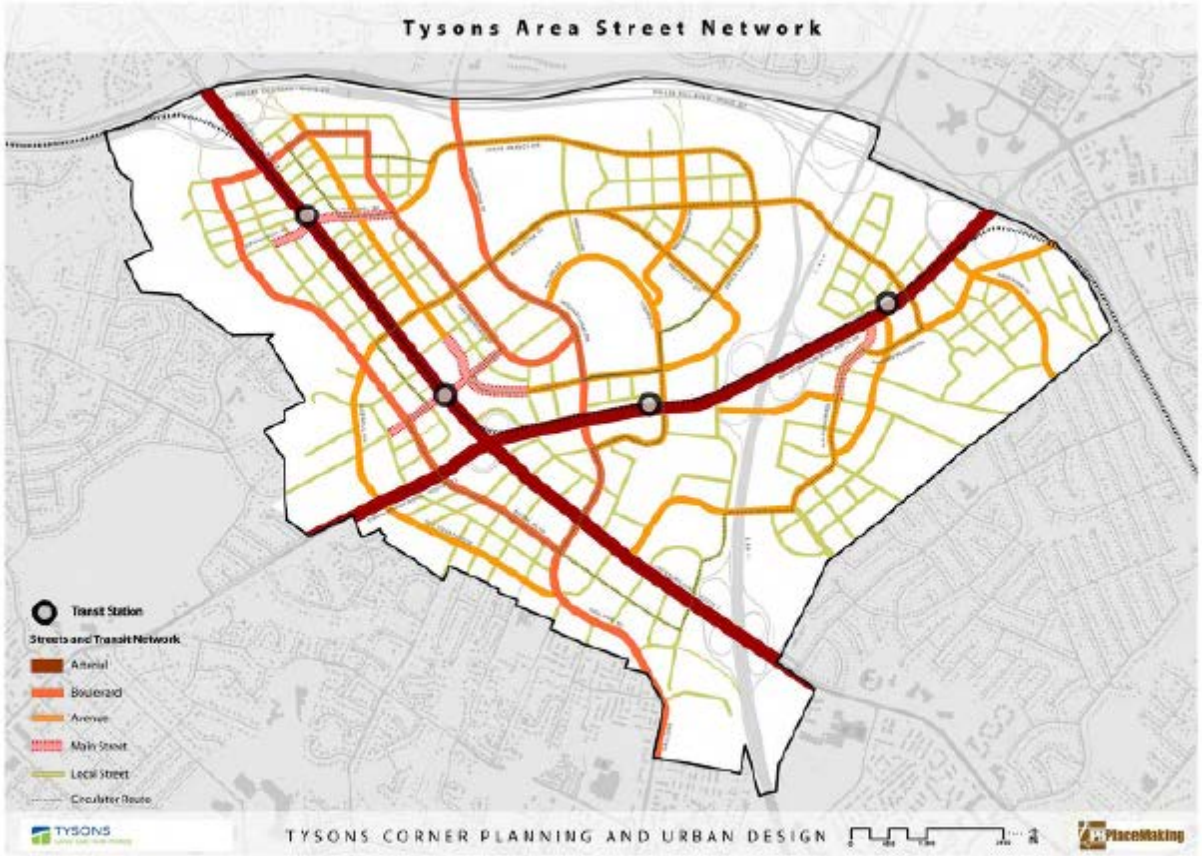
The transportation recommendations focus on improved mobility within the area for greater mode choice, a system of circulators, regional connectivity and new urban standards for all streets and roads. A functionally classified street map is coupled with illustrated typical sections to demonstrate the versatility of the street system in allowing different types of trips to use different streets. To ensure Tysons residents can get around without a car, a system of three circulator routes will extend the reach of the Metrorail system and connect the districts. Bicycle and pedestrian movement is integrated in the design of the street network. Transportation demand management and parking management strategies are also discussed.



Arterial Street 1



Local Street 2

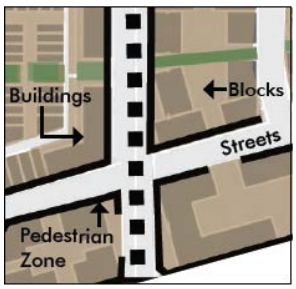


CONCEPTUAL MAP 5- A fundamental transformation of Tysons transportation is required with a network of walkable streets, bike lanes, and a robust transit system

Urban Design

The urban design recommendations consist of general Urban Design Principles and more specific Urban Design Guidelines. The Tysons Land Use Task Force consolidated a 'constellation' of Urban Design Principles to provide the framework for transitioning to the future. The principles address regional identity, identifiable centers and edges, vibrant streets and walkable block pattern, quality public realm and natural features, mix of uses, balanced growth and community benefits, and edge areas.

The Urban Design Guidelines provide more detail and direction on how to implement the principles and create the desired urban form. The guidelines organize the urban fabric into four elements: **blocks**, **streets**, **pedestrian zones**, and **buildings**. Several general guidelines for each of the four elements are applicable throughout the Tysons area regardless of district. More detailed guidelines are specific to three distinct character zones:



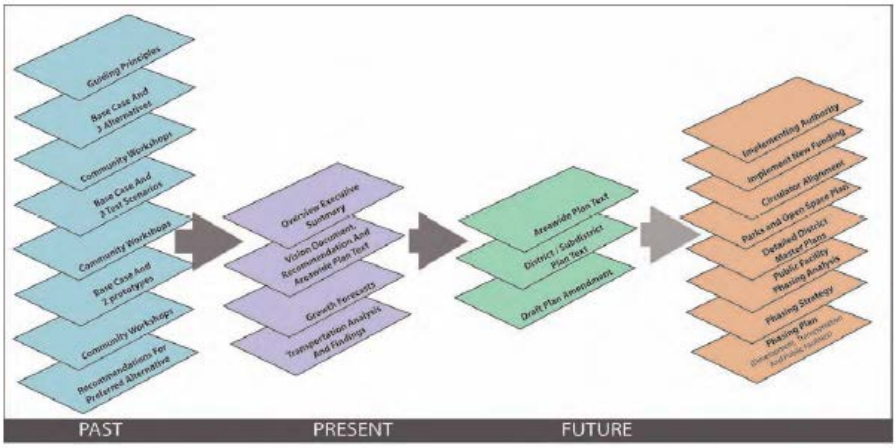
1. **Station Core Zone**
2. **Circulator Zone**
3. **Transition Zone**

Conceptual Map showing Character Zones

These detailed design guidelines include specifications for block size, parking, build-to lines, setbacks, bulk, massing, building articulation, fenestration, transparency, landmarks, gateways and public art. The plan also contains sections on environmental stewardship and public facilities, incorporating aspects of sustainability, stormwater management, green architecture, parks and open space, and community services.

Implementation Strategy

The area-wide plan is accommodated by an implementation strategy that establishes priorities and responsibilities, recognizing the need for evolution to achieve successful implementation. More detailed planning will be required, including preparing district plans, identifying the circulator alignment, creating a coordinated parks and open space network, and crafting an environmental stewardship strategy. Other essential elements include establishing an implementing authority, a funding strategy, public-private partnerships, a regulatory framework, and a phasing plan. National examples of cities that have successfully utilized innovative implementation strategies are provided, including the Midtown Alliance in Atlanta and the Downtown Denver Partnership.



14. Street Design Guidelines, by City of Roanoke, Virginia (July 2007)

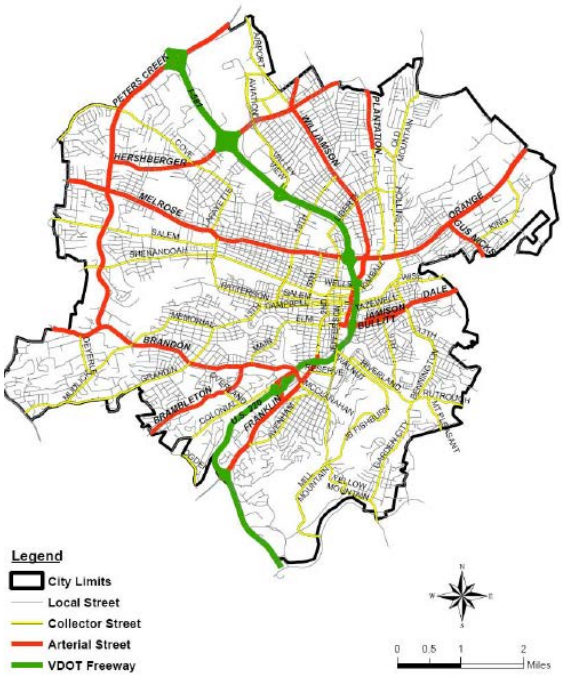
The City of Roanoke created and adopted its Street Design Guidelines to provide viable transportation options, ensure its city streets serve all modes of transportation, enhance pedestrian and bicycle safety and convenience, encourage active living, reduce congestion and improve air quality.

These guidelines provide a local example of classifying streets based on function and character. The statewide Virginia guidelines could use the approach of the Roanoke Street Design Guidelines as a basis for the multimodal corridors element. The City of Roanoke classifies its street network into three categories by function and character: arterials, collectors, and locals.

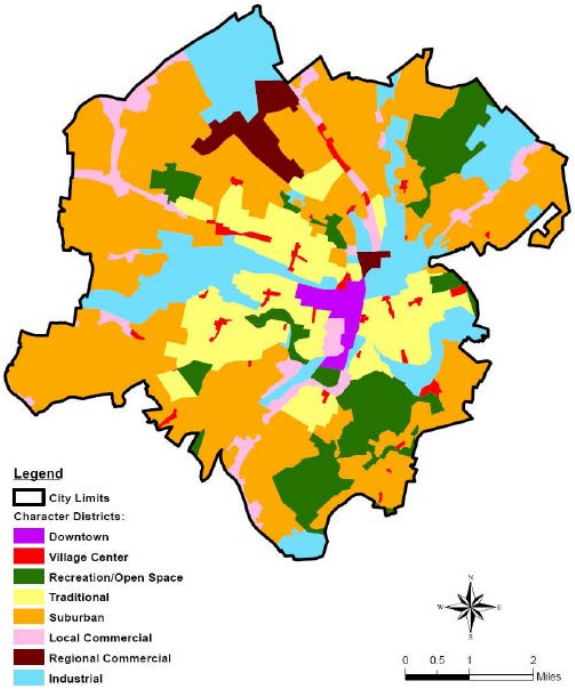
The City also organizes its land area into eight character districts that describe the general building style, development form and land purpose.

1. Downtown
2. Village Center
3. Recreation/Open Space
4. Traditional Residential Neighborhood
5. Suburban Residential Neighborhood
6. Local Commercial
7. Regional Commercial
8. Industrial

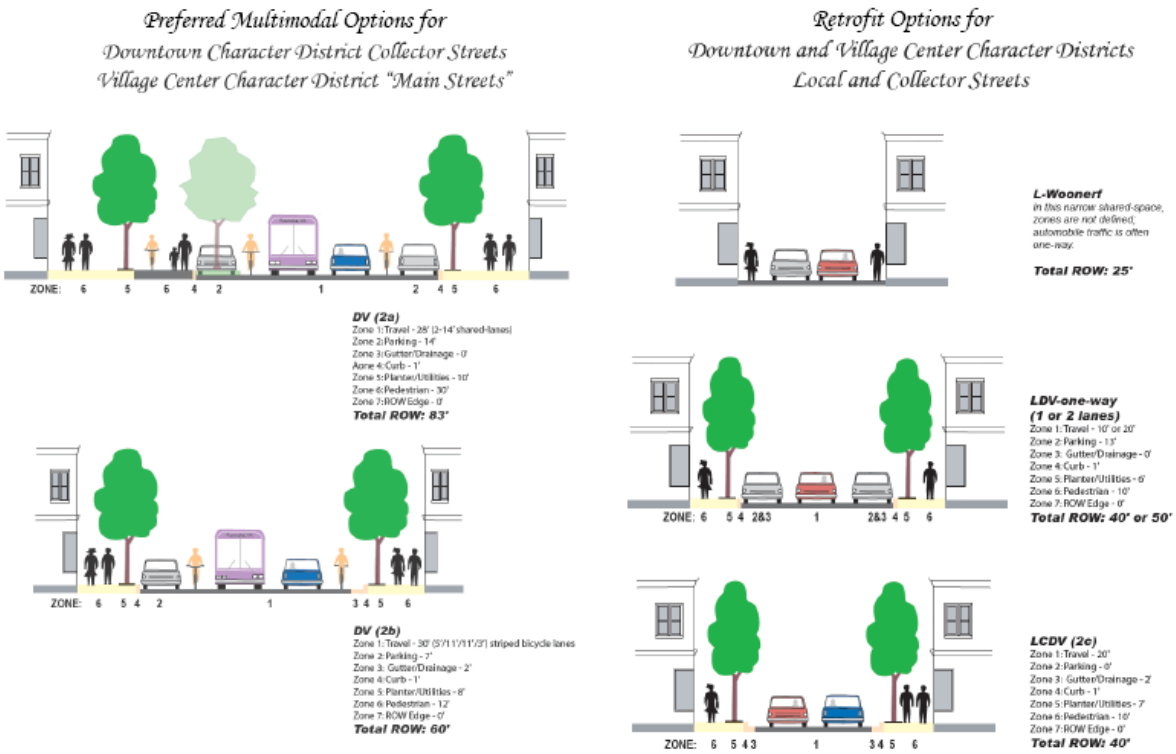
Roanoke's Street Hierarchy



Roanoke's Character Districts



The Street Design Guidelines provide corridor recommendations for each street type within each character district. These corridor guidelines organize the street cross-section in to seven zones as they relate to automobile accommodations, bicycle accommodations, pedestrian accommodations, transit accommodations, trees, signs, and lighting. Street cross-section illustrations of the street types for each character district demonstrate the ideal minimum width for each zone. Preferred and retrofit options are presented, acknowledging that the ideal cross-section may not be attainable in all instances because of right-of-way constraints.



General streetscape guidelines are provided for elements like benches and bicycle parking that are applicable to all areas with the city regardless of character district.

15. Arlington County's Transit Corridor Growth Strategy

Since the 1960s, Arlington County has successfully concentrated high-density development within Metro corridors and preserved lower-density residential areas throughout the County using a variety of planning and policy documents, regulatory tools and ordinances. The General Land Use Plan describes broad goals and establishes policies that focus on areas within Metro Station Areas and Metro Corridors. It also establishes zoning mechanisms to achieve these goals. Policy plans and land use plans for the Rosslyn-Ballston and Jefferson-Davis Metro Corridors provide the foundation for a unified long-range planning approach. Sector plans for the individual station areas delve into the details of urban design, zoning, transportation, and market trends, distinguishing the unique character of each station area. Arlington County continually tracks development statistics within the Metro corridors dating back to 1960 to quantify its success.

General Land Use Plan

The General Land Use Plan's goals include concentrating high-density development, promoting mixed-use development, and increasing the supply and variety of housing within the Metro corridors. It concentrates the highest density uses within walking distance of Metro stations; tapers densities, heights and uses down to single-family residential neighborhoods; and provides for a mix of office, hotel, retail and residential development. The Plan establishes regulatory mechanisms, namely special coordinated mixed-use zoning districts which allow FARs that exceed general zoning designations and special residential zoning districts which promote tapering of heights between higher-density commercial development and lower-density residential neighborhoods.

Each station area serves a unique function within the corridor. Rosslyn is a first class office and business center. Courthouse is the County's government center. Clarendon is planned as an "urban village." Virginia Square contains a concentration of residential, cultural and educational facilities. Ballston is developing as Arlington's "new downtown."

Crystal City Sector Plan

This sector plan provides the policy framework, master plan, and implementation steps for the Crystal City planning area, a 260-acre (0.4 sq. mi.) area within the 361-acre (0.6 sq. mi.) Crystal City Metro Station Area, as defined by the General Land Use Plan. It includes a discussion on the impact of regional growth, including identification of activity centers and their dispersion along major transportation corridors. It is an example of high density mixed use neighborhood and an economic engine with high-rises approaching full build-out of existing plans.

The planning area for station has an oblong shape. It is 1.3 miles from north to south and varies in length from east to west with a maximum width of 0.5 miles. It excludes the areas of low-density residential. Within the planning area, the plan defines neighborhoods and districts based on use characteristics and identifies destinations. It also distinguishes the ways in which the transportation infrastructure influences the area, local and collector streets connecting places within the area, and large arterials acting as barriers or edges to the districts.

East Falls Church Area Plan

The East Falls Church Area represents an example of a commuter station area with park-and-ride and kiss-and-ride facilities. It is less dense than the other Metro station areas within Arlington County. The East Falls Church Area Plan provides a policy framework, concept plan, design guidelines, and implementation actions.

The study area includes the commercial development and multi-family housing along I-66 and some of the single-family housing. Much of the existing single-family housing is not included, even though it is within a quarter-mile of the Metro station, in an effort to preserve it. The plan introduces the Neighborhood Center concept, a collection of three low- to medium-scale mixed use development nodes, each with its own specific character and role. These are essentially different mini-districts working together to create a cohesive whole.

Clarendon Sector Plan

Clarendon represents a future "urban village" with public spaces, accessibility, connectivity and a rich mix of uses to achieve a sense of place and uniqueness. The sector plan includes policies on urban form, transportation, land use, historic preservation and other topics. It includes urban design guidelines and a matrix of implementation recommendations. The station area boundary is approximately a quarter-mile radius within the Metro Station areas.

D. Virginia's Statewide Integrated Multimodal Planning Framework

The Virginia Department of Transportation (VDOT) has taken numerous steps in recent years to better accommodate multiple modes in its transportation planning and design process. This section reviews the various policies that support integrated, multimodal transportation in Virginia including:

- Policy for Integrating Bicycle and Pedestrian Accommodations
- Context Sensitive Solutions Policy
- Urban Development Areas
- Secondary Street Acceptance Requirements
- Chapter 527 Traffic Impact Analysis Regulations
- Access Management Regulations and Standards
- VTrans2035 and the Virginia Surface Transportation Plan

1. Policy for Integrating Bicycle and Pedestrian Accommodations

In March 2004, the Commonwealth Transportation Board (CTB) adopted the "Policy for Integrating Bicycle and Pedestrian Accommodations." The policy identifies bicycling and walking as fundamental travel modes and states that all transportation projects will start with the assumption that accommodation will be provided. The intent of the policy is to integrate bicycle and pedestrian accommodations into all of VDOT's procedures and projects, therefore increasing multimodal options for Virginians. Following the adoption of the policy, a VDOT interdisciplinary team was formed to promote the funding, development, operation, and maintenance of bicycle and pedestrian accommodations. The team developed updated procedures and best practices for VDOT including guidelines for coordinating with localities, planning level cost estimates, and updated construction and maintenance scoping forms to ensure inclusion of bicycle and pedestrian accommodations.

The procedures identified by the team include:

- Guidelines for coordinating with localities that encourage the development and use of bicycle and pedestrian plans as the primary resource for discussions regarding accommodations
- Spending two percent of the paving budget in each VDOT Construction District to provide paved shoulders
- Clarification and guidance for when the Policy's six exceptions can be used, those exceptions are: (1) absence of need for accommodations, (2) environmental or social impacts that outweigh the need for accommodations, (3) evidence that safety would be compromised, (4) costs excessively disproportionate to the need, (5) project purpose and scope that do not facilitate the provision of accommodations, and (6) locations where bicycle and pedestrian travel is prohibited by state or federal law
- A decision process tree to evaluate and document how bicycle and pedestrian accommodations are provided during the scoping of VDOT managed projects
- Revision and updates to numerous design and maintenance forms and instructional memos

Note: In May 2007, VDOT issued a Department Policy Memorandum (DPM) on Implementation of the CTB *Policy for Integrating Bicycle and Pedestrian Accommodations*. This DPM provides definitions, procedures, and exceptions and identifies reference materials to clarify and supplement the Policy, to the extent necessary for operational effectiveness and compliance.

VDOT has embarked on a three-tiered approach to further integrate the policy in daily VDOT business practices, which includes:

- Development of a Bicycle Policy Plan
- Development of a Pedestrian Policy Plan
- Implementation Plan for both the Bicycle and Pedestrian Policy Plans

VDOT is currently developing a Statewide Bicycle Policy Plan that provides a framework to implement the bicycle portion of that policy and establishes a vision for the future of bicycling in the Commonwealth. It builds upon past VDOT initiatives to ensure that bicycle facilities are an integral component of the transportation system. It provides goals and objectives, recommends actions, and sets a platform for the development of a series of performance measures that will track progress over time. The Statewide Bicycle Policy Plan specifically addresses the following areas:

- The Plan provides strategies for enhancing the implementation of the Policy for Integrating Bicycle and Pedestrian Accommodations approved by the CTB in 2004.
- It establishes policies to guide the planning and design of bicycle facilities.
- It identifies opportunities for enhancing coordination between and within the various levels of VDOT, as well as with stakeholders outside of the organization.
- It recommends training programs needed for professionals who are responsible for planning and designing bicycle facilities.
- It sets forward benchmarks for tracking the implementation over time.

The Bicycle Policy Plan does not identify specific bicycle and pedestrian projects, but provides planning level guidance and policies that address the need for providing access, connectivity, and integration across individual modes to make bicycling a safe and feasible commuting and recreational alternative.

2. Context Sensitive Solutions Policy

VDOT's Context Sensitive Solutions (CSS) policy promotes transportation facilities that provide transportation safety and mobility, while also fitting the physical setting and reflecting concerns regarding scenic, aesthetic, historic, and environmental resources. The CSS policy seeks a realistic and practical balance between transportation goals and community values and needs. It encourages enhanced stakeholder engagement and consensus on clearly defined project goals before proceeding to the design phase of a project. The CSS policy requires VDOT to consider that motorists, pedestrians, bicyclists, and public transit vehicles jointly use transportation systems for both transportation and recreational purposes.

3. Urban Development Areas

In 2007, the General Assembly added Section 15.2-2223.1 to the Code of Virginia requiring high growth localities to designate Urban Development Areas (UDA) in their comprehensive plans by July 1, 2011 (counties) and July 1, 2012 (cities and towns). UDAs are intended to improve the coordination between transportation and land use. They include locations with reasonably compact existing development that can accommodate 10 to 20 years of projected growth.

The comprehensive plan must provide for commercial and residential densities within urban development areas that are appropriate for reasonably compact development at a density of at least four residential units per gross acre and a minimum floor area ratio of 0.4 per gross acre for commercial

development. These minimum requirements fit very well with necessary development levels to support fixed route bus and going beyond the minimum requirements can achieve a level that supports rail.

The amendment to the Code also requires comprehensive plans to incorporate principles of new urbanism and traditional neighborhood development, a development strategy that encourages smart managed growth. The legislation highlights a number of key principles which may include but are not limited to: pedestrian-friendly road design, interconnection of new local streets with existing local streets and roads, connectivity of road and pedestrian networks, preservation of natural areas, satisfaction of requirements for stormwater management, mixed-use neighborhoods, including mixed housing types, reduction of front and side yard building setbacks, and reduction of subdivision street widths and turning radii at subdivision street intersections. Encouraging well-designed development and growth in appropriate areas can help reduce trip lengths, encourage trips by other modes, foster more sustainable development patterns, and manage costs in the future.

4. Secondary Streets Acceptance Requirements

The Commonwealth Transportation Board approved the Secondary Street Acceptance Requirements (SSAR) in February 2009. The SSARs establish requirements that newly constructed streets must meet in order to be accepted into the secondary system of state highways and as a result to qualify for ongoing VDOT maintenance.

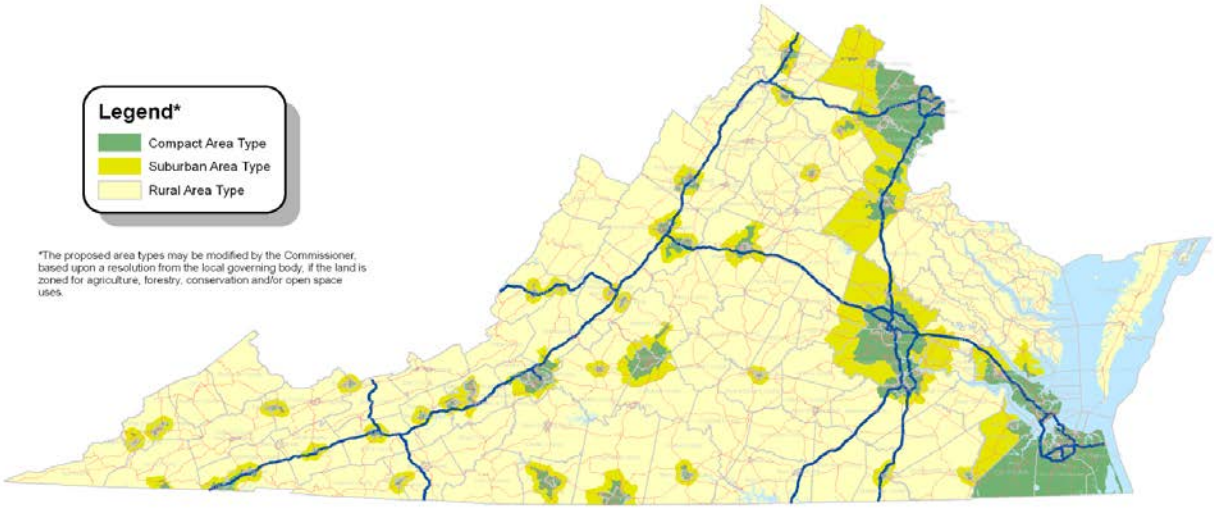
The most significant aspect of the revised regulation is that it introduces a change in public policy regarding the design and function a street must meet in order to be added to the state system.

The Commonwealth agrees to maintain streets built by developers and accepted by counties to the benefit and marketability of their developments. In exchange, the developer must build streets that connect with the surrounding transportation network in a manner that enhances the capacity of the overall transportation network and accommodates pedestrians.

The following describes the policies within the SSAR which are new to Virginia and most relate to the context of this research:

Area Types

- The division of the state into three categories based on long-term local, regional and federal planning boundaries.
- These area types are Compact, Suburban, and Rural.
- The importance of area types within the SSAR is that a parcel's area type will determine the connectivity and may impact pedestrian accommodation requirements which need to be met.



Connectivity Requirements

- Standards to ensure multiple connections with existing streets and adjacent properties.
- The "connectivity index" requirement is based upon a development's area type.
- The connectivity index can be found by dividing the development's street segments by its intersections (street segments/intersections). The SSAR Guidance Document has an extensive section on these calculations and definitions.
- Compact and Suburban area types must meet a 1.6 and a 1.4 index, respectively, while developments in the Rural area type are not required to meet an index amount.
- All newly built developments, regardless of area type, must have multiple transportation connections in different directions. This can be accomplished with connections to existing roads in the state system or "stub outs" constructed to the property line for a future connection.

Pedestrian and Bicycle Accommodations

- Sidewalk, trail, and path requirements are based upon density, proximity to public schools, and the functional classification of streets.
- Pedestrian accommodations are required on both sides of streets for developments with a median lot size of one half acre or less, a floor area ratio of 0.4 or greater, and along collector and arterial roads with three or more lanes.
- Accommodations must be provided on one side of the street for developments with median lot sizes between one half acre and two acres, developments within one half centerline mile of a public school in Compact and Suburban area types, and along collector and arterial roads with less than three lanes.
- If a development can be categorized into both groups requiring sidewalks on both and one side of a street, the higher requirement (pedestrian accommodations on both sides of the street) shall apply.
- Context sensitive street design – Revised street design requirements to provide initial design that will serve as built-in traffic calming and help ensure appropriate vehicular speeds. The SSAR also offers increased flexibility to use low impact development techniques to help reduce storm water runoff.

New development proposals initially submitted to counties and VDOT after June 30, 2009, must comply with the requirements of the SSAR.

5. Chapter 527 Traffic Impact Analysis Regulations

In 2006, the Code of Virginia was amended to add §15.2-222.1, which establishes procedures by which localities are directed to submit to VDOT for review and comment a traffic impact analysis for development proposals that would significantly impact the state transportation system. The goals of the amendment are to improve coordination between land use and transportation planning across Virginia by providing consistent information regarding traffic impacts of proposed land-use decisions to local decision-makers and citizens; and ensuring traffic impacts, both local and regional, are considered when land use decisions are made.

The requirement for localities to submit development proposals for VDOT to review through a traffic impact analysis is triggered at three key stages of land use: comprehensive plans and amendments, rezonings and site plans. At each of these key stages, VDOT has a fixed timeframe to review and comment on the traffic impact of the proposed land use change. The information and comments provided back to localities by VDOT is advisory since land use decisions remain a local prerogative.

The objectives of VDOT's traffic impact analysis include the following:

- Present recommendations for potential improvements or changes that may mitigate traffic impacts of proposed development
- Identify impacts to the existing transportation network associated with vehicle trips generated by the proposed development
- Identify potential impacts to bicycle and pedestrian facilities as well as to transit accommodations
- Determine need for signal additions or modifications and other traffic engineering features

The Commonwealth has formalized this process through regulations, known as Chapter 527. In 2010, the Chapter 527 regulations were amended to offer local governments the option of conducting a single traffic analysis at the comprehensive plan stage of the development process for all parcels that are part of a small area plan for an urban development area or for a transit oriented development. These amendments will reduce the number of traffic impact analyses required for developments located within small area plan areas in an effort to realize the benefits of compact development, which are not always quantified when each proposed developments are considered individually.

Furthermore, the amendments require VDOT to approve a trip generation methodology that accurately determines the traffic impacts of urban developments. VDOT will need to adopt by July 1, 2011 at least one non-Institute of Transportation Engineers methodology or alternative trip/internal capture/modal split rate for determining the trip generation of development proposals within small area plans. The approved methodology will need to recognize the reduced vehicle trip generation of mixed-use, compact development patterns and transportation demand management measures.

Finally, the amendments will ensure that the applicable provisions of the Secondary Street Acceptance Requirements and the Access Management Regulations: Principal Arterials (24 VAC 30-72) and Access Management Regulations: Minor Arterials, Collectors, and Local Streets (24 VAC 30-73) are included in the traffic impact analyses.

6. Access Management Regulations and Standards

In 2007, the General Assembly approved legislation directing VDOT to develop access management regulations that would balance the right of property owners to reasonable access to the highway with the right of users of the roads to mobility, safety, and efficient expenditure of public funds. Regulations and standards address:

- Spacing entrances intersections, median openings and traffic signals;
- locating entrances a safe distance from intersection turning movements and from interchange ramps;
- providing vehicular, and where appropriate, pedestrian circulation between adjoining properties; and
- sharing highway entrances.

The Access Management Regulations took effect on July 1, 2008 for Principal Arterials (24 VAC 30-72) and on October 14, 2009 for Minor Arterials, Collectors and Local Streets (24 VAC 30-73). Both Access Management Regulation documents require compliance with the CTB's Policy for Integrating Bicycle and Pedestrian Accommodations, and require entrance design to accommodate transit users of the adjacent highways to the extent possible.

These documents require entrance and intersection spacing to comply with standards in Appendix F of the VDOT Road Design Manual. The spacing standards are based on functional classification (urban vs. rural and arterial vs. collector), the speed limit, and type of entrance. Exceptions to the spacing standards within the Road Design Manual include developments within a designated UDA or an area that the local comprehensive plan designates for higher development that incorporates principles of new urbanism and traditional neighborhood development (including pedestrian-friendly road design and connectivity of road and pedestrian networks). As a condition of a commercial entrance permit, applicants are required to provide pedestrian connections to the property line, unless the new access point is right-in-right-out only.

7. VTrans2035 and the 2035 Virginia Surface Transportation Plan

The Code of Virginia (§33.1-23.03) and federal regulations (23CFR450.214) require the CTB to develop a statewide multimodal long-range transportation plan every five years. VTrans2035 is Virginia's long-range multimodal transportation plan and sets forth an overall vision with transportation policy goals, key investment priorities, and action items to set the foundation for future transportation in the Commonwealth.

VTrans2035 represents a uniquely integrated planning approach, as it was developed by the Office of Intermodal Planning and Investment and involved Virginia's five statewide transportation agencies - Department of Aviation (DOAV), Department of Motor Vehicles (DMV), Department of Rail and Public Transportation (DRPT), Virginia Port Authority (VPA), and Department of Transportation (VDOT) - from start to finish. The guiding vision of the document is a multimodal transportation system that is safe, strategic and seamless. This vision directly relates to the purpose of the statewide multimodal and public space design guidelines, as it promotes the safe accommodation of and complete connected networks for all transportation modes.

VTrans2035 acknowledges the changing circumstances and growth pressures that are increasing the demand for transportation choices and the mobility needs of all residents. Investment priorities include all ranges of transit service and infrastructure, from high speed intercity rail between Washington DC, Richmond and Hampton Road and Metrorail expansion, to ensuring a state of good repair in Virginia's local transit systems, to improving rural connectivity with transit and coordinated human services transportation. VTrans2035 provides high level policy guidance to integrate transportation and land use planning, and prioritizes increasing transit usage and encouraging supportive land uses.

The 2035 Virginia Surface Transportation Plan (VSTP) follows the policy guidance of VTrans2035 and identifies specific multimodal solutions for Virginia's different regions, including public transportation strategies, rail investments and highway improvement projects. The 2035 VSTP represents a continuation of the integrated multimodal approach to statewide transportation planning in Virginia. Public transportation recommendations balance maintaining existing assets, expanding capacity, and investing in major capital projects like rapid transit service. The rail element of the VSTP explains the demand for increased passenger rail service. The statewide scope of the VSTP is too broad to include individual bicycle and pedestrian projects, but acknowledges the current regional trails available.

Several policy papers were prepared in conjunction with the VTrans2035 effort. The Transportation and Land Use: Challenges and Opportunities paper explains how the past growth patterns and expected growth influence the demand for transportation. It recognizes the need to accommodate future growth with compact development patterns that create proximity, especially for transit service. Analysis of the Fredericksburg area shows that allocating future growth into compact development areas results in better levels of service in major roads. The Regional Accessibility paper showcases the advantages of having proximity of activities, multimodal connectivity and transportation choices. It identifies the accessibility issues associated with varying levels of future growth rates, and regions within Virginia where those issues may arise. Recommendations from this paper include focusing growth in high density communities with a mix of activities and convenient connections for all transportation modes and expanding multimodal regional transportation networks.

E. Other Useful Web Resources

City of Charlotte, NC. Aug 2010. *Centers, Corridors and Wedges Growth Framework*. http://charmeck.org/city/charlotte/planning/AreaPlanning/CentersCorridorsWedges/Pages/Home.aspx.

City of Denver, CO: Regional Transportation District FasTracks. Sep 2010. *Strategic Plan for Transit Oriented Development*. http://www.rtd-fastracks.com/main_45.

Florida Department of Transportation and the Department of Community Affairs. Oct 2010. *A Framework for Transit Oriented Development in Florida Draft Report*.

New Jersey Department of Transportation and Pennsylvania Department of Transportation. Mar 2008. *Smart Transportation Guidebook: Planning and Designing Highways and Streets that Support Sustainable and Livable Communities*. http://www.state.nj.us/transportation/community/mobility/pdf/smarttransportationguidebook2008.pdf.

Reconnecting America. Nov 2009. *Mixed-Income Housing Near Transit: Increasing Affordability with Location Efficiency*.

Reconnecting America. Nov 2009. *Realizing the Potential for Sustainable and Equitable TOD: Recommendations to the Interagency Partnership on Sustainable Communities.*

Sacramento Regional Transit District. Aug 2002. *Transit for Livable Communities*. http://www.sacrt.com/TLC/index.stm.

San Francisco Bay Area Rapid Transit District. Apr 2003. *BART Station Access Guidelines*. http://www.bart.gov/about/planning/station.aspx.

San Francisco Bay Area Rapid Transit District. Jun 2003. *BART Transit Oriented Development Guidelines*. http://www.bart.gov/about/planning/station.aspx.

F. Full Literature Review Summary Table

ORGANIZATION	DOCUMENT/ POLICY TITLE	DESCRIPTION	DOCUMENT/ POLICY TYPE	SCALE (STATE, REGION, LOCAL)	TRANSPORTATION SYSTEM (ROADWAY, TRANSIT TYPE, BIKE/PED)	PLACE TYPE / CORRIDOR TYPE / DISTRICT TYPE (DESCRIPTION)	URL	STATUS
Center for Transit Oriented Development	Station Area Planning: How to Make Great Transit Oriented Places	This guidebook focuses on TOD station areas and strategies to achieve TOD that maximizes ridership potential. It presents TOD place types and defines their characteristics, and provides station area planning principles.	Transit Oriented Development Policy and Strategy Guidance	Primarily focuses on **local** areas, but has applicability for region-wide scales.	Commuter Rail, Local Bus, Regional Bus, Light Rail, Streetcar, BRT, Heavy Rail	Place types are defined according to the intensity of surrounding development, the transit technology, and the characteristics of transit service.	http://www.reconnectingamerica.org/public/show/tod202	Published in February 2008.
Institute of Transportation Engineers and Congress for New Urbanism	Designing Walkable Urban Thoroughfares: A Context Sensitive Approach	This report is the industry standard for Context Sensitive Solutions and walkable thoroughfare design. intended to facilitate the restoration of the complex multiple functions of urban streets. It provides planning and design guidance for urban roads, acknowledging their complexity and multiple functions. Application is generally limited to low-speed, urban arterials and collectors, streets that require tradeoffs between pedestrian and vehicle priority.	Multimodal Corridor Planning Strategies and Design Guidelines	All scales	Pedestrian, Bicycle, Roadway, Local Bus	Context zones describe the physical form and character of a place and are defined by multiple parameters, including land use, density and design features. Context zone is combined with functional classification and thoroughfare type.	http://www.ite.org/emodules/scriptcontent/Orders/ProductDetail.cfm?pc=RP-036A-E	Adopted as an ITE Recommended Practice in March 2010.
Center for Transit Oriented Development	Mixed Income Housing Near Transit: Increasing Affordability with Location Efficiency	This best practice guidebook outlines 11 strategies on how to preserve and encourage mixed income transit oriented housing. It defines the scale for which each strategy is applicable: state/region, corridor, city/locality, neighborhood.	Transit Oriented Development Policy and Strategy Guidance	Primarily focuses on **local** areas, but has applicability for region-wide scales.	N/A	N/A	http://www.reconnectingamerica.org/public/display_asset/091030ra201mixedhousefinal	Published in November 2009.
Center for Transit Oriented Development	Realizing the Potential for Sustainable and Equitable TOD: Recommendations to the Interagency Partnership on Sustainable Communities	This policy white paper discusses coordination efforts between government agencies on how to attain sustainable development. It includes a discussion on livability principles and their application to TOD; the history of federal government agency coordination between USDOT, HUD and EPA for sustainability and livability. Best practices for agency coordination at the state, regional and local level provide examples on legislative measures that were passed and funding programs. The paper presents recommendations for short and long term actions for different agencies.	Sustainability White Paper	All scales	N/A	N/A	http://www.reconnectingamerica.org/public/display_asset/091118ra_sustainabilityrecommendations_final	Published in November 2009.

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Indianapolis MPO	Multimodal Corridor and Public Space Design Guidelines	This manual is a tool for the region's jurisdictions to guide implementation of public improvements within the ROW that are based on attaining a balanced transportation system and thoroughfare character. It integrates transportation and land use to enhance economic and community development and sustain the region's quality of life and environmental health. The manual outlines 6 types of pedestrian districts, mapped as part of a Regional Pedestrian Plan and establishes various multimodal corridor typologies. The design guidelines focus on those elements that are within the public and quasi-public sphere, providing detailed guidance on the application of certain multimodal treatments for various conditions. Numerous diagrams and pictures illustrate the presented concepts.	Corridor Design Guidelines	Local	Automobile, Pedestrian, Bicycle, Local Bus, Rapid Bus, Light Rail	The six pedestrian districts outlined in the Regional Pedestrian Plan form the basis of the district design guidelines. The terms Ped Districts and Multimodal Districts appear to be used interchangeably in places, yet they are defined slightly differently. A multimodal district is 1-2 mile radius, bikeable scale; consists of district node, center, and subdistrict. A pedestrian district is 1/4 - 1/2 mile radius.	http://www.indympo.org/Plans/Documents/MM_DesignGuidelines.pdf	Approved in August 2008.
Florida Department of Transportation	A Framework for Transit Oriented Development in Florida	This framework is a tool to help local communities take the first steps in planning for TOD. It provides key considerations and includes a set of station area place types that address land use and design considerations. The guidelines present qualitative and quantitative information to assess how transit ready existing development patterns are and establish targets to create transit supportive development patterns in the future. The document provides goals, benchmarks and strategies for implementation across the state.	Transit Oriented Development Framework and Policy Guide	State	Heavy Rail, Commuter Rail, Streetcar, Light Rail, Bus Rapid Transit, Express Bus, Local Bus, Pedestrian, Bicycle, Automobile, Park & Ride	The framework illustrates multiple levels TOD concepts at the system, corridor and station area scales. Place types are defined by varying levels and types of activity and accessibility, varying types of transit, and varying community contexts. Ranges for intensity/density indicators, mix of uses, network and building design, and parking parameters are defined for each place type.	Available from the Florida Department of Transportation and Department of Community Affairs.	Draft Published in October 2010.
Utah's Wasatch Front	Transit Oriented Development Guidelines	The Wasatch Front TOD guidelines identify and provide general qualitative guidance for targeted TOD areas for a large region with different types of transit systems. The report highlights several main concepts of TOD design including circulation, urban design, and parking and transportation demand policy, without providing quantitative parameters and standards for TOD place types. It contains a comprehensive section on implementation and focuses on economic feasibility of TOD.	Transit Oriented Development Guidelines	Region	Pedestrian, Bicycle, Rapid Bus, Feeder Bus, Light Rail, Commuter Rail, Automobile, Park & Ride, Kiss & Ride	The document generally defines station areas as the area within walking distance of the station. It discusses ways in which TOD context can vary between station areas, but does not identify or organize specific place types or districts. Layers that contribute to a TOD's context include place/location (urban core, suburban employment center), development type (infill, greenfield), and transit type.	http://www.envisionutah.org/Wasatch%20Front%20Transit%20Oriented%20Development%20Guidelines_2002.pdf	Published in 2002.

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City of Charlotte, NC	Urban Street Design Guidelines	This document is Charlotte's 'Complete Streets' guidelines. It acknowledges conflicts between road users (pedestrians, motorists, neighbors, etc) and provides design guidelines and standards for road segments and intersections. The guidelines go hand-in-hand with the Transportation Action Plan (TAP) and the Centers, Corridors and Wedges growth framework.	Corridor Design Guidelines	Local	Automobile, Pedestrian, Bicycle, Bus Transit	Charlotte's streets are classified according to five street types that follow a continuum from pedestrian-oriented (Main Streets) to auto-oriented (Parkways).	http://charmeck.org/city/charlotte/Transportation/PlansProjects/Pages/Urban%20Street%20Design%20Guidelines.aspx	Adopted in October 2007.
City of Charlotte, NC	Centers, Corridors and Wedges Growth Framework	The Centers, Corridors and Wedges concept is Charlotte's vision for future growth. The framework provides general guidance for future area plans on where and how to focus new growth and development. It identifies different areas with different characteristics and sub-areas within those areas. It discusses transportation and public facilities that should accompany new growth to allow the system to function effectively, as appropriate for the geographic type.	Growth Management Policy	Local	Automobile, Pedestrian, Bicycle, Bus Transit	Charlotte's land area is organized into three different types. Activity centers are concentrated areas of economic activity. Growth corridors are radial spokes from city center to city limits with typically at least three high capacity transportation facilities running parallel to each other. Corridors are wide swaths of land and include a variety of land use types. Wedges are areas in between. Transit station areas are a subarea type of growth corridors, the half-mile around the station. In addition to station areas, there are mixed use centers that do not correlate to a particular corridor but have a goal for multimodal transportation network.	http://charmeck.org/city/charlotte/planning/AreaPlanning/CentersCorridorsWedges/Pages/Home.aspx	Adopted in August 2010.
City of Denver, CO: Community Planning & Development	Transit Oriented Development (TOD) Strategic Plan	Between the T-Rex line and FasTracks, Denver is planning 23 new transit station and five new transit corridors. This guide is intended to help city staff to prioritize the planning and implementation activities for TOD. It provides background info on what TOD is and TOD in the Denver context; specific city-wide action strategies to implement TOD, and briefly identifies issues, opportunities and recommendations for transit corridors and station areas. Parameters and standards for station areas are reserved for individual station are plans, most of which are completed or underway.	Transit Oriented Development Policy	Region	Regional Bus, Local Bus, Light Rail, Park & Ride	The document contains a TOD typology matrix that categorizes each station area into one of seven different typologies and specifies the market opportunity and priority. TOD typologies are distinguished by desired land use mix, desired housing types, commerical and employment types, proposed scale, and transit system function.	http://www.denvergov.org/HomePage/tabid/395229/Default.aspx	Published in August 2006.

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City of Denver, CO: Regional Transportation District (RTD) FasTracks	FasTracks: Strategic Plan for Transit Oriented Development	The Regional Transportation District (RTD) is the regional transit agency for the Denver-Aurora and Boulder metro areas, and FasTracks is RTD's 12-year comprehensive transit plan. FasTracks provides the TOD vision, goals, and strategies, It outlines the review process for TOD development proposals and focuses on defining the roles of RTD, local governments, private developers and other professional and research organizations.	Agency Procedural Policy	Region	Commuter Rail, Light Rail, Bus Rapid Transit, Park & Ride	The document does not discuss different TOD contexts, but it directs RTD to track all development within a half-mile of the transit stations and prepare an annual report on status of TOD including quantitative, spatial and trends analysis of TOD development.	http://www.rtd-fastracks.com/main_45	Revised in September 2010.
Sacramento Regional Transit	Transit for Livable Communities	Sacramento's land use plan for 21 light rail stations consists of conceptual land use plans including transit overlay zones and proposed development standards; joint development strategies and development plans for property owned by the transit agency; and a discussion on barriers to TOD and implementation measures. It includes interim station area land use standards to regulate development until permanent transit zoning is adopted.	Transit Oriented Development Guidelines	Local	Light Rail	Three light rail lines are identified, and the land use plans for each light rail station cover a quarter-mile radius around the station.	http://www.sacrt.com/TLC/index.stm	Approved in August 2002.
Bay Area Rapid Transit (BART) - San Francisco, CA	BART Station Access Guidelines (Apr 2003)	These guidelines identify access priorities for different travel modes around transit stations and set goals for future mode share. Key considerations and design principles for improving non-motorized access to transit including direct walking routes, safety, pedestrian-friendly design and wayfinding information are provided.	Station Area and Facility Design Guidelines	Region, Local	Pedestrian, Bicycle, Local Bus, Automobile, Light Rail, Heavy Rail	N/A	http://www.bart.gov/about/planning/station.aspx	Published in April 2003.
Bay Area Rapid Transit (BART) - San Francisco, CA	BART Transit Oriented Development Guidelines (Jun 2003)	BART's TOD Guidelines clarify the agency's priorities for TOD. It presents recommendations to assist planning and development process. It purposefully does not cite dimensions or specify precise land uses to allow flexibility in adapting to local conditions. The guidelines focus on connecting to destinations and providing design features for different modes to foster community, increase safey, and make the transportation system work. Minimum densities within station areas are included	Transit Oriented Development Guidelines	Region	Pedestrian, Bicycle, Local Bus, Automobile, Light Rail, Heavy Rail	The guidelines identify three different "zones of urgency" within a station area, defined by the intent and purpose of the people moving through them. Design principles reflect the state of urgency within each zone.	http://www.bart.gov/about/planning/station.aspx	Published in June 2003

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Metro Portland, OR	Transit Oriented Development Program	The Metro Portland TOD program is admired across the nation for its public-private partnerships, investments and incentives in TOD projects. The 2040 Growth Concept calls for a significant amount of the region's growth to be concentrated in medium- to high-density mixed use, walkable urban centers and corridors linked by high quality transit service. The TOD Program provides funds for development projects within designated TOD areas (around rail station areas and frequent bus stops).	Development Assistance Program	Region	Heavy Rail, Light Rail, Streetcar, Express Bus	Metro Portland assesses the performance of its station areas through by looking at its transit orientation and market strength. The level of performance determines Metro's investment priorities.	http://www.oregonmetro.gov/index.cfm/go/by.web/id=140	Ongoing TOD Program created in 1998.
Center for Transit Oriented Development	Performance-Based Transit Oriented Development Typology Guidebook	This research report introduces a unique methodoly for characterizing and analyzing TOD performance. It organizes rail station areas into place types according to VMT and percentage of workers to residents. It also looks at other characteristics relative to the place types (e.g. auto ownership, transportation costs, commute travel behavior, employment proximity, and urban form. The report provides case studies for each of the nine place types and includes scenario studies to analyze effect of additional growth in reducing VMT. The report provides a template for communities to assess station areas in comparison to others and can be used to determine how to lower VMT in an individual zone.	Research Report	National, Local	Commuter Rail, Light Rail, Heavy Rail	Place types are organized by VMT on vertical axis and use mix on horizontal axis. The purpose is to compare place types within a system or across multiple systems. Other measures, called normative metrics can be compared to the place types (e.g. travel time to work, avg median income, autos per HH, gross density, etc).	http://reconnectingamerica.org/public/display_asset/2010_performancebasedtodtypologyguidebook	Published in December 2010.
New Jersey Department of Transportation and Pennsylvania Department of Transportation	Smart Transportation Guidebook: Planning and Designing Highways and Streets that Support Sustainable and Livable Communities	This resource provides guidance on planning and designing all classes of non-limited access roadways in New Jersey and Pennsylvania to fit within the existing and planned community context. The handbook provides tools and techniques to integrate context sensitivity into the project development processes of the DOTs. It presents a set of land use contexts and roadway types that influence the appropriate design values. It also provides design guidelines for roadway elements like travel lanes and on-street parking, roadside elements like pedestrian and transit facilities, and general systems issues like access management and traffic calming.	Multimodal Corridor Planning Strategies and Design Guidelines	State	Automobile, Bicycle, Pedestrian, Bus Transit	The handbook defines different land use contexts according to ____ and roadway types based on ___.	http://www.nj.gov/transportation/community/mobility/guide.shtm	Published in March 2008.

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(California Department of Transportation)	Smart Mobility: A Call to Action for the New Decade	The Smart Mobility handbook represents an approach to integrating transportation and land use. It presents a methodology for understanding smart mobility within the context of location efficiency and identifies different place types throughout the state based on location efficiency potential. The place types create a distinct context for transportation investments and opportunities for mobility benefits. The handbook provides multimodal performance measures for smart mobility, compares them to conventional Caltrans performance measures, and explains how the performance measures apply to different place types.	Growth Framework	State	Pedestrian, Automobile, Transit, Bicycle	CalTrans is an example of a statewide agency that has categorized places into place types. Place types are based on locational efficiency, which considers levels of community design and regional accessibiltiy. They are necessarily broad and should be applied at a general planning level of detail. Finer-grained analysis would show large areas characterized as one place type would actually consist of several subareas with characteristics of other place types.	http://www.dot.ca.gov/hq/tpp/offices/ocp/smf.html	Published in February 2010.
Virginia Department of Rail and Public Transportation	Transit Service Design Guidelines	These guidelines help localities understand their options for implementing transit service and explain which planning activities should be conducted to make the effort successful. The document explains the range of different transit options available and helps localities determine which transit technology may be appropriate for their community based on factors like density, diversity, design and transit station type.	Policy Guidance on Transit Service	Statewide guidance for regions and localities	Heavy rail, Light Rail, Streetcar/Trolley, Express Bus, Local Bus, and others	The document acknowledges the spectrum of transit network designs, target markets and service area sizes throughout the state. It contrasts the radial systems of VRE and WMATA with the grid-type bus networks of more dispersed areas.	http://www.drpt.virginia.gov/activities/Transit_ref_materials.aspx	Finalized in November 2008.
Virginia Department of Rail and Public Transportation	Amtrak Station Area Planning and Land Use Analysis	DRPT staff and local planners collaborated to create six transit oriented land use plans at existing and potential Amtrak stations along the I-95/I-64 rail corridor linking Washington DC, Richmond and Newport News. Station Area Plans present land use plans for compact development with particular urban design characteristics around the station areas to achieve a walkable transit oriented place. The Plans provide in-depth analyses of the resulting effects of creating these TODs, including assessed market conditions, economic impacts, and potential funding mechanisms. Traffic, transit, pedestrian and bicycle analyses assess the effects of increased activity around the train station for all modes, and infrastructure and service improvements are noted in the report. Environmental effects for water resources, historic sites, hazardous materials and protected species are also addressed.	TOD Station Area Plans	Regional (Amtrak Corridor) and Local (Station Areas)	Commuter Rail, Local Bus, Pedestrian, Bicycle, Automobile	The document identifies each station's unique function and character within the corridor and establishes overarching themes specific to each station area. It is unclear why each station was chosen, but together they represent a range of station area types, from rural towns to downtown centers.	Available from the Virginia Department of Rail and Public Transportation.	Finalized in November 2008.

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Washington Metropolitan Area Transit Authority (WMATA)	Station and Site Access Planning Manual	Illustrates how station site facilities should be planned to optimize pedestrian and vehicular access to Metro, with focus on physical design and operational issues. Similar to BART's Station Access Guidelines.	Station Area and Facility Design Guidelines	Regional (Metro system) and Local (Station Areas)	Heavy rail, Pedestrian, Bicycle, Local bus, Light Rail, Streetcar, Kiss & Ride, Park & Ride	Stations are classified into three general types: Core Stations, Mid-Line Station, and Terminus Stations, according to the variety of modes used to access that station and surrounding development density.	http://www.wmata.com/pdfs/planning/Station%20Access/SSAPM.pdf	Published in May 2008.
Washington Metropolitan Area Transit Authority (WMATA)	Joint Development Policies and Guidelines	Outlines the general practices of the joint development program. Under this program, WMATA markets publicly owned property to developers to create TOD projects. WMATA selects a developer to work with WMATA and local jurisdictions in the development of the property to integrate transit investments in the development process. The Policies and Guidelines document specifies the program's objectives, procedures, and roles and responsibilities of WMATA, local jurisdictions, developers and the community.	Procedural Guidelines	Region	Heavy rail, Local Bus	N/A	http://www.wmata.com/pdfs/business/Guidelines%20Revision11-20-08.pdf	Revised in November 2008.
Fairfax County and Tysons Land Use Task Force	Transforming Tysons: Vision and Area Wide Recommendations	This integrated land use and transportation plan provides a parcel level land use plan with intensity focused around transit, transportation recommendations for a variety of street types that accommodate all modes, and urban design guidelines specified by character zones. It is a nationally recognized model for TOD planning.	Transit Oriented Development Plan	Local	Heavy Rail, Circulator Bus, Automobile, Bicycle, Pedestrian	The Tysons area is divided into eight districts; four surrounding the future rail stations and four creating transitions between adjacent communities. 95% of development is concentrated within walking distance of transit (1/2 mile of rail or 600 feet of the circulator). The urban design guidelines organize the area into three different character zones (station core, circulator and transition) and provide guidelines for blocks, streets, pedestrian zones and buildings. Streets are classified by function and range from arterial to local street.	http://www.fairfaxcounty.gov/dpz/tysonscorner/finalreport.htm	Revised in October 2008. Fairfax County Comprehensive Plan amended in June 2010.

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Hampton Roads Metropolitan Planning Organization	Vision Plan Document: A Transit Vision Plan for Hampton Roads	This vision plan acknowledges the need for integration of land use and transit plans. The plan identifies major activity centers based on HRPDC demographic estimates and projections and examines the land use composition of current and potential transit corridors that could connect the centers. Potential transit corridors were evaluated to assess the "transit supportiveness" of the governing land use policies and regulations and the feasibility of implementation. The document includes guidelines for transit supportive development, drawing mainly from the Virginia Transit Service Design Guidelines (4Ds) and FTA guidelines. It provides a matrix of place types localities can use to plan for feasible future transit corridors. It also includes a vision for transportation demand management.	Vision Plan	Region	Local Bus, Enhanced bus, Express bus, Bus rapid transit, Streetcar/Trolley, Light Rail, Commuter rail	Place types are categorized by land use type, density, mix and design characteristics. Each place type is given a range of typical housing and job densities and a list of feasible transit options. The place types do not have a specific shape or area size, and can be applied at any scale.	http://www.hrtpo.org/TPO_SpecReports.asp	Draft Report published in April 2009. Public meetings held and public comments received by December 2010. Final Report underway.
City of Norfolk	Downtown Norfolk 2020 Plan	In the advent of light rail, Norfolk's downtown plan envisions itself as one large TOD with all development within a ten minute walk of transit, using the light rail stations as foundations. The plan focuses on the creation of place around transit and along the waterfront and the creation of improved connections between the downtown the city's neighborhoods.	Vision Plan & Transit Oriented Development Station Area Plans	Local	Light Rail, Local Bus, Pedestrian	The plan focuses on several centers located along the waterfront, around transit stations, or close to a new town square to be served by shuttle bus. Each small area has a unique vision and purpose.	http://www.norfolk.gov/Planning/Downtown.asp	Adopted in April 2009.
City of Norfolk	Downtown Norfolk Pattern Book: Architectural Guidelines for Place Making	The Pattern Book accompanies the Downtown Norfolk 2020 Plan and provides guidelines for urban and building design that will be consistent with the vision of the downtown plan. The book is essentially a step-by-step handbook that provides guidelines based on street type (urban spatial type), site type, building height (facade type), and archtectural style.	Design Guidelines	Local	N/A	The streets are categorized by existing or future urban character (e.g. neighborhood streets vs. commercial streets). Downtown greens and squares are also identified as a specific urban spatial type.	http://www.norfolk.gov/Planning/PDFFiles/Downtown_Pattern_Book.pdf	Adopted in April 2009.

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Arlington County, Virginia	Transit Corridor Growth Strategy	Since the 1960s, Arlington County has successfully concentrated high-density development within Metro corridors and preserved lower-density residential areas throughout the County using a variety of planning and policy documents, regulatory tools and ordinances. The General Land Use Plan describes broad goals and establishes policies that focus on areas within Metro Station Areas and Metro Corridors. It also establishes zoning mechanisms to achieve these goals. Policy plans and land use plans for the Rosslyn-Ballston and Jefferson-Davis Metro Corridors provide the foundation for a unified long-range planning approach. Sector plans for the individual station areas dig into the details of urban design, zoning, transportation, and market trends, distinguishing the unique character of each station area. Arlington County continually tracks development statistics within the Metro corridors dating back to 1960 to quantify its success.	TOD and Growth Management Policy	Regional, Local	Heavy Rail, Pedestrian	N/A	http://www.arlingtonva.us/departments/CPHD/planning/docs/CPHDPlanningDocsMain.aspx#bs_plan	Strategy adopted in early 1970s in preparation for Metro system. General Land Use Plan last updated in June 2010. Sector Plans range in date from the 1980s to the present.
Arlington County, Virginia	General Land Use Plan	The General Land Use Plan's goals include concentrating high-density development, promoting mixed use development, and increasing the supply and variety of housing within the Metro corridors. It concentrates the highest density uses within walking distance of Metro stations; tapers densities, heights and uses down to single-family residential neighborhoods; and provides for a mix of office, hotel, retail and residential development. The Plan establishes regulatory mechanisms, namely special coordinated mixed use zoning districts which allow FARs that exceed general zoning designations and special residential zoning districts which promote tapering of heights between higher-density commercial development and lower-density residential neighborhoods.	Land Use Plan	Regional, Local	Heavy Rail, Pedestrian	Each station area serves a unique function within the corridor. Rosslyn is a first class office and business center. Courthouse is the County's government center. Clarendon is planned as an "urban village." Virginia Square contains a concentration of residential, cultural and educational facilities. Ballston is developing as Arlington's "new downtown."	http://www.arlingtonva.us/departments/CPHD/planning/docs/CPHDPlanningDocsGLUP.aspx.	Last updated in June 2010.

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Arlington County, Virginia	Crystal City Sector Plan	This sector plan provides the policy framework, master plan, and implementation steps for the Crystal City planning area, a 260-acre (0.4 sq. mi.) area within the 361-acre (0.6 sq. mi.) Crystal City Metro Station Area, as defined by the General Land Use Plan. It includes a discussion on the impact of regional growth, including identification of activity centers and their dispersion along major transportation corridors. It is an example of high density mixed use neighborhood and an economic engine with high-rises approaching full build-out of existing plans.	Station Area Plan	Local	Heavy Rail, Automobile, Pedestrian, Bicycle, Commuter Rail, Local Bus, Express Bus	The planning area for station has an oblong shape. It is 1.3 miles from north to south and varies in length from east to west with a maximum width of 0.5 miles. It excludes the areas of low-density residential. Within the planning area, the plan defines neighborhoods and districts based on use characteristics and identifies destinations. It also distinguishes the ways in which the transportation infrastructure influences the area, local and collector streets connecting places within the area, and large arterials acting as barriers or edges to the districts.	http://www.arlingtonvirginiausa.com/index.cfm/11250	Draft published in June 2010. Adopted in September 2010 with final changes to be incorporated .
Arlington County, Virginia	East Falls Church Area Plan	The East Falls Church Area represents an example of a commuter station area with park-and-ride and kiss-and-ride facilities. It is less dense than the other Metro station areas within Arlington County. The East Falls Church Area Plan provides a policy framework, concept plan, design guidelines, and implementation actions.	Station Area Plan	Local	Heavy rail, Pedestrian, Bicycle, Automobile, Local Bus	The study area includes the commercial development and multi-family housing along I-66 and some of the single-family housing. Much of the existing single-family housing is not included, even though it is within a quarter-mile of the Metro station, in an effort to preserve it. The plan introduces the Neighborhood Center concept, a collection of three low- to medium-scale mixed use development nodes, each with its own specific character and role. These are essentially different mini-districts working together to create a cohesive whole.	http://www.arlingtonva.us/departments/CPHD/forums/eastfallschurch.aspx	Draft published in January 2011.
Arlington County, Virginia	Clarendon Sector Plan	Clarendon represents a future "urban village" with public spaces, accessibility, connectivity and a rich mix of uses to achieve a sense of place and uniqueness. The sector plan includes policies on urban form, transportation, land use, historic preservation and other topics. It includes urban design guidelines and a matrix of implementation recommendations.	Station Area Plan	Local	Heavy rail, Pedestrian, Bicycle, Automobile, Local Bus	The station area boundary is approximately a quarter-mile radius within the Metro Station areas.	http://www.arlingtonva.us/departments/CPHD/planning/docs/CPHDPlanningDocsMain.aspx#clarendon	Original Sector Plan adopted in 1984. Revised and re-adopted in 2006.

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Arlington County, Virginia	Master Transportation Plan	Arlington's Transportation Plan echoes the policies of the General Land Use Plan. One main goal of the plan is moving more people without more traffic by implementing transit oriented and mixed use development for better access and use of the transportation system, minimizing person delay across modes rather than focusing exclusively on minimizing vehicle delay, and encouraging bicycling, walking, transit, carpooling and telecommuting.	Transportation Plan	Local	Heavy rail, Pedestrian, Bicycle, Automobile, Local Bus	N/A	http://www.arlingtonva.us/departments/EnvironmentalServices/dot/planning/mplan/mtp/MTP_Draft.aspx	Goals and policies adopted in November 2007. Final element adopted in February 2011.
Arlington County Transportation Demand Research Center	Arlington County Commercial Building Research Summary Report	Arlington County Commuter Services (ACCS) distributed a survey to employers and employees in Arlington County to study roles of location factors, transportation facilities, commuter assistance services and other factors on business location decisions and employee's travel choices in Arlington County. The survey tracked distance to transit, area of the county, level of "urban-ness," availability of commuter services, parking availability and parking charge.	Survey Results	County	Carpool, vanpool, bike, pedestrian, bus, train, drive alone	The document does not identify place type, but accounts for differences in level of "urban-ness" and proximity to Metrorail stations and bus stops.	http://www.commuterpage.com/research/study_list.asp?jobID=ACCS030&studyID=110	Published in December 2009.
Arlington County Transportation Demand Research Center	2007 State of the Commute Study: Arlington Perspective. The Factors of Success in Reducing Drive Alone Commuting in Arlington	This study assessed the factors of reducing the drive alone mode share, including market need, ridesharing infrastructure, commuter mindset, employer support and involvement, telework opportunity, and societal awareness and support of ridesharing. It provides recommendations for ACCS to reduce the drive alone mode share for work trips.	Survey Results and Recommendations	County	Drive alone, Metrorail, carpool, vanpool, bus, bike, pedestrian	N/A	http://www.commuterpage.com/research/study_list.asp?jobID=ACCS035&studyID=120	Published in March 2010.
Loudoun County	TOD Planning and Zoning Districts	Loudoun County has included policies for transit oriented development into its comprehensive plan. and has instituted several zoning codes to actively encourage this type of development. The County's two transit nodes are key components of its suburban policy area, intended to limit sprawl, reduce public costs, provide the critical mass for bus and rail transit, provide a development alternative the separates auto-oriented land uses from transit oriented uses.	Comprehensive Plan and Zoning Policy	Local	Bus Transit, Rail Transit, Pedestrian, Automobile	There are two transit nodes within the county. One is a Transit Related Employment Center, consisting of offices and support services. The other is a Transit Oriented Development, a mix of high-intensity land uses ranging from high-density residential uses, regaional offices, entertainment and cultural centers and other businesses.	http://www.loudoun.gov/Default.aspx?tabid=327&fmpath=/Comp%20Plan	Incorporated in current Comprehensive Plan and Zoning Ordinance.

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Loudoun County Department of Planning	Route 28 Corridor Plan	Loudoun County is working on an amendment to their comprehensive plan for the Route 28 Corridor. The Corridor Plan and Implementation Strategy were created as part of this effort. The vision for this corridor includes pedestrian- and transit oriented mixed use office centers. The Plan includes policies for land use, transportation, design,economic development, housing and sustainability. Policies include a multimodal transportation network, including transit, within the corridor, and highest intensities within a quarter-mile of planned bus or rail stations. Design policies and standards promote general TOD design and will be accompanied by an illustrative design handbook. The implementation plan outlines specific action items like amending existing zoning ordinance.	Corridor Plan and Implementation Strategy	Local	Automobile, General Transit (bus or rail), Pedestrian, Bicycle	N/A	http://www.loudoun.gov/Default.aspx?tabid=2978	Draft Plan dated February 2011. Board of Supervisors currently reviewing.
City of Roanoke, VA	Street Design Guidelines	Roanoke's guidelines accommodate all modes of transportation on its city streets and are consistent with Complete Streets principles. The document provides design guidelines for each character district as well as general streetscape element guidelines applicable for all areas within the city. Right-of-way cross sections for each street class illustrate options for new streets (preferred) and for retrofitting in situations where the preferred is not feasible.	Multimodal Corridor Design Guidelines	Local	Automobile, Truck, Local Bus, Bicycle, Pedestrian	Streets are classified into three categories by function and character: arterials, collectors and locals. Land area is organized into eight character districts (downtown, industrial, etc) depending on general building style, development form and land purpose. **Connection between character and function - street types within character districts**	http://www.roanokeva.gov/85256A8D0062AF37/CurrentBaseLink/B444FCBE9084DAE48525781D0049F958/$File/STREET_DESIGN_GUIDELINES.pdf	Adopted in July 2007.
Virginia Department of Transportation	Policy for Integrating Bicycle and Pedestrian Accommodations	This policy integrates bicycle and pedestrian accommodations into all of VDOT's procedures and projects. It requires that all transportation projects will start with the assumption that accommodation for bicycling and walking will be provided. As a result of this policy, VDOT has updated its procedures and best practices to include guidlines for coordinating with localities, planning level cost estimates, and updated construction and maintenance scoping forms.	Transportation Policy	State	Bicycle, Pedestrian, Automobile	N/A	http://www.virginiadot.org/programs/resources/bike_ped_policy.pdf	Adopted in March 2004.

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Virginia Department of Transportation	State Bicycle Policy Plan	The Bicycle Policy Plan provides a framework to implement the bicycle portion of VDOT's Policy for Integrating Bicycle and Pedestrian Accommodations. It establishes policies for bicycle facility planning and design, identifies opportunities for enhancing coordination, recommends training programs, and sets forward benchmarks for tracking implementation over time.	Transportation Policy Plan	State	Bicycle, Pedestrian, Automobile	N/A	http://www.virginiadot.org/programs/bicycling_and_walking/bicycle_policy_plan.asp	Draft published in April 2010.
Virginia Department of Transportation	Context Sensitive Solutions Policy	The CSS policy requires VDOT to consider that motorists, pedestrians, bicyclists, and public transit vehicles jointly use transportation systems for both transportation and recreational purposes. It promotes transportation facilities that provide transportation safety and mobility, while also fitting the physical setting and reflecting concerns regarding scenic, aesthetic, historic, and environmental resources.	Transportation Policy	State	Automobile, Bicycle, Pedestrian, Transit	N/A	http://www.extranet.vdot.state.va.us/locdes/electronic%20pubs/iim/IIM235.pdf	Instructional and Informational Memorandum dated August 2008.
Virginia General Assembly	Urban Development Areas (Code of Virginia Section 15.2-2223.1)	The amendment requires high growth localities to designate Urban Development Areas (UDAs) in their comprehensive plans. UDAs will be areas of compact development that incorporate principles of new urbanism and tranditional neighborhood development. Encouraging well-designed development and growth in these areas will help reduce trip lengths, encourage trips by other modes, and foster more sustainable development patterns.	Virginia Legislation	State	Automobile, Bicycle, Pedestrian, Transit	N/A	http://leg1.state.va.us/cgi-bin/legp504.exe?000+cod+15.2-2223.1	General Assembly added to Code of Virginia in 2007.
Virginia Department of Transportation	Secondary Street Accepatance Requirements	These regulations incorporate the design and function of a street as criteria for acceptance into the state system of roads. Developers must build streets that connect with the surrounding transportation network in a way that enhances the capacity of the overall transportation system and accommodates pedestrians, as determined by the area type.	Transportation Policy	State	Automobile, Bicycle, Pedestrian	The state is divided into three categories based on long-term local, regional and federal planning boundaries: compact, suburban, and rural.	http://www.virginiadot.org/projects/ssar/default.asp	Approved in February 2009.

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Virginia Department of Transportation	Chapter 527 Traffic Impact Analysis Regulations	This regulation requires localities to submit a traffic impact analysis (TIA) to VDOT for development proposals that would significantly impact the state transportation system during comprehensive plan amendments, rezonings and site plan approvals. Amendments to the regulations require VDOT to approve a trip generation methodology for urban developments and small area plans that recognizes the reduced vehicle trip generation of mixed use, compact development patterns and transportation demand managemetns measures.	Transportation Policy	State, Local	Automobile, Bicycle, Pedestrian, Bus	N/A	http://www.virginiadot.org/projects/chapter527/default.asp	Established in 2006 and amended in 2010.
Virginia Department of Transportation	Access Management Regulations and Standards	These regulations define standards for design of intersections and entrances to reduce conflict points and enhance vehicular and pedestrian circulation. The regulations attempt to balance efficient highway operation and reasonable property access.	Transportation Policy	State, Local	Automobile, Bicycle, Pedestrian	Spacing standards vary by functional classification (urban or rural, arterial or collector)	http://www.virginiadot.org/projects/accessmgt/default.asp	Effective July 2008 for Principal Arterials and October 2009 for Minor Arterials, Collectors and Local Streets.
Virginia Office of Intermodal Planning and Investment	VTrans2035 and the Virginia Surface Transportation Plan	VTrans2035 is Virginia's long-range multimodal transportation plan. VTrans2035 acknowledges the changing circumstances and growth pressures that are increasing the demand for transportation choices and the mobility needs of all residents. The Virginia Surface Transportation Plan (VSTP) follows the policy guidance of VTrans2035 and identifies specific multimodal solutions for Virginia's different regions, including public transportation strategies, rail investments and highway improvement projects.	Transportation Policies	State	Automobile, Bicycle, Pedestrian, Public Transportation, Rail	N/A	http://www.vtrans.org/	Completed in 2010.