MULTIMODAL SYSTEM DESIGN GUIDELINES

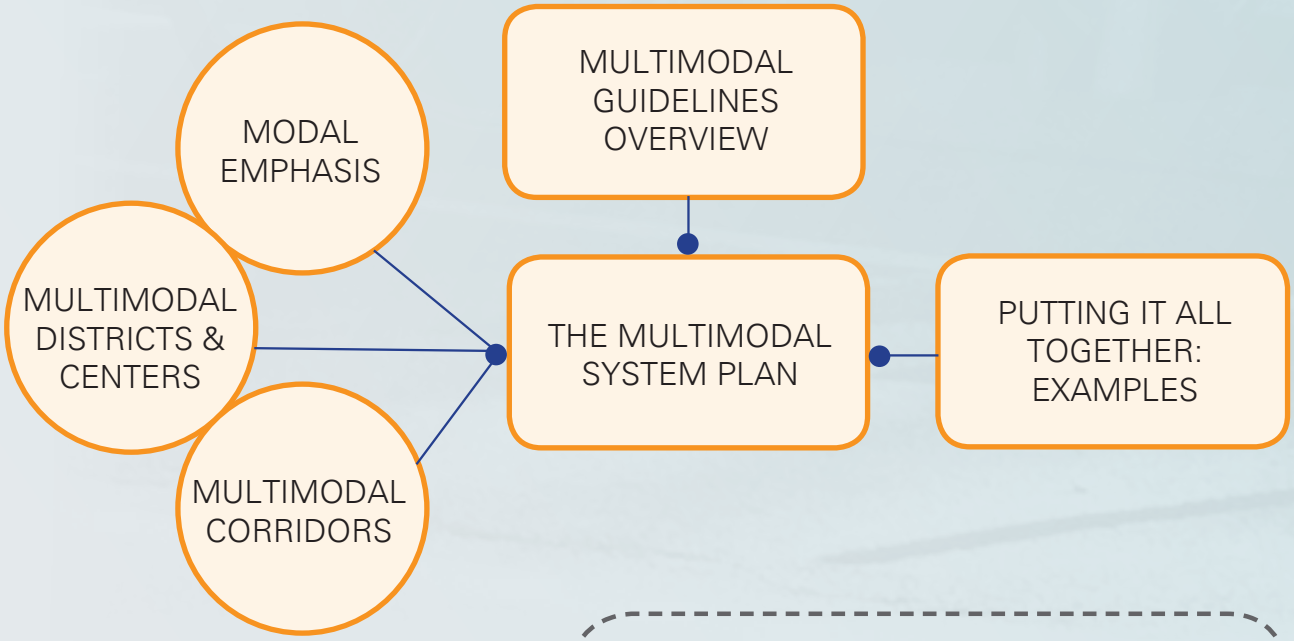
EXECUTIVE SUMMARY

OCTOBER 2013

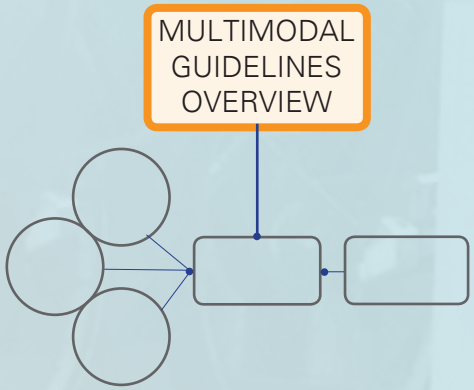
DEPARTMENT OF RAIL AND PUBLIC TRANSPORTATION

MULTIMODAL SYSTEM DESIGN GUIDELINES

This Summary of the Multimodal System Design Guidelines is organized into six broad topic areas: Multimodal Guidelines Overview, The Multimodal System Plan, Modal Emphasis, Multimodal Districts and Centers, Multimodal Corridors and Putting it all Together. This summary starts with a description of what the Guidelines are, and then describes the core concept of the Guidelines – the Multimodal System Plan. After showing the three key elements of a Multimodal System Plan, the last section shows examples of how the Guidelines can be applied in a real world context. This is only a summary overview of the Guidelines and their main concepts. More detail on any of these concepts can be found in the full Guidelines document.



Meeting the needs of Virginia's current and future generations of travelers is paramount. Our streets and public rights-of-way are called on to carry ever more complex arrays of passengers and goods, and they need to be safe, comfortable, and efficient. As part of its mission to serve Virginia's transport needs and provide travel choices, the Department of Rail and Public Transportation is pleased to introduce these Multimodal System Design Guidelines. They are intended to serve as a guideline and set of best practices to encourage our streets, our communities, and our Commonwealth to work for all modes and users.

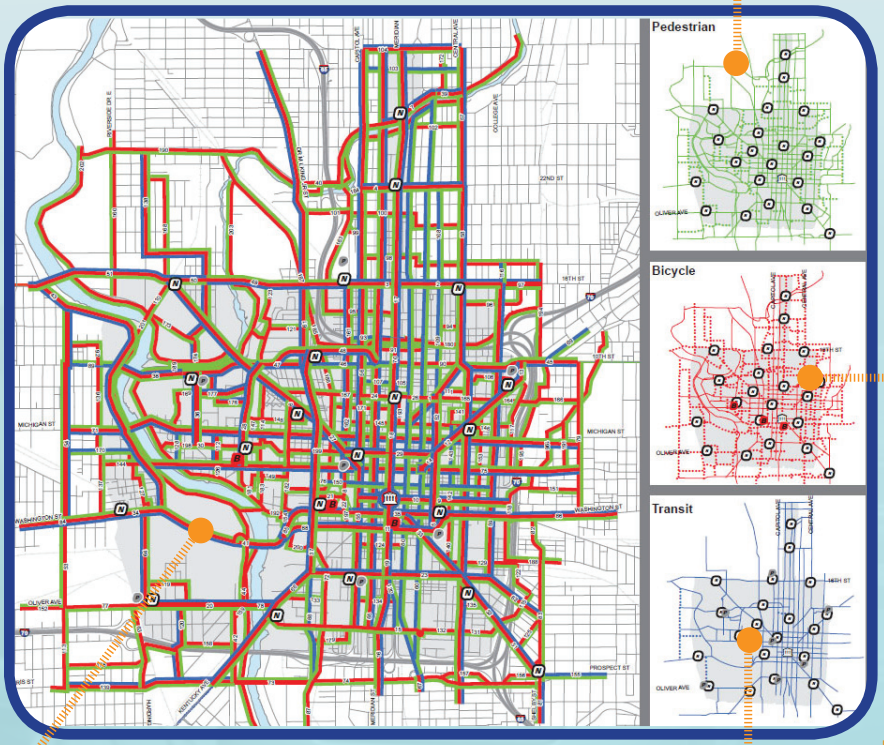


THE MULTIMODAL GUIDELINES

Why these Guidelines? Local governments throughout Virginia are increasingly making multimodal transportation investments a priority. They are enhancing sidewalks, creating bike lanes, and expanding transit service. They are developing bike plans and pedestrian plans to provide future connections. Some have even developed and adopted design guidelines for multimodal streets.

To aid local governments in these efforts, the Virginia Department of Rail and Public Transportation developed the Multimodal System Design Guidelines – a holistic framework for multimodal planning at the regional, local and corridor scale. The Guidelines provide a step-by-step manual of best practices for identifying centers of activity, designating connected networks for all travel modes, and designing and retrofitting multimodal corridors.

Multimodal Transportation Planning is most effective if we start by thinking about how the region functions as a network of multimodal systems. The Multimodal System Plan is the first step in the multimodal transportation planning process. At a regional scale, the Multimodal System Plan identifies where people are coming from and going to, what roads, trails and transit routes they take from beginning to end, and what critical links are missing.

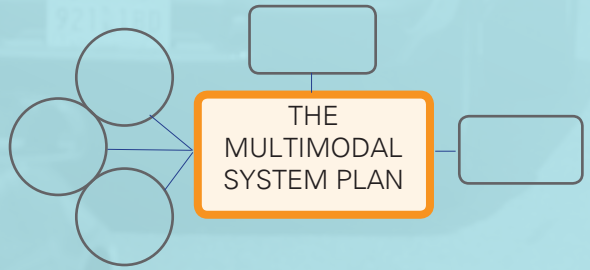


Pedestrian System
The regional network of trails and key corridors for pedestrians. Sidewalks exist on many local roads, but are not shown here.

Bicycle System The regional network of trails, bike lanes, and other key corridors for bikes.

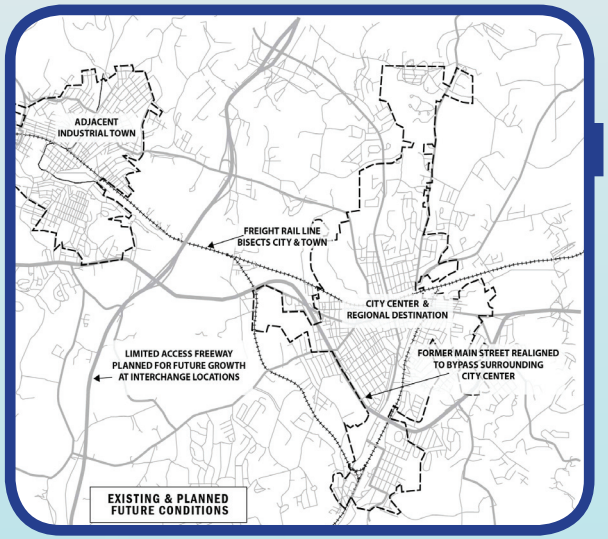
Transit System The regional network of local and express transit routes, some of which are in service now and others are planned for the future.

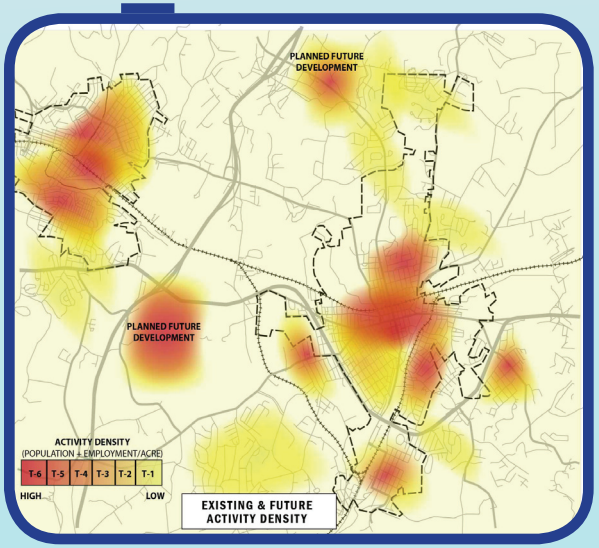
Multimodal System Plan The network of transit, bicycle, and pedestrian systems. All modes have a fully connected network of paths throughout the region. The Multimodal System Plan identifies gaps in each network and opportunities to connect the gaps.

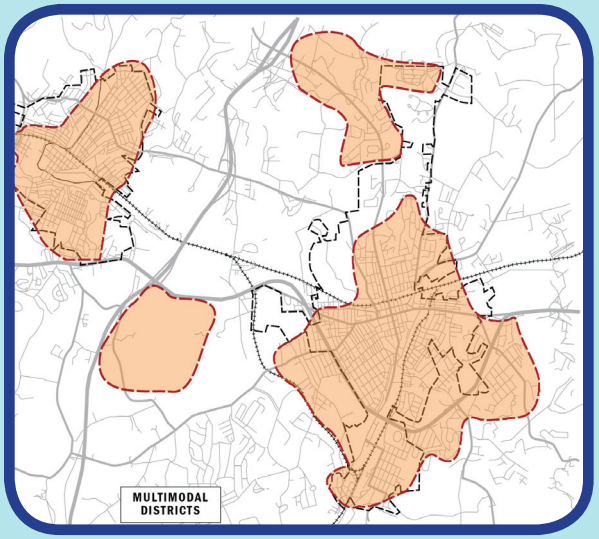


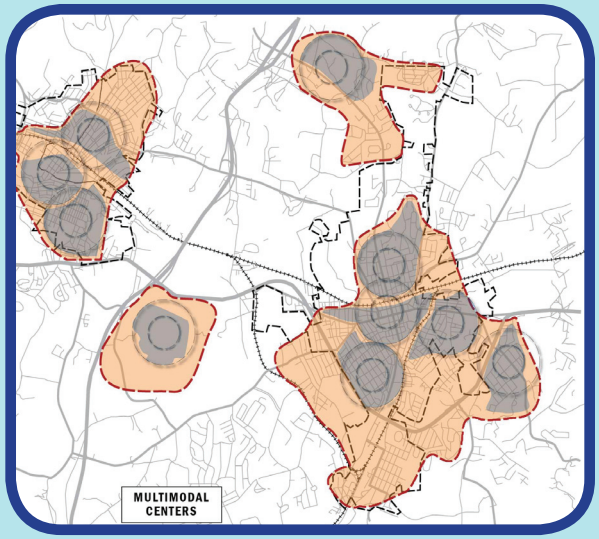
THE MULTIMODAL SYSTEM PLAN

THE MULTIMODAL SYSTEM PLAN







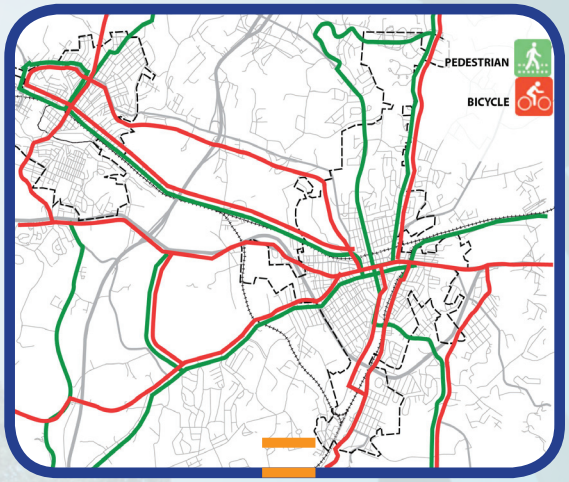


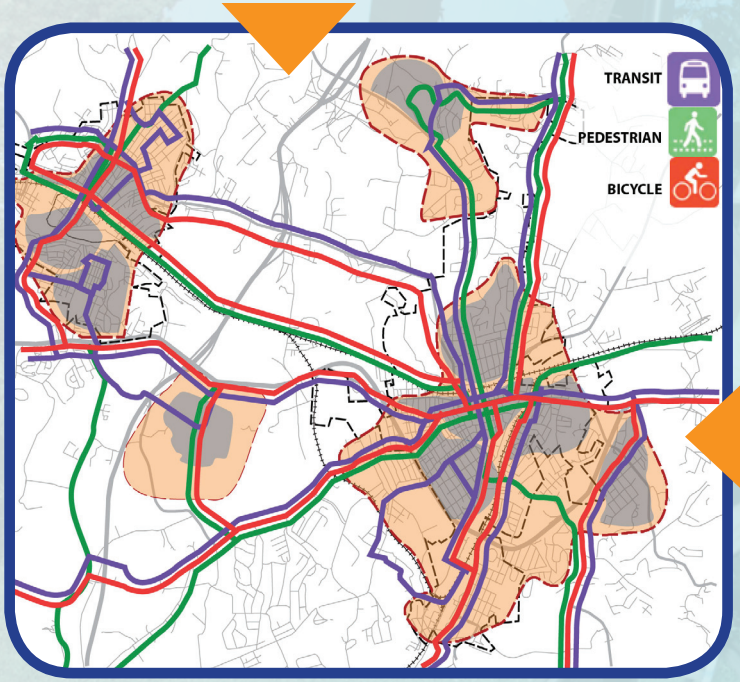
The Multimodal System Plan

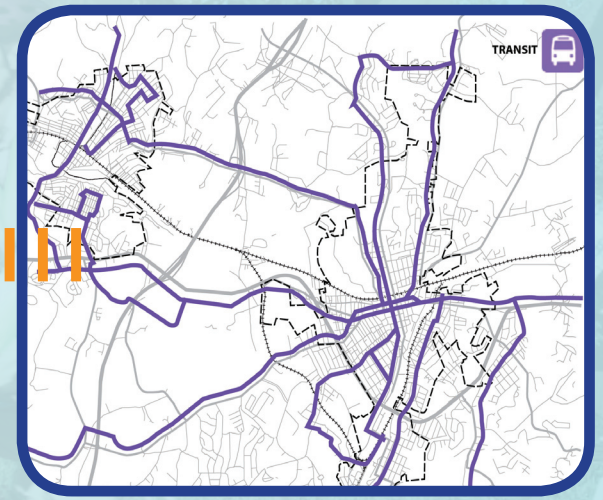
assesses the future density of jobs and people across the region, identifies areas with moderate to high levels of density and good multimodal connectivity, and defines these areas as Multimodal Districts. Within each Multimodal District, the Plan identifies Multimodal Centers where activity will be most concentrated. The Multimodal Districts and Centers represent areas of future targeted growth within which destinations are close enough where walking and biking are viable modes of transportation. Depending on the context, transit service may be provided.

Multimodal Districts are generally broad swaths of land area designated by a locality or region to have at least a moderate level of multimodal connectivity, either now or in the future. Multimodal Districts typically overlap with any area having any substantive amount of Activity Density, but they are usually defined by policy decisions and codified through planning documents as urban growth boundaries, service areas, and mixed use neighborhoods.

Multimodal Centers are smaller areas of high multimodal connectivity and more intense activity, roughly equivalent to a 10-minute walk-shed. Multimodal Centers can be approximated by a one-mile diameter circle, then morphed into more organic-looking shapes as they are modified by barriers such as rivers or high speed highways.



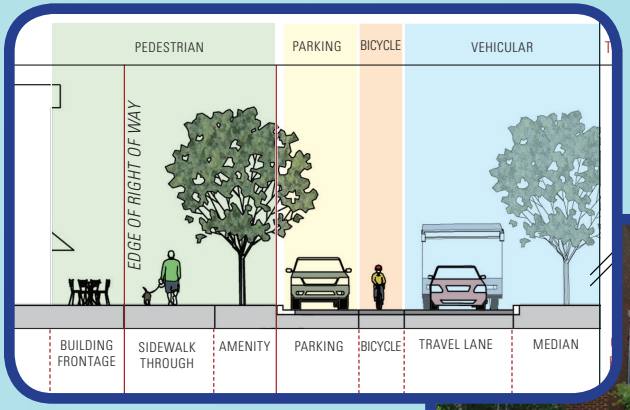




The Multimodal System Plan is a combination of the Multimodal Districts, Multimodal Centers, and the Multimodal Corridor networks that connect them. The transportation plans for a region or community typically identify networks for each travel mode. By putting these networks together with the Multimodal Districts and Centers, planners can identify gaps in each network and find opportunities to connect those gaps. This is the most critical part of the multimodal planning process - to make sure that all modes have a fully connected network of paths within and between the Multimodal Districts and Centers.

THE MULTIMODAL SYSTEM PLAN

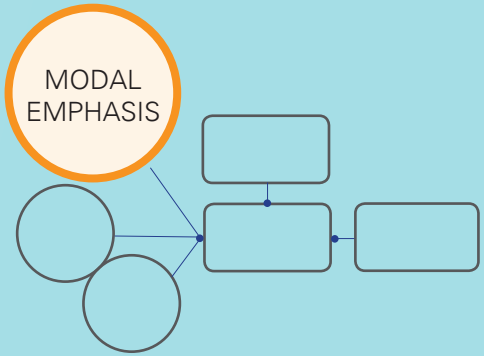
MODAL EMPHASIS

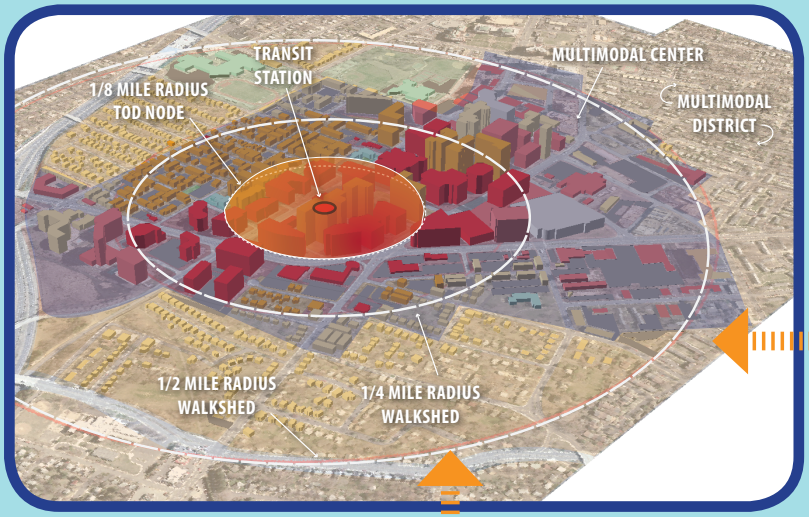


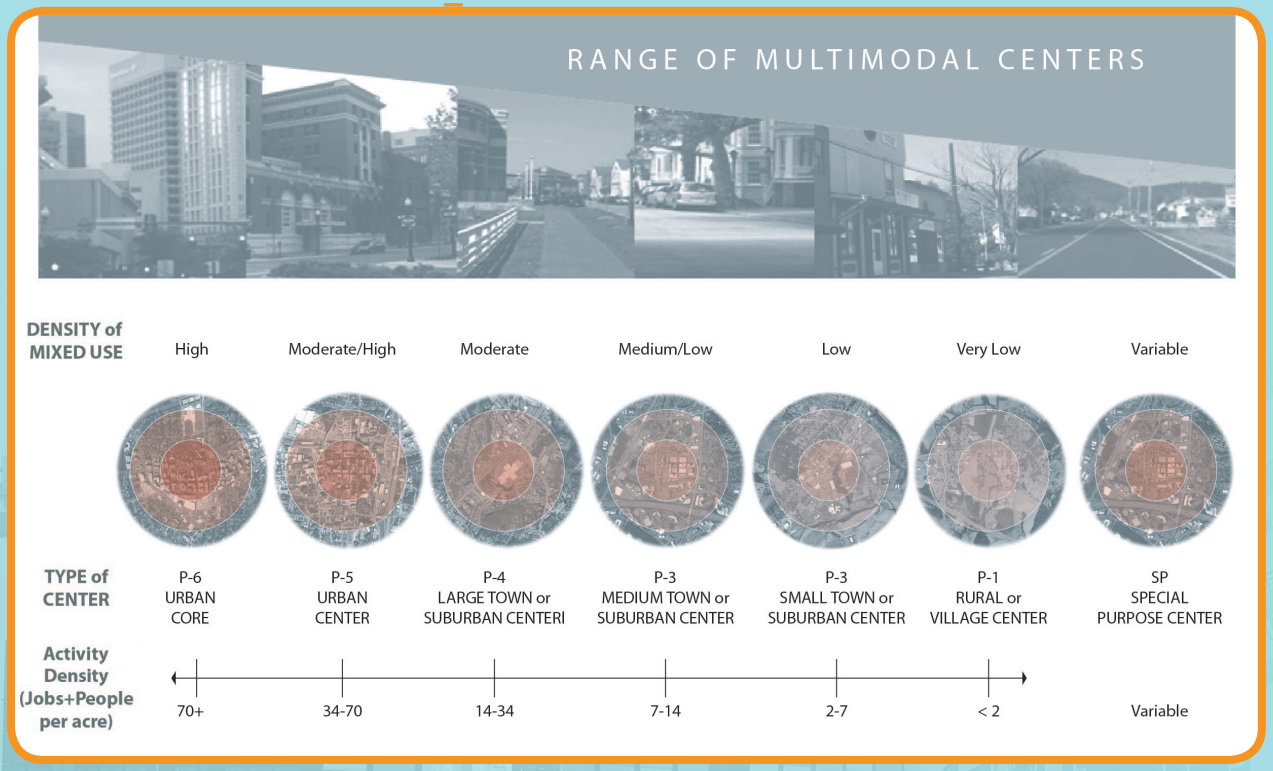
MODAL EMPHASIS	PRIMARY ELEMENTS	SECONDARY ELEMENTS	CONTRIBUTING ELEMENTS
Pedestrian	B-Sidewalk Through Element	A-Building Frontage Element C-Amenity Element	D- Parking Element Building Element
Bicycle	E-Bicycle Element	N/A	C-Amenity Element
Transit	F-Travel Lane Element	B-Sidewalk Through Element	A-Building Frontage Element C-Amenity Element E-Bicycle Element
Green	C-Amenity Element	G-Median Element	A-Building Frontage Element
Parking	D-Parking Element	N/A	E-Bicycle Element

Modal Emphasis Viewed altogether, these networks establish concept of Modal Emphasis – the designation of one or more travel modes that should be emphasized in the design of the cross-section for a given corridor. Modal Emphasis means that a travel mode may be emphasized on a corridor through certain design features but that other modes are still accommodated – either in a minimum or optimal way depending on right of way or other constraints.

Modal Emphasis is particularly helpful at the corridor scale to design a multimodal cross-section with limited right-of-way, using the Corridor Matrix, which is explained on Page 12.





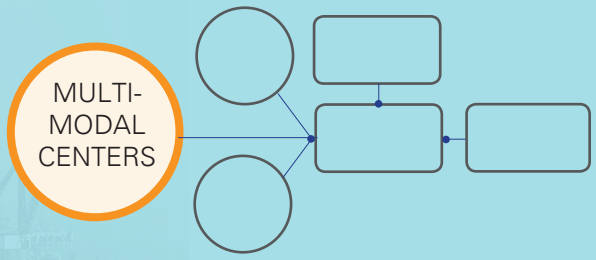


Multimodal Centers

in Virginia can span a wide range of contexts from dense urban downtowns, like Richmond to historic town centers like Lexington, to new walkable urban centers like Reston Town Center, and even rural places like the small town of Buchanan in Botetourt County. Even though these potential Multimodal Centers are remarkably different in context and character, they all show a similar pattern of higher density in the center that tapers off as you move toward the edges of the center. The area within the primary walkshed, which can be approximated by a quarter-mile radius, corresponds to a 5 minute walk, and usually has higher densities than those in the secondary walkshed, which corresponds to a 10 minute walk, and can be approximated by the outer quarter-mile ring.

Transit Oriented Development

Multimodal Centers with higher capacity transit service tend to have a noticeable jump in density at the very core, which can be approximated by an eight-mile radius TOD node.

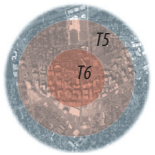
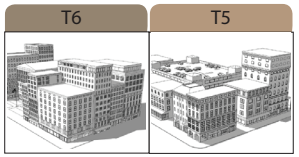
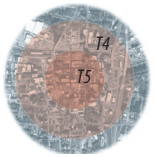
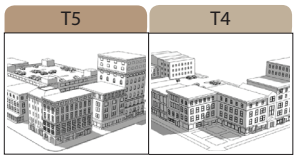
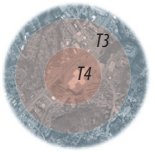
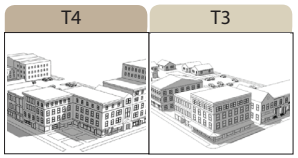
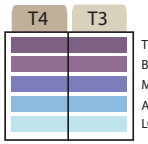
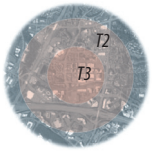
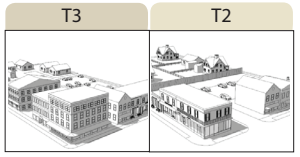
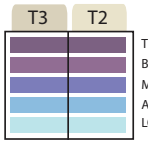
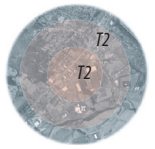
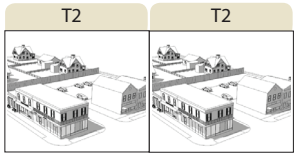
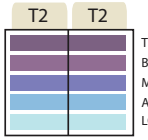
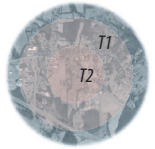
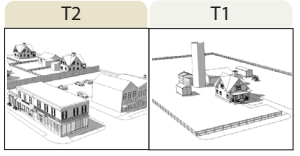
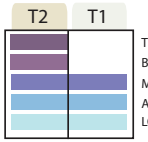


MULTIMODAL CENTERS

MULTIMODAL CENTERS

The Transect is a way to describe the range of natural and built environments from the countryside to the center of the city as a set of bands of uniform density called Transect or "T" zones. Each T-zone defines a consistent scale of density and intensity of development and the whole complement of streets, buildings and open space that goes along with that level of intensity. The Multimodal System Design Guidelines use the system of Transect densities to define the types and surrounding contexts of Multimodal Centers and Multimodal Corridors.

Transect Zones are the basic building blocks of Multimodal Centers. In a prototypical Multimodal Center, the primary walkshed is categorized as one T-zone, and the secondary walkshed is a slightly less intense T-zone. However, density does not occur in a uniform pattern in real places. In order to give a more realistic picture of the density in each transect zone, a series of three-dimensional illustrations have been developed for these Guidelines that show the built form of a typical block for each transect zone. The range of Multimodal Center types specifies a range of gross activity density that represents an aggregation of the T-zones of the prototypical primary and secondary walksheds.

TYPE OF MULTIMODAL CENTER		ACTIVITY DENSITY*	TRANSECT ZONES	MULTIMODAL CORRIDOR TYPES BY TRANSECT
P6 Urban Core		HIGH 70+		
P5 Urban Center		MODERATE/ HIGH 34-70		
P4 Large Town or Suburban Center		MODERATE 14-34		
P3 Medium Town or Suburban Center		MEDIUM/ LOW 7-14		
P2 Small Town or Suburban Center		LOW 2-7		
P1 Rural or Village Center		VERY LOW <2		

TRANSIT BLVD.
BOULEVARD
MAJOR AVE.
AVENUE
LOCAL ST.

* sum of jobs + population per acre

Multimodal Corridors are the building blocks for a multimodal system that moves people and goods between and within Multimodal Districts and Centers. Corridors have different functions in a region. Some corridors are used to get smoothly and rapidly through a region or to get quickly to major destinations and centers in the region. Other corridors are more slow speed and used to access local businesses, residences, and activities within a destination.

MULTIMODAL CENTERS & CORRIDORS

Multimodal Centers

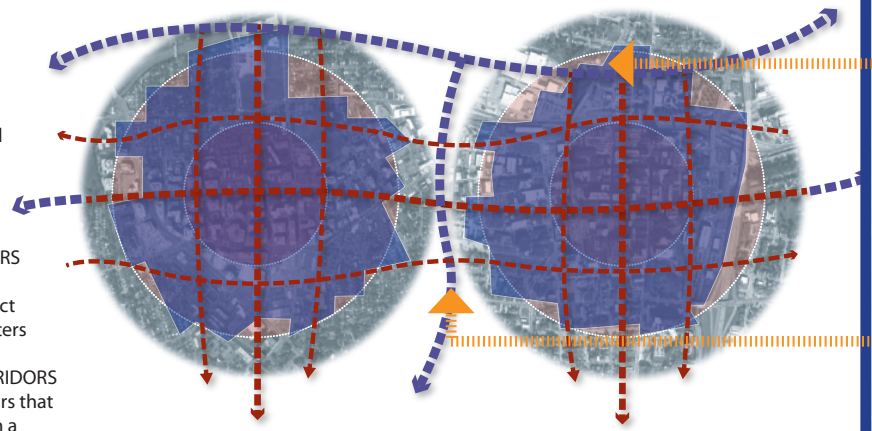
1/4 mi. radius
Primary Walkshed

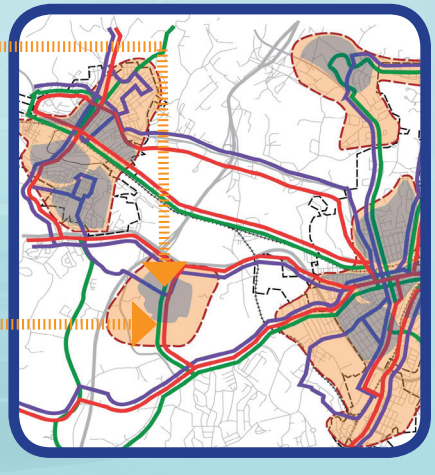
1/2 mi. radius
Secondary Walkshed

Multimodal Corridors

MULTIMODAL THROUGH CORRIDORS
Moderate speed corridors that connect the Multimodal Centers

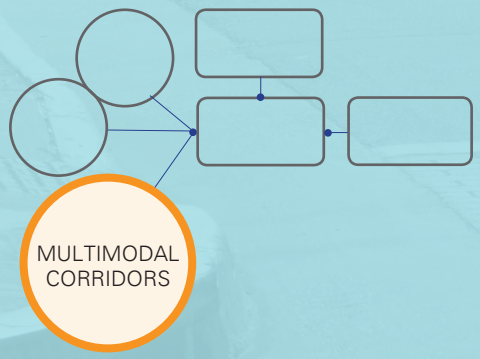
PLACEMAKING CORRIDORS
Lower speed corridors that connect areas within a Multimodal Center





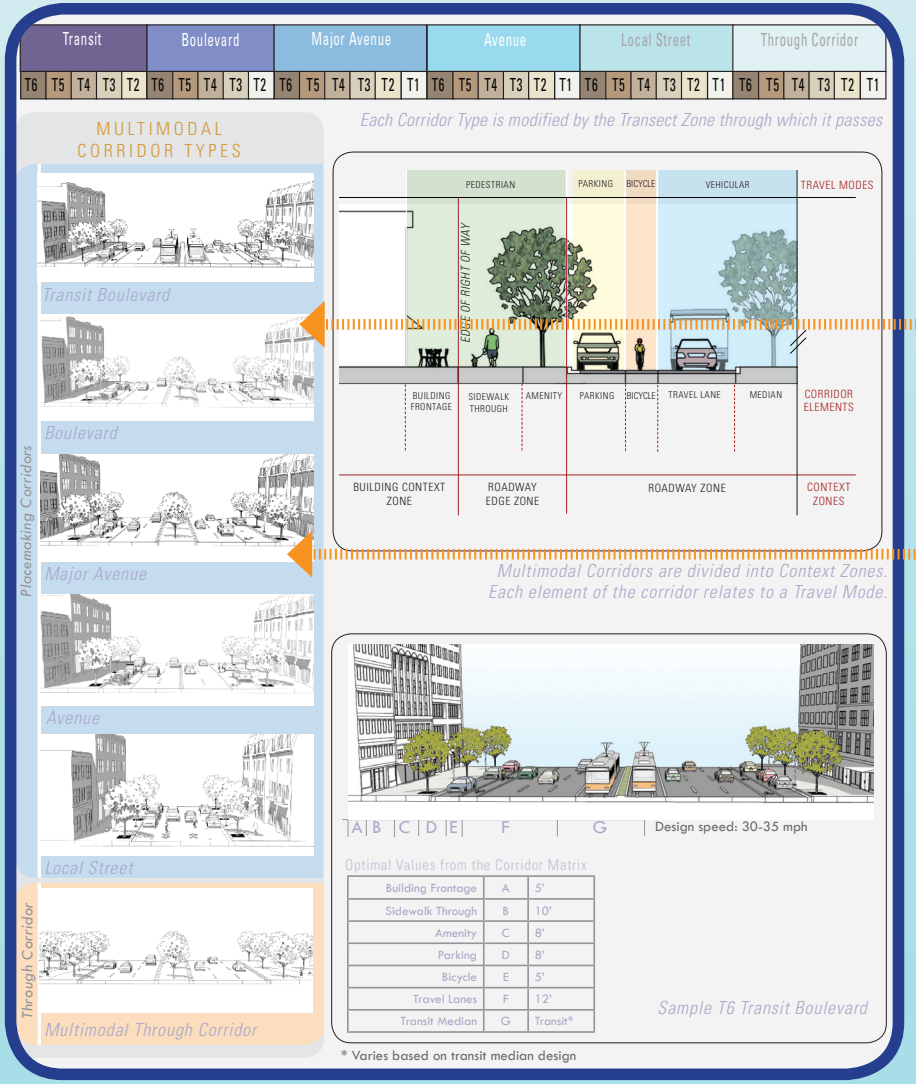
Placemaking Corridors are the slower speed roads that facilitate movement within Multimodal Centers. Placemaking Corridors are usually located within Multimodal Centers, but can extend outward into a Multimodal District.

Multimodal Through Corridors are the higher speed roads that travel between and connect Multimodal Centers. Multimodal Through Corridors are located exclusively outside of Multimodal Centers, but may traverse Multimodal Districts. Mutlimodal Through Corridors either skirt the edges of Multimodal centers or transition to Placemaking corridors if they go through a Multimodal Center.



MULTIMODAL CORRIDORS

MULTIMODAL CORRIDORS

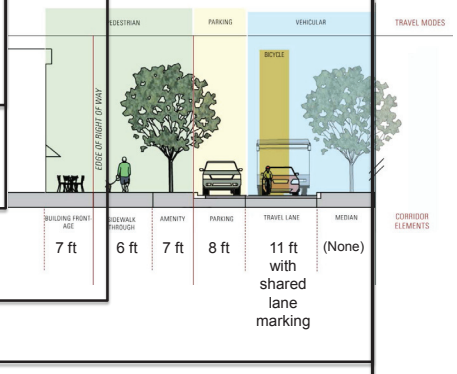


Types of Multimodal Corridors There are five basic Placemaking Corridors that serve Multimodal Centers – Transit Boulevards, Boulevards, Major Avenues, Avenues, and Local Streets. As part of a Multimodal System Plan, planners would designate the streets within each Multimodal Center as one of the five Placemaking Corridor types in a Multimodal Center Plan. They would also identify the Multimodal Through Corridors that connect Multimodal Centers to each other and to other parts of the region through the Multimodal System Plan. The Multimodal System Design Guidelines provide prototypical cross-sections for each multimodal corridor type and transect zone that optimize all modes when right-of-way is unconstrained.

The Corridor Matrix helps road designers select the appropriate design for each Corridor Element to fit within the surrounding context and according to the Modal Emphasis as designated in the Multimodal System Plan. The Modal Emphasis look-up tables specify which Corridor Elements should be optimized, and which Corridor Elements may have the minimum treatments. Applying Modal Emphasis lets road designers customize a corridor for the specific needs of the emphasized modes, while still accommodating other travel modes, allowing the corridor to fulfill its function in the overall Multimodal System Plan.

MODAL EMPHASIS	PRIMARY ELEMENTS	SECONDARY ELEMENTS	CONTRIBUTING ELEMENTS	NON-CONTRIBUTING ELEMENTS
Pedestrian	B-Sidewalk Through Element	A-Building Frontage Element C-Amenity Element	D- Parking Element	E-Bicycle Element F-Travel Lane Element G-MedianElement

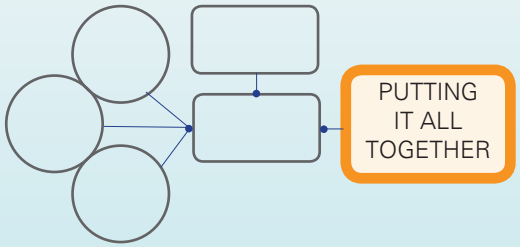
Corridor Element Key	Corridor Type ⇨ / Intensity ⇨ / Context Zones & Corridor Elements ⇩	Major Avenue T-4 OPTIMAL	Major Avenue T-4 MINIMUM
	Building Context Zone		
A	BUILDING FRONTAGE ELEMENT	7 ft	2.5ft
	Location of off street parking	rear	side
	Typical building entry locations	front	front
	Roadway Edge Zone		
B	SIDEWALK THROUGH ELEMENT	6 ft	6 ft
C	AMENITY ELEMENT	7 ft	6 ft
	Surface Treatment for Amenity Element	Paved with tree wells	
	Roadway Zone		
D	PARKING ELEMENT	8 ft bothsides	None
E	BICYCLE ELEMENT	4 ft bikelane[2]	Sharedlane markingswith no additional lanewidth
F	TRAVEL LANE ELEMENT	12 ft[2]	11 ft[2]
	Design Speed	30 - 35mph	
	Number of Through Lanes	2 to 4	
	Typical Traffic Volume Range (vehicles per day)	5,000 to 25,000	
G	MEDIAN ELEMENT	18 ft[3]	None



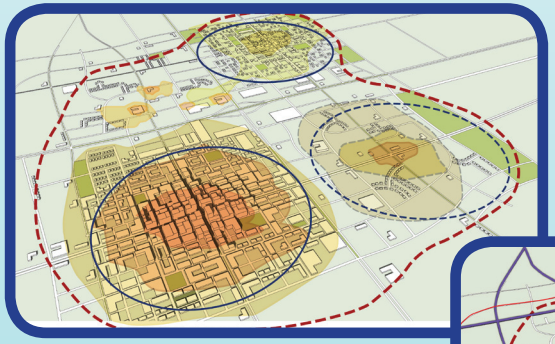
HOW CORRIDOR ELEMENTS ARE USED IN MODAL EMPHASIS

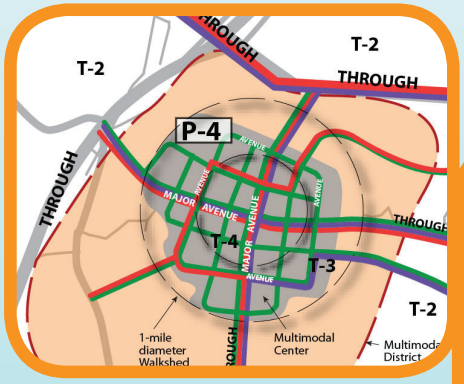
MODAL EMPHASIS	PRIMARY ELEMENTS	SECONDARY ELEMENTS	CONTRIBUTING ELEMENTS	NON-CONTRIBUTING ELEMENTS
Pedestrian	B-Sidewalk Through Element	A-Building Frontage Element C-Amenity Element	D- Parking Element Buidling Element	E-Bicycle Element F-Travel Lane Element G-MedianElement
Bicycle	E-Bicycle Element	N/A	C-Amenity Element	A-Building Frontage Element B-Sidewalk Through Element D-Parking Element F-Travel Lane Element G-MedianElement
Transit	F-Travel Lane Element	B-Sidewalk Through Element	A-Building Frontage Element C-Amenity Element E-Bicycle Element	D-Parking Element G-MedianElement
Green	C-Amenity Element	G-Median Element	A-Building Frontage Element	B-Sidewalk Through Element D-Parking Element E-Bicycle Element F-Travel Lane Element
Parking	D-Parking Element	N/A	E-Bicycle Element	A-Building Frontage Element B-Sidewalk Through Element C-Amenity Element F-Travel Lane Element G-MedianElement

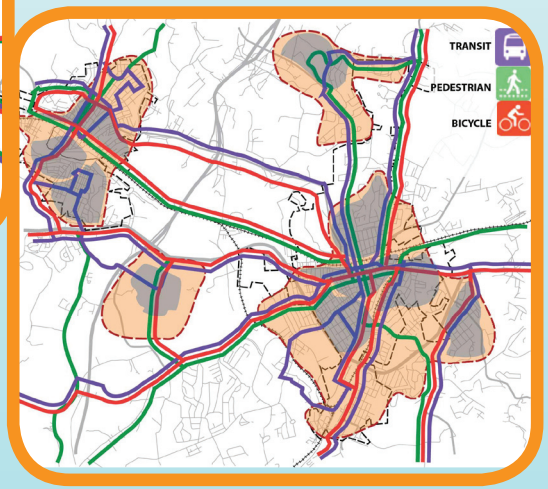
MULTIMODAL CORRIDORS

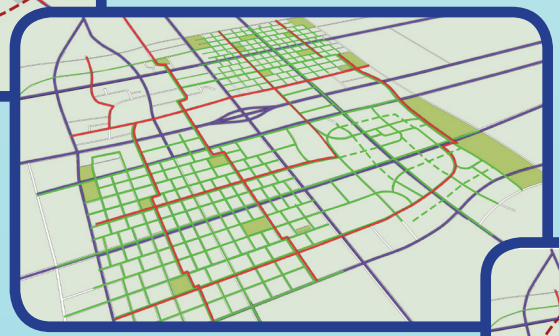


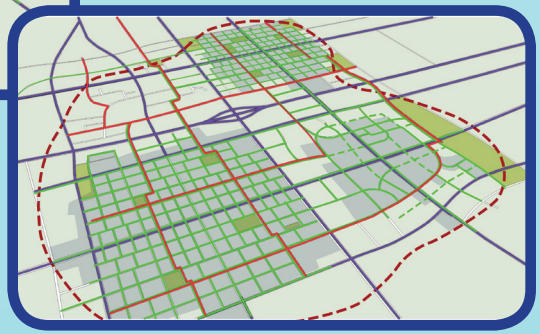
PUTTING IT ALL TOGETHER





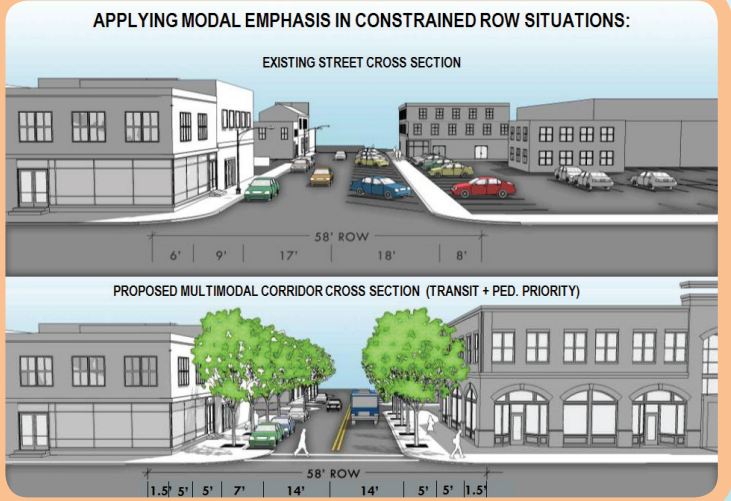






Building the Multimodal System Plan

Typically, developing a Multimodal System Plan is a mapping exercise of assembling the GIS layers from existing modal plans and land use plans, and a way to assemble existing plans into a standardized technical and graphic language for ease of communication with each other localities and regions or with state agencies. A Multimodal System Plan will highlight any disconnects in a multimodal circulation network, and provide an opportunity for a regional or local entity to address these disconnects by adding policies and actions to fix them in the future. Ideally, the Multimodal System Plan will show that all the multimodal networks in a region are part of a continuous and connected system of circulation that offers a diversity of travel choices.



Building a Multimodal Corridor

Using all of these concepts together, road designers can retrofit existing corridors to safely accommodate all travel modes and best fulfill their function within the broader multimodal transportation system. The Multimodal System Plan establishes the based corridor types, Transect Zones, and travel modes for modal emphasis. Designers can select the best facility and width to use for each Corridor Element using the lookup tables and the Corridor Matrix to build a customized and flexible cross-section in constrained rights-of-way. More information on the corridor design process can be found in the full Guidelines document.

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