ARC

STRATEGIC REGIONAL THOROUGHFARE PLAN

Management and Design Guidelines

for the Regional Thoroughfare Network

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Section 1
Introduction and Purpose

This set of guidelines was developed to serve as a tool to facilitate a common language and process for meeting a variety of sometimes competing goals along the Regional Thoroughfare Network (RTN). As such, the purpose of this document is to provide guidance for decision makers and professionals that influence specific factors that impact the overall functionality of the RTN, and the promotion of multimodal travel.

This section of the document provides policy recommendations related to transportation engineering and design, land use and form, and interagency coordination needed to effectively manage and preserve the RTN developed through the Strategic Regional Thoroughfare Plan (SRTP).

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1.1 Defining the Regional Thoroughfare Network

The Atlanta Regional Commission (ARC) faces a number of complex regional transportation issues, one of which is continued traffic growth on the Atlanta region's arterials. Nearly all of the commute trips in the region involve travel along arterial roadways, as they connect collectors, local streets and neighborhoods to transit stations and the limited access facilities. Because of its importance in regional mobility, traffic congestion along the arterial network directly impacts the region's environmental conditions, greenhouse gas emissions, energy consumption and economic vitality on a daily basis. As regional congestion becomes more problematic, successful congestion relief strategies takes center stage at all levels of decision-making, including those related to economic and business interests.

In recognition of their importance, the ARC commissioned the SRTP to identify a network of surface roadways that are most critical in providing regional mobility and connecting major activity centers throughout the Atlanta region and develop policy guidelines to maximize their overall functionality – from both a land use and transportation perspective.

1.2 Problem Statement

As in many other U.S. cities, many of the major non-expressway roadways in the Atlanta region were developed in a piecemeal fashion without sufficient regard to continuity along their length or connectivity with other arterials and other systems (i.e., highways, transit, and truck routes). The diagram below illustrates the range of trip characteristics that roadways serve. While some corridors primarily serve either through or local trips, there are some roadways that serve a mixture of these trips. Along these roadways it is difficult to balance the access to the variety of urban land uses that the streets serve with the goals of moving volumes of traffic needed for regional mobility. As a result, these corridors often cause conflicts over the priority that should be given to different modes of travel, transportation safety and capacity, maintaining smooth traffic flow, economic development, and the community's character and livability.

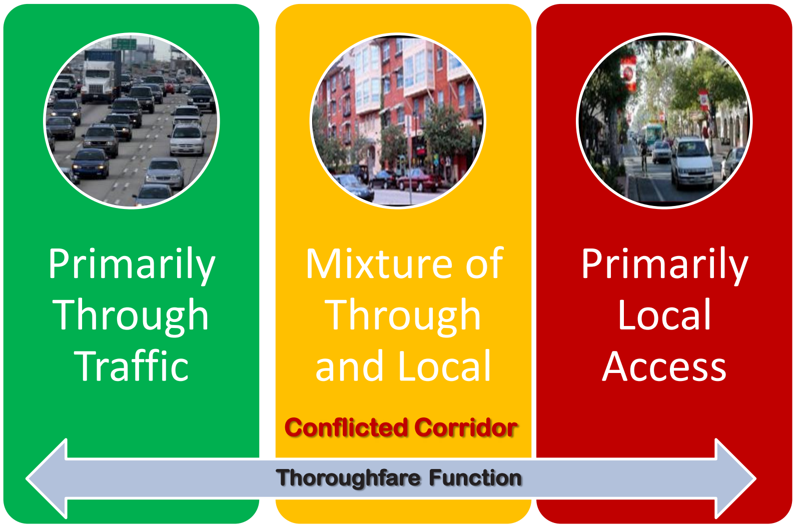


***Figure 1.1** Thoroughfare Functionality*
Some thoroughfares serve a mixture of through and local trips that require a high level of coordination amongst various stakeholders.

Addressing the balance between land use and mobility along these roadways requires a special level of planning and collaboration. As a result, several efforts have been undertaken, such as the ARC Livable Centers Initiative (LCI) program, to facilitate this balance. This document is an attempt to distill the lessons learned from these initiatives.

1.3 Purpose and Applicability of the Guidelines

The purpose of this document is to establish guidelines that local governments within the 18-county Atlanta Region can reference to manage regional thoroughfares in each of their jurisdictions, based on a consistent set design standards that facilitate the functionality of the Regional Thoroughfare Network (RTN).

The purpose of these guidelines is to maintain and improve mobility performance of major arterial facilities collectively, recognizing that the system as a whole is greater than the sum of its parts, and to prompt more strategic land use and multimodal choices to correspond with desired mobility performance. In recognition, the underlying standards of these guidelines are those expressed in *Context Sensitive Solutions for Designing Major Urban Thoroughfares for Walkable Communities (ITE, 2010),* which is provided on the opposite page.

In keeping with this approach, the design guidelines have been developed to coincide with:

- ***RTN Classification*** – provides a hierarchy of the overall regional mobility function of a thoroughfare. A map of the classified RTN is provided in **Figure 1.2** on page 4.
- ***The Unified Growth Policy Map (UGPM)*** – provides a basis for identifying the appropriate land use context for each segment of the RTN at the regional scale. The UGPM can be found in **Figure 1.3** on page 5.

1.4 RTN Classification

Through previous SRTP efforts, the RTN was identified and, subsequently classified into a hierarchy of three levels based on the degree to which they function (and are projected to function) as major regional thoroughfares. The factors used to classify the network are provided in the matrix below.

Level	Trip Mix Intensity (Commute and Freight Trips)	Land Use Connectivity (Link to UGPM)	Network Connectivity	Multimodal Functionality (Range of Modes and Scales)
I	"High" Number of Work Trips and Freight Trips	"Primary" Link – serves five (5) or more UGPM areas	Freeway-to-Freeway or Interstate Connector Route	"High" Multimodal Function – serves premium transit
II	"Moderate" Number of Work Trips and Freight Trips	"Intermediate" Link –serves three to four (3-4) UGPM areas	Freeway-to-Activity Center/Town Center Connector	"Moderate" Multimodal Function - serves local transit
III	"Low" Number of Work Trips and Freight Trips	"Basic" Link – serves up to two (0-2) UGPM areas	Freeway-to-Other Limited Access or U.S. Route Connector or other system connector	"Basic" Multimodal Function - serves paratransit, bike or walk trips

Basic Principles for Livable Thoroughfare Design

1. Urban circulation networks should accommodate pedestrians, bicycles, transit, freight and motor vehicles, with the allocation of right-of-way on individual streets determined through the CSS process.

2. The larger network, including key thoroughfares, should provide safe, continuous and well-designed multimodal facilities that capitalize on development patterns and densities that make walking, transit and bicycle travel efficient and enjoyable.

3. Thoroughfare design should complement urban buildings, public spaces and landscape, as well as support the human and economic activities associated with adjacent and surrounding land uses.

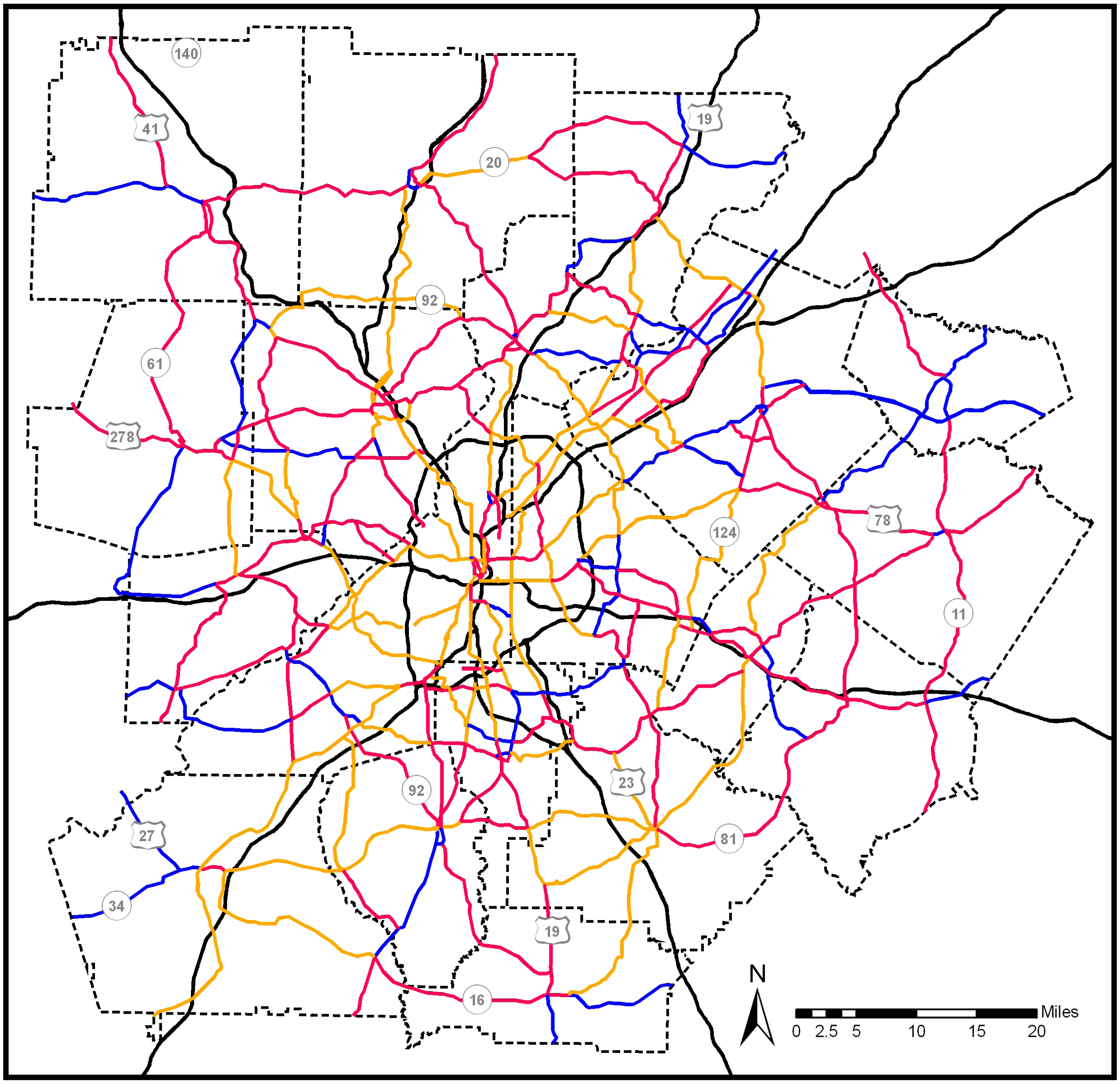
4. Safety is achieved through thoughtful consideration of users' needs and capabilities, through design consistency to meet user expectations and selection of appropriate speed and design elements.

5. Thoroughfare design should serve the activities generated by the adjacent context in terms of the mobility, safety, access and place-making functions of the public right-of-way. Context sensitivity sometimes requires that the design of the thoroughfare change as it passes through areas where a change in character is desired.

6. System-wide transportation capacity should be achieved using a high level of network connectivity and appropriately spaced and properly sized thoroughfares, along with capacity offered by multiple travel modes, rather than by increasing the capacity of individual thoroughfares.

Source: Institute of Transportation Engineers, Designing Walkable Urban Thoroughfares: A Context-Sensitive Approach *(2010).*

Strategic Regional Thoroughfare Levels



Strategic Regional Thoroughfare Level

- Level I
- Level II
- Level III

Figure 1.2 *Regional Thoroughfare Network*

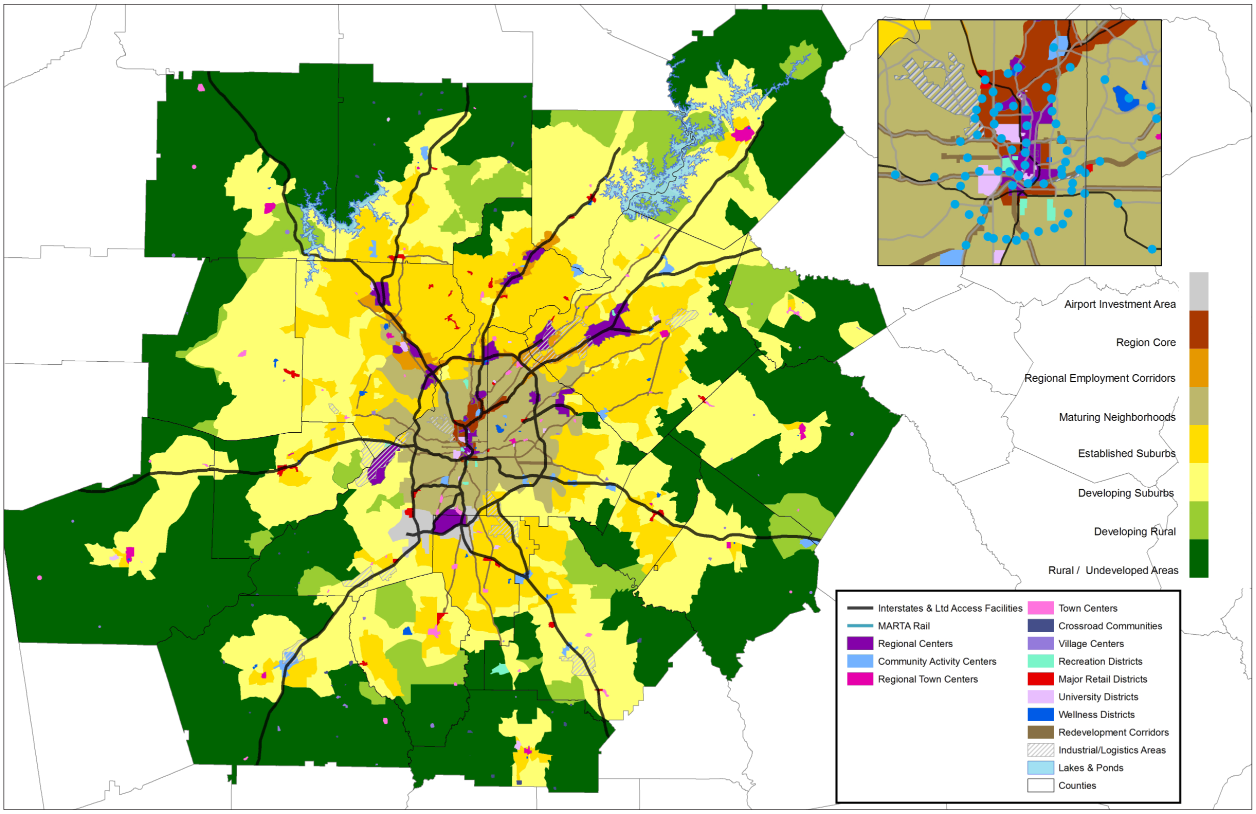


Figure 1.3 *ARC Unified Growth Policy Map (UGPM)*

1.5 Role of the Unified Growth Policy Map

In addition to the definition of three thoroughfare levels, the design guidelines that follow are organized by three types of land use character that are derived from a generalized form of the UGPM:

Urban. These include the City of Atlanta, the Maturing Neighborhoods that surround it, and multiple urban centers throughout the region (primarily historic downtown business districts and major employment and retail corridors). These are areas in the region where a complex balance of travel modes and trip types can be expected, and in particular pedestrian, bicycle and transit travel are higher than in other parts of the region.

Suburban. These include Established Suburbs and Developing Suburbs from the PLAN 2040 Regional Development Guide and comprise the context in which the majority of the RTN thoroughfares are found.

Rural. Rural areas have included little or no development and, due to development pressure, are likely to remain rural. Thoroughfare roadways in these areas are likely to accommodate all traffic and, due to the low development intensity and long distances between developed areas, are generally to be designed for long distance mobility.

Urban Areas

Urban Areas encompass a large number of land use categories described in the PLAN 2040 Regional Development Guide. These include Atlanta's Region Core and its surrounding Maturing Neighborhoods. These also include compact areas of urban development throughout the region, including Regional Centers and Town Centers. There is a wide range of recommended densities within these areas based upon the scale of appropriate development in each land use category. These range from very high densities in the urban core to lower densities in smaller scale village and town centers.

The map on the opposite page details the land use designations from the Plan 2040 UGPM included within Urban Areas grouping. The land uses within the city of Atlanta are shown separately in black to illustrate that these areas are not under the purview of these guidelines herein, but are rather under the purview of the Connect Atlanta Plan. Urban Areas are predominantly found adjacent to the city of Atlanta, although they can be found dispersed throughout the region along major transportation routes.

Within Urban Areas planning for pedestrians and bicyclists is of equal importance to the automobile. Design criteria should help limit vehicular travel speeds in these areas. Standards should also provide adequate buffers between travel lanes and pedestrians to ensure safety. Urban areas often feature constrained right-of-way which can present challenges to providing adequate sidewalks, bicycle lanes and travel lanes. Planning for each of these elements within a limited space should be factored into corresponding design criteria for these areas.

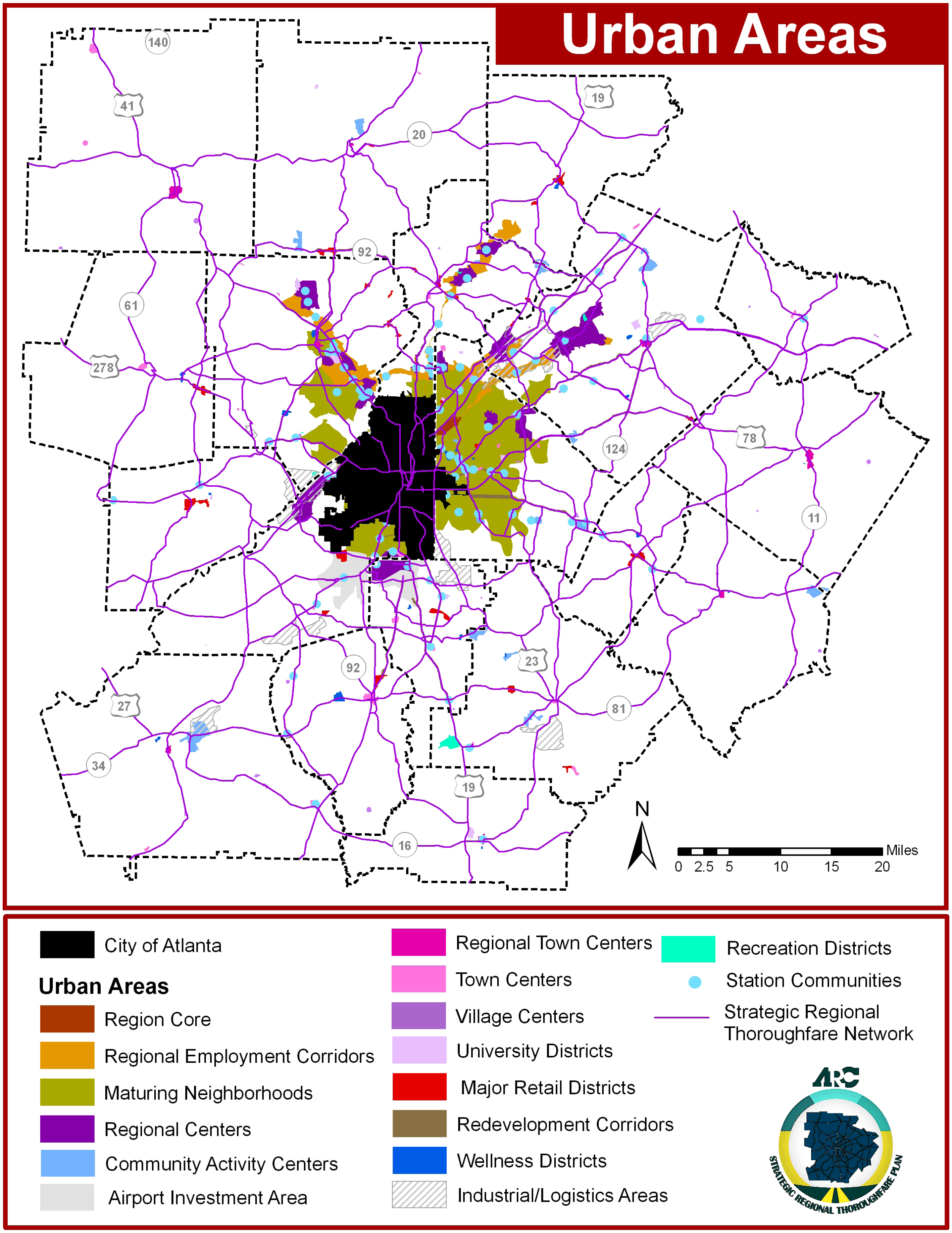
It is important to note that when entering Urban Areas transitions will be needed between Suburban or Rural Areas. Abrupt changes between design standards and cross-sections should be avoided. A gradual transition between these areas is needed to ensure the safety of motorists, pedestrians, and bicyclists.

The Connect Atlanta Plan establishes design guidelines for major roadways within the city of Atlanta. Regional thoroughfares within the city of Atlanta are under the purview of that plan and should follow the guidelines established within it. A link to the plan's Street Design Guide is provided below.

http://web.atlantaga.gov/connectatlanta/connectatl09/AtlantaCTPStreetDesignGuidelines.pdf

Recommended Densities

Context	Units per Acre	Stories based on Local Context
Region Core, Regional Employment Corridors	10-80+	3-20+
Station Communities	10-80+	1-20+
Regional Centers	30-80+	2-20+
Airport Investment Area	10-30	1-20
University Districts, Wellness Districts	10-30	1-10
Community Activity Centers	10-40	1-10
Town Centers, Major Retail Districts, Redevelopment Corridors	10-20	1-10
Regional Town Centers	10-40	2-10
Village Centers	1-10	1-3
Maturing Neighborhoods	2-5	1-10


Urban Areas
140
41
20
19
92
61
278
124
78
11
23
81
27
34
19
16
N
Miles
0 2.5 5 10 15 20
City of Atlanta
Urban Areas
Region Core
Regional Employment Corridors
Maturing Neighborhoods
Regional Centers
Community Activity Centers
Airport Investment Area
Regional Town Centers
Town Centers
Village Centers
University Districts
Major Retail Districts
Redevelopment Corridors
Wellness Districts
Industrial/Logistics Areas
Recreation Districts
Station Communities
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Suburban Areas

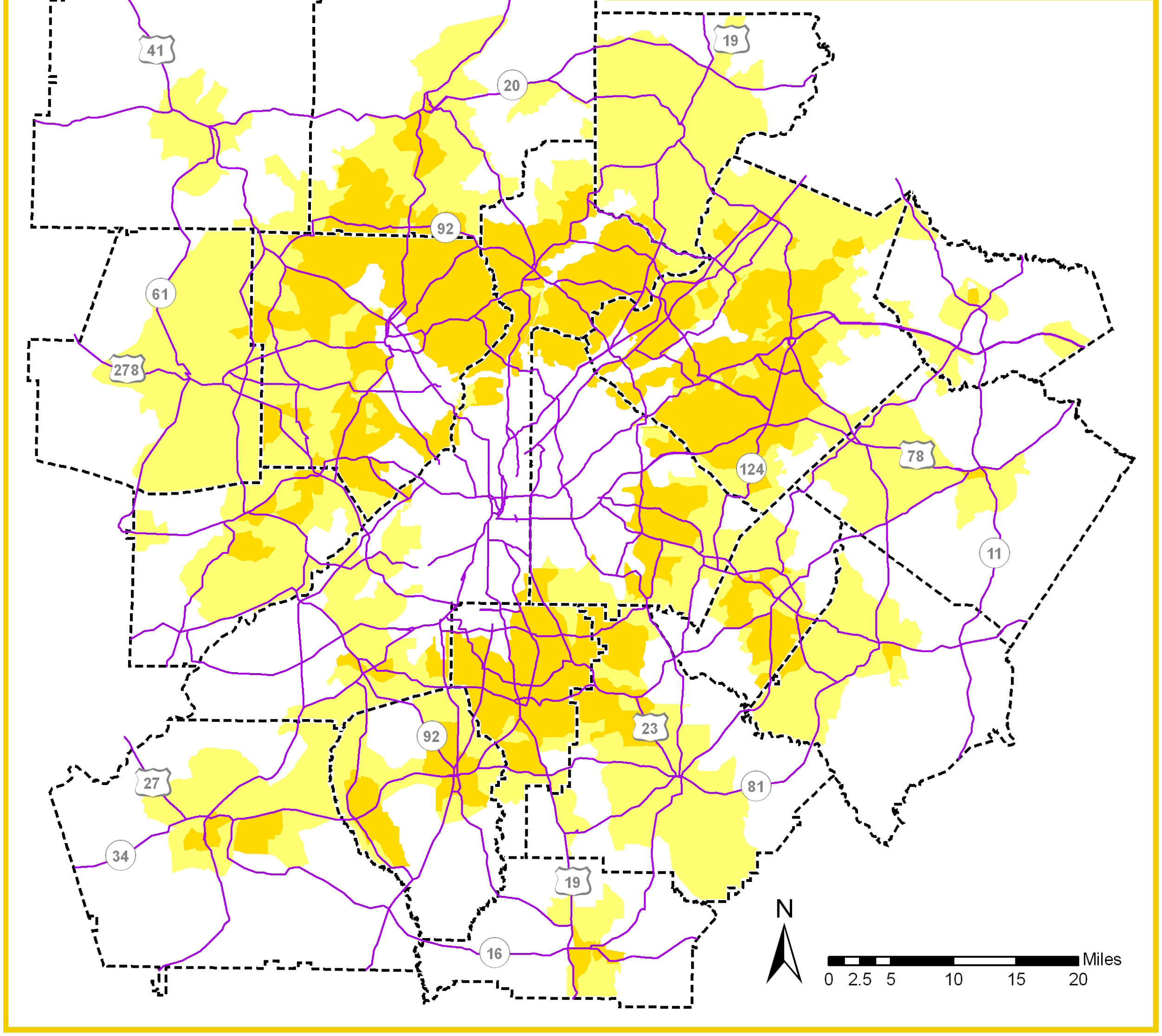
Suburban Areas include the Established Suburbs and Developing Suburbs land use categories detailed in the PLAN 2040 Regional Development Guide. Established Suburbs represent locations where suburban development has reached 'build-out' and is fully-developed. The Developing Suburbs category represents areas where suburban development has occurred, but the development pattern is not set.

The map on the opposite page details the land use designations from the Plan 2040 UGPM included within Suburban Areas grouping. Suburban Areas are predominately comprised of single-family residential subdivisions with strip commercial development along major thoroughfares.

Due to more dispersed land use patterns and lower overall densities within Suburban Areas, thoroughfares in these areas should promote long to medium-range mobility in the region. Design criteria in these areas should enhance vehicular travel speeds through limiting driveways on major roadways. Suburban thoroughfares vary greatly in the number of driveways along them due to the age of development and presence of access management regulations. Because of this the general vehicular speeds vary considerably on these thoroughfares and this presents corresponding design challenges. On low-speed suburban thoroughfares left turn lanes and sidewalk buffers are more important, while on high-speed suburban thoroughfares lane capacity is critical.

Recommended Densities	
Units Per Acre	1-5
Stories Based on Local Context	1-10

Suburban Areas



Suburban Areas

- Established Suburbs
- Developing Suburbs
- Strategic Regional Thoroughfare Network

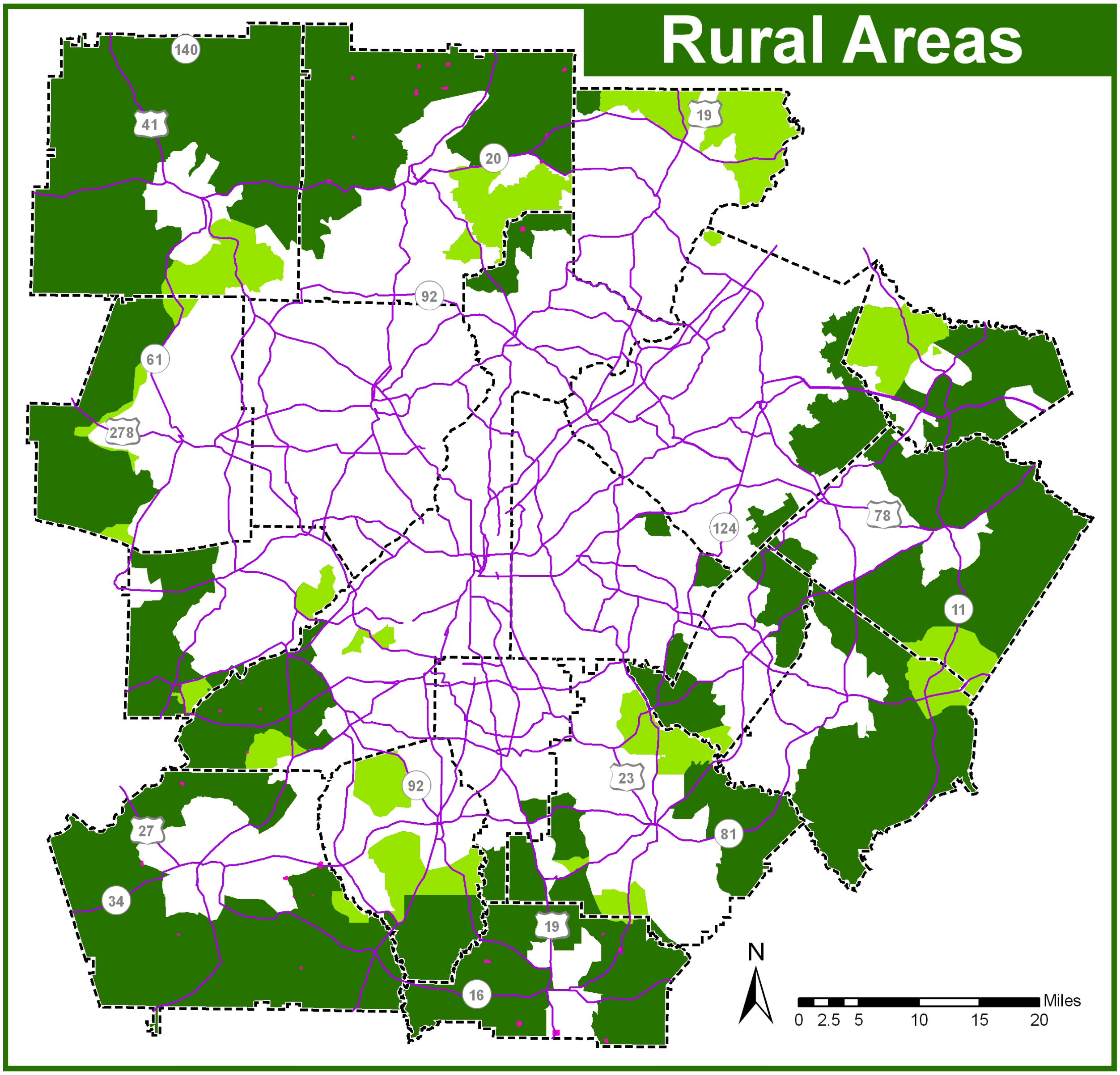
Rural Areas

Rural Areas include the Developing Rural and Rural Areas land use categories detailed in the PLAN 2040 Regional Development Guide. Rural Areas include areas where there has been little to no development and where land use policy supports preservation of rural character. These areas include locations where there is no development pressure and also areas where there is development pressure but very little development. Crossroad Communities are also included in this category because they represent a rural development pattern of widely dispersed commercial land uses and are found at major crossroads in these areas.

The map on the opposite page details the land use designations from the Plan 2040 UGPM included within the Rural Areas grouping. Rural Areas are predominately comprised of agricultural and forested lands.

Due to the largely undeveloped nature of Rural Areas thoroughfares within these areas should primarily serve long-range regional mobility needs. Design criteria that support high-speed vehicular travel are critical in these areas. Within these corridors lane capacity is of the utmost importance. Where rural thoroughfares coincide with bicycle routes identified within the ARC's Bicycle Study Network, bicycle lanes of adequate width are also critical design elements.

Recommended Densities	
Units Per Acre	1-5
Stories Based on Local Context	1-2



Rural Areas

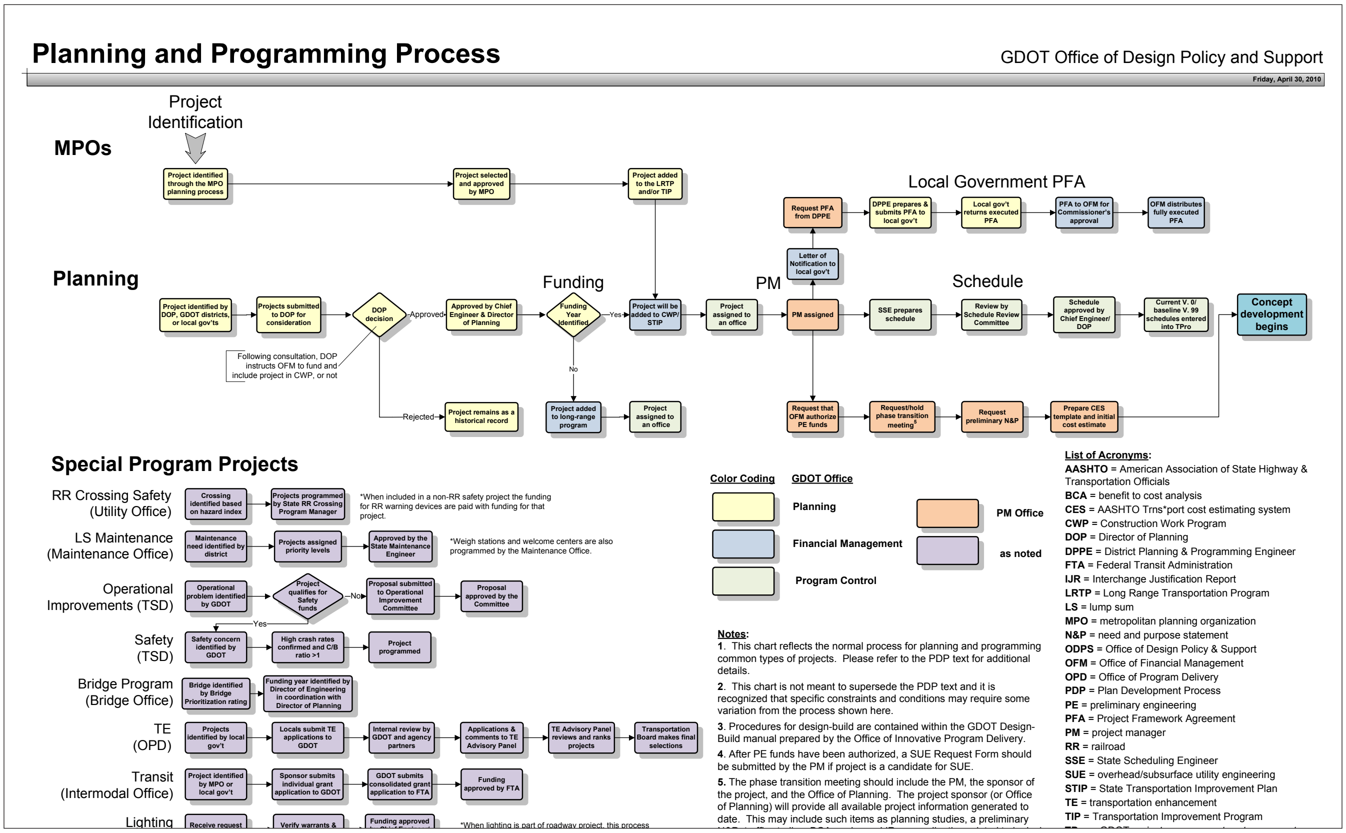
- Developing Rural
- Rural Areas
- Crossroad Communities
- Strategic Regional Thoroughfare Network

ARC STRATEGIC REGIONAL THOROUGHFARE PLAN

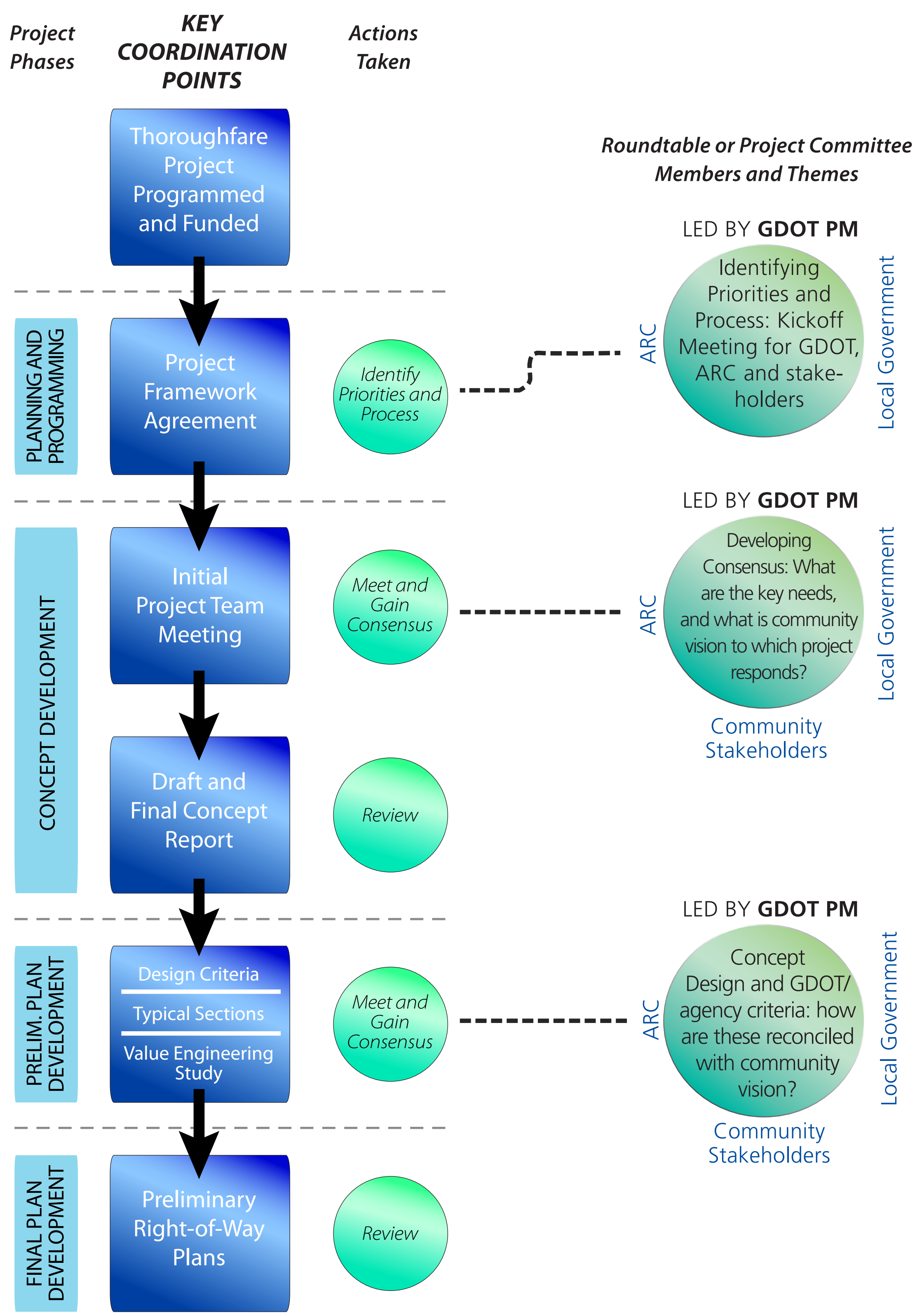
1.6 Project Development Process

For successful implementation of these guidelines increased coordination between ARC, local governments, and GDOT for projects on the RTN is recommended. There are several decision points throughout GDOT's Plan Development Process, shown in the graphic below, where said coordination would be most beneficial. The diagram on the opposite page illustrates key points in this process where various stakeholders – including the GDOT project manager, ARC staff, and local government officials - could be involved in ensuring the success of these guidelines. The Management and Operations Subcommittee could also play a role in reviewing programmed and long-range projects in the Transportation Improvement Program and the Regional Transportation Plan. This could be an ongoing review process similar to DRI reviews or area plan reviews.

Coordination activities shown in the graphic can be facilitated through the Multimodal Corridor Studies (MMCS) Program to be implemented by ARC over the coming years. In order to allow flexibility with respect to design, the scope of the MMCS will follow that GDOT's Context-Sensitive Design Manual (CSDM). The overall scope of the MMCS should be to facilitate a project through the Preliminary Plan Development phase of project development.



COORDINATING WITH THE GDOT PLAN DEVELOPMENT PROCESS



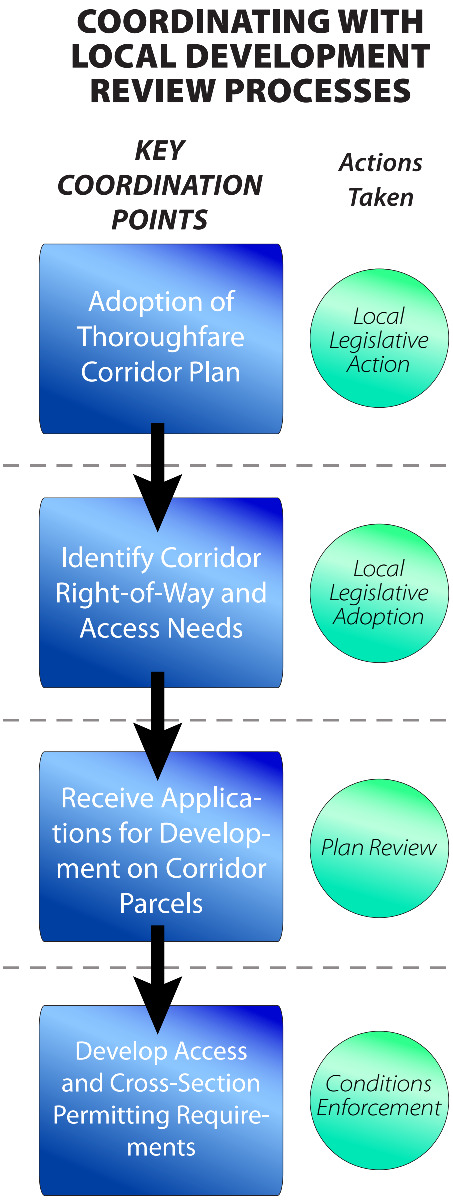
1.7 Local Development Review Processes

Land use and redevelopment policy actions at the local government level will also have a significant effect on these corridors. The availability of right of way, the number of driveway cuts and the walkability of these corridors will primarily result from local agency decisions. The diagram to the lower-right indicates some of the local actions and decision points when coordination with ARC and project designers is highly recommended.

ARC and local communities should work together to assure that appropriate local support is in place to empower local staff for each of these decision points. In particular, local governments should be prepared to follow specific actions that reiterate their support for the management guidelines herein. These are listed as follows:

- ***Local action and adoption of plans.*** Local governments should adopt corridor plans, LCI study recommendations or other specific-area plans developed in coordination these guidelines as policy and commit to the implementation items that are within their purview, such as zoning changes and access management regulations.
- ***Plan review.*** Review of development applications should be based on the implementation strategies of these guidelines, including the zoning, land development and access regulations committed to when the local government adopted the plan as policy.
- ***Coordination with property owners to promote access management.*** Access management plans and policies often feature cross-access easements, side access points from cross streets, and other strategic approaches to reducing the number of driveway access points on thoroughfare roadways. While the consolidation of driveways along a corridor can be partially accomplished when specific properties submit development applications, it is also recommended that local governments take a proactive role in working with property owners to promote access management strategies.

From a larger perspective, the overall purpose of the MMCS program should be to bridge the gap between GDOT, ARC, and local policies to come to consensus for a development strategy that works for all stakeholders. With that said, the MMCS will include a land use analysis and develop an access management plan that will need to be consistent with local practices and adopted by affected jurisdictions.



Section 2

Design Parameters and Definitions

Basic elements of thoroughfare design are determined largely by coordination with other regional and local plans. This section discusses the primary thoroughfare design considerations based on the framework of thoroughfare levels in the Strategic Regional Thoroughfare Plan. It also provides guidance in selecting thoroughfare designs for implementation of the Concept 3 regional transit plan, the Atlanta Region Bicycle Transportation and Pedestrian Walkways Plan, and the Atlanta Regional Freight Mobility Plan.

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This section describes the decision-making process for the thoroughfare designer, offering guidance on choosing an appropriate cross-section based on the land use context and expected travel speeds. As described in the previous section, the RTN is classified into three levels, tied primarily to regional land use connectivity, mix of trip types and multimodal functionality. However, the responsiveness to context—and the implications of that context for multimodal use, private property access and potential for streets outside the RTN to carry traffic—is another important element in roadway design that should be considered in conjunction with the definitions of the three thoroughfare levels.

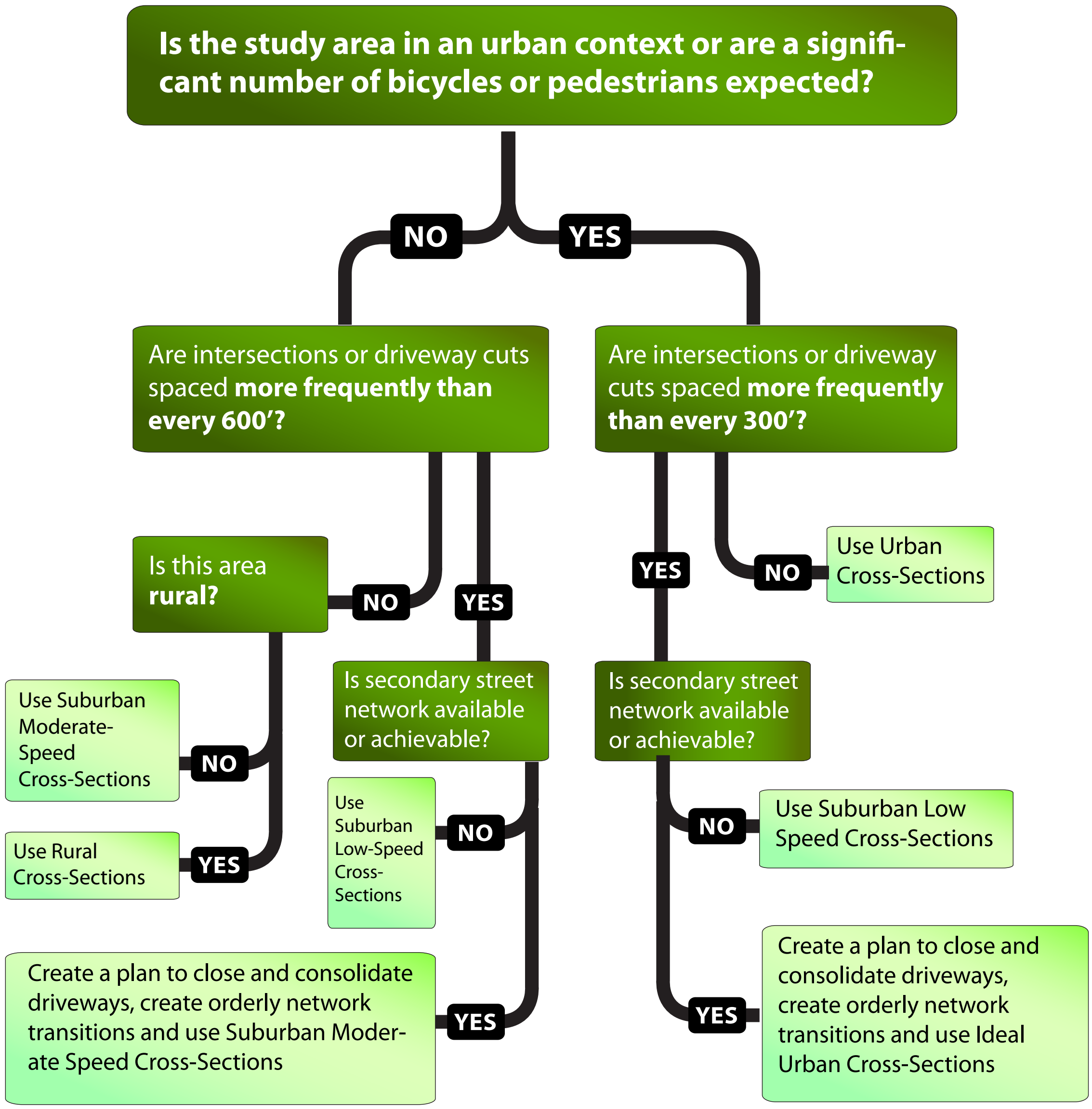
2.1 Choosing a Cross-Section Design

While the role of the RTN is to preserve and/or promote regional mobility, many thoroughfares pass through a variety of community types. The types of users, behavior of travelers, economic needs and public expectations within the different communities will, naturally, suggest differences in design in order to best balance sometimes competing corridor desires. There are three design factors in particular that are most indicative of the need for design changes:

- ***Presence of Bikes and Pedestrians.*** The safety of bicyclists and pedestrians may be compromised when they are mixed with fast-moving vehicles. Urban areas are most likely to present this mix and should provide measures to meter vehicle speeds and buffer bicycles and pedestrians.
- ***Frequency of Driveways.*** High speed vehicular traffic that does not have sufficient transition to low speed access movements (such as driveways on regional arterials) will very predictably result in high rates of vehicle crashes. Areas along Regional Thoroughfares that exhibit these characteristics should be considered for remedial efforts that either reduce the frequency of driveways or reduce through vehicle speeds.
- ***Availability of Supporting Network.*** Accomplishment of sustainable design is greatly advanced by the availability or creation of secondary street networks. Such networks allow better organization of intersections and parking, more orderly transitions between vehicular movements and safer walking and biking environments.

The flowchart diagram on the following page is intended to provide guidance in understanding the land use context in which RTN facilities operate. This is based on specific factors such as availability of street network and spacing of driveway access points.

This flowchart helps identify the difference between moderate and higher-speed suburban thoroughfares and lower speed thoroughfares. The main difference is the degree of land use access. Even in the suburban land use context, some suburban corridors feature a frequent spacing of driveways that serve small commercial parcels. This is especially true for mature suburban corridors that evolved from smaller rural roads.



A designer would work through this decision-making process as follows:

Assessing context and multimodal needs. The project designer should first assess whether a significant volume of bicycles and pedestrians is expected. Although most of these places are already designated as urban contexts, it is possible that this condition may arise in non-urban locations with schools or university campuses, regional parks, or major transit facilities.

Reviewing driveway access spacing. Based on the answer reached at the first decision point, the project designer should next assess intersection and driveway access spacing. In urban and mature suburban contexts, it is more typical that intersections and driveways will be spaced more frequently than in less urban contexts; if they are spaced more frequently than every 300 feet, the designer should then choose a cross-section based on the corridor's potential for adding a supporting secondary street network. Places where network can be achieved (or where the spacing of intersections and driveways is already relatively infrequent) may use an urban cross-section, which generally emphasizes narrower travel lanes, more frequent use of medians as opposed to continuous two-way left turn lanes, and smaller curb radii at intersections.

If the first decision point determines that the area is a suburban or rural area, driveway spacing should also be assessed, using a less restrictive spacing of 600 feet as a threshold level. If driveways and intersections are spaced every 600 feet or less and the context is truly rural, a rural cross-section should be used.

The underlying purpose of basing this selection purpose on driveway and intersection spacing is to match the design of the thoroughfare roadway in a given area to the predominant function it serves. Thoroughfares that carry a mix of regional trips destined for long distances (through trips) and local trips typically experience notably high accident rates, due largely to the difference in speeds between the two. Better aligning a roadway's design with its function makes motorist behavior more predictable. This is a key element of improving safety on regional thoroughfares.

In addition to the selection of context and identification of the appropriate thoroughfare level, thoroughfares need to accommodate the needs of multiple transportation agencies and constituencies, especially as these are expressed in other regional plans administered by ARC and GDOT. The three primary considerations—transit, bicycles and freight—are discussed in the following subsections.

2.2 Transit Corridors

Many RTN facilities accommodate local and regional bus transit services offered by MARTA or another of the region's local public transit agencies. The design guidelines for streets on the RTN that are served by local or regional buses should reflect the needs of safe and efficient public transportation service. In addition, new premium transit service lines and extensions of existing MARTA rail lines warrant consideration. In 2008, the Transit Planning Board (TPB) approved the recommendations of an extensive study of alternative long-range transit services needed by the Atlanta Region. The result, Concept 3, shown on the following page, reflects that long-range transit vision of the Atlanta Region.

Concept 3 anticipates seven different forms of transit services for the Atlanta Region:

1. MARTA heavy rail extensions
2. Light Rail Transit (LRT) and /or streetcar lines
3. Commuter rail lines
4. High capacity (freeway) Bus Rapid Transit (BRT) lines
5. Arterial rapid transit service
6. Express and intercity regional service
7. Expanded local and activity center service

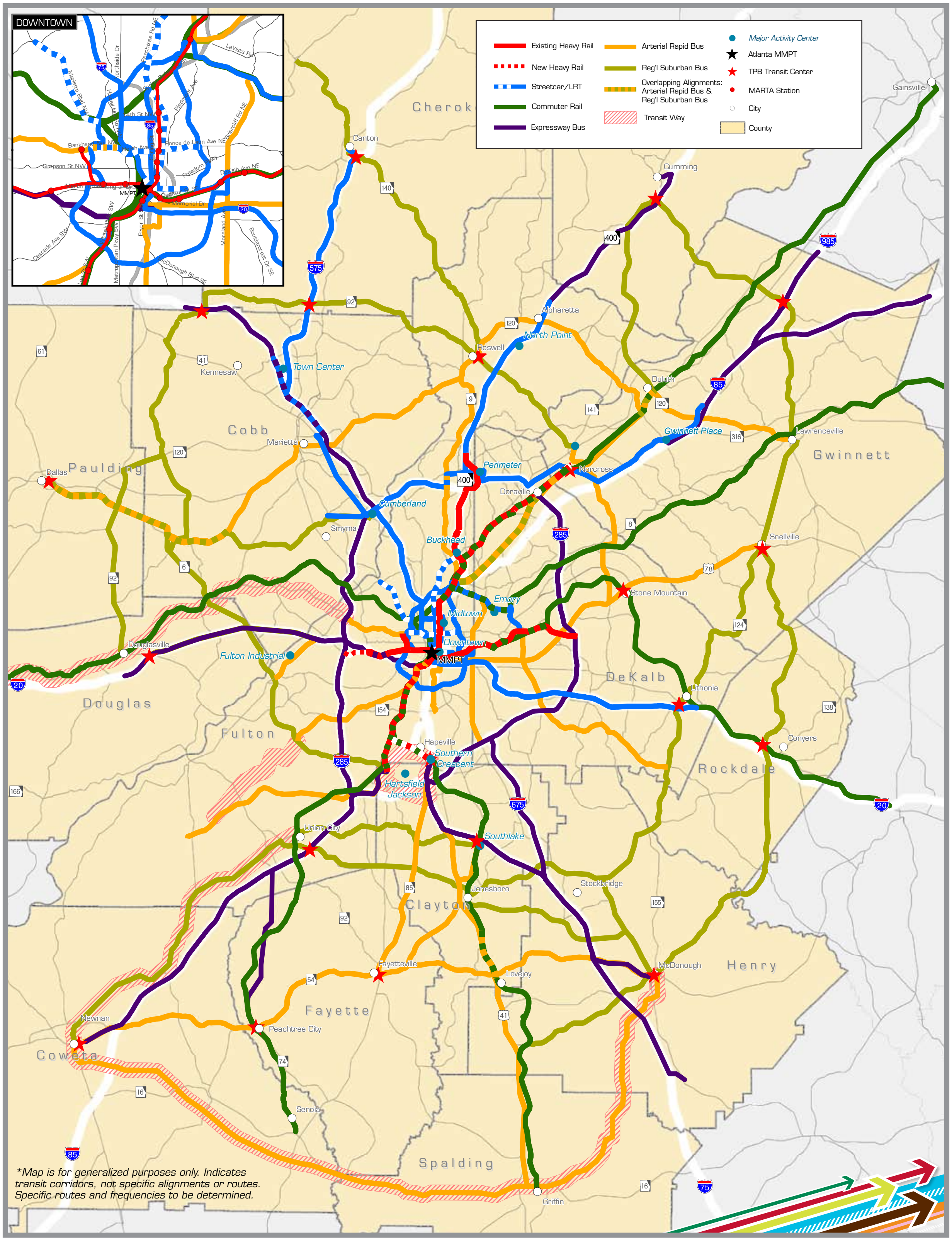


Figure 2.1 *Concept 3 Regional Transit Vision*

This set of design guidelines recognizes the need to reflect how transit guideways and passenger boarding can best be accommodated in the design of thoroughfares that share the existing or future rights of way with bus lines, Bus Rapid Transit lines, streetcars and Light Rail Transit lines.

The following should be considered as transit planning design factors that affect RTN facilities located along future transit corridors shown in the Concept 3 plan. More detailed design considerations, including illustrative graphics, can be found in special design elements for transit thoroughfares in Section 3.

- Preservation of future right of way for transit operations (refer to Section 3 for recommended guideway dimensions)
- Adequate turn lanes and curb radii for transit vehicles
- Adequate street grade for light rail vehicles
- Pavement strength for transit vehicle stops
- Station spacing and stop and station locations
- Configuration of station or stop with passenger waiting facilities, signage, landscaping and lighting
- Pedestrian access and safety around stations and stops
- Adequate clearance (horizontal and vertical) for outdoor lighting, signal systems and street trees
- Signal priority and preemption needs for transit vehicles
- Coordinating vehicle left-turn lanes with median station locations
- Possibility of queue jump lanes at intersections
- Parking restrictions near stations and stops
- Coordination of transit stations and stops with on-street parking lanes
- Bike/bus conflicts where bicycle lanes share the same right of way (bike lane passes along the curb side of the bus lane for safety.)

2.3 Bicycle Corridors

The *Atlanta Region Bicycle Transportation & Pedestrian Walkways Plan* is the overall blueprint for identifying a continuous and integrated network of priority routes for bicycle travel in the Atlanta Region. The plan evaluated the role of bicycle travel in the Atlanta Region and the need for an interconnected system of bicycle facilities throughout the region. It included a recommended Bicycle Study Network map based on selected corridors that are significant to regional transportation needs and have a federal funding priority for mitigating congestion (next page).

The Plan's network is comprised of links on the Regional Strategic Transportation System that connect regionally significant nodes: LCI study sites, Town Centers, Major Activity Centers, incorporated cities with populations over 5,000, and county seats. See the map on the opposing page.

The primary means for accommodating safe travel for bicyclists on the RTN is through the provision of paved, dedicated, marked and signed bicycle lanes or separate off-street multi-purpose trails along the corridor in accordance with the AASHTO *Guide for Development of Bicycle Facilities (1999)*. Given the high level of functional classification of these thoroughfares and the expected volumes and speeds of traffic they will carry, establishing off-road bicycle facilities is the preferred design option on bicycle routes on RTN streets and roads. The ARC regional bicycle plan recommends bike lanes or parallel side paths on arterials that are within:

- ½-mile of schools
- 1 mile of major parks and greenways
- 1 mile of MARTA stations and premium transit operations service centers.

It also provides an Level of Service (LOS) evaluation metric for bicycle travel on major streets throughout the Atlanta Region using a range of values from A to F, where LOS D is the minimum acceptable level of service. It recommends a LOS of B for bicycle travel in all LCI study areas and in Regional Places (the urban areas of the UGPM). It recommends a LOS of C for all other segments of the Bicycle Study Network.

Level of Service is based on a mathematical formula that considers factors such as:

- Speed and volume of traffic on the roadway
- Percentage of vehicles on the roadway that are trucks
- Width of outside through lane
- Pavement conditions

Chapter 3 provides a brief set of design guidelines for the safe accommodation of bicycles on the RTN system, including alternatives for on-street bike lanes, off-street multi-use paths, and combinations of both types of facilities. It also provides design guidance for typical situations such as reconciling bicycle lanes with dedicated right turn lanes at intersections.

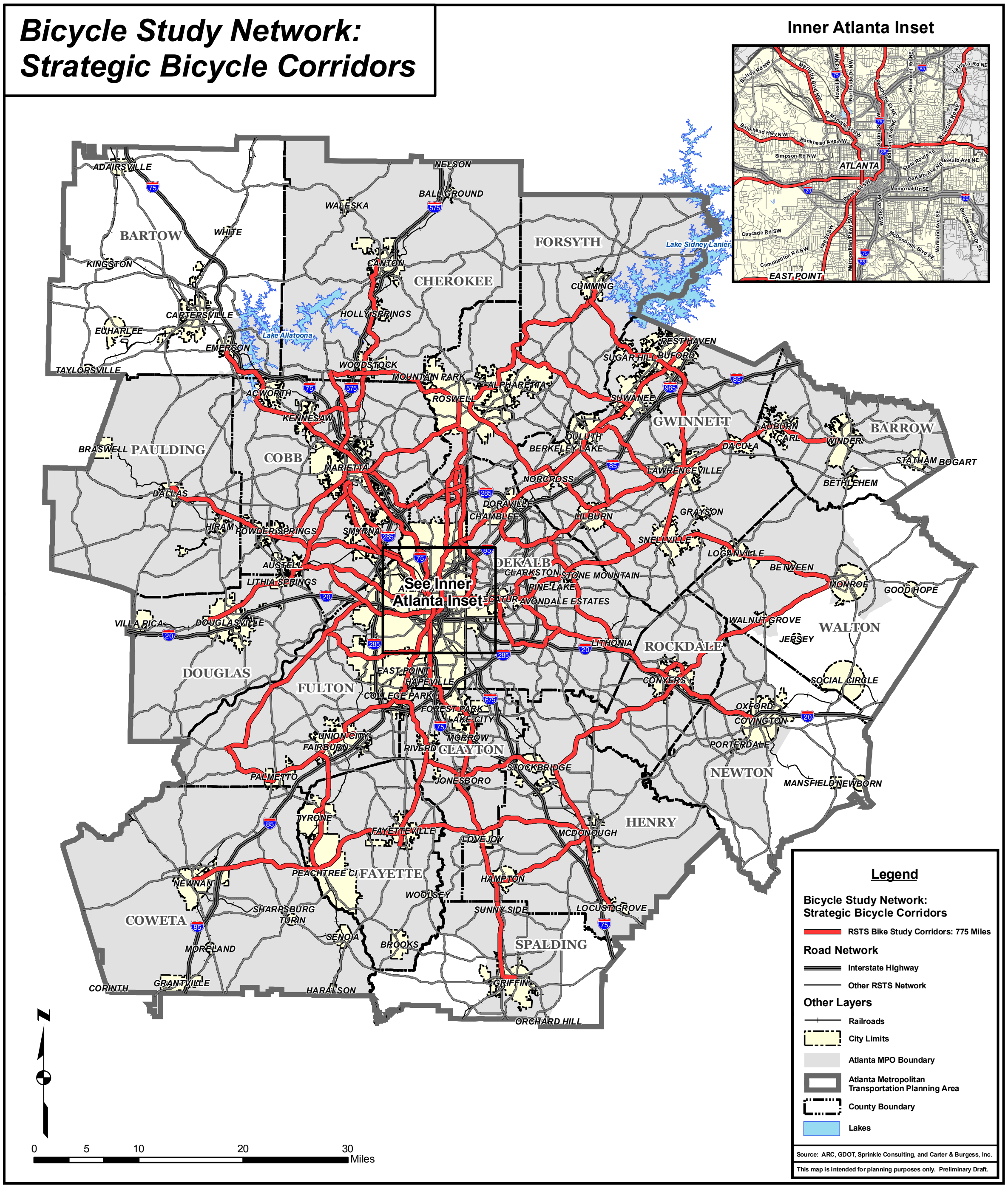


***Figure 2.2** Strategic Bicycle Corridors*

2.4 Freight Corridors

An important function of the RTN is the facilitation of goods movement. According to the 2008 Atlanta Regional Freight Mobility Plan the total amount of freight movement in the Atlanta Region is projected to increase by 78 percent between 2008 and 2030. According to this study, approximately 60 percent of the truck trips in the Atlanta Region have an origin or destination in the Atlanta Region and therefore, are likely to impact the RTN. Freight movement through and within the region is extremely dependent on the freeway system, especially I-285, largely because the surface arterial network is fragmented and discontinuous. Many of the original truck routes are not logical in that they may stop at jurisdictional boundaries or conflict with restrictions placed in adjacent communities. As a result, there are few alternatives for trucks to use. Ultimately the arterial network should be the backbone of the urban freight system, or a dependable means of final delivery of goods to local markets. The Freight Mobility Plan recognized that additional study was needed to address issues pertaining to truck routing and operations.

Out of this process came the Atlanta Strategic Truck Route Master Plan (ASTRoMaP) was adopted by the ARC in June 2009. The objectives of the ASTRoMaP study were to:

- Follow-up on recommendations from the Atlanta Regional Freight Mobility Plan to direct truck traffic to roadways whose physical and operational characteristics can effectively accommodate truck traffic.
- Identify a Regional Strategic Truck Route Network concept to direct and manage freight movement.
- Identify supportive improvement strategies to implement the regional truck route concept, including identifying priority road-railway at-grade crossings for removal.
- Develop access management best practices to protect freight corridors.

The result of the ASTRoMaP was the development of a regionwide priority truck route network as well as associated policies and guidelines. A copy of the ASTRoMaP route network is shown on the facing page.

Although most truck travel in the region will continue to use interstate routes, especially for through trips, the ASTRoMaP network illustrates that many of the RTN corridors are also freight corridors that need to be designed to accommodate truck traffic. This affects the geometric design, signalization and access management features needed for the RTN routes that are also on the ASTRoMaP. Chapter 3 of this report provides a number of design recommendations for these routes.

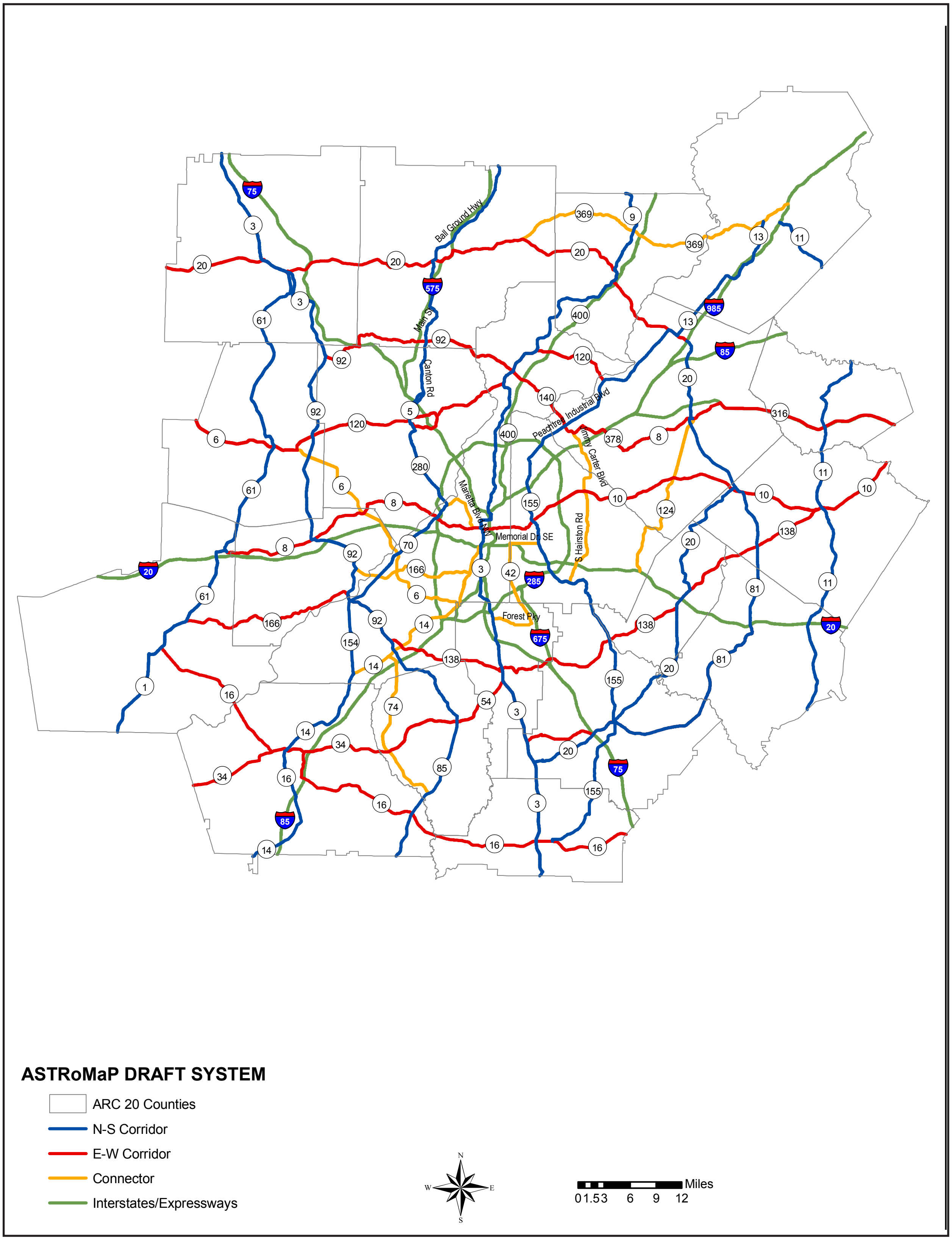


Figure 2.3 ASTRoMaP Corridors

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Section 3

Elements of Design

This section presents detailed cross-section design for the different levels of thoroughfare class as defined in the SRTP and different land use contexts. It also offers guidance on designing auxiliary roadway features that may be called for in coordinating thoroughfare projects with the Concept 3 regional transit plan, the Atlanta Region Bicycle Transportation and Pedestrian Walkways Plan, and the many Livable Centers Initiative (LCI) studies that have been completed throughout the region.

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Each thoroughfare's design must address primary transportation needs (such as vehicle-carrying capacity, demand for walking and pedestrian access, and serving planned transit and bicycle connections). At the same time, though, designs need to respond to the surrounding community context and should design for movements, vehicles and behavior that preserve a balance between the thoroughfare's function and the activities and needs of the communities that the thoroughfares serve.

The table below directs a user of this guide to the appropriate designs for each of the three different Thoroughfare Level types within a variety of contexts. Because of the predominance of suburban contexts in the Atlanta region, consideration has been given in the street designs for different speeds.

Context	Level I	Level II	Level III
Urban	Pages 37-39	Pages 41-43	Pages 45-47
Suburban Moderate Speed	Pages 49-51	Pages 53-55	Pages 57-59
Suburban Low Speed	Pages 61-63	Pages 65-67	Pages 69-71
Rural	Pages 73-75	Pages 77-79	Pages 81-83

3.1 Compatibility with Other Design Standards

The guidance for roadway design provided in this document is consistent with the guidance in AASHTO's *Policy on Geometric Design of Highways and Streets* (the 'Green Book') and follows the context-sensitive approaches of the Institute for Transportation Engineers's *Designing Walkable Urban Thoroughfares* publication. However, because many of the thoroughfares in ARC's system are on routes under GDOT's jurisdiction, they must follow the standards defined in the GDOT Design Policy Manual or need to be granted design exceptions.

Design guidance published in the AASHTO Green Book reflects the consensus of AASHTO's member departments regarding what constitutes good design practice nationally. In arriving at a consensus, AASHTO recognizes that each region or state has different conditions, constraints, and needs. As is noted in the foreword of the Green Book, "sufficient flexibility is permitted to encourage independent design tailored to particular situations." The discussion of lane width for urban areas in particular reflects a high degree of flexibility. It is noted that lane widths "may vary from 10 to 12 ft. (3.0 to 3.6 m) for arterials." For lower-classified RTN facilities, similar flexible language encourages the tailoring of an urban street cross section to site-specific conditions. Lane widths substantially less than 12 ft. (3.6 m) are considered adequate for a wide range of volumes, speeds and other conditions.

For the reconstruction of rural two-lane highways, the Green Book notes that lane widths less than 12 feet may be retained "where alignment and safety record are satisfactory." In other words, widening a narrow existing highway is not mandated if its safety performance is acceptable. Flexibility is also evident for lower-class roads and streets, with recommended narrower lane widths consistent with lower design speeds on such roads.

In urban areas and along rural routes that pass through urban settings, narrower lane widths are appropriate, and indeed an important design feature to promote greater safety. For such locations, space is limited and narrower lanes can help to accomplish a more complete street design within the available right-of-way envelope, but roadways also tend to have higher levels of pedestrian activity and lower speeds become an important goal. In addition, narrower lane widths for urban streets lessen pedestrian crossing distances, enable the provision of on-street parking and transit stops, and may enable the development of left-turn lanes for safety. Lesser widths also encourage lower speeds, an outcome that may be desirable in urban areas.

In addition to environmental constraints, lane width has an influence on the safety and comfort of the driver. The width of the travel lanes selected should be influenced by the physical dimensions of cars and trucks, desired speeds and type of road. Studies have shown that drivers tend to be more comfortable traveling at higher speeds on roads with wider lanes. As speed and volumes increase, additional lane width is often considered desirable to accommodate the variations in lateral placement of the vehicle within a lane. Greater lane widths also more easily accommodate wider vehicles in the traffic stream, such as trucks, buses, and recreational vehicles. Wider lane widths may also marginally increase the capacity of the roadway.

In considering the use of narrower lanes, however, designers should recognize that narrow travel lanes reduce vehicle separation from other vehicles and from bicyclists. They can also create complications for buses, trucks and other large vehicles in forcing these vehicles to infringe on multiple lanes when turning.

Green Book values for lower-speed urban street lane widths are less rigorously derived. There is less direct evidence of a safety benefit associated with incrementally wider lanes in urban areas, compared with other cross sectional elements. Here, provision for a total cross section that considers left-turning vehicles, medians, and the needs of pedestrians and bicyclists should be considered in selecting appropriate lane widths and cross section based on safety considerations. NCHRP Reports 282 and 330 demonstrate the operational and safety effectiveness of various combinations of cross section values for urban arterials.

The cross-sections shown in this section present geometric dimensions that vary from GDOT's design standards, primarily because of the likelihood of constraints in establishing right-of-way in urbanized areas. Each of the cross-sections responds to what are expected to be realistic circumstances throughout the Atlanta metropolitan area. Perhaps of equal importance, the need for vehicle speeds and motorist behavior to fit into the overall context of more urbanized areas suggests that the Atlanta region needs a broader set of design options than in the GDOT standards.

Handling Trade-offs

Many of the RTN corridors serve a complex array of purposes, many of them often competing for priority. Project planners and designers must consider all at once safety for all roadway users, roadway capacity and vehicular mobility, and the walkability of a roadway for short-trips and those who do not or cannot drive. Balancing these priorities involves trade-offs. For example, pedestrian crossings may need to be longer than what is ideal because a thoroughfare's status as a freight route demands that larger intersection turning radii be used. However, in this case, the pedestrian crossings can still be designed safely and in a way that makes the pedestrian's path clear and easy to follow. As another example, the addition of a bicycle lane in a space-constrained corridor might mean that narrower travel lane widths are used, potentially leading to lower travel speeds for vehicles but ensuring that the travel modes that have been identified as important to the thoroughfare corridor are accommodated safely.

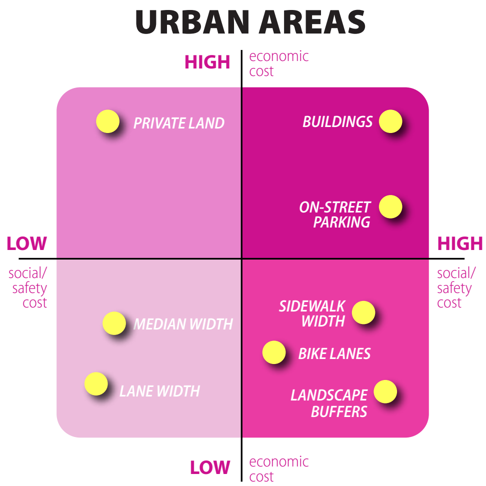
The implementation of projects in the types of built up environments found throughout the Atlanta Region often leads to the realization that insufficient right-of-way exists to apply the ideal cross-section. This finding inevitably leads to an evaluation of trade-offs. Decision makers are forced to decide whether provision of all of the design elements at the desired dimensions are worth the additional financial or community cost involved in the acquisition of additional right of way. Since these evaluations can sometimes be subjective, the outcomes very often depend on the perspective of the decision maker.

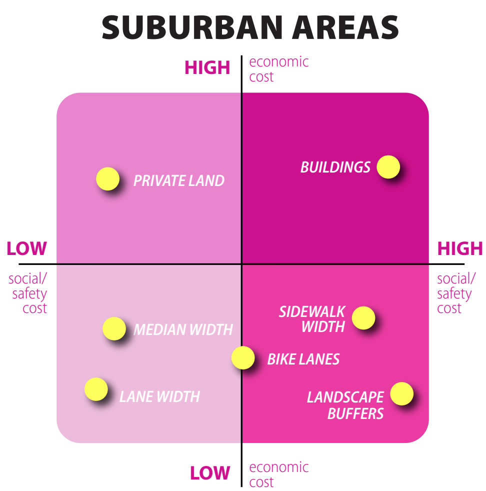
Historically, the decision makers have been the design engineers of the implementing agencies. These engineers typically have focused on maximizing vehicular throughput and so the trade-offs have often been overlooked. If the Region intends to improve the physical design of its thoroughfares, two characteristics of the old decision making process must change:

During the plan development process, it is recommended that a more diverse group of professionals engage in the design of a thoroughfare. Disciplines of urban design, land use, transportation planning (with bike or transit expertise when applicable) should be assembled and assigned to each project. Ideally these teams will work together throughout the implementation of a given project. A more broad-based group of professionals must be involved in the process at these decision points. A set of priorities tailored to each different functional type of facility and land use context must be agreed upon by partner agencies.

Understanding Cost and Defining Priorities

Each of the design elements has a cost, in both economic (or fiscal) and social (or community impact) terms. However, the cost of each varies between urban and suburban contexts, and one element that may have a relatively insignificant fiscal cost has a high community impact if foregone from a thoroughfare project. Sidewalk width is a common example of this: relative to the overall project cost, the cost may be small for two additional feet of sidewalk to make a five-foot sidewalk a seven-foot sidewalk in a business district, but the cost to the community is high in that the business district has insufficient pedestrian space and visitors to the district may not feel safe walking. The diagrams on the next page illustrate these costs schematically; designers should keep these kinds of balances in mind when working to resolve trade-offs in





Figures 3.1 and 3.2 *Understanding Costs*

The figures above illustrate how costs are distributed from both economic (or monetary) and social (or political) perspectives. All of the points in the diagram are factors that are considered when a thoroughfare project is being designed. In suburban areas, some factors, such as on-street parking, are less likely to be considered due to the prevailing patterns of land development.

thoroughfare design.

While the definition of the highest priorities might vary depending of the viewpoint of an individual agency or discipline and will certainly vary based on the type of thoroughfare facility, all should agree on ***safety as a common goal***. This safety should extend to all users of the system. Therefore, in areas where significant numbers of bicycles and pedestrians can be expected, the safety of these vulnerable users must rise in prominence as a priority. On corridors that are designated as freight corridors, the needs of large vehicle and their impact on other system users will be important.

The tables on the opposite page suggest priority for elements of the thoroughfare cross sections in the various contexts of the Atlanta Region.

Pedestrian zones, buffers and moving lanes

Although most communities likely wish to have an aesthetically rich thoroughfare design, with trees and other landscaping, as well as a comfortable sidewalk space, roadway project costs and available funds for thoroughfare projects are likely to constrain the overall design to more modest dimensions. Nonetheless, pedestrian and vehicle safety should be a high priority in all designs. For that reason designers should always provide at ***least five feet of buffer space*** between the clear sidewalk width and the outermost moving travel lane of the roadway. The buffer space does not need to be landscaping— bicycle lanes, on-street parking and non-landscaped space adjacent to a sidewalk can count toward the buffer. However, the designer should make every effort to include this space so that later streetscape improvement projects or other enhancement projects can work within the existing right-of-way and still make conditions better for pedestrians.

For this reason, the cross-sections in Section 3 have shown the basic minimum acceptable dimensions for each of the thoroughfare types and land use contexts.

Urban Areas

Critical	High Priority	Lower Priority
Number of Lanes (Capacity)	Sidewalk Buffers (Bike Lane, Landscape or Parking)	Lane Width
Clear Walk Width	Left Turn Lanes	

Low-Speed Suburban Areas

Critical	High Priority	Lower Priority
Number of Lanes (Capacity)	Clear Walk Width	Lane Width
Left Turn Lanes	Sidewalk Buffers (Bike Lane, Landscape or Parking)	

Moderate-Speed Suburban Areas

Critical	High Priority	Lower Priority
Number of Lanes (Capacity)	Clear Walk Width	Sidewalk Buffers (landscape or bike lane)

Rural Areas

Critical	High Priority	Lower Priority
Lane Width (Safety)	Number of Lanes (Capacity)	Bike Lane Width (When present)

Figure 3.3 *Priorities in Design Elements*

As discussed previously, thoroughfare project designers face a need to balance competing priorities for a roadway, especially in order to manage project costs and ensure that projects can be delivered according to established schedules. The tables above provide guidance on which elements should take which priorities, based on the typical patterns of travel, balance of travel modes, and land use needs of each of the major context types. Critical needs are just that— they must always be addressed as conditions and context demand. High priority items follow in importance— designers should make every effort to include them in the roadway design and can consult the cross-sections in Section 3 for guidance on appropriate dimensions and design criteria. Lower priority items can be accommodated if cost and physical constraints do not make them unreasonable or impractical to include.

3.2 Thoroughfare Cross-Section Design Guidance

The 12 cross-sections presented on the following pages are the primary geometric design guidance for RTN thoroughfares. They present a typical section for each combination of the three thoroughfare levels and the three primary land use contexts. Two different context types are addressed for suburban areas, given the patterns of driveway access and intersection spacing described in the decision tree in Section 2.1, page 20. This page and the opposite page illustrate how the project designer would make use of these section templates.

The typical section *illustrates the main components of the traveled way. It specifies buffer space and sidewalk width as well. To provide flexibility in the event of constrained rights-of-way, the buffer does not need to be landscaping, only a distance between the sidewalk clear area and the outer lane of the traveled way.*

Urban Thoroughfare Design
***Level I** Thoroughfares*

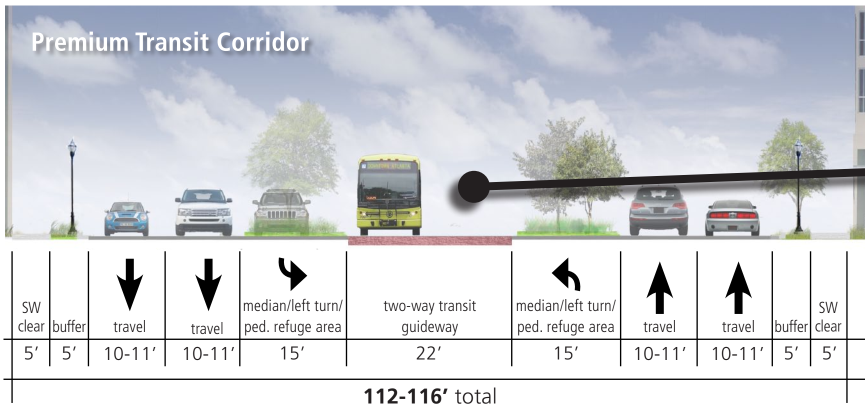
The explanatory text *provides general information on the cross-section and the intended conditions in which it should be used.* ***The table of standards*** *that accompanies it describes geometric design elements in greater detail. It is important to remember that these are guidelines, and good engineering judgment should always be used in applying them. In some cases, certain elements may not be used in a given section.*

Urban thoroughfares are routes of regional significance in the context of the Atlanta region's downtowns and traditional urban centers. Their right of way is typically constrained; designs need to provide basic sidewalk space for pedestrians while still meeting a basic roadway capacity need.

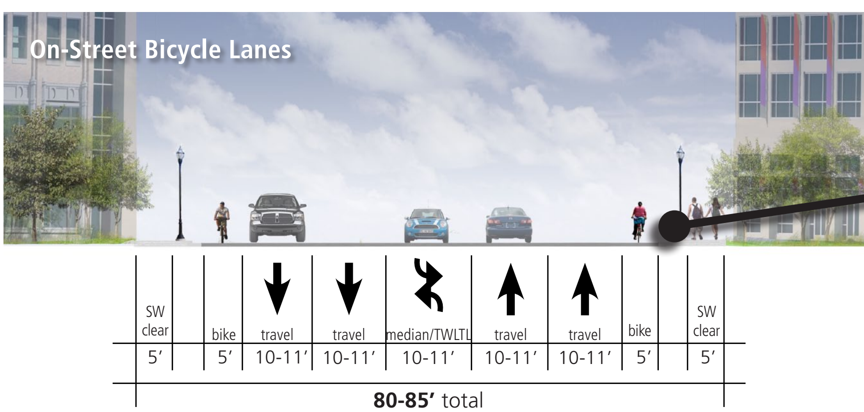
The diagrams on the opposite page illustrate street design components that are likely to be used in coordination with implementing the Concept 3 plan, Atlanta Regional Bicycle Plan, and LCI Plans.

Design Element	Standards
Right-of-Way	70-74'
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common, roundabouts may be used on 3-lane sections
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	10-11'
Turn Lanes	To be used at intersections as needed
Clear Zone	Minimum 1.5' from back of curb
On-Street Parking	7.5' when used (see diagram on opposite page)
Sidewalk	5' minimum clear width required
Bicycle Lane	5' minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	5' minimum width when used, either for tree wells or parkway strip
Lighting	Within landscape width

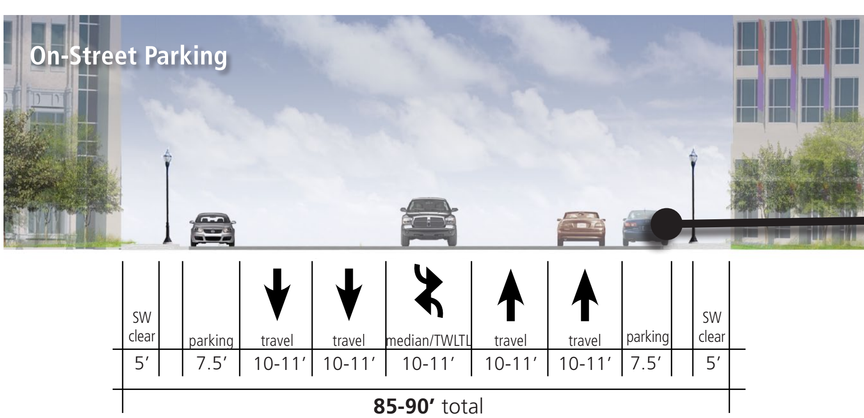
The right-side page of each cross-section template presents variations on the typical section to be used on thoroughfares in the Atlanta Region Bicycle Plan, the Concept 3 Transit Plan, or ASTRoMaP. Because these are variations on the typical section, ***they will require additional right-of-way*** beyond that specified for the typical cross-section. The project designer may also need to respond to multiple plans on the same corridor, such as a transit corridor also specified as a bicycle corridor. The cross-sections on these pages provide guidance for each of the design elements and the designer may combine them as needed, noting the additional right-of-way requirements.



The transit corridor section *illustrates how a center-aligned transit guideway would be integrated into the section. Recommended design uses medians on either side of the guideway; this space allows the placement of transit station platforms and left turn lanes, as needed.*



The bicycle corridor section *illustrates the placement of on-street bicycle lanes, which are the preferred means of accommodating bicycle routes on RTN thoroughfares. More detailed guidance on bicycle facility design (especially at intersections) is provided in Section 3.3.*



On-street parking *may be added in some extents of the RTN routes, especially in urban and maturing suburban context areas. On-street parking can count toward the minimum spacing between the sidewalk clear width and moving travel lanes.*

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Urban Thoroughfare Design
***Level I** Thoroughfares*

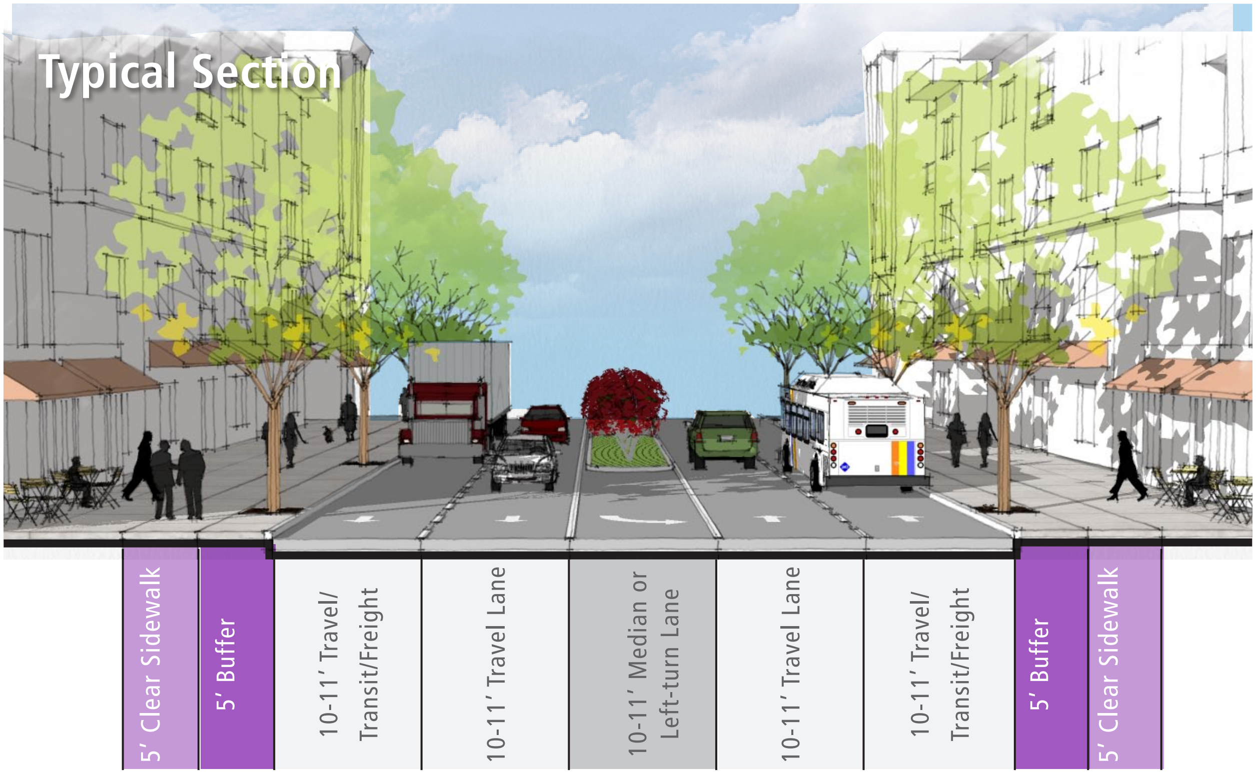
Urban thoroughfares are routes of regional significance in the context of the Atlanta region's downtowns and traditional urban centers. Their right of way is typically constrained; designs need to provide basic sidewalk space for pedestrians while still meeting a basic roadway capacity need.

The table below identifies certain factors of roadway design or community context that are distinctive to this section. In general, most design parameter values reflect overlap with other sections and especially with other thoroughfare levels in the same context, but this guidance is intended to help a user of the guidelines to best understand why this section is distinctive.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Community Context	Level I indicates regional function more than expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles).	Used in smaller downtowns and mature built environments with high levels of pedestrian activity.
Lane Widths	10-to-11 foot range is allowed. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account.	Freight volumes are expected to be high due to interstate-to-interstate connection, which suggests 11-foot lanes are preferred. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet.
Medians	Narrower median widths than in suburban sections.	Downtowns and other constrained corridor sections but on major regional routes connecting a variety of UGPM areas.

Urban Thoroughfare Design

Level I *Thoroughfares*



Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping.

Design Element	Standards
Right-of-Way	70-74'
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common, roundabouts may be used on 3-lane sections
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	10-11'
Turn Lanes	To be used at intersections as needed
Clear Zone	Minimum 1.5' from back of curb
On-Street Parking	7.5' when used (see diagram on opposite page)
Sidewalk	5' minimum clear width required
Bicycle Lane	5' minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	5' minimum width when used, either for tree wells or parkway strip
Lighting	Within landscape width

Urban Level I *Thoroughfares - Alternative Typical Sections*

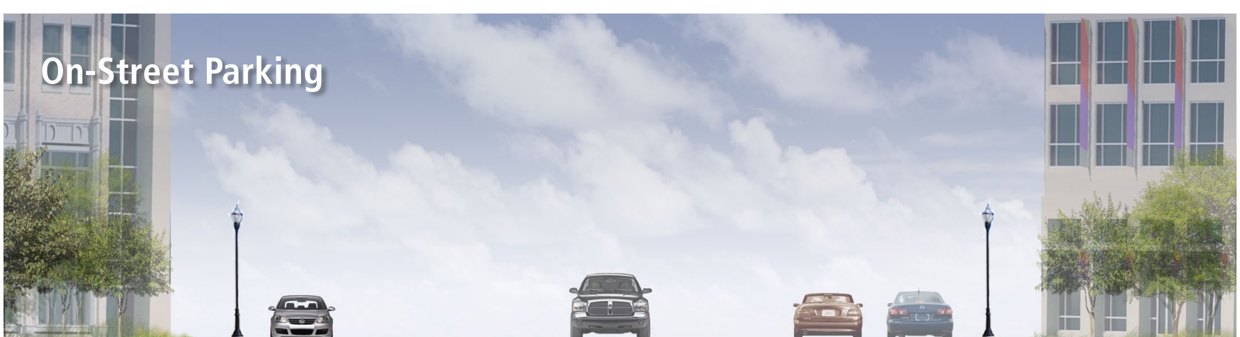
SW clear	buffer	travel	travel	median/left turn/ ped. refuge area	two-way transit guideway	median/left turn/ ped. refuge area	travel	travel	buffer	SW clear
5′	5′	10-11′	10-11′	15′	22′	15′	10-11′	10-11′	5′	5′

112-116′ total

SW clear	*	bike	travel	travel	median/ TWLTL	travel	travel	bike	*	SW clear
5′		5′	10-11′	10-11′	10-11′	10-11′	10-11′	5′		5′

80-85′ total

* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.



SW clear	*	parking	travel	travel	median/ TWLTL	travel	travel	parking	*	SW clear
5′		7.5′	10-11′	10-11′	10-11′	10-11′	10-11′	7.5′		5′

85-90′ total

* Parking counts toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.

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Urban Thoroughfare Design
Level II *Thoroughfares*

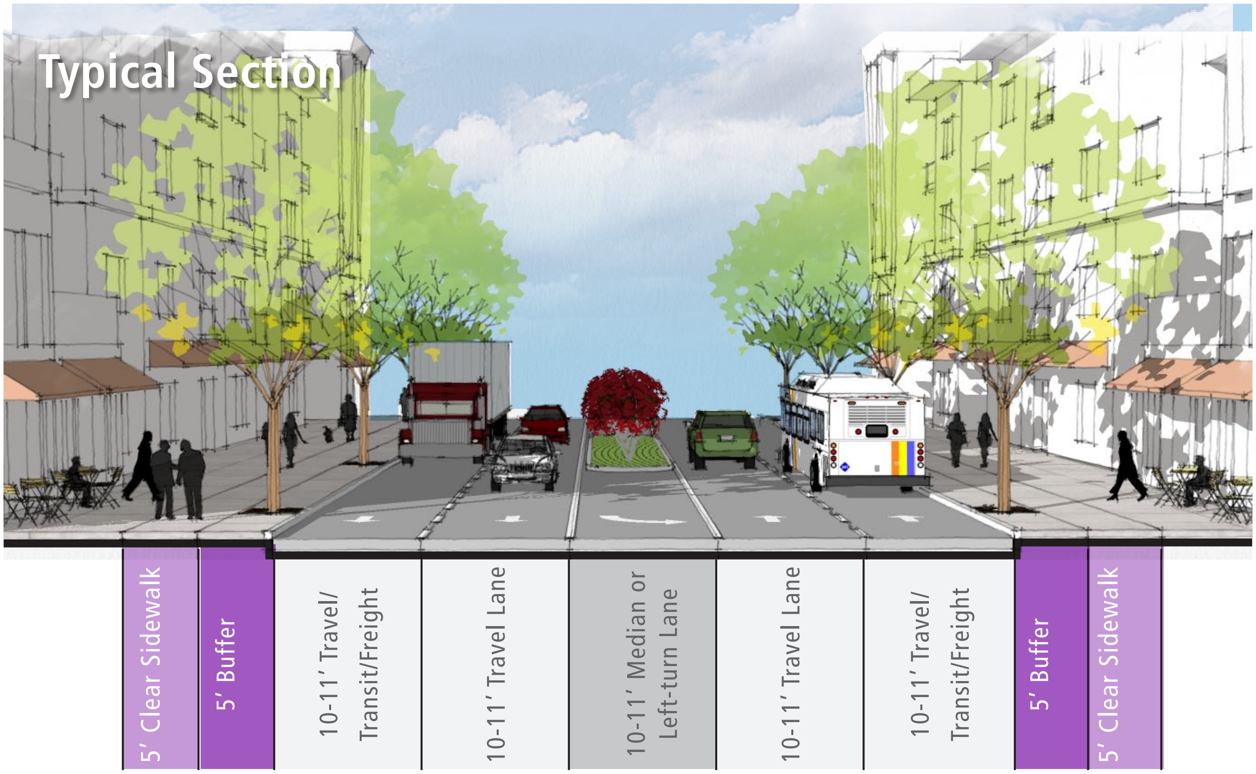
Urban thoroughfares are routes of regional significance in the context of the Atlanta region's downtowns and traditional urban centers. Their right of way is typically constrained; designs need to provide basic sidewalk space for pedestrians while still meeting a basic roadway capacity need. Level II thoroughfares are likely to have truck traffic due to their connection to the freeway system, but given that they also serve town centers should expect sections with a higher level of pedestrian activity as well. Careful consideration should be given to this design dimensions to ensure that functional freight routes do not become unwalkable in urban areas.

The table below identifies certain factors of roadway design or community context that are distinctive to this section. In general, most design parameter values reflect overlap with other sections and especially with other thoroughfare levels in the same context, but this guidance is intended to help a user of the guidelines to best understand why this section is distinctive.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Community Context	Level II indicates regional function more than expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles). Also used on larger city streets that terminate in a downtown but that are important interstate connections.	Used in smaller downtowns and mature built environments with high levels of pedestrian activity.
Lane Widths	10-to-11 foot range is allowed. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account.	Freight volumes are expected to be high due to interstate-to-interstate connection, which suggests 11-foot lanes are preferred. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet.
Medians	Narrower median widths than in suburban sections. Downtowns wishing to use median planting should coordinate with GDOT or other transportation agency on appropriate clear zones and placement of trees.	Downtowns and other constrained corridor sections but on major regional routes connecting a variety of UGPM areas.

Urban Thoroughfare Design

Level II *Thoroughfares*



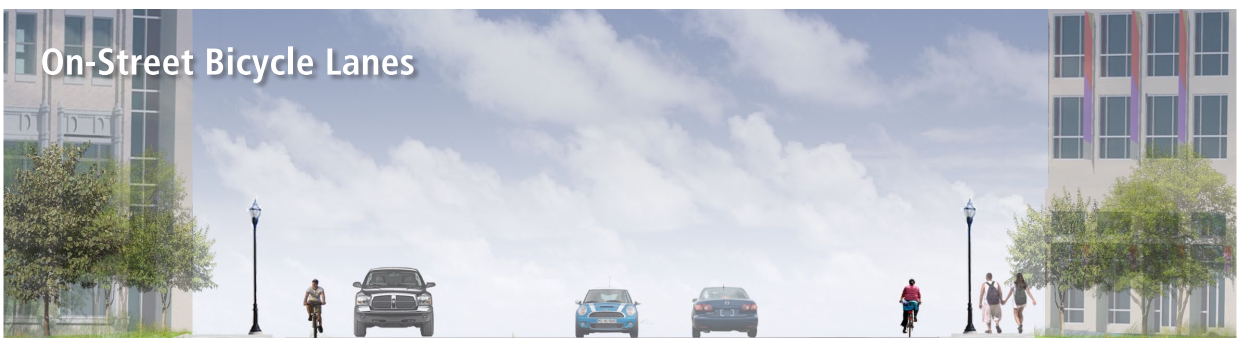
Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping.

Design Element	Standards
Right-of-Way	70-74'
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common, roundabouts may be used on 3-lane sections
Median	10-11', to fit within 10' two-way left turn lane
Lane Widths	10-11'
Turn Lanes	To be used at intersections as needed
Clear Zone	Minimum 1.5' from back of curb
On-Street Parking	7.5' when used (see diagram on opposite page)
Sidewalk	5' minimum clear width required
Bicycle Lane	5' minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	5' minimum width when used, either for tree wells or parkway strip
Lighting	Within landscape width

Urban Level II Thoroughfares - Alternative Typical Sections

SW clear	buffer	travel	travel	median/left turn/ ped. refuge area	two-way transit guideway	median/left turn/ ped. refuge area	travel	travel	buffer	SW clear
5′	5′	10-11′	10-11′	15′	22′	15′	10-11′	10-11′	5′	5′

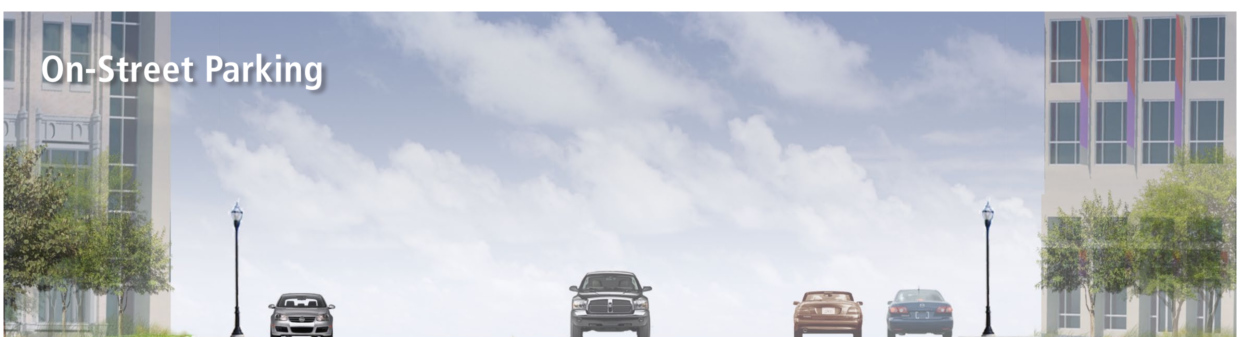
112-116′ total



SW clear	*	bike	travel	travel	median/ TWLTL	travel	travel	bike	*	SW clear
5′		5′	10-11′	10-11′	10-11′	10-11′	10-11′	5′		5′

80-85′ total

* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.



SW clear	*	parking	travel	travel	median/ TWLTL	travel	travel	parking	*	SW clear
5′		7.5′	10-11′	10-11′	10-11′	10-11′	10-11′	7.5′		5′

85-90′ total

* Parking counts toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.

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Urban Thoroughfare Design
***Level III** Thoroughfares*

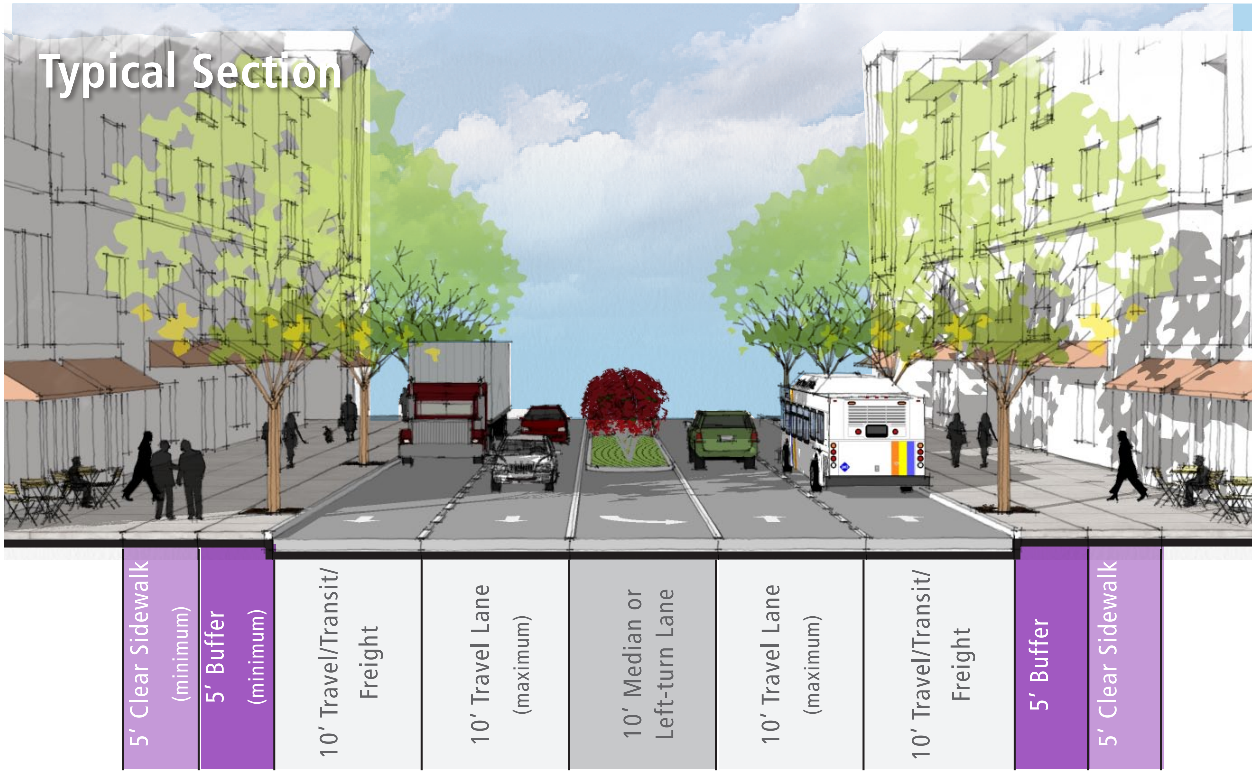
Urban thoroughfares are routes of regional significance in the context of the Atlanta region's downtowns and urban centers. Level III Thoroughfares connect over relatively short distances and as such are less likely to be major freight and through-movement routes. This suggests that a standard lane width can be used throughout the cross-section. Overall, freight activity is expected to be lower on Level III thoroughfares, leading to a narrower standard lane dimension.

The table below identifies certain factors of roadway design or community context that are distinctive to this section. In general, most design parameter values reflect overlap with other sections and especially with other thoroughfare levels in the same context, but this guidance is intended to help a user of the guidelines to best understand why this section is distinctive.

Major Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Community Context	Used in smaller downtowns and mature built environments with high levels of pedestrian activity.	Level III indicates a more local or sub-regional function more than it indicates expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles). Also used on larger city streets that terminate in a downtown and serve other parts of a city or county, especially non-activity center corridors.
Lane Widths	10' is specified as the maximum. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account.	Freight volumes are expected to be less than Level I and II due to fewer interstate-to-interstate connections, which suggests 10-foot lanes are acceptable as needed. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet. 11 foot lanes should not be used in the event of constrained corridors unless they do not cause a loss of sidewalk/pedestrian space.
Medians	Narrower median widths than in suburban sections. Downtowns wishing to use median planting should coordinate with GDOT or other transportation agency on appropriate clear zones and placement of trees.	Downtowns and other constrained corridor sections but on major regional routes connecting a variety of UGPM areas.

Urban Thoroughfare Design

Level III *Thoroughfares*



Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping.

Design Element	Standards
Right-of-Way	70'
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common, roundabouts may be used on 3-lane sections
Median	10', to fit within 10' two-way left turn lane
Lane Widths	10' maximum
Turn Lanes	To be used at intersections as needed
Clear Zone	Minimum 1.5' from back of curb
On-Street Parking	7.5' when used (see diagram on opposite page)
Sidewalk	5' minimum clear width required
Bicycle Lane	5' minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	5' minimum width when used, either for tree wells or parkway strip
Lighting	Within landscape width

Urban Level III *Thoroughfares - Alternative Typical Sections*

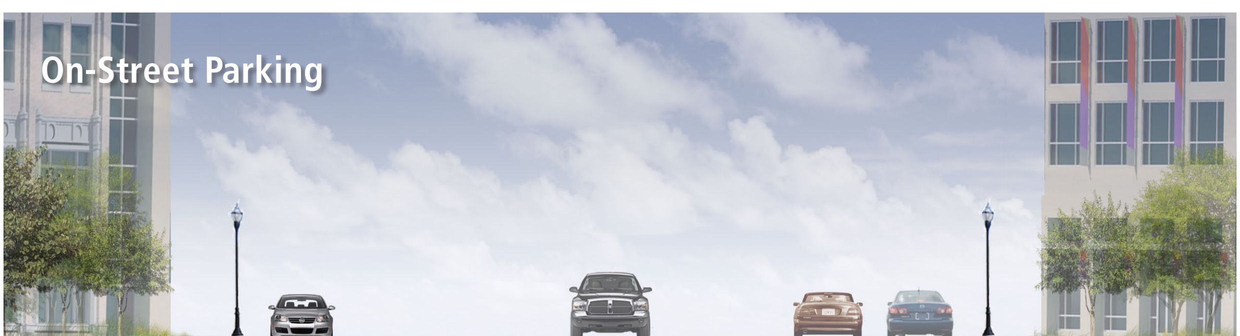
SW clear	buffer	travel	travel	median/left turn/ ped. refuge area	two-way transit guideway	median/left turn/ ped. refuge area	travel	travel	buffer	SW clear
5′	5′	10′	10′	15′	22′	15′	10′	10′	5′	5′

112′ total

SW clear	*	bike	travel	travel	median/ TWLTL	travel	travel	bike	*	SW clear
5′		5′	10′	10′	10′	10′	10′	5′		5′

80′ total

* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.



SW clear	*	parking	travel	travel	median/ TWLTL	travel	travel	parking	*	SW clear
5′		7.5′	10′	10′	10′	10′	10′	7.5′		5′

85′ total

* Parking counts toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.

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Suburban Moderate Speed Thoroughfare Design
Level I *Thoroughfares*

Newer suburban areas that have been developed under more contemporary policies and regulations tend to feature larger parcels and more limited driveway access; this in turn encourages higher speeds and makes these roads more desirable options for long-distance mobility within the region.

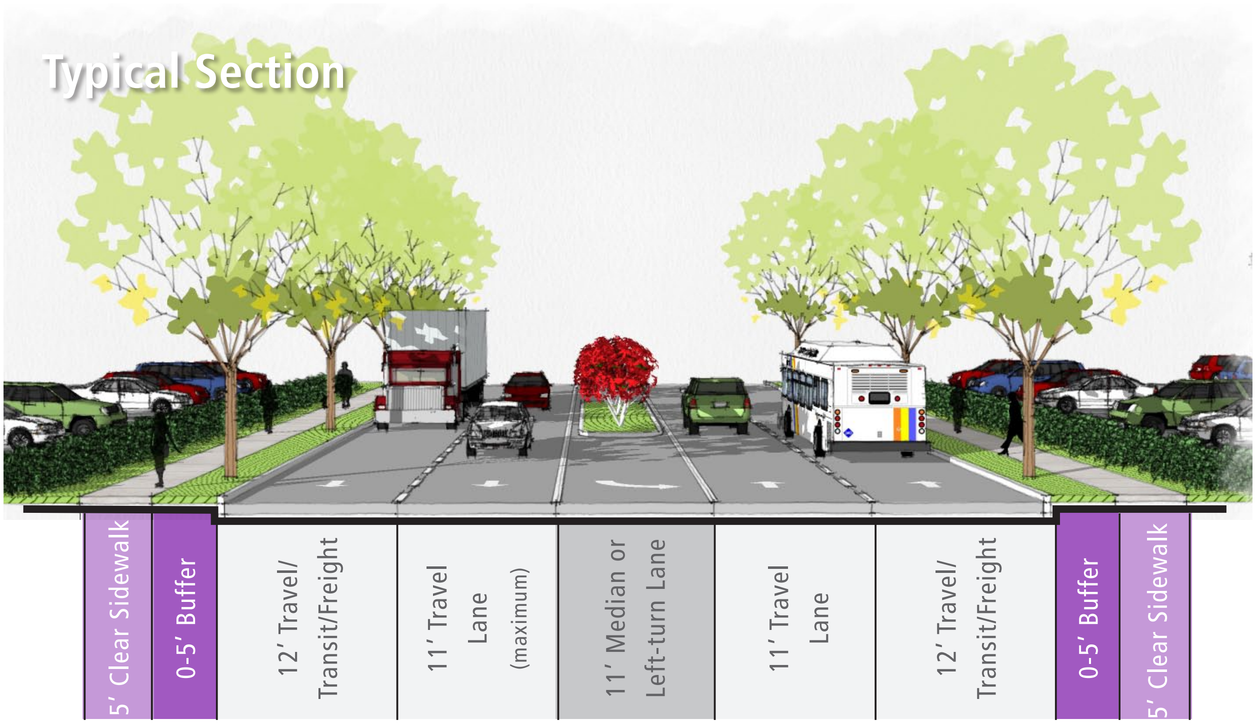
The Management Guidelines distinguish suburban cross-sections based on speed and provide guidance for low-speed thoroughfares that differs from guidance for high-speed thoroughfares in suburban areas. The distinction between high-speed and low-speed corridors is based primarily on thresholds of roadway safety, especially for non-motorized users of the street. Federal Highway Administration research has demonstrated that collisions involving pedestrians are significantly more likely to result in fatalities as speeds increase beyond 35 miles per hour.

To a large degree, this is driven by land use and community context. It is for this reason that the decision matrix on page In urban and more mature suburban areas, a higher incidence of pedestrian activity can be expected as buildings are closer to streets and a more balanced mix of land uses tends to encourage short trips to be taken on foot instead of by automobiles. In addition, older suburban areas of the Atlanta region have witnessed significant demographic change in recent years, with a rise in population that does not have access to automobiles.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Context	Level I indicates regional function more than expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles).	Used in newer suburban contexts and in places where access management plans have been implemented.
Lane Widths	11-to-12 foot range is allowed. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account. Note that constrained corridors have the option of using narrower lanes.	Freight volumes are expected to be high due to interstate-to-interstate or interstate-to-freight route connection, which suggests that at least 11-foot lanes are preferred. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet.

Suburban Moderate Speed Thoroughfare Design

***Level I** Thoroughfares*



Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping. In the Suburban moderate-speed context, a landscaped buffer may not be needed if bicycle lanes or added sidewalk width are to be used.

Design Element	Standards
Right-of-Way	70'
Number of Lanes	3, 5 or 7; depends on capacity need
Intersection Control	Signals and stop-controlled cross-streets
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	11' maximum; 12' maximum for outer lanes
Clear Zone	Minimum 1.5' from back of curb
On-Street Parking	not used
Sidewalk	5' minimum clear width required; at least 5' buffer must be preserved between clear area and moving travel lanes and this can be extra sidewalk width.
Bicycle Lane	5' minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	Not required, though when used, should accommodate tree/plant growth
Lighting	Within landscape width

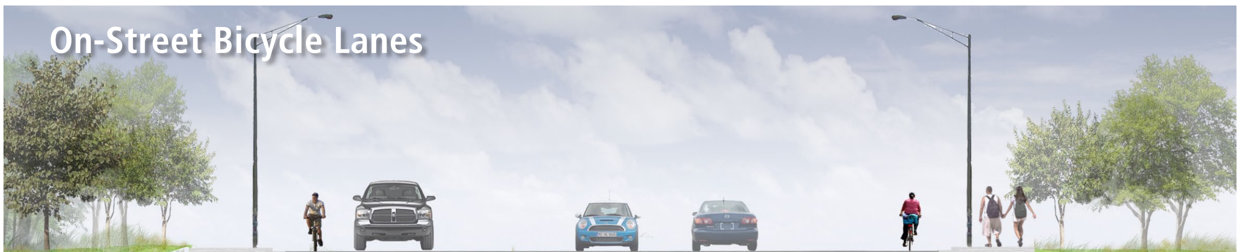
Suburban Moderate Speed Level I *Thoroughfares - Alternative Typical Sections*

Premium Transit Corridor

SW clear	buffer	travel	travel	median/left turn/ ped. refuge area	two-way transit guideway	median/left turn/ ped. refuge area	travel	travel	buffer	SW clear
5′	5′	12′	11′	15′	22′	15′	11′	12′	5′	5′

118′ total

On-Street Bicycle Lanes

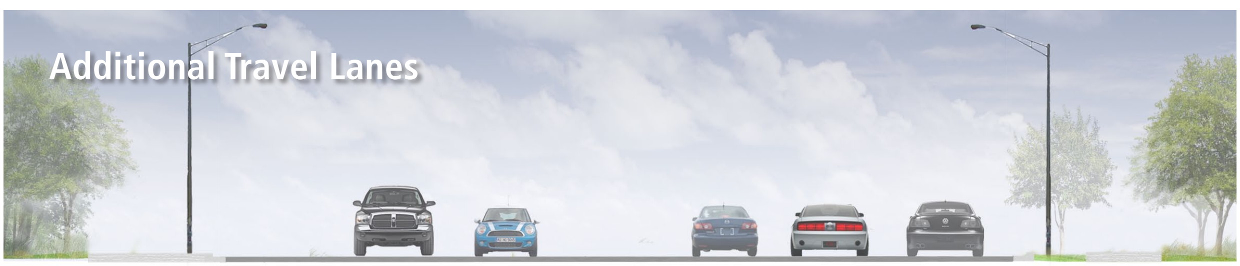


SW clear	*	bike	travel	travel	median/ TWLTL	travel	travel	bike	*	SW clear
5′		5′	12′	11′	11′	11′	12′	5′		5′

77-87′ total

* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.

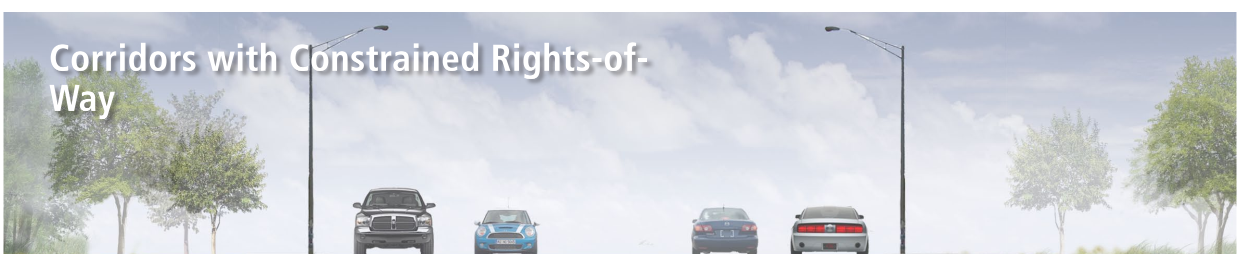
Additional Travel Lanes



SW clear	buffer	travel	travel	travel	median/TWLTL	travel	travel	travel	buffer	SW clear
5′	5′	12′	11′	11′	11′	11′	11′	12′	5′	5′

107-109′ total

Corridors with Constrained Rights-of-Way



SW clear	buffer	travel	travel	median/TWLTL	travel	travel	buffer	SW clear
5′	5′	10′	10′	10′	10′	10′	5′	5′

70′ total

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Suburban Moderate Speed Thoroughfare Design
Level II *Thoroughfares*

Newer suburban areas that have been developed under more contemporary policies and regulations tend to feature larger parcels and more limited driveway access; this in turn encourages higher speeds and makes these roads more desirable options for long-distance mobility within the region. Level II Thoroughfares do not differ greatly in their design from Level I thoroughfares, though the service of activity centers or other areas of greater pedestrian activity suggests a need for care in selecting design elements.

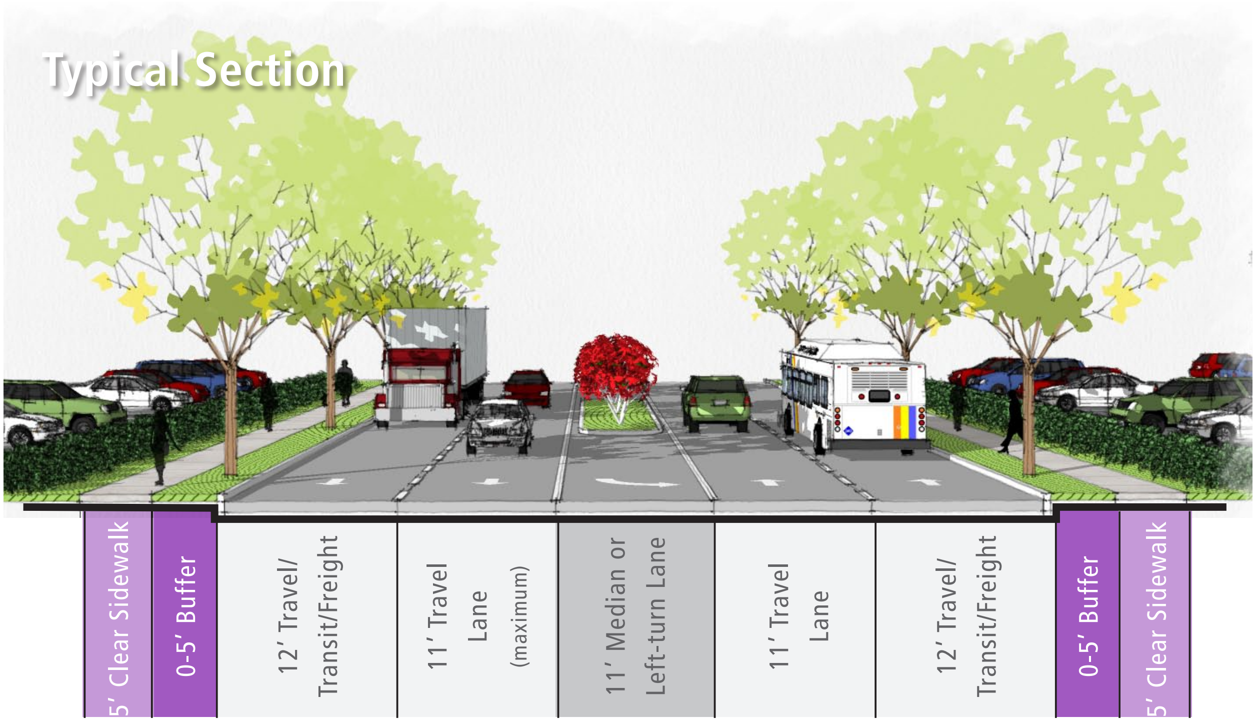
The Management Guidelines distinguish suburban cross-sections based on speed and provide guidance for low-speed thoroughfares that differs from guidance for high-speed thoroughfares in suburban areas. The distinction between high-speed and low-speed corridors is based primarily on thresholds of roadway safety, especially for non-motorized users of the street. Federal Highway Administration research has demonstrated that collisions involving pedestrians are significantly more likely to result in fatalities as speeds increase beyond 35 miles per hour.

To a large degree, this is driven by land use and community context. It is for this reason that the decision matrix on page In urban and more mature suburban areas, a higher incidence of pedestrian activity can be expected as buildings are closer to streets and a more balanced mix of land uses tends to encourage short trips to be taken on foot instead of by automobiles. In addition, older suburban areas of the Atlanta region have witnessed significant demographic change in recent years, with a rise in population that does not have access to automobiles.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Context	Level II indicates intra-regional function more than expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles). Because of the variety of UGPM areas served, expect a greater mix of trucks and heavy vehicles with commuter traffic volumes.	Used in newer suburban contexts and in places where access management plans have been implemented.
Lane Widths	11-to-12 foot range is allowed (with 12' designated for outer lanes). Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account. Note that constrained corridors have the option of using narrower lanes.	Freight volumes are expected to be moderate to high due to interstate-to-freight route connection, which suggests at least 11-foot lanes are preferred. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet.

Suburban Moderate Speed Thoroughfare Design

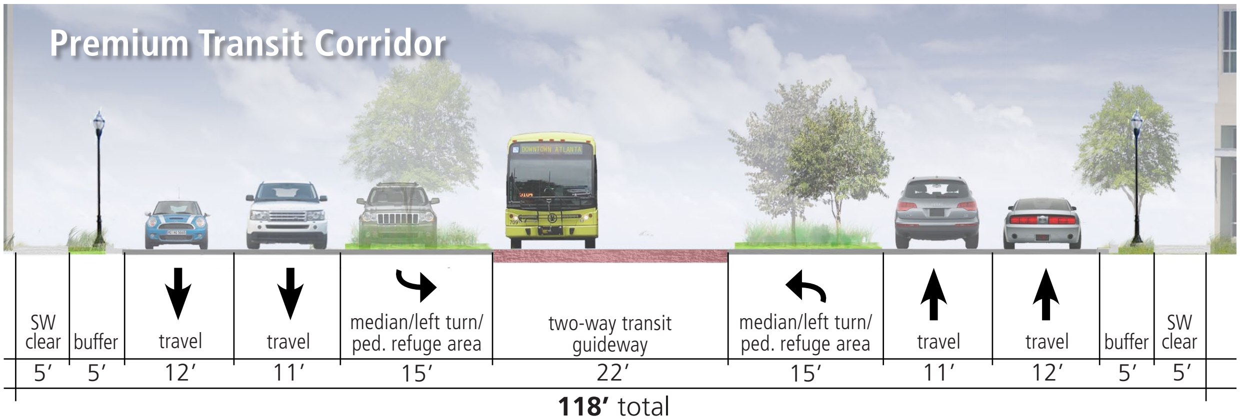
Level II *Thoroughfares*

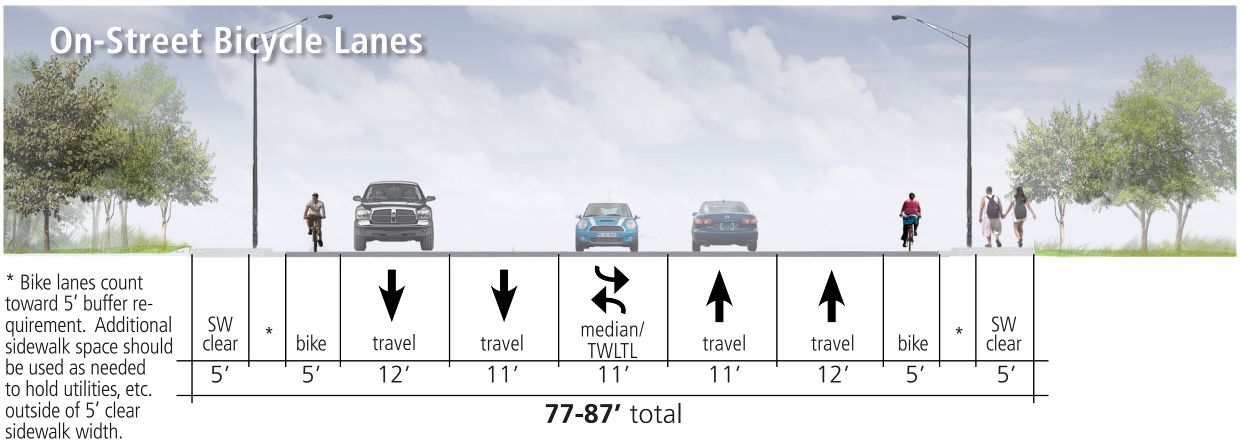


Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping. In the Suburban moderate-speed context, a landscaped buffer may not be needed if bicycle lanes or added sidewalk width are to be used.

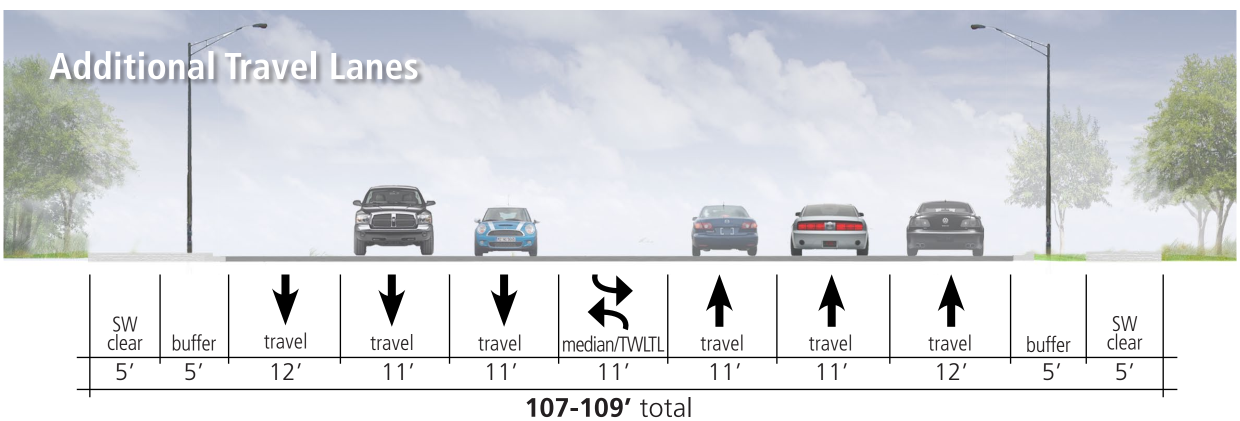
Design Element	Standards
Right-of-Way	70’
Number of Lanes	3, 5 or 7; depends on capacity need
Intersection Control	Signals and stop-controlled cross-streets
Median	8-10’, to fit within 10’ two-way left turn lane
Lane Widths	11’ maximum; 12’ maximum for outer lanes
Clear Zone	Minimum 1.5’ from back of curb
On-Street Parking	not used
Sidewalk	5’ minimum clear width required; at least 5’ buffer must be preserved between clear area and moving travel lanes and this can be extra sidewalk width.
Bicycle Lane	5’ minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	Not required, though when used, should accommodate tree/plant growth
Lighting	Within landscape width

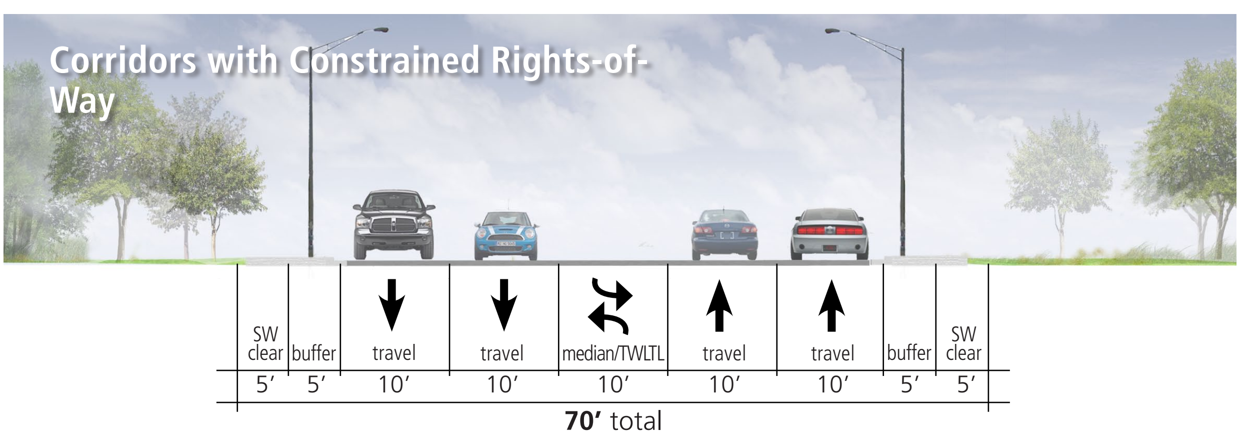
Suburban Moderate Speed Level II *Thoroughfares - Alternative Typical Sections*





* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.





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Suburban Moderate Speed Thoroughfare Design
Level III *Thoroughfares*

Newer suburban areas that have been developed under more contemporary policies and regulations tend to feature larger parcels and more limited driveway access; this in turn encourages higher speeds and makes these roads more desirable options for long-distance mobility within the region. In the case of Level III thoroughfares, these generally serve less of a commuting and regional freight function.

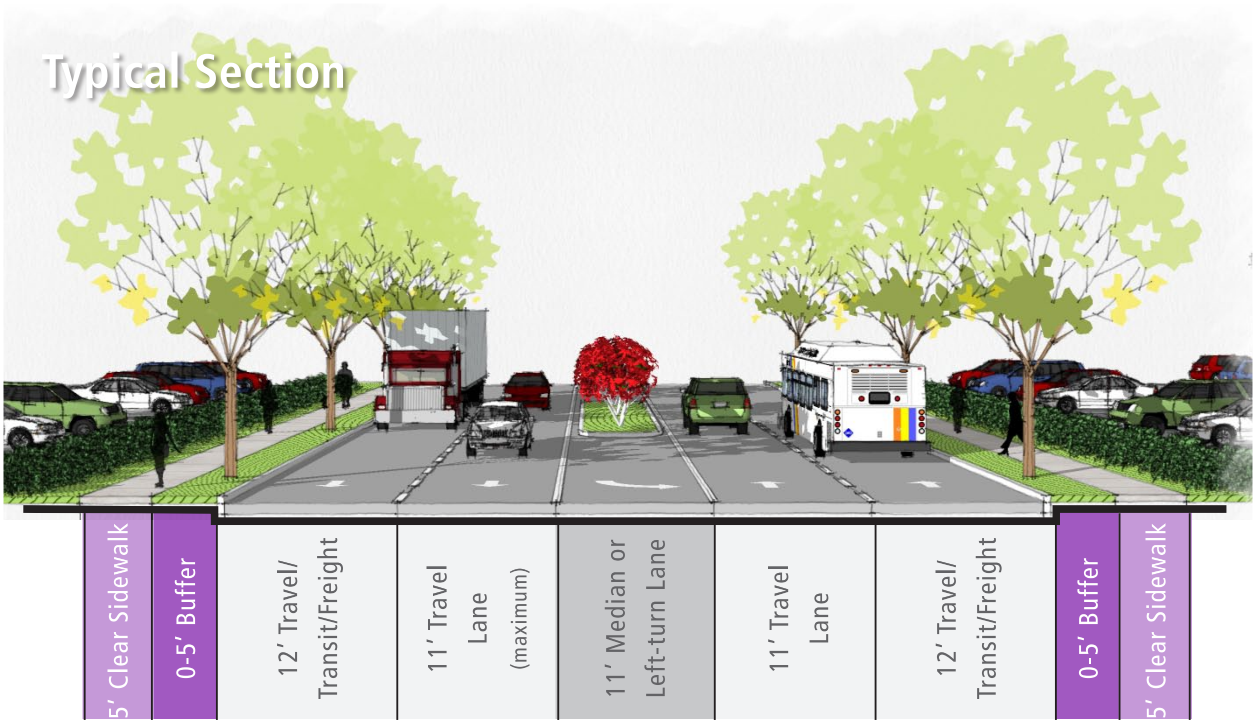
The Management Guidelines distinguish suburban cross-sections based on speed and provide guidance for low-speed thoroughfares that differs from guidance for high-speed thoroughfares in suburban areas. The distinction between high-speed and low-speed corridors is based primarily on thresholds of roadway safety, especially for non-motorized users of the street. Federal Highway Administration research has demonstrated that collisions involving pedestrians are significantly more likely to result in fatalities as speeds increase beyond 35 miles per hour.

To a large degree, this is driven by land use and community context. It is for this reason that the decision matrix on page In urban and more mature suburban areas, a higher incidence of pedestrian activity can be expected as buildings are closer to streets and a more balanced mix of land uses tends to encourage short trips to be taken on foot instead of by automobiles. In addition, older suburban areas of the Atlanta region have witnessed significant demographic change in recent years, with a rise in population that does not have access to automobiles.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Community Context	Level III indicates a more local or sub-regional function more than it indicates expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles). Also used on larger city streets that terminate in a downtown and serve other parts of a city or county, especially non-activity center corridors.	Used in newer suburban contexts and in places where access management plans have been implemented.
Lane Widths	11-12' is an acceptable range. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account.	Freight volumes are expected to be less than Level I and II due to fewer interstate-to-interstate connections, which suggests 10-foot lanes are acceptable as needed. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet. 11 foot lanes should not be used in the event of constrained corridors unless they do not cause a loss of sidewalk/pedestrian space.

Suburban Moderate Speed Thoroughfare Design

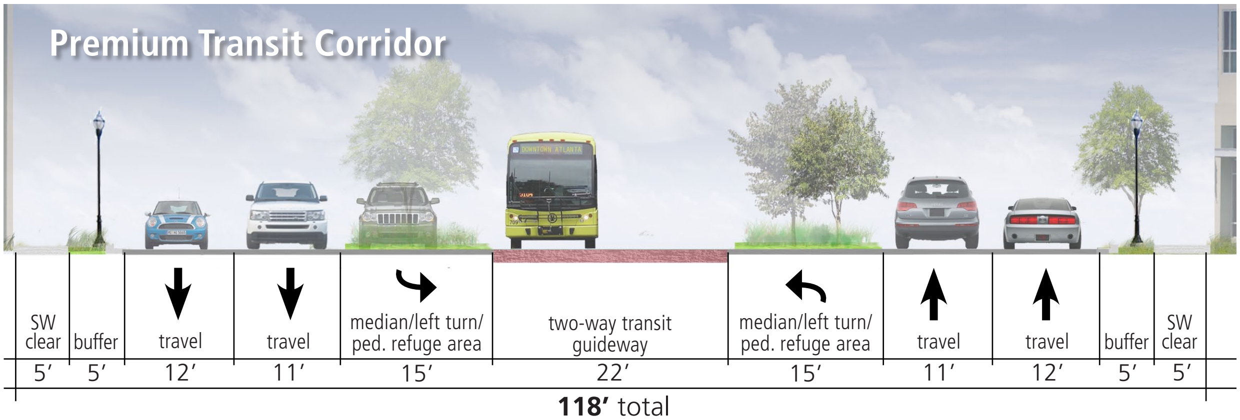
Level III *Thoroughfares*

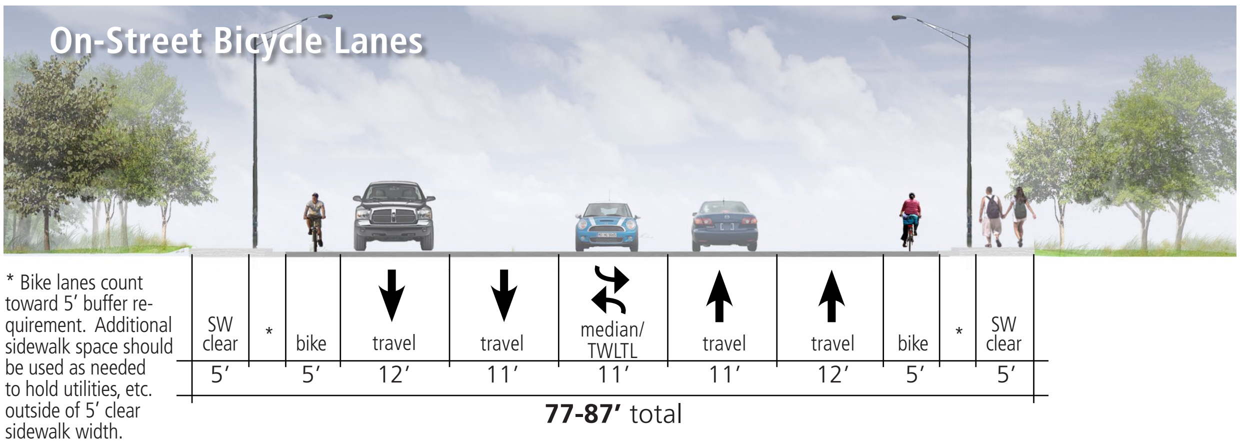


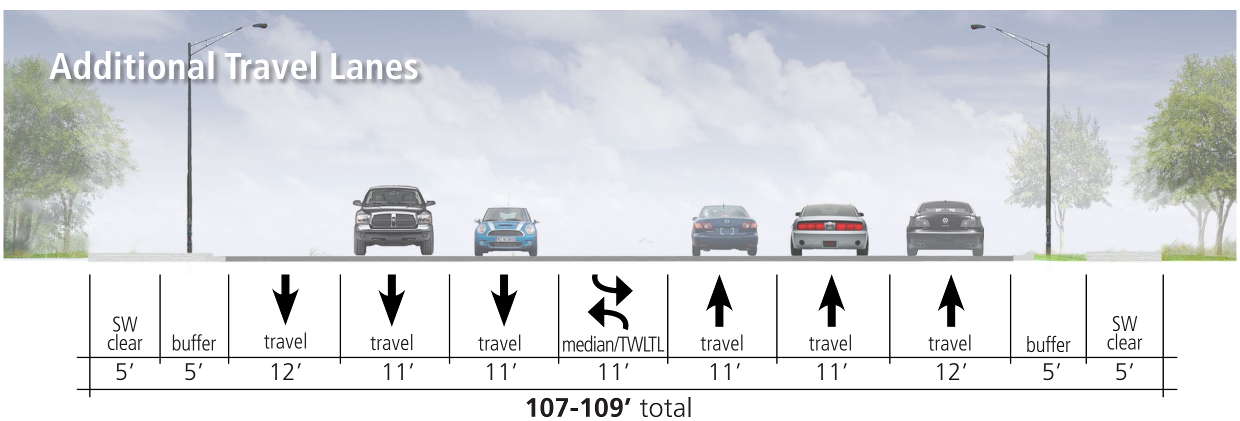
Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping. In the Suburban moderate-speed context, a landscaped buffer may not be needed if bicycle lanes or added sidewalk width are to be used.

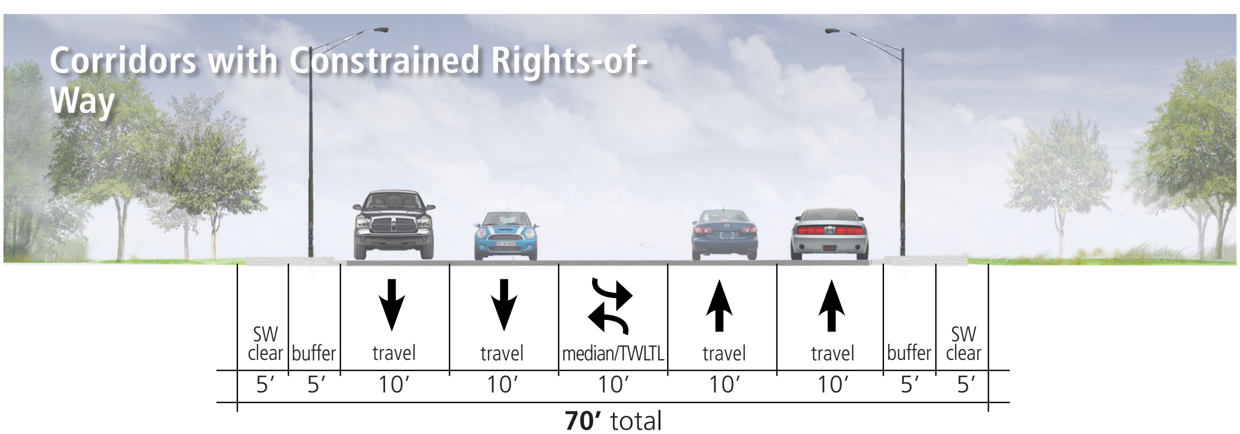
Design Element	Standards
Right-of-Way	70'
Number of Lanes	3, 5 or 7; depends on capacity need
Intersection Control	Signals and stop-controlled cross-streets
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	11' maximum; 12' maximum for outer lanes
Clear Zone	Minimum 1.5' from back of curb
On-Street Parking	not used
Sidewalk	5' minimum clear width required; at least 5' buffer must be preserved between clear area and moving travel lanes and this can be extra sidewalk width.
Bicycle Lane	5' minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	Not required, though when used, should accommodate tree/plant growth
Lighting	Within landscape width

Suburban Moderate Speed Level III *Thoroughfares - Alternative Typical Sections*









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Suburban Low Speed Thoroughfare Design
***Level I** Thoroughfares*

In some suburban contexts, land use patterns and spacing of intersecting streets and driveways suggest that speeds will be lower. This is especially the case in older suburban areas that were subdivided on smaller lot patterns (and subsequently have a need to provide frequent driveway access.

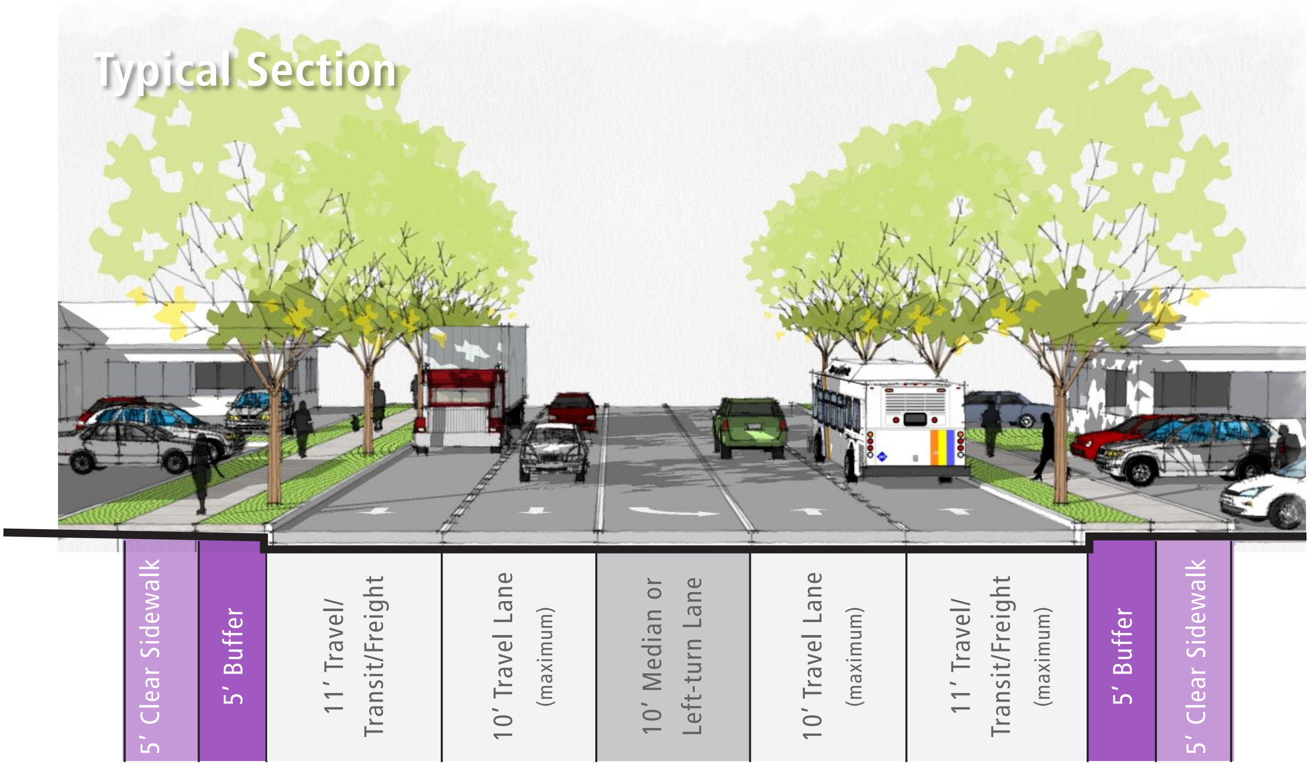
The Management Guidelines distinguish suburban cross-sections based on speed and provide guidance for low-speed thoroughfares that differs from guidance for high-speed thoroughfares in suburban areas. The distinction between high-speed and low-speed corridors is based primarily on thresholds of roadway safety, especially for non-motorized users of the street. Federal Highway Administration research has demonstrated that collisions involving pedestrians are significantly more likely to result in fatalities as speeds increase beyond 35 miles per hour.

To a large degree, this is driven by land use and community context. It is for this reason that the decision matrix on page In urban and more mature suburban areas, a higher incidence of pedestrian activity can be expected as buildings are closer to streets and a more balanced mix of land uses tends to encourage short trips to be taken on foot instead of by automobiles. In addition, older suburban areas of the Atlanta region have witnessed significant demographic change in recent years, with a rise in population that does not have access to automobiles.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Context	Level I indicates regional function more than expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles).	Used in more mature suburban contexts, LCI areas and parts of the region with an exceptional need for frequent driveway access. and in places where access management plans have been implemented.
Lane Widths	11-to-12 foot range is allowed. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account. Note that constrained corridors have the option of using narrower lanes.	Freight volumes are expected to be high due to interstate-to-interstate or interstate-to-freight route connection, which suggests that at least 11-foot lanes are preferred. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet.

Suburban Low Speed Thoroughfare Design

***Level I** Thoroughfares*



Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping. In the Suburban low-speed context, a landscaped buffer may not be needed if bicycle lanes or added sidewalk width are to be used.

Design Element	Standards
Right-of-Way	70'
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common, roundabouts may be used on 3-lane sections
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	10' maximum
Turn Lanes	To be used at intersections as needed
Clear Zone	Minimum 1.5' from back of curb
On-Street Parking	7.5' when used (see diagram on opposite page)
Sidewalk	5' minimum clear width required
Bicycle Lane	5' minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	5' minimum width when used, either for tree wells or parkway strip
Lighting	Within landscape width

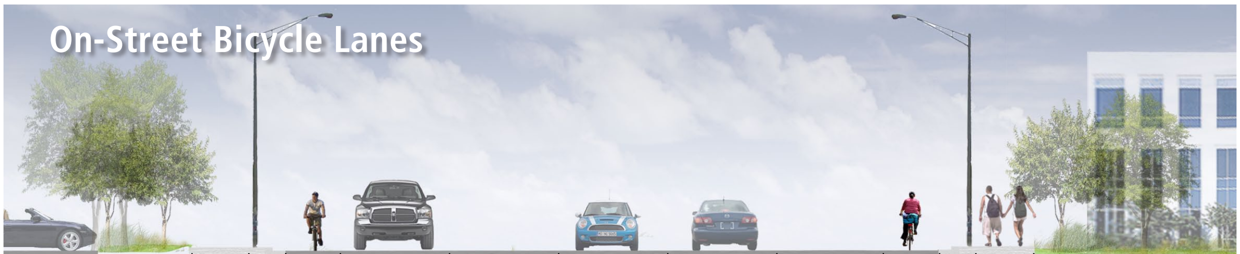
***Suburban Low Speed Level I** Thoroughfares - Alternative Typical Sections*

Premium Transit Corridor

SW clear	buffer	travel	travel	median/left turn/ ped. refuge area	two-way transit guideway	median/left turn/ ped. refuge area	travel	travel	buffer	SW clear
5′	5′	12′	11′	15′	22′	15′	11′	12′	5′	5′

118′ total

On-Street Bicycle Lanes

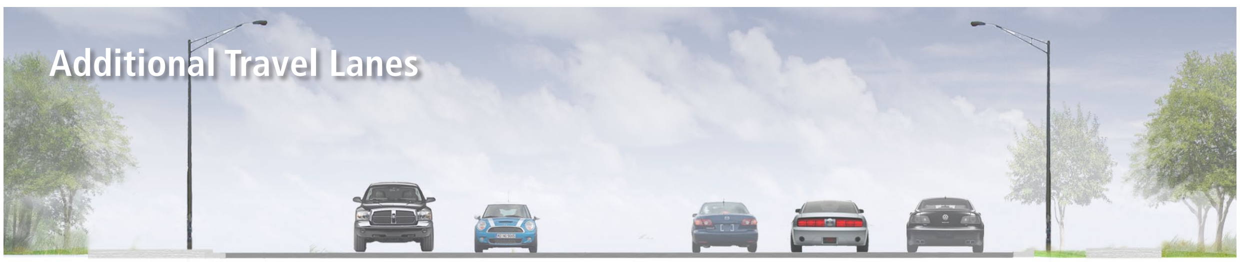


SW clear	*	bike	travel	travel	median/ TWLTL	travel	travel	bike	*	SW clear
5′		5′	12′	11′	11′	11′	12′	5′		5′

77-87′ total

* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.

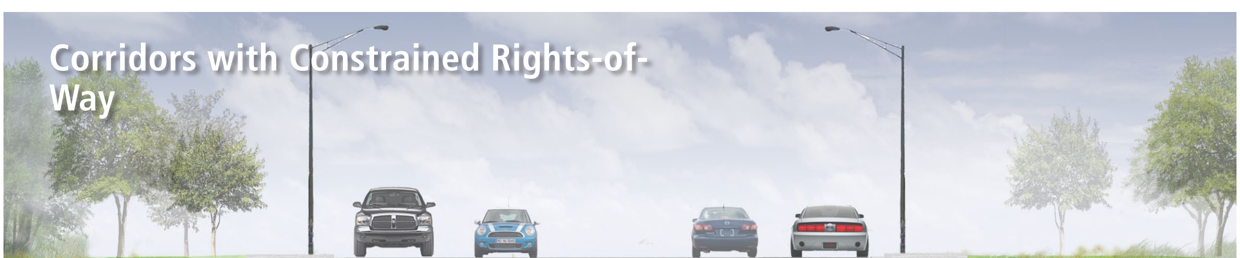
Additional Travel Lanes



SW clear	buffer	travel	travel	travel	median/TWLTL	travel	travel	travel	buffer	SW clear
5′	5′	12′	11′	11′	11′	11′	11′	12′	5′	5′

107-109′ total

Corridors with Constrained Rights-of-Way



SW clear	*	travel	travel	median/TWLTL	travel	travel	*	SW clear
5′		10′	10′	10′	10′	10′		5′

65-70′ total

* Designers should make every effort to separate moving lanes from the sidewalk clear area by 5 feet. If this is not practical due to space constraint, this buffer dimension should be as close to 5 feet as possible.

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Suburban Low Speed Thoroughfare Design
***Level II** Thoroughfares*

In some suburban contexts, land use patterns and spacing of intersecting streets and driveways suggest that speeds will be lower. This is especially the case in older suburban areas that were subdivided on smaller lot patterns (and subsequently have a need to provide frequent driveway access, which is often the case in LCI areas throughout the region that are beginning to transition from a more suburban land use character to one that is more walkable and urbanized.

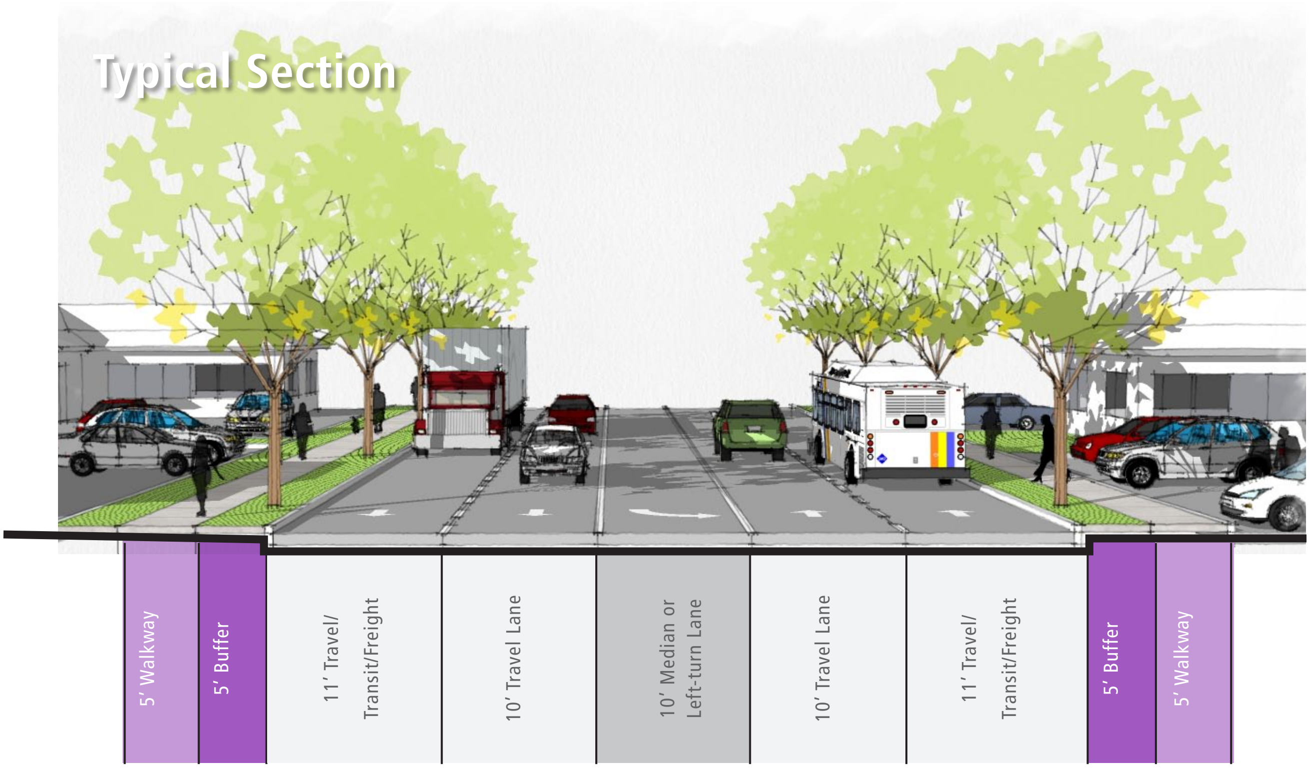
The Management Guidelines distinguish suburban cross-sections based on speed and provide guidance for low-speed thoroughfares that differs from guidance for high-speed thoroughfares in suburban areas. The distinction between high-speed and low-speed corridors is based primarily on thresholds of roadway safety, especially for non-motorized users of the street. Federal Highway Administration research has demonstrated that collisions involving pedestrians are significantly more likely to result in fatalities as speeds increase beyond 35 miles per hour.

To a large degree, this is driven by land use and community context. It is for this reason that the decision matrix on page In urban and more mature suburban areas, a higher incidence of pedestrian activity can be expected as buildings are closer to streets and a more balanced mix of land uses tends to encourage short trips to be taken on foot instead of by automobiles. In addition, older suburban areas of the Atlanta region have witnessed significant demographic change in recent years, with a rise in population that does not have access to automobiles.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Context	Level II indicates intra-regional function more than expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles). Because of the variety of UGPM areas served, expect a greater mix of trucks and heavy vehicles with commuter traffic volumes.	Used in more mature suburban contexts, LCI areas and parts of the region with an exceptional need for frequent driveway access. and in places where access management plans have been implemented.
Lane Widths	11-to-12 foot range is allowed (with 12' designated for outer lanes). Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account. Note that constrained corridors have the option of using narrower lanes.	Freight volumes are expected to be moderate to high due to interstate-to-freight route connection, which suggests at least 11-foot lanes are preferred. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet.

Suburban Low Speed Thoroughfare Design

***Level II** Thoroughfares*



In some suburban contexts, land use patterns and spacing of intersecting streets and driveways suggest that speeds will be lower.

Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping. In the Suburban low-speed context, a landscaped buffer may not be needed if bicycle lanes or added sidewalk width are to be used.

Design Element	Standards
Right-of-Way	70'
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common, roundabouts may be used on 3-lane sections
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	10' maximum
Turn Lanes	To be used at intersections as needed
Clear Zone	Minimum 1.5' from back of curb
On-Street Parking	7.5' when used (see diagram on opposite page)
Sidewalk	5' minimum clear width required
Bicycle Lane	5' minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	5' minimum width when used, either for tree wells or parkway strip
Lighting	Within landscape width

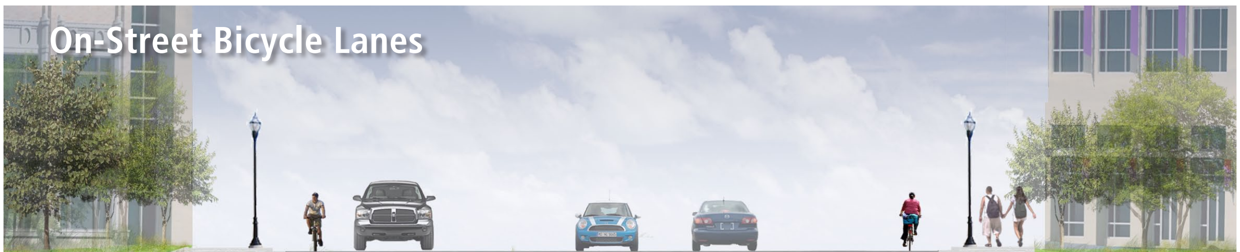
Suburban Low Speed Level II *Thoroughfares - Alternative Typical Sections*

Premium Transit Corridor

SW clear	buffer	travel	travel	median/left turn/ ped. refuge area	two-way transit guideway	median/left turn/ ped. refuge area	travel	travel	buffer	SW clear
5′	5′	12′	11′	15′	22′	15′	11′	12′	5′	5′

118′ total

On-Street Bicycle Lanes

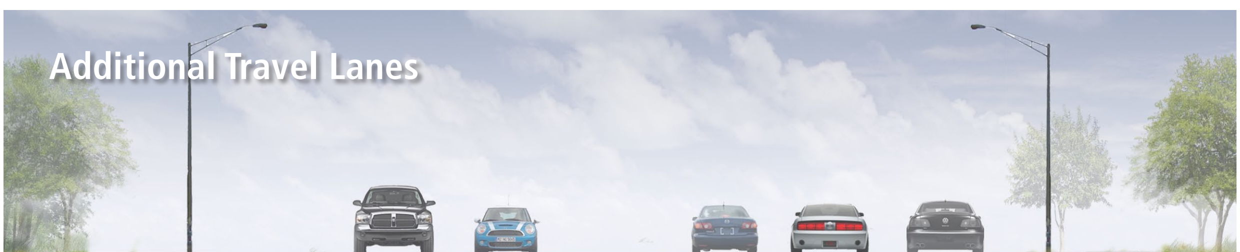


SW clear	*	bike	travel	travel	median/ TWLTL	travel	travel	bike	*	SW clear
5′		5′	12′	11′	11′	11′	12′	5′		5′

77-87′ total

* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.

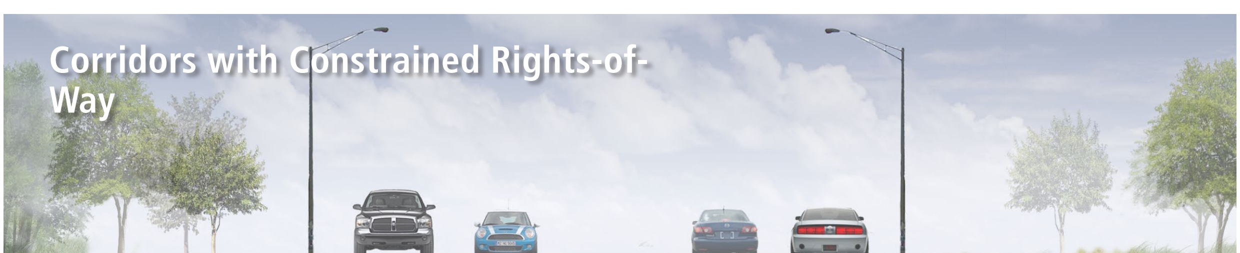
Additional Travel Lanes



SW clear	buffer	travel	travel	travel	median/TWLTL	travel	travel	travel	buffer	SW clear
5′	5′	12′	11′	11′	11′	11′	11′	12′	5′	5′

107-109′ total

Corridors with Constrained Rights-of-Way



SW clear	*	travel	travel	median/TWLTL	travel	travel	*	SW clear
5′		10′	10′	10′	10′	10′		5′

65-70′ total

* Designers should make every effort to separate moving lanes from the sidewalk clear area by 5 feet. If this is not practical due to space constraint, this buffer dimension should be as close to 5 feet as possible.

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Suburban Low Speed Thoroughfare Design
Level III *Thoroughfares*

In some suburban contexts, land use patterns and spacing of intersecting streets and driveways suggest that speeds will be lower. This is especially the case in older suburban areas that were subdivided on smaller lot patterns (and subsequently have a need to provide frequent driveway access, which is often the case in LCI areas throughout the region that are beginning to transition from a more suburban land use character to one that is more walkable and urbanized.

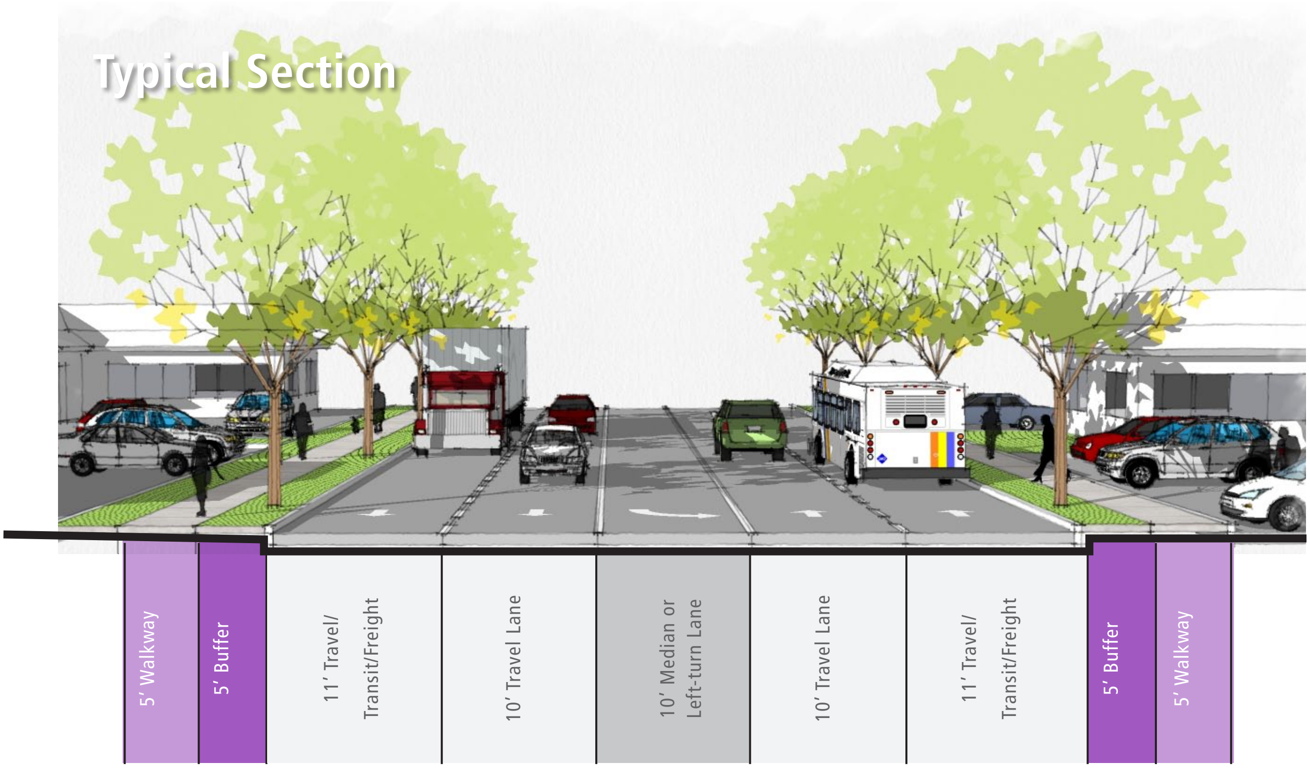
The Management Guidelines distinguish suburban cross-sections based on speed and provide guidance for low-speed thoroughfares that differs from guidance for high-speed thoroughfares in suburban areas. The distinction between high-speed and low-speed corridors is based primarily on thresholds of roadway safety, especially for non-motorized users of the street. Federal Highway Administration research has demonstrated that collisions involving pedestrians are significantly more likely to result in fatalities as speeds increase beyond 35 miles per hour.

To a large degree, this is driven by land use and community context. It is for this reason that the decision matrix on page In urban and more mature suburban areas, a higher incidence of pedestrian activity can be expected as buildings are closer to streets and a more balanced mix of land uses tends to encourage short trips to be taken on foot instead of by automobiles. In addition, older suburban areas of the Atlanta region have witnessed significant demographic change in recent years, with a rise in population that does not have access to automobiles.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Community Context	Level III indicates a more local or sub-regional function more than it indicates expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles). Also used on larger city streets that terminate in a downtown and serve other parts of a city or county, especially non-activity center corridors.	Used in newer suburban contexts and in places where access management plans have been implemented. It is expected for this section that constraints may be more common, requiring consideration of narrower travel lane widths.
Lane Widths	11-12' is an acceptable range. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account.	Freight volumes are expected to be less than Level I and II due to fewer interstate-to-interstate connections, which suggests 10-foot lanes are acceptable as needed. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet. 11 foot lanes should not be used in the event of constrained corridors unless they do not cause a loss of sidewalk/pedestrian space.

Suburban Low Speed Thoroughfare Design

Level III *Thoroughfares*



Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping. In the Suburban low-speed context, a landscaped buffer may not be needed if bicycle lanes or added sidewalk width are to be used.

Design Element	Standards
Right-of-Way	70'
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common, roundabouts may be used on 3-lane sections
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	11-12'
Turn Lanes	To be used at intersections as needed
Clear Zone	Minimum 1.5' from back of curb
On-Street Parking	7.5' when used (see diagram on opposite page)
Sidewalk	5' minimum clear width required
Bicycle Lane	5' minimum when used (not including gutter)
Utilities	Underground or within landscape width
Landscaping	5' minimum width when used, either for tree wells or parkway strip
Lighting	Within landscape width

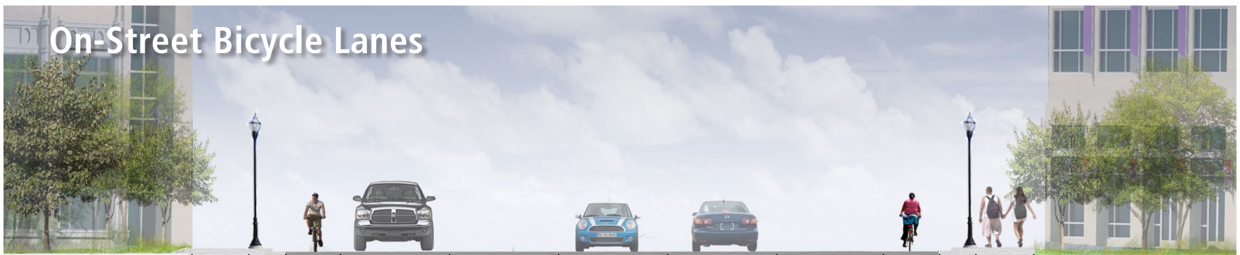
Suburban Low Speed Level III *Thoroughfares - Alternative Typical Sections*

Premium Transit Corridor

SW clear	buffer	travel	travel	median/left turn/ ped. refuge area	two-way transit guideway	median/left turn/ ped. refuge area	travel	travel	buffer	SW clear
5′	5′	12′	11′	15′	22′	15′	11′	12′	5′	5′

118′ total

On-Street Bicycle Lanes

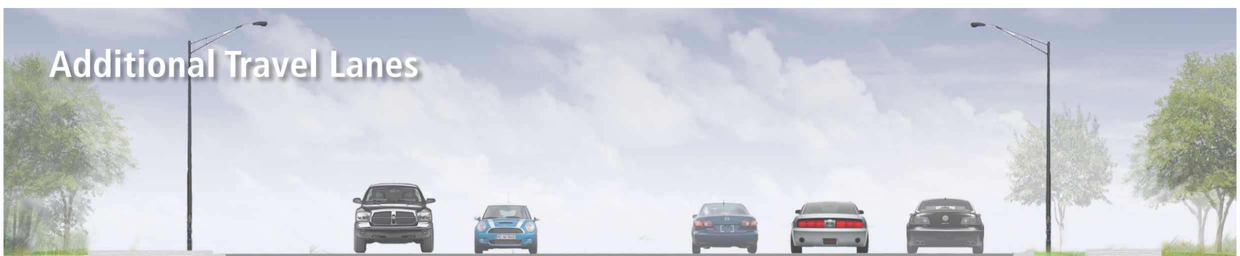


* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.

SW clear	*	bike	travel	travel	median/ TWLTL	travel	travel	bike	*	SW clear
5′		5′	12′	11′	11′	11′	12′	5′		5′

77-87′ total

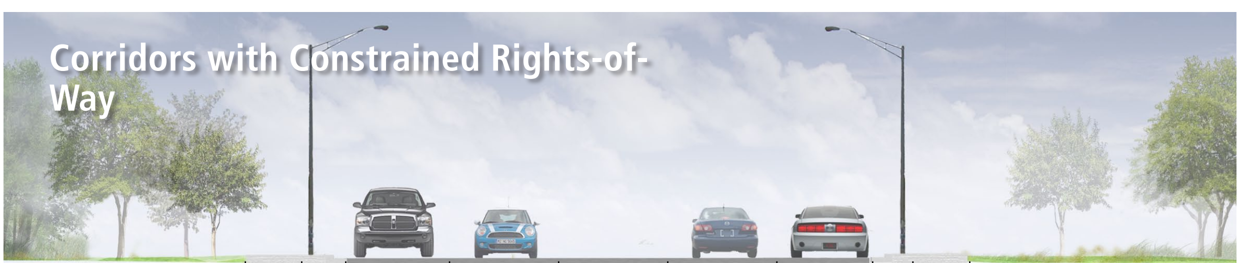
Additional Travel Lanes



SW clear	buffer	travel	travel	travel	median/TWLTL	travel	travel	travel	buffer	SW clear
5′	5′	12′	11′	11′	11′	11′	11′	12′	5′	5′

107-109′ total

Corridors with Constrained Rights-of-Way



* Designers should make every effort to separate moving lanes from the sidewalk clear area by 5 feet. If this is not practical due to space constraint, this buffer dimension should be as close to 5 feet as possible.

SW clear	*	travel	travel	median/TWLTL	travel	travel	*	SW clear
5′		10′	10′	10′	10′	10′		5′

65-70′ total

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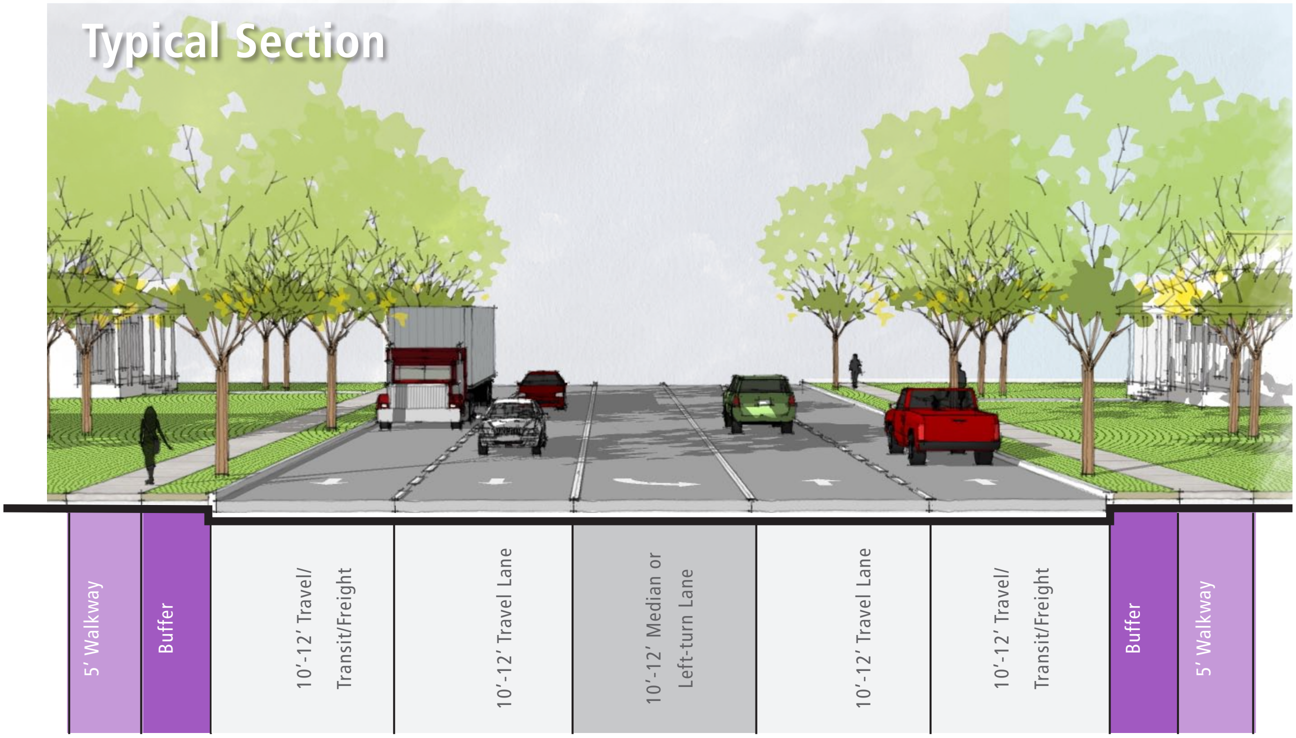
Rural Thoroughfare Design
Level I *Thoroughfares*

Rural thoroughfares serve largely undeveloped areas and connect these with community centers as well as other parts of the Atlanta region. The difference in the three Thoroughfare Levels is due primarily to the use of a thoroughfare as a freight corridor; designers should consider the need for wider lanes accordingly. Therefore, a stronger emphasis is placed on safety in these areas.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Context	Level I indicates regional function more than expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles).	Used in rural and exurban contexts. Though it may vary, access needs are low in these areas and a mobility function is likely to drive design decisions.
Lane Widths	A full 10-to-12 foot range is allowed. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account. Note that all corridor types have the option of using narrower lanes.	Freight volumes are expected to be high due to interstate-to-interstate or interstate-to-freight route connection, which suggests that at least 11-foot lanes are preferred. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet.

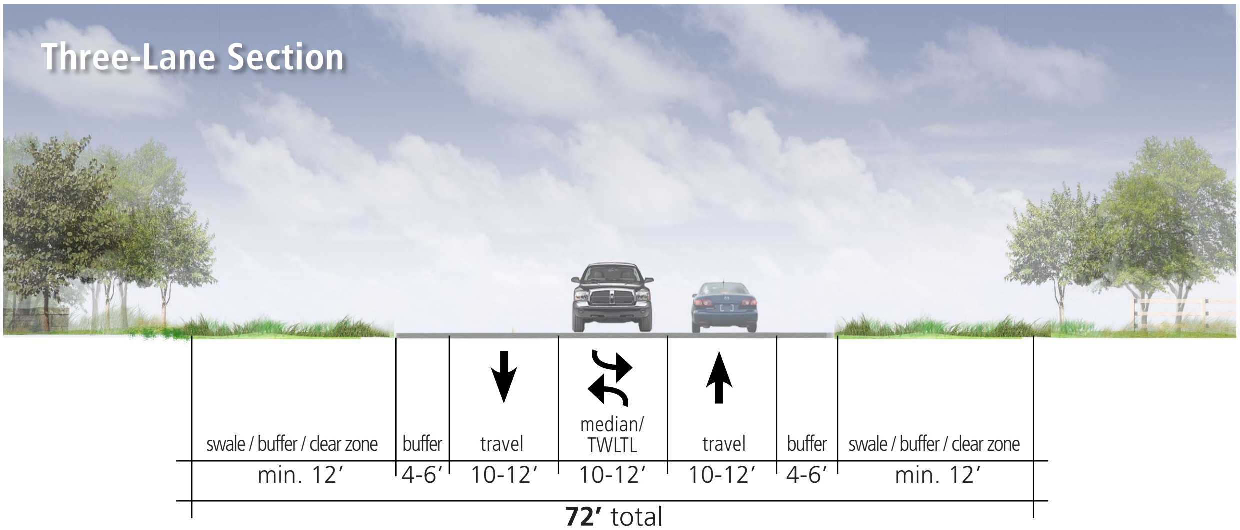
Rural Thoroughfare Design
Level I *Thoroughfares*



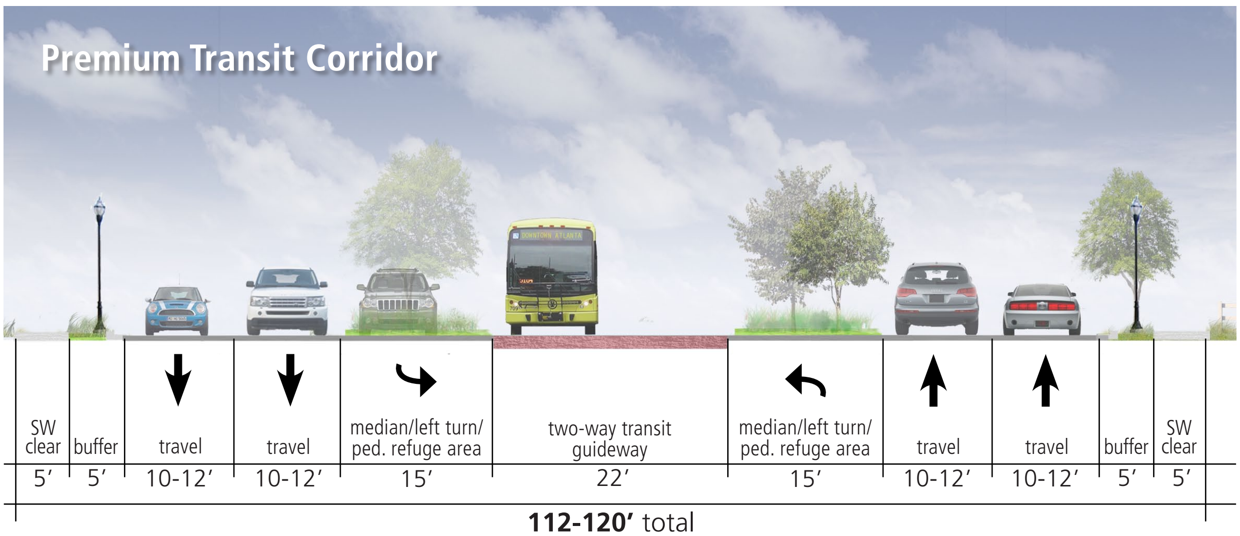
Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping. Buffer areas are only needed if sidewalks are used.

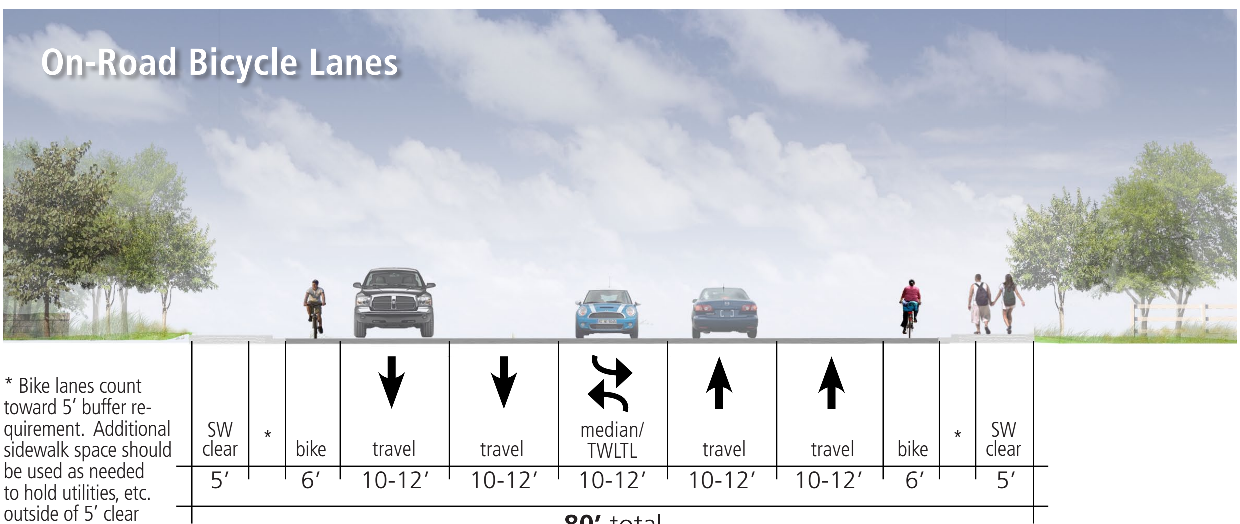
Design Element	Standards
Right-of-Way	70'
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	10' maximum
Turn Lanes	To be used at intersections as needed
Clear Zone	Determined by design speed; minimum 10'
On-Street Parking	Not used
Sidewalk	5' minimum clear width required when used
Bicycle Lane	6' minimum when in shoulders without rumble strips; 4' minimum smooth surface when rumble strips are used
Utilities	Underground or within landscape width
Landscaping	5' minimum width when used, either for tree wells or parkway strip
Lighting	Not typically used, though if used is located in buffer area

Rural Level I *Thoroughfares - Alternative Typical Sections*



(upper values of lanes and minimum buffer widths)





* Bike lanes count toward 5' buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5' clear sidewalk width.

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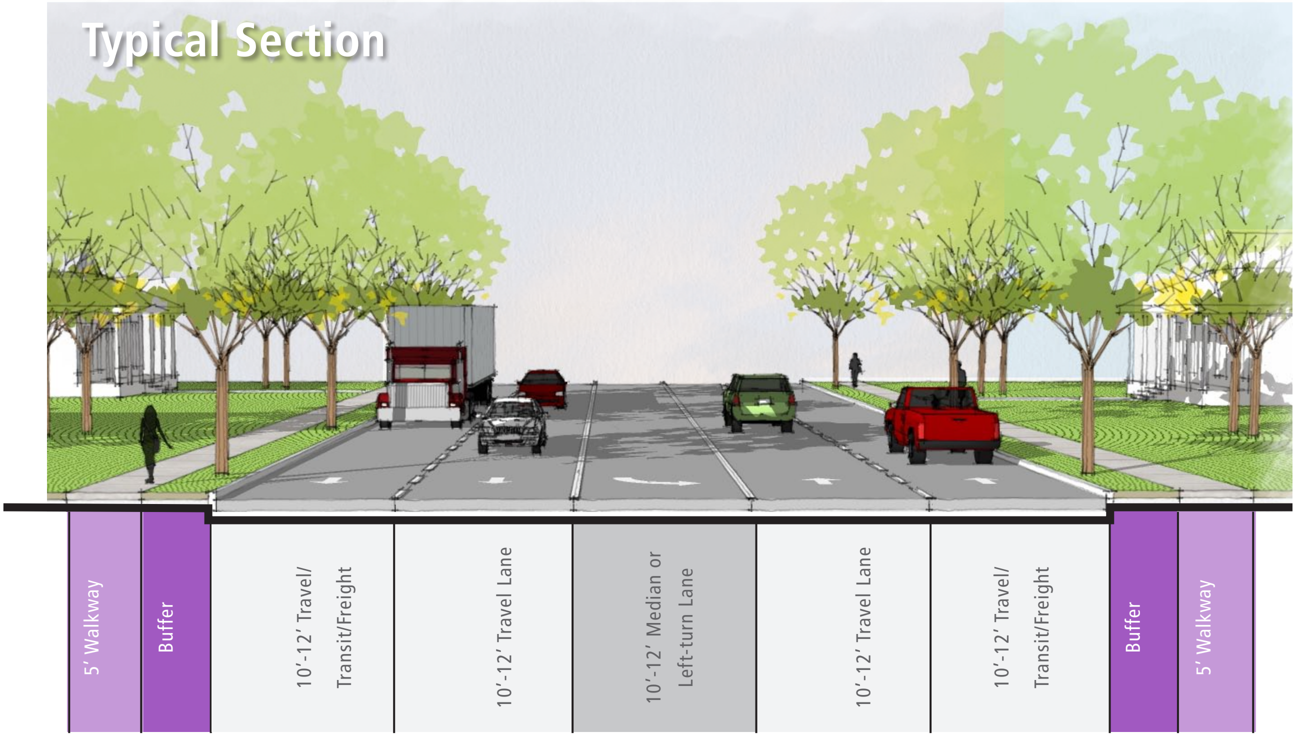
Rural Thoroughfare Design
***Level II** Thoroughfares*

Rural thoroughfares serve largely undeveloped areas and connect these with community centers as well as other parts of the Atlanta region. The difference in the three Thoroughfare Levels is due primarily to the use of a thoroughfare as a freight corridor; designers should consider the need for wider lanes accordingly. Therefore, a stronger emphasis is placed on safety in these areas.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Context	Level II indicates sub-regional and farm-to-market function more than expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles).	Used in rural and exurban contexts. Though it may vary, access needs are low in these areas and a mobility function is likely to drive design decisions.
Lane Widths	A full 10-to-12 foot range is allowed. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account. Note that all corridor types have the option of using narrower lanes.	Freight volumes are expected to be relatively high due to interstate-to-interstate or interstate-to-freight route connection, which suggests that at least 11-foot lanes are preferred. Major regional transit vehicles using curb lane and not fixed guideway also suggest 11 feet. If freight is not expected or allowed, 10 foot lanes may be considered.

Rural Thoroughfare Design
Level II *Thoroughfares*

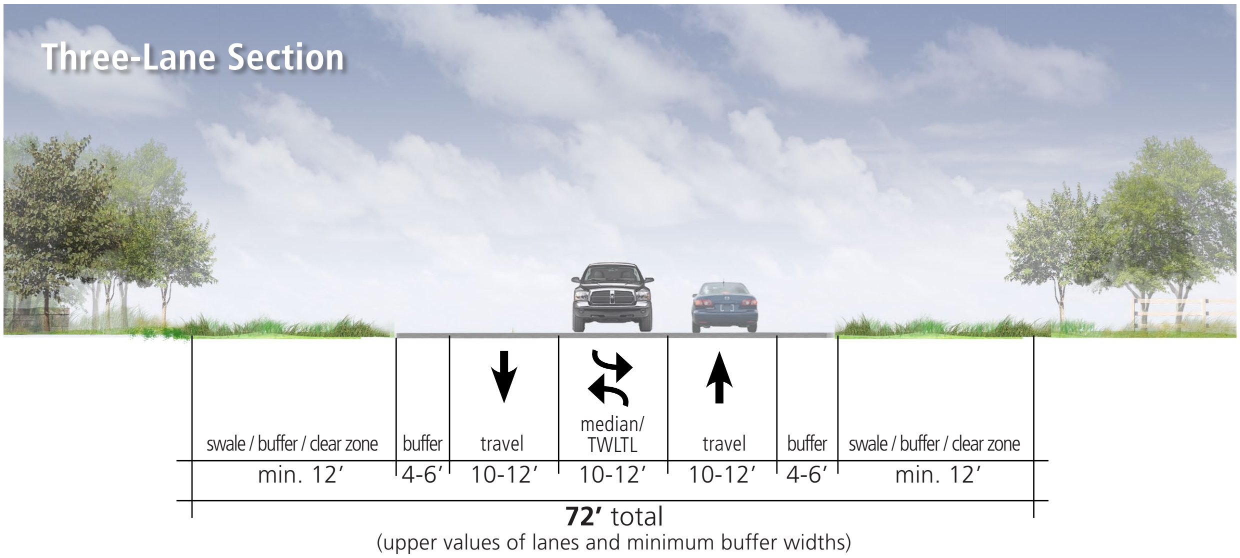


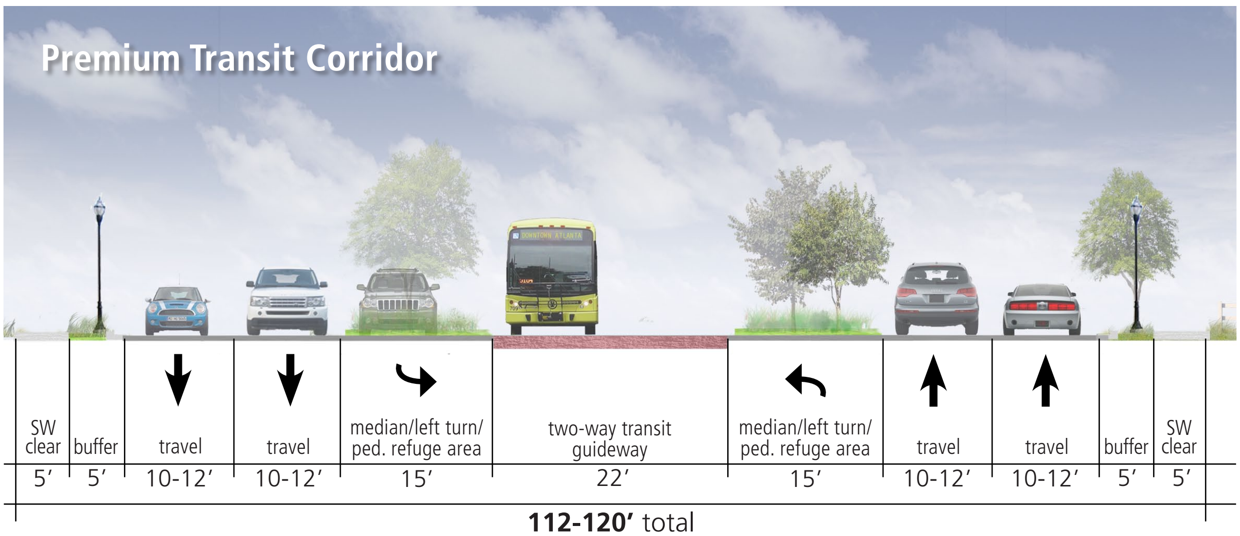
Rural thoroughfares serve largely undeveloped areas and connect these with community centers as well as other parts of the Atlanta region.

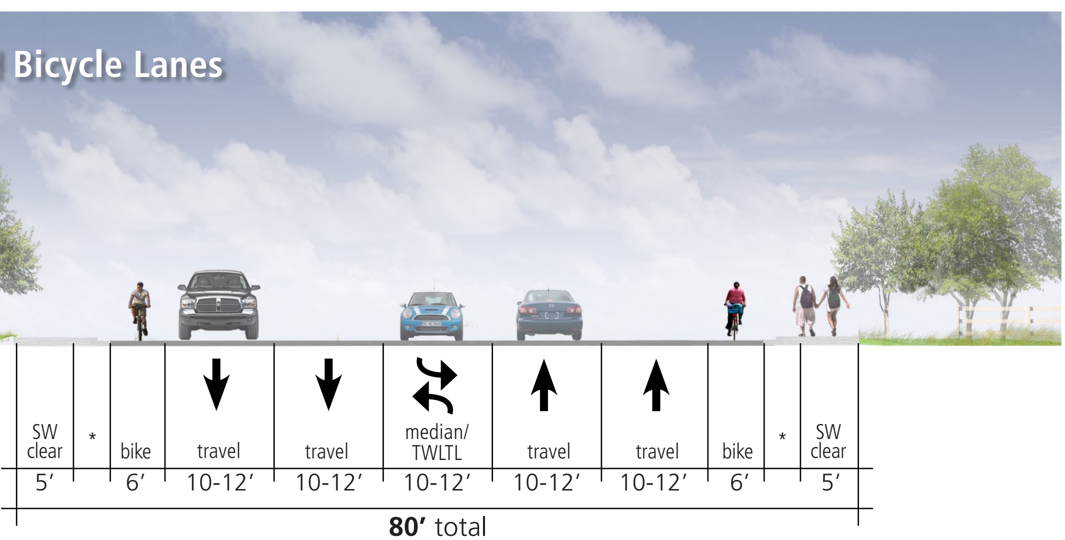
Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping. Buffer areas are only needed if sidewalks are used.

Design Element	Standards
Right-of-Way	70'
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	10' maximum
Turn Lanes	To be used at intersections as needed
Clear Zone	Determined by design speed; minimum 10'
On-Street Parking	Not used
Sidewalk	5' minimum clear width required when used
Bicycle Lane	6' minimum when in shoulders without rumble strips; 4' minimum smooth surface when rumble strips are used
Utilities	Underground or within landscape width
Landscaping	5' minimum width when used, either for tree wells or parkway strip
Lighting	Not typically used, though if used is located in buffer area

Rural Level II *Thoroughfares - Alternative Typical Sections*







* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.

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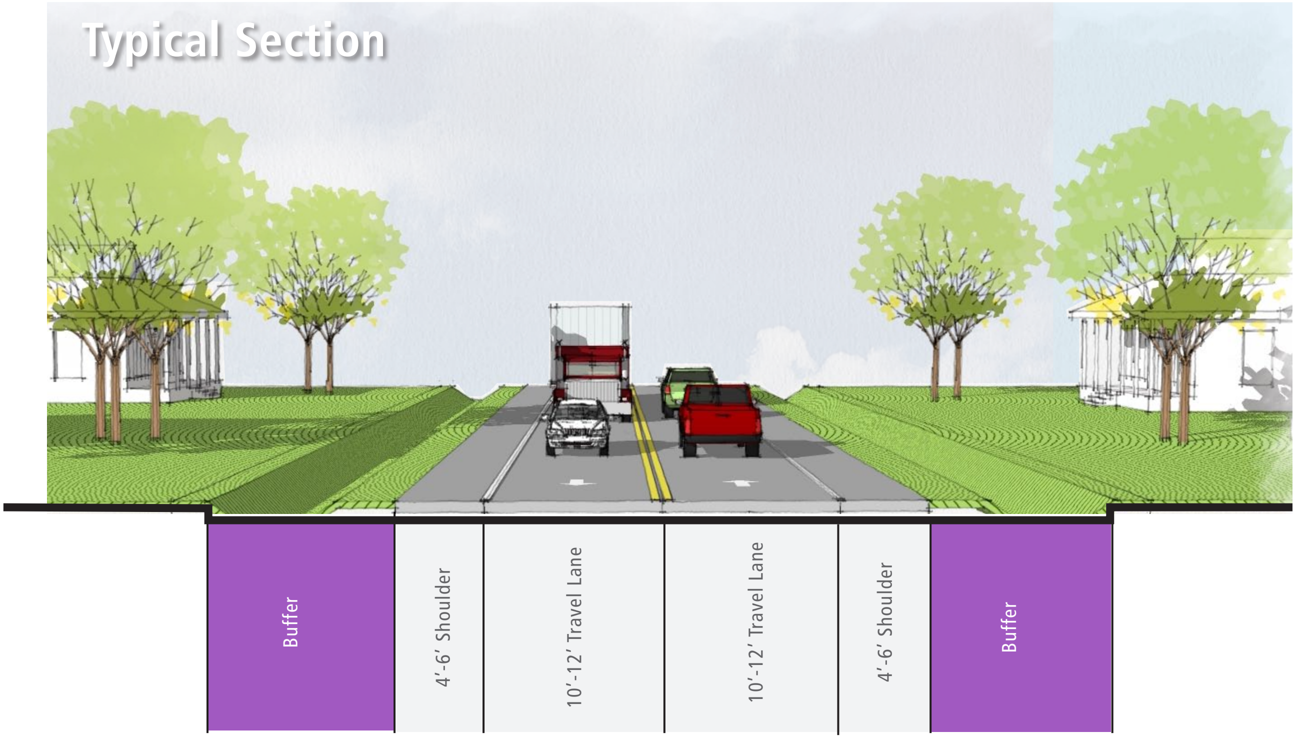
Rural Thoroughfare Design
***Level III** Thoroughfares*

Rural thoroughfares serve largely undeveloped areas and connect these with community centers as well as other parts of the Atlanta region. The difference in the three Thoroughfare Levels is due primarily to the use of a thoroughfare as a freight corridor; designers should consider the need for wider lanes accordingly. Therefore, a stronger emphasis is placed on safety in these areas.

Context / Design Parameter	Distinctive Elements About This Section	Cases Where This Section Is Preferred
Context	Level III indicates sub-regional and farm-to-market function more than expected volume or land use character, but this nonetheless has implications on vehicle mix (especially for trucks and transit vehicles).	Used in rural and exurban contexts. Though it may vary, access needs are low in these areas and a mobility function is likely to drive design decisions.
Lane Widths	A full 10-to-12 foot range is allowed. Lane widths should be chosen based on expected design vehicles, but flexibility is intended to take context into account. Note that all corridor types have the option of using narrower lanes.	Freight volumes are expected to be relatively low, which suggests that 11-foot lanes are acceptable. If freight is not expected or allowed, 10 foot lanes may be considered.

Rural Thoroughfare Design
Level III *Thoroughfares*

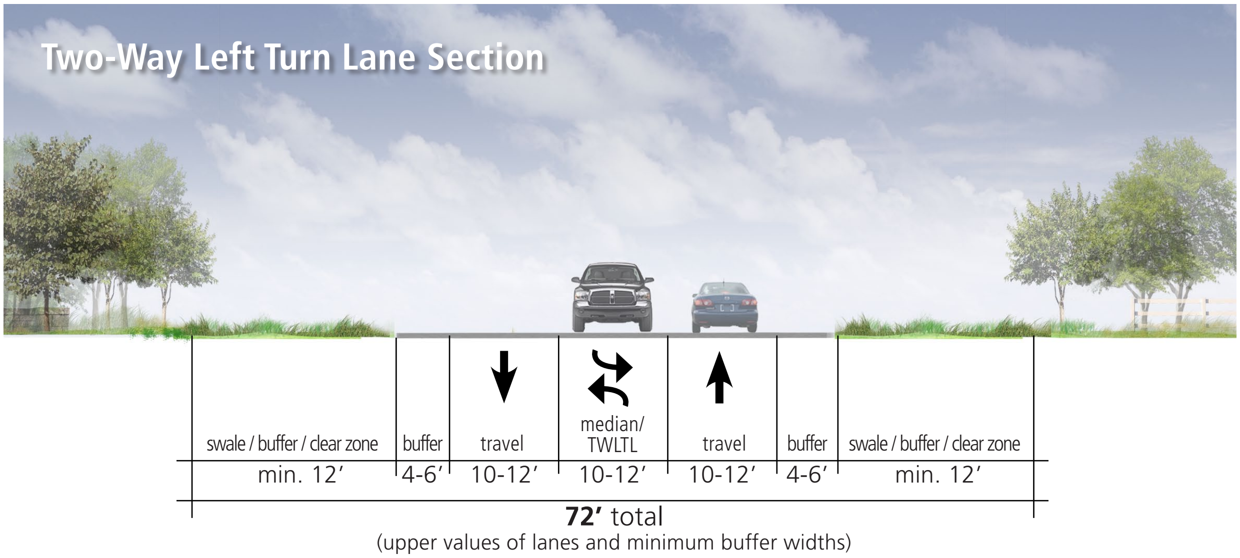


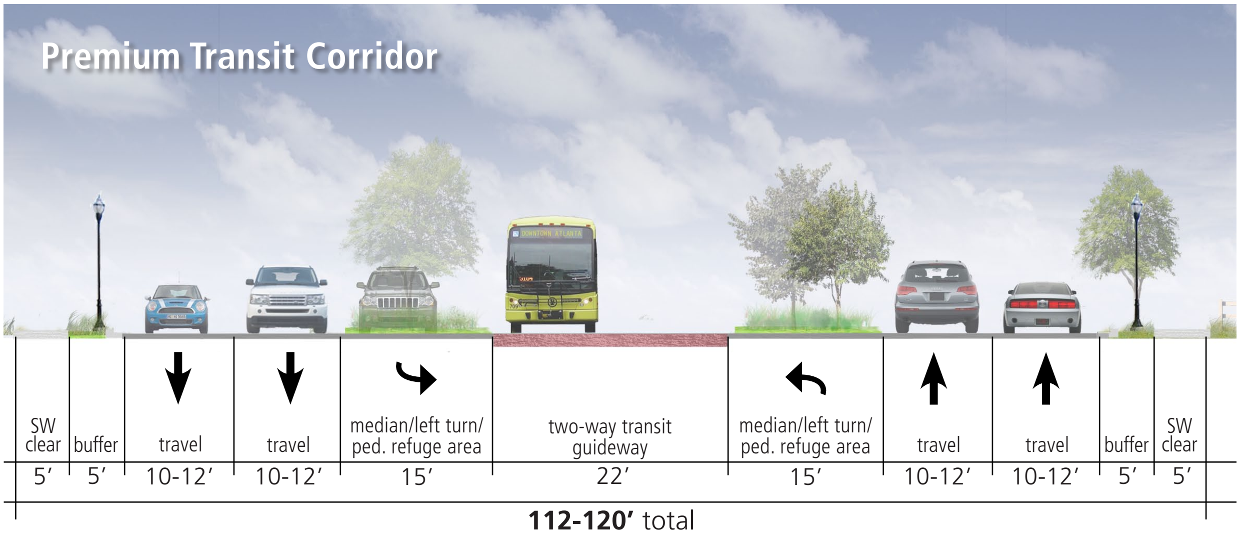
Rural thoroughfares serve largely undeveloped areas and connect these with community centers as well as other parts of the Atlanta region.

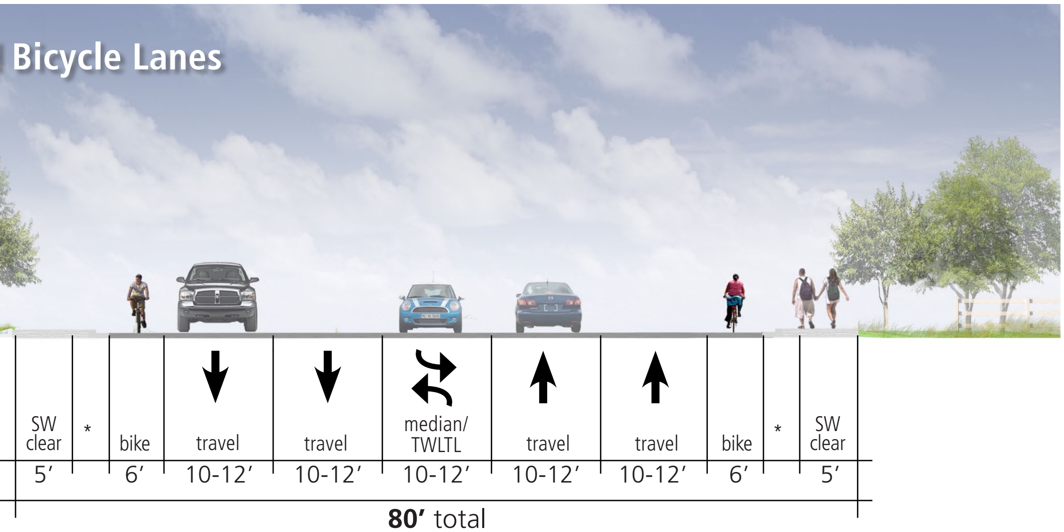
Refer to the discussion of pedestrian zones, buffers and moving lanes on Page 34 for a more detailed discussion of the relationship between buffers (as shown in the cross-section above) and other design elements such as clear zones and landscaping. Buffer areas are only needed if sidewalks are used.

Design Element	Standards
Right-of-Way	60' includes 12' of swale width on either side of the traveled way
Number of Lanes	3 or 5, depends on capacity need
Intersection Control	Signals most common
Median	8-10', to fit within 10' two-way left turn lane
Lane Widths	10' maximum
Turn Lanes	To be used at intersections as needed
Clear Zone	Determined by design speed; minimum 10'
On-Street Parking	Not used
Sidewalk	5' minimum clear width required when used
Bicycle Lane	6' minimum when in shoulders without rumble strips; 4' minimum smooth surface when rumble strips are used
Utilities	Typically on outside of open drainage area/clear zone
Lighting	Not typically used, though if used is located in buffer area

Rural Level III *Thoroughfares - Alternative Typical Sections*







* Bike lanes count toward 5′ buffer requirement. Additional sidewalk space should be used as needed to hold utilities, etc. outside of 5′ clear sidewalk width.

Section 2 provided a high-level overview of how these guidelines relate to other ARC planning efforts, including the Concept 3 regional transit vision, the Atlanta Region Bicycle Transportation and Pedestrian Walkways Plan, and the many LCI studies that have been completed throughout the region. The following subsections provide more specific geometric design guidance for these thoroughfares, to complement the variation cross-sections shown on the preceding pages in Section 3.2.

3.3 Design Considerations for Transit Corridors

3.3.1Bus Transit Design Criteria

Lane width and curb radii

Standard buses are 8.5 feet wide, wider than passenger cars and trucks and with wider turning radii. The minimum inside turning radius for a bus is 21 to 26 feet and the minimum outer radius is 44 to 48 feet. The standard coach is 40 feet long, but articulated buses are 60 feet long. For these reasons, lane widths and turning radii should be increased where transit traffic is expected.

Bus stop placement

Bus stops are typically 400 to 500 feet apart in dense downtown areas and between 2,000 feet and ½ mile apart in lower density areas. The preferred location for bus stops is the far side of an intersection because intersections provide the best accessibility for pedestrians and intersecting bus routes. Far side bus stops allow passengers exiting the bus to cross the street safely behind the bus. It also gives motorists more opportunity to turn at the intersection if they are behind the bus when it is loading.

In more urban areas, the bus stop location should be signed to prohibit on street parking and be at least 50 feet from the nearest driveway entrance on the same side of the thoroughfare. A bus stop should not be placed adjacent to a stormwater catch basin.

Bus stop configuration

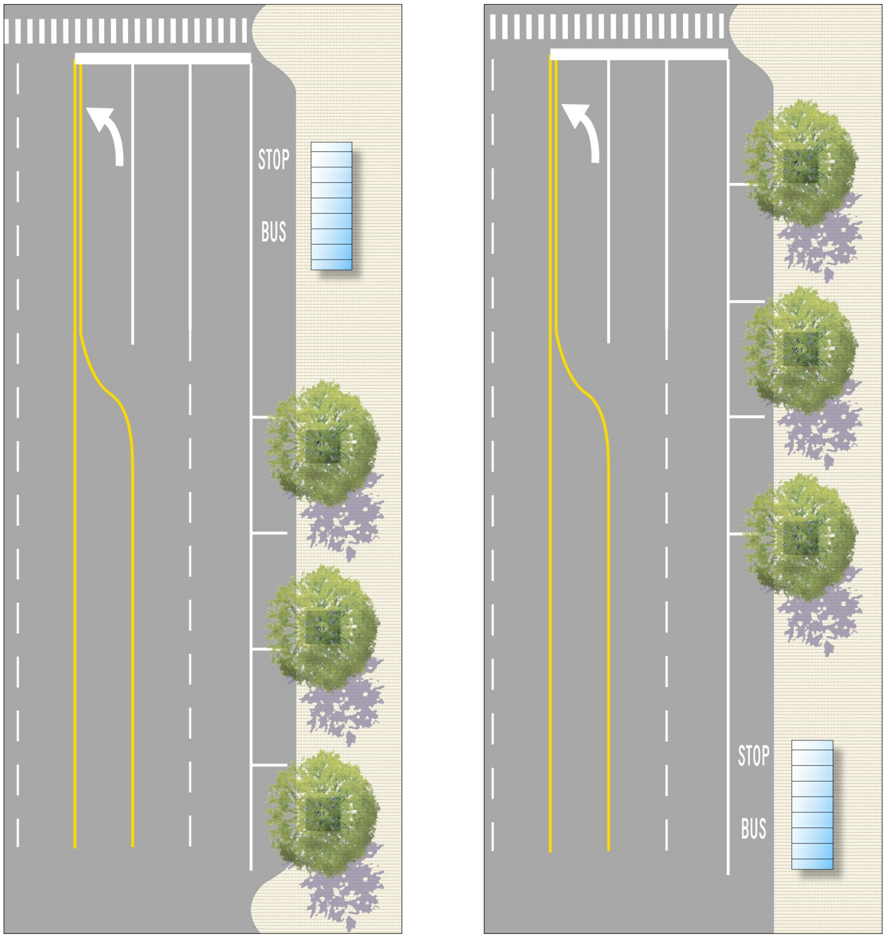
Bus stops require an unobstructed section of curb at least 60 feet long. The passenger facility can be as simple as a bus stop sign located next to a bench placed on a 4 ft. deep by 6 ft. wide concrete pad and set at least 4 feet back from the back of the curb to the front of the passenger boarding area. A preferable design would be a covered and lighted (2 to 5 lumens) bus passenger shelter placed on a concrete slab that is at least 8 ft. deep and 10 feet wide and set at least four feet behind the back of curb. If the bus is loading from the front and unloading from a rear door, then the paved area for passengers should be at least 30 feet long and at least 6 feet deep to allow adequate space for the two sets of doors to open. Bicycle racks are a good accessory to any bus stop.

Bus turnouts

Bus stops may be located at mid-block locations with a bus pullout either if the block is very long, or if a major trip attractor has a mid-block entrance. However, bus pullouts often cause operational difficulty for buses needed to re-enter the moving traffic stream on the main roadway and should be carefully considered with regard to traffic volumes and sight distance. Bus turnouts are not encouraged because they can be safety hazards and generally cause operators difficulty when traffic is congested or moving fast. Bus turnouts are justified in unusual circumstances, such as the mid-block stop or a major attraction (like an auditorium) or transfer location where buses need to stop or layover for prolonged periods of time to wait for passengers to arrive or disembark in large numbers. Typical bus turnouts need 40 to 60 feet per bus plus entrance and exit tapers of 40 to 60 feet each. The result is a total curb recess of approximately 150 – 200 feet.

Curb Extension Bus Stops

Curb extensions are often used as a "bulbout" of the curb at the intersection of a block that provides on-street parking. Bus bulbs, or curb extension bus stops, are bus stops located alongside on-street parking lanes. They are typically used in cases where on-street parking width is insufficient to hold a bus and where traffic conditions—typically lower traffic volumes—are not impeded by a bus stopping in the travel lane. The bus stops in the travel lane and uses the curb extension for passenger boarding and alighting. When this is used, it is important that the curb be extended as far as the bus boarding and alighting areas: for a 40-foot bus length, this typically means at least 30 feet back from where the front of the bus will likely stop.



***Figures 3.1 and 3.2** Bus stop locations*

There are numerous reasons why transit operators may prefer to use near-side or far-side bus stop placement. Traffic engineering and pedestrian safety usually point to far-side locations as preferred, although in urban areas with frequent spacing of signalized intersections a bus can often take advantage of red lights with a near-side stop location. In either case, any on-street parking should be removed or disallowed to give the bus ample length to stop directly adjacent to the curb and re-enter the flow of traffic.

3.3.2 Modern Streetcar Design Criteria

System Technology

Modern streetcar refers to an urban transit system technology with the following characteristics:

- Low-floor vehicles with articulated sections to navigate tight curves
- Electrical propulsion motors
- Steel wheels that run along steel rails
- Power generally drawn from an overhead wire or from an onboard battery
- Travel along both city streets (mixed-traffic or non-exclusive right-of-way) and dedicated rights-of-way with street crossings (semi-exclusive right-of-way).

The benefit of an in-street alignment is a minimal amount of construction, challenging designers to "fit" the system into existing roadway rights-of-way. Most, if not all, streetcar vehicles available are designed to run in this type of track environment. By following the existing physical features of the roadway, streetcar trackways avoid major reconstruction of the remaining lanes. This method of avoiding reconstruction also allows existing drainage patterns to be maintained, further reducing costs by eliminating the need to reconstruct catch basin inlets and other drainage facilities.

Speed

Generally, the streetcar schematic alignment is developed to operate within 10 mph of automobile speeds. If the automobile speed for a road is 30 mph, the streetcar is designed to operate at a minimum of 20 mph. Speeds are interrupted by stops and traffic signals. Therefore, the average speed of most streetcar lines is less than 15 mph. Some areas where slower speeds are expected are listed below.

- 90 Degree turn - when the streetcar turns from one street to another, the speeds are limited to approximately five mph.
- Lane changes - when the streetcar shifts from one lane to another at an intersection where it is performing a transit-only maneuver, slower speeds (approximately 15 mph) are expected.
- Urban stops - the alignment at streetcar stops may have to shift slightly closer to the curb to interface with the platform and accommodate American with Disability Act (ADA) boarding requirements. In addition, the vehicle will stop and briefly dwell for approximately twenty seconds (potentially in mixed traffic).

Figure 3.3 Modern Streetcar. *Modern Streetcars run in mixed traffic, like buses, and are accessed from streetside stops.*

Design Criteria

Streetcar systems that operate in an urban, in-street environment need to be designed in close coordination with the design decisions made for right of way, geometrics, and operations of routes on the region's strategic corridors. In general, the following design criteria will be used to develop streetcar alignments at a conceptual level:

- Track gauge = 4'-8 ½" (distance between inner and outer rail)
- Track slab width = 8 feet
- Minimum design horizontal curve radius = 82 feet
- Minimum curve radius is 600 feet +/- (with spirals) to achieve 25 miles per hour (mph).
- Grade: 9% absolute maximum; desirable five percent. Maximum design grade at stations= 2%

Roadway Cross Section

Track slabs are designed to provide a flat (zero percent) slope between the rails. Any slope greater than zero percent, or reverse super-elevation in curved sections, is undesirable and can result in uneven rail and wheel wear. Typically the track is at least five feet from the curb, which puts the rail approximately 2.5 feet from the face of the curb. The area between the rail and the face of the curb is sloped similar to a gutter to carry the water to the nearest inlet.

Lane Selection

When selecting the lane to place a streetcar trackway, several factors affect the decision-making process. Existing and future traffic volumes, presence of existing utilities, presence of bicycle lanes and on-street parking, and desired station configuration all influence the lane selection of streetcar tracks on a multi-lane street.

The pros and cons of left lane versus right lane running options are based on the type of street on which the streetcar will operate. For example, a wide ROW two-way street with large existing medians or continuous left turn lanes operates better with a left lane running alignment and shared median stops, which also minimizes conflicts with bike lanes and impacts to parking. Side running alignments and side stops are common to one-way couplets and narrow two-way streets, which do not have a median or left turn pockets. Figures 2 and 3 illustrate streetcar trackways with side stations and median stations, respectively.

Streetcar Stop Design

Spacing of stops is typically 1,200 to 1,400 feet, based in part on block lengths. The layout and design of a streetcar stop will be dependent upon a number of factors including:

- location of the stop in the roadway (curb-side or median)
- location of the stop with respect to an intersection (prior to or beyond an intersection)
- dimensions and configuration of the streetcar vehicle
- availability of space (including sidewalk) behind the street curb
- type of shelter (if desired/required) to be provided at a stop
- presence or absence of on-street parking at the site of the stop
- codes, regulations, and standards such as Americans with Disabilities Act (ADA) Standards for Accessible Design

Streetcar Stop Types

1. Corner Stop (near or far side) – This stop occurs at an intersection to allow direct access from the sidewalk (direct boarding with a low floor vehicle, from an on-board lift or from a raised, ADA-compliant high block platform). The stop is a "bulb-out" or an extended sidewalk. The vehicle stays in the travel lane.

2. Mid-block Stop – This type occurs less frequently but may be required due to specific site or block considerations, and it, too, is a "bulb- out" design. The vehicle stays in the travel lane.

3. Curbside Stop (likely a mid-block location) – This stop is on a street with no on-street parking, and it allows berthing directly from the existing curb.

4. Median/Center Stop – This type occurs if the streetcar is running on the inside lanes. It may take up more available lane width, since it cannot be located in a moving lane. This application requires enhanced pedestrian safety and amenity features since it requires all boarding and alighting passengers to cross a busy street, sometimes at mid-block.

Length of Streetcar Stop

The length of the streetcar stop is dependent upon the location of the doors on the streetcar vehicle. It is recommended that a minimum of 66′ be used for side stops, which allows ample space for a boarding platform (42 ft. long), access ramps, and a basic level of amenities at the stop.

Width of Streetcar Stop

A number of factors influence the width of a streetcar stop, not the least of which is the requirements of the Americans with Disabilities Act (ADA). Given these requirements, the minimum width of a curbside streetcar stop is 8 feet (96 inches) to provide for the ADA access pad that includes the 24-inch wide detectable warning at the curb and a minimum accessible route (sidewalk). Median stops serving two tracks should be a minimum of 12 feet wide to accommodate the detectable warning strip on both sides.

Streetcar Stop Shelter

A shelter must have at least a minimum clear floor area of 2′-6″ wide by 4 feet deep entirely within the shelter perimeter as required in Section 10.2.1(1) of ADA. A variety of commercially available shelters could be used on the streetcar system. These shelters can be enclosed or freestanding. Allowing for 6 inches on each side of an enclosed shelter's exterior gives a typical shelter width of 5 feet while a self-supporting shelter would not require this additional space. A shelter must also maintain a minimum of a 1-foot clearance from the back of the shelter to a wall or other obstruction. If the shelter were to be placed at the end of the 8-foot access pad, then the minimum width of a stop would be 14 feet (including the 1 foot clearance) depending upon the type of shelter.

Stop Locations, Bicycle Lanes, and Parking

Placement of streetcar stops must consider other uses of the roadway: traffic conditions, bicyclists, parking, and pedestrians. Modern streetcar vehicles are designed with low floor doors on both sides of the vehicles, allowing the system flexibility to have right side or left-side boarding. The location of the track within the roadway often follows desired stop placement; the location of stops and the location of track are inter-dependent and are designed and tested against each other during preliminary engineering. Curb side stops are typically proposed when the following conditions are encountered:

- Single track on the roadway (in a couplet or single track operation)
- Narrow roadway width (too narrow for median stop); or a wide roadway with multiple lanes in each direction
- Side stop would enhance pedestrian activity and streetscape
- Parallel parking adjacent to curb can be removed for a streetcar stop 'bump-out'

In addition, if the streetcar track is located on a one-way street, a left-side curbside stop may be desirable when the right lane moves slower due to on-street parking or when a bicycle lane is present. Median stops are typically proposed when the following conditions are encountered:

- Bicycle lane and/or heavy bicycle traffic would be impeded by a curbside stop.
- Dual streetcar tracks (one in each direction) with ample space in between for a median stop
- Parallel parking or other curb-side features that cannot be removed.

General Design Criteria for Traffic Design

Where streetcars operate in a lane of traffic, the shared lane must be at least be as wide as the dynamic outline of the streetcar vehicle. If the streetcar operates in a semi-exclusive guideway, it should be delineated or physically separated from parallel general traffic on that street.

Guideways and passenger station stops should be located and designed so as not to create unnecessary interference with pedestrian or bicycle movements. Where pedestrians and/or bikes must cross streetcar tracks, appropriate control devices are needed. Where a pedestrian and/or bike crossing is part of a signalized street intersection, control can be provided by means of standard vehicle, pedestrian, and/or bike traffic signals. These devices may be supplanted or supplemented by passive signs, active signs, flashing beacons, movable gates, or any combination.

Where the streetcar operates in mixed flow in the existing traffic lane, streetcar movements will be controlled by normal traffic signal operations. At locations where sight distance is limited or the streetcar must make a left-turn movement, transition into or out of special lanes, or transition into semi-exclusive operations, special transit-only signals will be provided. These transit signals will be physically separated from the traffic signals and will use transit-only display indications consistent with the MUTCD.

Impacts on Utilities

The location of existing utilities is an important consideration when selecting streetcar routes and trackway locations. Streetcars and other urban rail transit system restrict the access to facilities in close proximity to the trackway (both above and below ground), and introduce stray electric current that may trace back to metallic pipes buried in the ground.

Also the cross-section of streetcar carriage ways does not allow any cross-slope. Therefore street drainage may need to be re-directed and curb inlets relocated away from stops.

3.3.3 Light Rail Transit Design Criteria

When LRT is used alongside or within street right of way, many of the same parameters about station location and design, traffic controls, and utilities apply as were discussed for the streetcar. There are some distinctions, however, as described below.

Figure 3.4 Light Rail Transit. *Light rail has the ability to run on-street in mixed traffic, but can also operate in its own right of way for faster travel.*

Width of Rights of Way

Where LRT is running on existing streets mixed with automotive traffic the minimum width of right-of way is 28 feet, including the catenary system, but additional width may be required for drainage and retaining walls, where required. On exclusive right-of-way, the minimum allowable distance from the centerline of the nearest track to the limit of the right-of-way is 10 ft. 6 in. and the preferred minimum right-of-way is 35.0 ft. for two tracks including the trackbed and the catenary system support poles. Additional right-of-way may be required for sloped banks and structures including retaining walls, access roads and drainage facilities.

Track dimensions

The standard LRT track is 4'-8½", measured between the inner (gauge) sides of the heads of the rails at a distance of 5/8" below the top of the rails. Wider gauges are used in some curves, depending upon the radius. Below is a typical cross-section of tracks in a street.

Vehicle Turning Radius

Minimum curve radius for street running tracks:

- R (desirable minimum) = 535 feet (assume 20 mph speed)
- R (absolute minimum) = 82 feet (less than 5 mph)

Grades

Embedded Track Grade: min. = 0.5%

Station Area Grade:

- desirable max. = 0.5%
- absolute max. = 2.5%*

Vertical Clearances

The following minimum vertical clearances are required from the top of the high rail to the underside of any overhead structure, within the horizontal limits of the design envelope:

- For exclusive LRT track in dedicated rail corridor - 18'-0", plus the depth of the catenary system (preferred); 14'-3" absolute minimum.
- For LRT in street with mixed traffic in same lane or exclusive LRT being crossed by roadway at grade = 18'-0",plus the depth of the catenary system (preferred); 15'-0" absolute minimum.

Per the National Electrical Safety Code, the trolley contact wire must not be less than 18’-0’ above the top of any roadway pavement under any condition of loading (including wind and ice loading) or temperature. Exceptions from the code must be obtained for any clearance less than that minimum.

Platform Geometrics

At station platforms use the following minimum tangent lengths (platform length is defined by a four-car train):
(desirable)* = (length of platform) + (45’ at each end) = (length of platform) + (90’)

Typical center platform width is nominally 18 ft., considering current ADA accessibility guidelines for clear space around station amenities and columns. Typical side platform width is nominally 14 feet.

3.4 Design Considerations for Bicycle Corridors

One-way lanes for bicycles that are 5 to 6 feet in width should be placed outside travel lanes in each direction of travel. Where bicycle lanes are provided along the same side of the street as on-street parking lanes, they are located between the outside vehicle travel lane and the on-street parking. The combined width of the on-street parking lane and the bicycle lane should be at least 13 feet. Based on AASHTO bicycle guidance, four feet is the absolute minimum width that is acceptable; however, a five foot bicycle lane width is highly desirable.

Ideally, bicycle lanes or separate multi-purpose trails would be planned in conjunction with all street construction or reconstruction in the RTN and on other connecting streets with a posted speed limit of 35 mph or more. Strategies for improving bicycle LOS on existing roadways that are not slated for major reconstruction include:

1. Restriping existing roadways to encroach onto the paved shoulder or narrow the travel lanes in order to provide a shoulder for use by bikes that is at least 4 feet in width (5 feet is preferable) outside a travel lane, leaving lane widths as discussed in the cross-sections in Section 3.2. As always, designers should weigh the other needs of the thoroughfare, especially expected transit and truck use of the thoroughfare, that may limit the feasibility of this approach.

2. Widening an existing shoulder to provide a paved bicycle lane. Where a rumble strip exists, the width of the bicycle lane should be at least 4 feet measured outside the rumble strip.

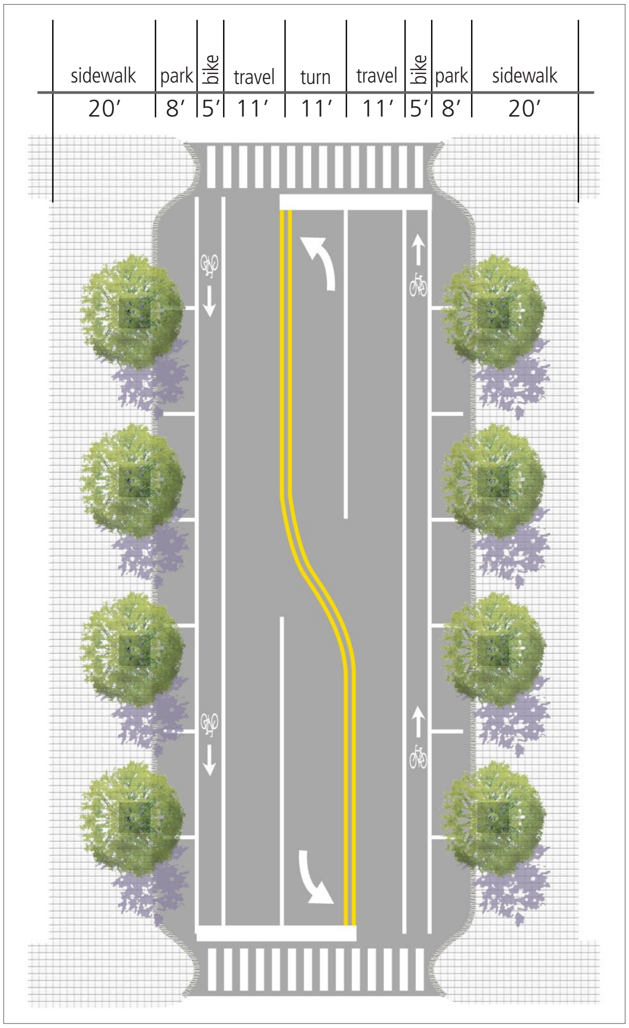


***Figure 3.5** Typical Bicycle Lane Configuration*

Bicycle lanes are conventionally designed as striped space between the traveled way and any on-street parking (or in the absence of parking, the curb).

Bicycle Lanes and Right-Turn-Only Lanes
One of the most common hazards cyclists face is the conflict with right-turning vehicles, which may pass the cyclist before beginning their turn but then come into conflict with the cyclist's path as the turn is being made. Dedicated right turn lanes, which create an expectation among drivers that they have less impedance in making turns, should be located to the right of a bicycle lane that continues through an intersection in order to avoid this conflict. The proper treatment for this condition, as outlined in the 2009 Manual on Uniform Traffic Control Devices, is to continue the bicycle lane on a straight path and provide a transition space (with short dashed lines) through which right-turning vehicles merge into the turn lane.

The use of green color in bicycle lanes, especially to designate special transitions such as these, has been given interim approval by the Federal Highway Administration and is expected to appear in the next full update of the MUTCD following the 2009 version. Though the use of color is not required, it can be a useful means of alerting motorists to the bicycle lane and the need to be aware of cyclists using the roadway.

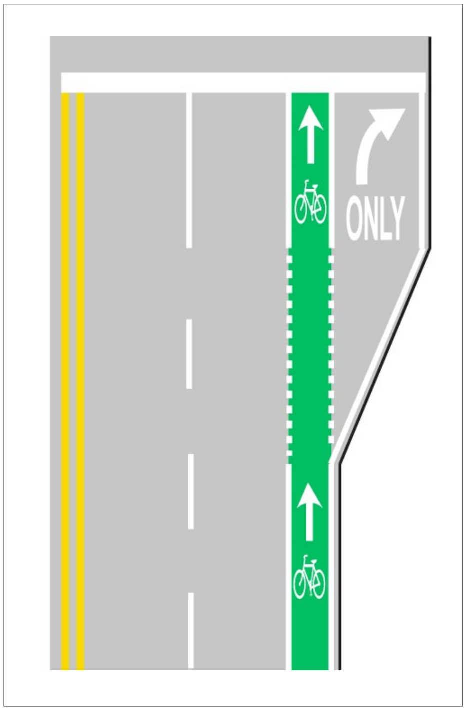


Figure 3.6 Bicycle Lanes and Right Turn Lanes. *Bicycle lanes should be placed to the right of regular travel lanes, but not to the right of dedicated right turn lanes.*

Bike Boxes
An emerging practice in bicycle planning and design is the bike box, or a dedicated space in front of vehicles at an intersection approach that allows cyclists to better position themselves for turn movements. Vehicle traffic is controlled by a stop bar located behind the bike box, and cyclists waiting at a red light wait inside the area if they are making a turn.

Because at the time of these guidelines' development bike boxes were still considered to be experimental in use, they should be used judiciously and consideration should be given to expected bicycle volume and turning movement demand. Bike boxes may not be a suitable approach at intersections where heavy traffic volume without protected left turning phases will force left-turning cyclists to wait against oncoming traffic.

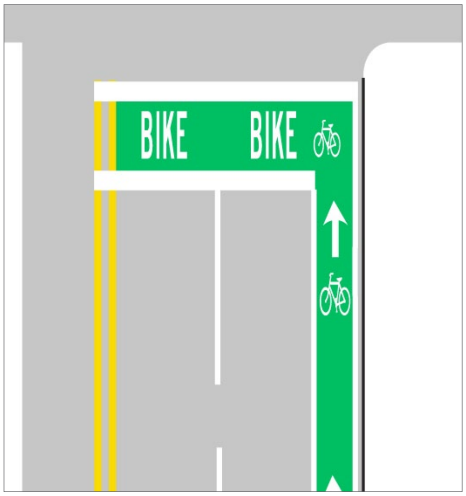


Figure 3.7 Bike Boxes. *These traffic control treatments are growing in use, though they are still experimental. Their advantage is in placing cyclists at the front of a traffic queue, allowing a 'head start' in making turning movements.*

Signage on Bicycle Routes

While vehicle-based route signage per the MUTCD is commonly used, especially when designated routes take turns onto different roadways, this same level of basic wayfinding is less often used for bicycles, even though the MUTCD provides guidance and standards for it.

As a tool for effective implementation of the ARC bicycle system, signage should be incorporated into thoroughfare design and management. Basic MUTCD signage standards are oriented to numbering routes and identifying a change of direction, but recent experimental signage programs have also explored signage that identifies control destinations, distances and other information for the cyclist.

Placement of signs should keep in mind the position of the cyclist relative to most vehicles: typically on the right side of the traveled way and moving at slower speeds. While this means that signs on average can be smaller to be read effectively by the cyclist, it also means that signs need to be placed closer to the roadway and well in advance of upcoming turns or other decision points.

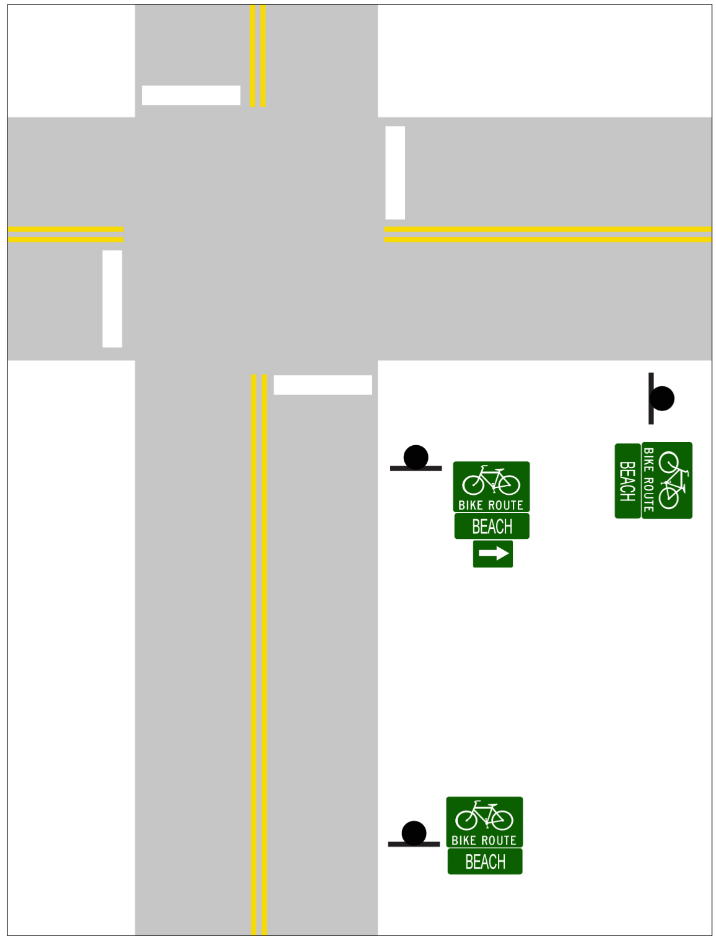


Figure 3.8 Bicycle Signage. *Signage for bicycles as a guiding tool as important as route and wayfinding signage for vehicles.*

3.5 Design Considerations for Freight Corridors

A designated roadway truck system is instrumental for the efficient and reliable movement of freight and the sustainability of the economy of the Atlanta region. Commercial vehicles rely on properly engineered and constructed roads to move through the region in order to deliver freight in a timely and safe manner. Design deficiencies can have significant cost impacts on truck carriers in the region. Tight maneuvering can lead to increased travel times, increased safety hazards, and property damage. Truck-friendly design of an arterial should be based on the following considerations:

- Appropriate functional class
- Connectivity, continuity and accessibility, especially to intermodal facilities and major terminals
- Adequate travel lane width- 12 to 13 feet wide.
- Adequate shoulder width.
- Posted speed limit at least 45 MPH
- Bridge conditions (adequate weight limit, vertical clearance, and bridge sidewalk width)
- Lack of at-grade railway crossings
- Appropriate nearby land use (relatively low amount of travel in residential areas)
- Acceptable crash history
- Adequate design speed (shallow horizontal and vertical curves)
- Signal timing and coordination that favors through movements
- Adequate sight distance on curves, at intersections and driveway approaches
- Adequate turning radii at intersections
- Longer turn lanes and acceleration lanes
- Adequate pavement standards
- Adequate clear zone along route
- Few steep grades and provision of passing lanes on steep grades
- Long transitions for grade changes at intersections and driveways
- Good route signage and wayfinding information on route

RTN facilities that are designated as priority truck routes on the ASTRoMaP need to be adjusted to include these considerations. The following guidance from the Institute of Transportation Engineers (ITE) is taken from their publication, *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* (pages 186-187):

> *The designer must consider lane widths, curb radii, locations of driveways, on-street parking spaces, grades, and other factors in designing intersections. Curb-return radii of different lengths can be used on different corners of the same intersection to match the design vehicle turning at that corner. Compound, spiral or asymmetrical curb returns can be used to better match the wheel tracking of the design vehicle (see the AASHTO Green Book for the design spiral and compound curves).*

Curb radii may need to be larger where occasional encroachment of a turning bus or truck into the opposing travel lane is not acceptable. Large vehicles can still maneuver through an intersection with curb-return radii that are not sufficient, but they typically will need space to swerve out into the adjacent lanes. This is less problematic if the lane widths are 12 ft. or wider, or If there are bicycle lanes or on-street parking lanes along the receiving street, because these may provide increased clearance at the corner for the truck's turn. Otherwise, rear wheels of the truck will go over curbs and may cause damage to sign and light poles or threaten pedestrians waiting along the curb.

In addition to the use of wider travel lanes, if large vehicles need to encroach into an opposing travel lane, a designer may also consider placing the stop line for opposing traffic further from the intersection. This allows large vehicles navigating a turn movement a degree of 'cushion' space in which to straighten their path in the correct lane.

As with all thoroughfare needs, pedestrian circulation and safety must be considered, even on heavy freight corridors serving industrial, commercial and goods distribution-based land uses. The design of intersections involves selecting a corner radius based on the operational characteristics and turning capability of a design vehicle. On freight routes expected to carry truck traffic, this typically means using larger curb radii, which compromises pedestrian safety by requiring longer crossing distances and allowing vehicles to make faster right turns through the pedestrian path. A balance between these two competing priorities can be found when on-street parking, bicycle lanes or other auxiliary space is provided beyond the basic travel lane width. This provides space in which turning vehicles can encroach without coming into contact with the curb or pedestrians waiting at the corner to cross. When the pedestrian path is clear, this shortens the distance the pedestrian must cross.

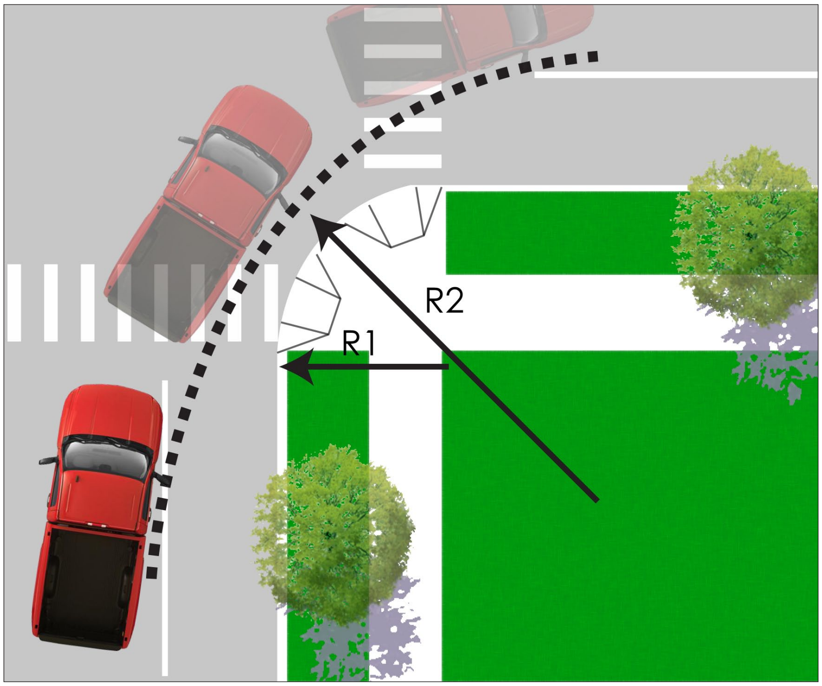


***Figure 3.9** Physical and Effective Intersection Curb Radii*

Intersection design involves selecting a curb radius (R1) based on a design vehicle. However, the effective radius (R2) defines the path that vehicles may follow from one travel lane to another. In this example, on-street parking allows vehicles to navigate a wider path without colliding with the corner curb. This is important with large trucks and other heavy vehicles as it can keep a smaller radius and give pedestrians a shorter crossing distance.

3.6 Design Guidance for Multi-Way Urban Boulevards

As the region continues to grow, innovative design may be necessary to respond to local needs, preferences and mobility. Multi-way boulevards can provide both a major axis for movement of people and vehicles and to offer a signature public space. The complexity of their design (and especially how this handles large volumes of vehicular traffic) led to a decline in their use, although the growth of the New Urbanism movement and a rediscovery of historic examples has led to a renewed interest in them.

This section describes examples and design characteristics of multiway boulevards, with a particular focus on the implications that design has on traffic operations and safety. They should be considered as a potential design option for major thoroughfares, but a designer should have a more thorough understanding of how they can be expected to perform under different conditions. It draws on information and discussions provided in *The Boulevard Book: History, Evolution, Design of Multiway Boulevards* by Allan Jacobs, Elizabeth MacDonald and Yodan Rofé, which is considered to be the definitive publication on this type of street design from the standpoint of physical planning and urbanism. Although its focus is on boulevards as an option for street design in a broader urban context, their study does explore more engineering-related concerns of boulevards, such as traffic and safety.

The general design features common among boulevards are local land use access lanes that are separated from the main travel lanes of the thoroughfare street, usually by a landscaped median. As illustrated on the opposite page, the traffic flow of the access lanes is typically one-way, parallel to the main travel lanes adjacent to them.

Major North American Examples

Octavia Boulevard, San Francisco. Octavia Boulevard was designed in the wake of a project to remove a portion of the Central Freeway in San Francisco. The multiway boulevard section of Octavia extends from Market to Fell Streets, a length of four blocks, and carries approximately 30,000 vehicles per day.

Figure 3.10 *Octavia Boulevard, San Francisco.*

The Esplanade, Chico, California. The Esplanade was planned as a multi-way boulevard in the 1950s, replacing streetcars along an historic farm-to-market road that had evolved into Chico's main street. It carries between 20,000 and 24,000 vehicles per day, according to the most recent available traffic counts. The length of the multiway boulevard is twelve blocks.

Ocean Parkway, Brooklyn, New York. Ocean Parkway is one of New York's great suburban boulevards planned in the late 19th century by Frederick Law Olmsted and Calvert

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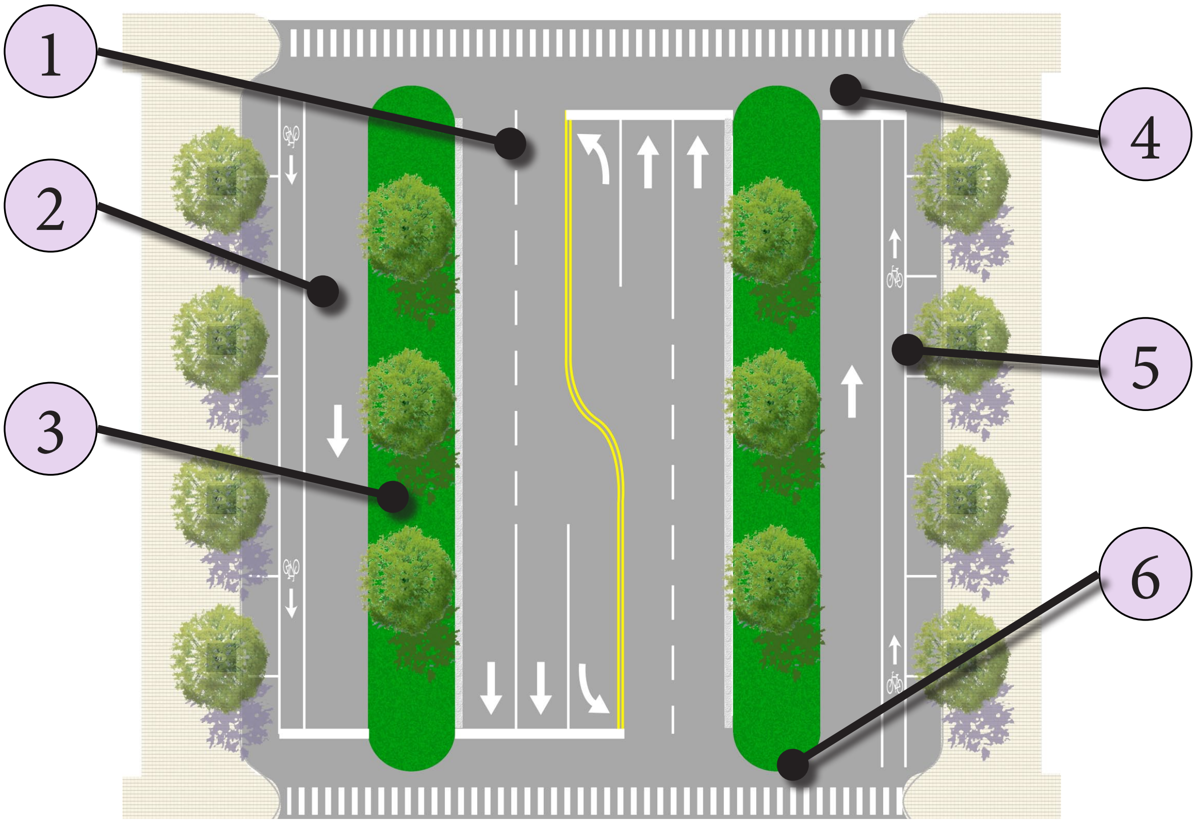
Typical Multiway Boulevard Design



1. Regional and other through trips are carried in the boulevard's main travel lanes. In many examples, these do not look significantly different from a more typical arterial cross-section without the side medians and access roadways. Here the boulevard mainline is illustrated as a typical four-lane arterial with left turn storage lanes.

2. Local and service-based trips accessing properties use parallel side roads (or access lanes). These generally feature one-way traffic flow in order to increase the safety and predictability of traffic movements to and from the lanes.

3. The mainline and access lanes are typically separated by medians, which often feature landscaping and contribute to the boulevard's aesthetic appeal as a community amenity.

4. Traffic operations must be detailed when the project is designed, especially on how to treat traffic control of access lanes and movement between the access lanes and the mainline.

5. Bike lanes and parking are shown here. Although bicycle lanes may not always be provided with dedicated space, part of the interest planners have had in the boulevard design is in its ability to provide on-street parking while removing the friction and capacity loss that parking causes in the outer lane.

6. Medians can be extended such that the crosswalk passes through them, thus providing additional pedestrian refuge for longer crossings.

Vaux. Construction of the boulevard had been completed by 1880. With the advent of vehicle traffic, it became one of southern Brooklyn's major traffic thoroughfares, carrying approximately 55,000 vehicles per day today.

K Street, Washington, DC. K Street is one of downtown Washington's main streets, only blocks away from the White House. Because of this heavy business focus, pedestrian volumes are high, although the street carries around 30,000 vehicles per day. The multiway boulevard section of K street extends between Mount Vernon Square and Washington Circle, a length of 12 blocks.

Practicality of Boulevards in Different Traffic Environments

In the United States, transportation and traffic engineers continue to emphasize a need for reducing vehicular congestion and delay as a preeminent objective for transportation policy. Although a more holistic understanding of urban mobility has been emerging in the last two decades, largely coinciding with a wave of urban revitalization that has seen added population and vitality in many central cities, the imperative of traffic engineering remains largely focused on increasing the flow of vehicles on urban streets and highways.

With this in mind, it is important to consider the traffic operations implications of multi-way boulevards.

- In terms of corridor movement, the 'mainline' boulevard lanes carry regional traffic, or traffic passing entirely through a corridor, as well as traffic originating in or traveling to a given location along the corridor. The 'local' lanes function as distribution for local access and service needs. Perhaps the greatest advantage of this configuration is that it helps to separate different trip types—and different trip speeds—from the same traveled way, potentially alleviating many of the safety problems caused by different speeds along arterial roadways.
- As with any arterial thoroughfare, traffic control for the boulevard must be configured to balance the regional needs of the thoroughfare with those of intersecting local and collector streets. Boulevards add complexity to traffic control in introducing parallel traveled ways that may either be controlled in the same manner as the mainline traffic or that may be given a separate form of control (for example, the parallel access lanes may use the same signal phasing for movement as the mainline, they may be stop-sign controlled, or they may have separate signal phasing altogether).
- Traffic control also must consider that the multi-way boulevard is a wider cross-section, and providing adequate green signal time and clearance interval time for cross-street traffic may mean that a greater portion of the signal cycle length must be given to cross-streets. Whether this is accomplished with less green time provided to the boulevard thoroughfare's traffic or by using a longer overall cycle length, it is likely that average traffic control-related delay will increase for thoroughfare traffic.

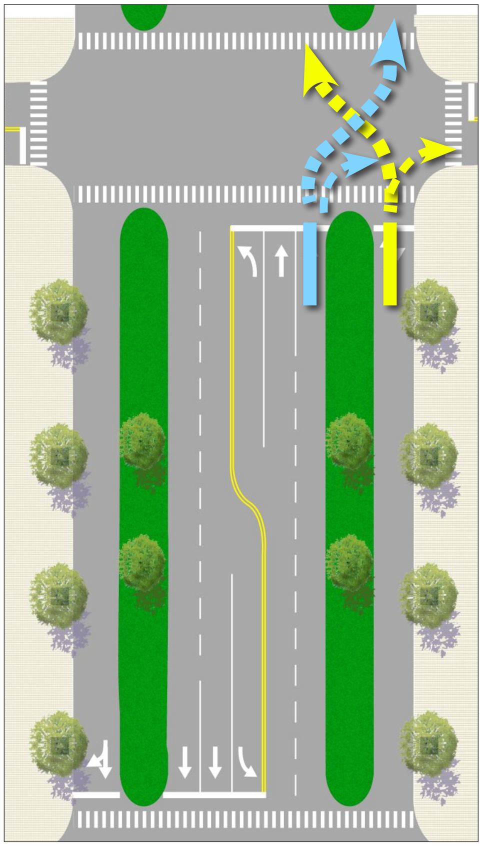
Engineers also express concern over the safety of multiway boulevards, noting that the separation of mainline and access lanes cannot be preserved indefinitely and the two traffic streams must mix at some point. The nature of safety problems along multi-way boulevards seems to be tied to where and how the transitions between the two are designed. If there is a strict separation of the two everywhere but at cross streets, the intersections will be places where motorists will attempt movement between the access streets and the mainline; traffic control must take this into account (either by allowing these weaving movements with separate signal phasing or by prohibiting certain turn movements from different parts of the boulevard).

In addition to the implications the multi-way boulevard has on traffic control, the needs of transit and non-vehicular modes must be considered as well. Boulevards offer a distinct advantage for pedestrians in that they provide greater separation between sidewalks and higher-speed traffic on the boulevard mainline, and the use of access lanes as conduits for slower-moving vehicles, potentially including local buses, may provide a better environment for transit access.

Nonetheless, corridor and small-area plans in maturing suburban areas around the United States are beginning to consider multi-way boulevards as a way of providing for the complex needs of urban and suburban arterial streets while reserving a significant portion of the roadway's space for vehicular mobility. The examples on the following pages describe several different potential boulevard applications, with an emphasis on advantages and disadvantages to each. They are also presented along with recommended off-thoroughfare treatments that may be necessary to help ensure that the multi-way boulevard design sustains a basic regional mobility function.

The diagrams presented here illustrate three different configurations of access lanes and mainline, with a particular focus on how the traffic from each of the two interacts. Even only among the examples of multiway boulevards in the United States, such traffic configurations vary, based mostly on the flexibility of the original design and on the evolving needs of the roadway. This interchange between mainline and access lane traffic is the critical factor in boulevard design, and it is seen most notably at intersections.

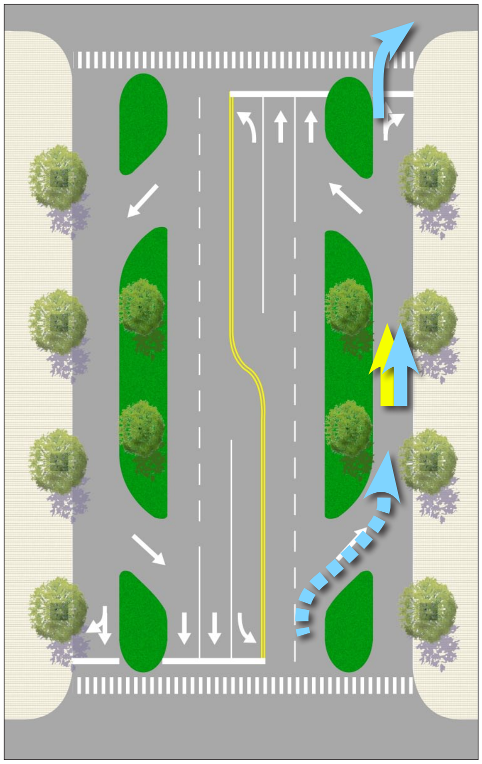
These are only three basic boulevard configurations with regard to intersections, yet they represent the major concerns of multiway boulevards and mixing traffic. Each could feature signalized intersections and signalized access lanes. However, depending on traffic conditions, each could also feature stop-sign-controlled access lanes. This is likely to be determined in detailed, case-specific engineering studies that evaluate existing and projected traffic, future land use plans, and other safety and roadway design concerns such as vertical curves and the angles at which key cross streets intersect the roadway.



Circulation Pattern 1: Intersections used as transitions

In this design, the access lanes are entirely separate from the mainline and traffic only has an opportunity to move from one to the other through intersections. This suggests that the access lanes need their own signal phases at intersections and that traffic on cross-streets must be stopped behind the access lanes. On very wide boulevards, this likely leads to an increase in signal cycle length, not only because of a greater number of phases accommodated, but also because of an increase in clear time throughout the cycle to address a larger intersection footprint. It also means that no right turns are allowed on red lights from any approach, excepting perhaps from side streets onto the access lanes.

The advantage to this configuration is that it eliminates safety conflicts by strict separation of mainline traffic, access lane traffic, and side-street traffic, allowing a greater range of movements (but at the cost of signal delay).

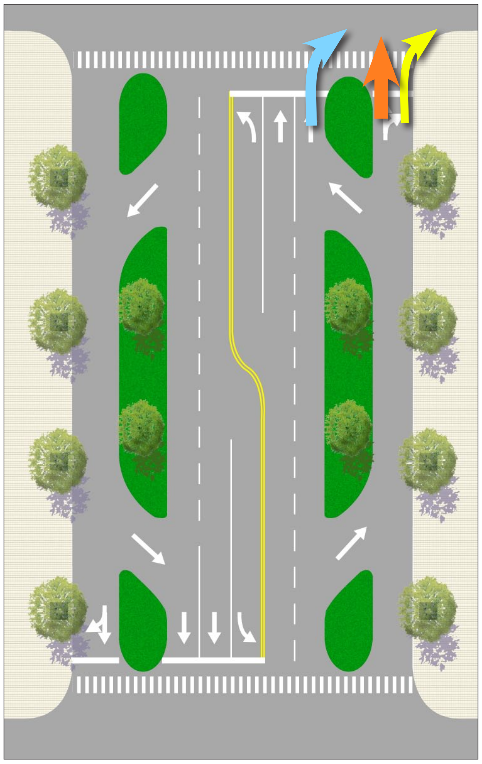


Circulation Pattern 2: Access lanes handle all right turns

In this pattern, right-turning vehicles need to exit the mainline in the entry slip preceding their intersection and then use the slip for a right turn. Right turns are not allowed from the mainline at cross-street intersections.

Vehicles using the access lanes wishing to return to the mainline must use the first available entry slip. Vehicles may turn right or proceed through the intersection on an access lane, but they may not make a jog to the left through the intersection to transition back to the mainline.

The principal advantage of this configuration is that the mainline through lanes have higher capacity; right-turning traffic is effectively removed from them. However, the safety implications of this must be considered, and high turning volumes may justify a separate phase for access lanes to avoid conflicts with left turns coming from the opposite direction.



Circulation Pattern 3: Right turns allowed from mainline

This pattern tends to be used when traffic volumes on the mainline are higher. To avoid conflict with right turns from the mainline and access lane traffic, through movements may be restricted from the access lanes (through curb alignment, for example).

If access lane traffic is to be allowed to move through intersections, it is likely that the access lanes need to be given an independent signal phase from the mainline, during which no right turns on red are permitted from the mainline.

The complexity of traffic control associated with this pattern most likely means that overall signal cycle lengths are greater, resulting in additional delay for heavy movements. For this reason, designers may wish to avoid use of this pattern when crossing streets also carry heavy volumes.

The table below outlines different operational conditions that may occur on a boulevard, whether from the land use patterns on the road or from regional traffic conditions, and what implications these have on traffic control, safety and further land development and local access.

Condition	Traffic Control Implications	Safety Implications	Land Use/Local Access Implications
Access Lanes have low traffic volumes	Lanes may be able to be stop-controlled or can share a signal phase with mainline. Right turns from mainline may be permitted.	Vehicle-vehicle and vehicle-pedestrian conflicts less likely, though low volumes on access lanes may encourage higher speeds along them than desired.	This is good for accessing on-street parking, although boulevards with retail and business uses tend to have higher access lane volumes.
Access Lanes have high traffic volumes	Lanes may need to have their own signal phasing; this has an impact on delay for dominant movements in the intersection.	Crossing paths from mainline and access lane movements may create conflicts. Pedestrians face heavy traffic volumes and their crossing should not be obscured by vertical elements.	The friction from accessing parking from the access lanes may make traffic movements in the access lanes slow. Retail and business uses along the boulevard may not be able to allow front-entrance service and deliveries due to how often these vehicles park on the street.
Cross-streets have high volumes	Both the thoroughfare mainline and the cross-street demand longer signal intervals; access lanes may not be able to have separate phases	Pedestrians must be given high priority, especially if access lane traffic cannot continue through the intersection—access lane traffic will need to make right turns to exit the access lane and may be inclined to do so quickly.	Side and alley access may be complicated by long queues along cross-street at intersection approaches. Shared access points and cross-access easements may be necessary for land use districts that do not feature building to the front lot line.
Corridor expects transit service	Median guideway transit likely not affected by boulevard design. Local (curbside) transit service will likely need to use access lanes to be able to reach curbside transit stops, suggesting a need for allowing through-moving access lane traffic.	Buses merging into and from access lanes may have difficulty merging back into the roadway.	Front-side access to properties from the street is highly important; transit-heavy boulevards are likely most feasible in urban and central city contexts.
Corridor expects heavy truck use (and local truck access)	Right turns are likely to be allowed from mainline so that trucks do not have to navigate access lanes. This in turn means a need for more restrictive control of access lanes at intersections in order to avoid conflicts with mainline right turns. Otherwise, trucks may need to be prohibited from making right turns through the boulevard extent of the corridor.	Access lane traffic merging back into boulevard mainline from slip lanes may come into conflict with faster moving trucks; for this reason landscaping may need to be controlled around the entry merge area to allow entering vehicles ample sight distance.	Extensive landscaping may not be as feasible within the boulevard cross-section, meaning that desired levels of landscaping and aesthetics may need to be partly borne on private property (in turn suggesting building setbacks).

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Section 4
Coordinating with Context and Community

In developing thoroughfare projects, further coordination is needed at both local and state levels. Thoroughfares may have a regional function but they pass through local jurisdictions where comprehensive plans, zoning and other development regulations affect how land use and thoroughfare roadways interact.

This section provides tools for the local governments to use in participating with ARC and transportation agencies in thoroughfare management. It focuses on the connections between access management, street network and corridor development.

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4.1 Supporting Local Street Network

Although the cross-section of the thoroughfare must be designed to accommodate a series of trade-offs and competing priorities, a broader approach to thoroughfare management takes into account a larger transportation system and how streets off of the thoroughfare can help to satisfy travel demand needs and organize local trips from regional trips more effectively. This consideration is not often made in arterial roadway projects, largely because of restrictions on how transportation funds can be used and limitations on agencies' abilities to spend these funds outside of roadways within their purview. However, local streets are an important component of land use and local access, and as such should be integrated into an overall corridor plan. Local governments responsible for land use decisions can help with this, defining ways in which street network addition can be a part of the development process.

The diagrams on pages 80 and 81 illustrate the typical process of a thoroughfare's evolution from a rural highway into a more developed land use context and point out key moments of change. The conventional response to addressing land development along thoroughfare corridors, especially when the thoroughfare roadway reaches critical capacity deficiencies, is to widen the roadway. In addition to the high cost of doing this, due both to roadway construction and right-of-way acquisition, this approach to adding thoroughfare capacity may disrupt the balance between roadway design and land use context that exists in established places.

These diagrams provide an instructive understanding of how a local government can begin guiding development to provide the local network that begins to emerge in the later slides. Generally speaking, development standards need to accomplish the following principal steps:

1. Future location of streets should be identified, at least generally, so that critical street alignments and connections can be understood by both development review agency staff and the developer. The preferred configuration for this network is in streets that are parallel to the thoroughfare, allowing local traffic to make the same general movements as those that the thoroughfare handles and then to transition back to the thoroughfare for regional travel at controlled access points.

2. Where possible, right of way for new network streets to cross the thoroughfare should be designated based on a preferred spacing of intersections (which may vary based on whether the corridor is in urban or suburban conditions). Although this does not necessarily mean that right-of-way must be acquired outside of development of the property, it does imply that a defined alignment for the cross-streets is needed.

3. Development standards should be revised to eliminate permission of multiple driveways from the thoroughfare roadway onto a single parcel, or, ideally, to eliminate mid-block driveway cuts altogether if cross-streets that could allow side access are in place.

The Conventional Evolution of Thoroughfare Corridors

The steps of a corridor's evolution shown in these diagrams can help a community understand the typical cycle of land development and corridor capacity improvement; they also illustrate where the balance of development and roadway capacity leads to impacts on private property and potentially established com-

With no development outside of the existing town center, the thoroughfare roadway has been built to the capacity needed by regional travel demand.

As additional development begins to occur, however, the thoroughfare's capacity is eventually exhausted. This is a common occurrence in a growing region, and the typical response is to add capacity, or to widen the roadway. Widening the roadway through existing centers may have impacts on those communities, however, especially due to the need for additional right-of-way.

There is a consequence to added capacity, however: more and more land along the thoroughfare corridor now has the infrastructure to support a more intense development, something that becomes increasingly desirable for landowners as property values increase along the newly-widened roadway. This development, accessed by the same thoroughfare, generates additional traffic that the thoroughfare must absorb.

munity character. Local governments responsible for development review should assess these steps and understand the key decision points tied to them that may be within their control. As always, it is critical for local governments to coordinate and communicate with GDOT and other transportation agencies in developing policy and regulations that affect thoroughfare corridors to ensure that all stakeholders have identified their interests, obligations and critical needs.

As enough of this new development happens, its traffic impact in turn exhausts even the added capacity on the thoroughfare and leads planners and engineers to widen the road yet again. As before, the existing, established communities bear the impact of this, and traffic and travel patterns on the thoroughfare become more complex as it handles a mix of local and regional traffic.

There is an alternative to continuing along this same path: local plans and development regulations can guide development in a way that adds local street network and uses this network to process some of the traffic impact from new development. This alleviates the burden on the regional thoroughfare in handling all trips, both local and regional.

In addition to helping to 'sort' traffic operations and provide an alternative for local trips, the enhanced street network also changes the environment for land development: it now has a series of local streets on which it can be based, allowing a greater diversity of development types (including compact forms of development that encourage walking, cycling and transit use, potentially further reducing vehicle traffic impacts).

By creating a true network of supporting streets along the thoroughfare corridor, the need for future widening can be reduced, even with added development along the thoroughfare corridor.

Local governments can begin to guide the addition of this network relative to the steps identified in the diagrams on the previous pages. The following are major actions that they could take when each step of the corridor's redevelopment happens. The intent of taking these steps is to guide the corridor's development in a way that does not lead to major impacts, either on private property or community character.

Step 2. When development along the thoroughfare corridor necessitates widening, established communities need to begin developing a street network master plan to establish new street alignments. Adopted LCI studies throughout the Atlanta region have established a precedent for this in identifying new street connections to occur in conjunction with new development. This allows future development to reserve right-of-way for these streets or at least configure development site plans in such a way that streets may later be added.

Step 3. Development applications that are submitted after the street master plan's adoption should follow the master plan for providing access. For example, the big-box retail stores shown in the Step 3 image may need to use (and at least partially provide) public streets that intersect with the thoroughfare as their means of access, even if they continue to face the thoroughfare roadway, instead of direct driveway access to the thoroughfare. Some properties may continue to use direct driveways as their means of access, but the street master plan allows the local government development review process to begin managing access by tying it to an emerging parallel street network.

Step 6. As new development begins to depend more heavily on the parallel street network for access, local governments need to refine their expectations for what the parallel streets will be. Standards should be established to regulate building form, relationship of buildings to streets, and ways that these streets can serve a variety of travel modes. This is intended to reinforce the thoroughfare corridor as a regional access route: it can and should remain a safe and walkable street, but a more sophisticated definition of the local streets can help to utilize the street network as a true set of supporting facilities.

4.2 Implementing Access Management

It will be important for thoroughfare designers to coordinate with ARC and GRTA policies on access management as well as GDOT and local requirements. As suggested in section 4.1, local governments should treat access as a critically important element in the dynamic relationship of transportation and land use. Developing access management policies and regulations to anticipate a corridor's evolution and proactively manage the impact of added growth and development along the corridor can help to extend the life of a roadway's capacity.

Local governments should develop access policies and regulations within the purview of their development review authority, facilitating coordination of development with access placement, consolidation and closure. The diagram on page 84 illustrates a series of access management approaches that can be applied in different land use contexts. These are described briefly as follows:

Rural. In many rural contexts, access management is not needed: properties are large and can allow direct driveway access without creating problems of traffic and safety problems of insufficient spacing. Typical concerns over rural land patterns and driveway access, such as the use of flag lots in subdivisions and platting, should be addressed in these areas to minimize 'clusters' of multiple driveways and to ensure that driveway placement respects sight obstructions, roadway curves, or other potential safety problems.

Transitioning Rural. Rural contexts that have experienced growth and are developing into suburban land patterns should begin to focus on driveway spacing and future shared access. Land development regulations may either specify access points or a minimum spacing standard, but they should also provide standards on how access from one side of a property to another is to be established and secured in the event that properties do not have immediate access available through the designated points or minimum spacing requirements.

This is also an appropriate context for beginning to establish parallel street alignments and right-of-way, as discussed in Section 4.1. The overall dimensions of a supporting street network should be generally consistent with the intended land uses in a local government's comprehensive development plan. If this designates rural or other very low-intensity development as the future land use, a full street network with parallel streets to the thoroughfare may not be required, but at a minimum cross-streets should be considered to enable side and rear access to properties.

Suburban. Suburban contexts, especially more mature suburban contexts where smaller properties along thoroughfares have resulted in a more frequent driveway spacing, are locations where a local government will likely need to be the most proactive about access management implementation, requiring the closure of duplicate driveways on a single parcel and helping to negotiate cross-access easements and other alternative arrangements when needed in order to ensure a more regular driveway spacing.

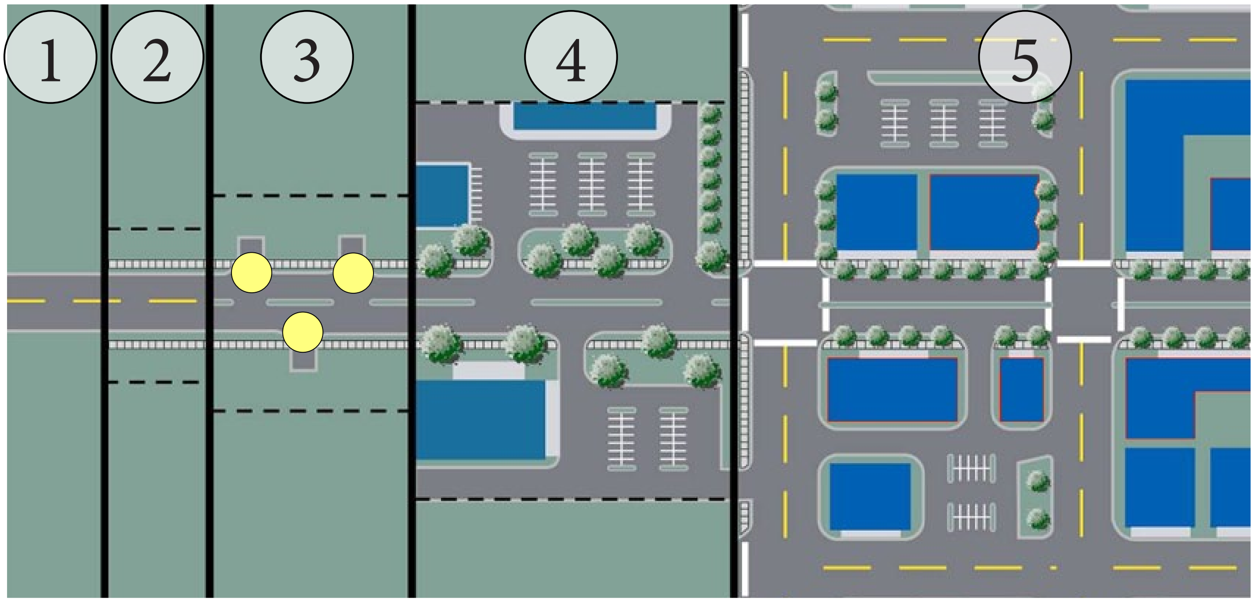

Figure 4.1 *Access management begins to emerge as a more complex set of concerns and priorities as development intensity increases and land use patterns become more varied. In the most rural settings (Approach 1) formal access management may not be needed. In more developed areas (Approaches 4 and 5), access management involves coordination of driveways for multiple parcels and the use of parallel street network to provide access.*

	Approach	Applicability
1	No management: applies in rural contexts with limited driveway access	Local roads with relatively low volumes (ADT > 4,000; rural contexts)
2	Right-of-way management: applies along major roadways where growth is expected	Higher-volume roads but in predominantly rural, low-density settings (rural and high-speed suburban contexts).
3	Access identification: Specifies points where access and intersections are allowed	Existing roads where development is expected; capacity projects and new roads (suburban and urban contexts)
4	Driveway-based management: Organizes access for multiple buildings and properties for safe spacing	In established built environments without regular side-streets, or in between these side streets where they exist but are not on a regular block-level spacing (suburban and urban contexts).
5	Public street-based management: relies on existing side streets to provide service access instead of driveways off of a corridor's principal road	In established built environments with regular side-street spacing (urban contexts)

For additional resources:

- www.atlantaregional.com
- ASTRoMaP

4.3 Mitigating Impacts of Large Intersections

Intersection design is a major factor of ensuring that thoroughfares remain responsive to all roadway users, especially pedestrians. Typically intersections that are designed to carry high volumes are more difficult for pedestrians to cross and their larger physical footprint has greater impacts on community context. However, the thoroughfares of the SRTS serve a regional function and as such may need to feature large intersections and grade-separated interchanges when expected travel demand exceeds the capacity of smaller, more community-sensitive intersection designs.

Highway design begins to consider grade-separated interchanges when travel demand on intersecting roadways causes traffic to increase beyond what can be accommodated in an at-grade intersection. Increases in volume, especially for heavy turning movements, increase the physical size of at-grade intersections to a point of no marginal return in capacity, or at which increases in lane capacity are offset by longer signal cycle phases, greater time for cycles to clear, and even spillback congestion from large downstream intersections.

Figure 4.2 *Double-roundabout interchange at Maryland Highways 100 and 103. Note that channelized right-turn bypasses of roundabouts are not pedestrian-friendly and increase the interchange's footprint.*

However, grade-separated interchanges on regional thoroughfare arterials should be approached with care and discretion. They carry significantly higher costs than at-grade intersections and, once implemented, change the character of the thoroughfare greatly toward high-speed mobility.

Figure 4.3 *The Keystone Parkway/116th Street double roundabout in Carmel, Indiana.*

More recent designs of grade separations have sought to lessen the impact these kinds of interchanges have on surrounding community context. Roundabout intersections are beginning to be used more commonly to control traffic where freeway access ramps intersect with a surface street. Although these designs often continue to favor vehicle movement, the concept is continuing to evolve to take advantage of the traffic calming and aesthetic features of roundabouts as a way to minimize the disruptions that grade separations have on community character and land use fabric. One example is in Carmel, Indiana, which has used roundabout intersections extensively as a traffic control and place-based transportation infrastructure approach since first installing one in 2002. The conversion of its Keystone Parkway thoroughfare to a limited-access roadway included grade separation of several intersections, but the local government sought an alternative to a traditional diamond interchange.

The resulting design, shown on the right, uses a depressed freeway cross section and allows the cross-street to pass over the freeway at a consistent grade. Traffic control is handled through a double roundabout in a manner similar to the Maryland interchange, although a more extensive span over the freeway helps to maintain the scale of the surface roadway and minimizes visual disruption. From the standpoint of vehicle traffic and operations, this approach also brings the benefits of roundabouts to the grade-separated interchange: increased vehicle-carrying capacity and minimized delay due to the removal of traffic signals, a reduction in crashes due to the roundabout's simplified system of conflict points, and, in this case, a reduction in right-of-way needed when compared to a traditional diamond interchange.

Figures 4.4 and 4.5 *Keystone Parkway double roundabout interchange, Carmel, Indiana.*