5. INTERSECTIONS

Designing Intersections

This chapter includes the guideline recommendations with the most potential for conflicts and tradeoffs – the ones for designing intersections. In addition to Tables 5.1-5.5, which provide information about most design elements related to the various possible intersection types, this chapter also describes Charlotte's new approach to evaluating the level-of-service (LOS) at intersections for motorists, pedestrians, and bicyclists.

Designing street segments often involves tradeoffs (particularly when retrofitting

streets without ample right-of-way), but designing intersections is even more complicated, for the following reasons:

- There are a large number of possible intersection types, due to the many combinations of street types. Furthermore, each intersection will potentially vary from the "ideal" or "preferred" design, particularly when the requirements of specific land use contexts are also considered.
- Intersections are where the transitions between different street types are most likely to occur. These transitions can be problematic, as they present potential conflicts between those elements that might support one street type over another.
- Vehicular traffic delays occur most often at intersections, so engineers typically attempt to reduce travel delays by increasing capacity at intersections. However, intersections are also where pedestrians are expected to cross the street. Conflicts are therefore created, because capacity increases for motorists often lead to lower LOS for other travelers (pedestrians and cyclists). Simply put, each additional turn lane or through lane makes crossing that intersection by foot or bicycle more difficult and is also more likely to directly affect the adjacent land uses through loss of right-of-way. This means that working through design tradeoffs is both more difficult and potentially more important for intersections than for street segments.

- Given the importance of intersections for congestion relief, pedestrian crossings, and commercial interests, these locations are also often where mismatches between transportation and land uses occur.

All of the above issues combine to make intersection design the most likely point of contention between traffic engineers, land use planners, urban designers, the traveling public, and those people who live and work near an intersection. The information contained in this chapter and in Appendices A-C is intended to provide guidance through the myriad tradeoffs associated with intersection design and to support the Urban Street Design Guidelines' objective of providing safer and more convenient travel for all modes.

Level of Service at Signalized Intersections

A consistent definition of the *verb* "intersect" is to "cut or divide by passing through or across". A consistent definition of the *noun* "intersection" is "a place where two or more roads (or streets) meet" or "a junction of roads (or streets)." Common synonyms for the noun "intersection" include crossroads, crossing, or corner. However defined, an intersection is where motorists, pedestrians, and bicyclists come together in their travel, and they compete for the use of the same space or signal time.

A motorist's interest in maintaining a smooth flow through intersections – to not have to wait 1 to 3 minutes for the next green signal phase at a signalized intersection, or to find a safe gap between vehicles traveling on the street perpendicular to his or her approach – collides with the interests of pedestrians and bicyclists to travel across or through the intersection safely. Motor vehicles

At this intersection, the competition between motorists and pedestrians for the same space is particularly pronounced. Vehicles making this right turn and pedestrians wanting to cross in the crosswalk are in obvious conflict, especially since right-turns-on-red are allowed.

traveling through, or making right or left turns will be competing for the same roadway space or signal green time. Pedestrians will be looking for shorter crossing distances and, especially, to not find themselves in conflicts with turning vehicles. Bicyclists will be looking for separation from motor vehicles.

As discussed earlier, intersections are also much more likely than segments to be the places where there are capacity deficiencies. This is why more through or turn lanes are added at intersections. A segment with only two travel lanes in one travel direction may widen to four lanes at an intersection, for example.

There is an ongoing, intense pressure for traffic engineers to add lanes at intersections, so as to reduce delays for motor vehicles traveling during peak travel periods. However, the decisions made about enhancing traffic LOS conditions during peak traffic periods will affect the cross-section of the intersection for all hours of every day and night. This is why, as part of these Guidelines, CDOT is changing the analytic process and the City will be changing the stakeholders' expectations about the physical and operational design of intersections.

To that end, CDOT has devised methodologies for determining LOS for bicycles and pedestrians at signalized intersections. The technical details of these methodologies can be found in Appendix B, and a more detailed description of their application is found in Appendix A.

Appendix A describes the analytic process and multi-modal assumptions that will be used for any evaluation of or construction project for a signalized intersection—anyone involved in such analyses should be familiar with and apply this approach.

The intersection of Sharon and Fairview Roads (above): capacity increases made for motor vehicles have made pedestrian crossings in this multi-use area much more difficult.

The intersection of Randolph and Wendover Roads (right), is an example where capacity increases for motor vehicles have affected pedestrian level-of-service, though the land uses and their orientation to the intersection make the issue less obvious.

The bicycle and pedestrian LOS methodologies, described in Appendix B, are used—in conjunction with existing traffic analysis methods—to evaluate how a signalized intersection performs for all travelers. Traditionally, the concept of LOS has only been applied to motor vehicles and then mostly related to traffic congestion or reduction of motorists' delay. The types of improvements that result from such a single mode approach, however, are not necessarily benign for other travelers or for the City. For that reason, these Guidelines introduce the approach wherein all users' interests are evaluated when making decisions about intersection design.

The Guidelines' multi-modal approach to intersection planning and design includes a "trigger" or threshold for considering an intersection for potential capacity increases. As outlined in the technical table in Appendix A, that threshold value varies according to the street type. Since Main Streets and some Avenues are intended to be much more pedestrian-oriented than are Boulevards and Parkways, it stands to reason that the threshold required to investigate potential vehicular capacity increases at these intersections should be set higher, to avoid unintended negative impacts on pedestrians, cyclists, and adjacent land uses. Therefore, the threshold volume/capacity (V/C) ratio for motor vehicles is not only higher, but it will also be measured for two hours, rather than for only the peak 60 minute period.

Using a higher threshold doesn't mean that congestion is ignored, only that its influence is tempered to meet other street design objectives. This approach allows careful consideration of the likely impacts of potential improvements on pedestrians, cyclists, and the adjacent land uses, *prior to making design decisions based solely on traffic congestion.*

Once the threshold for a *given intersection type is met* and an intersection is listed as "saturated", then the intersection will be evaluated as to the types of options that might be implemented and the potential impacts of those options. The pedestrian and bicycle LOS methodologies will be applied to meet the target pedestrian and bicycle LOS for that specific intersection type.

In some cases, meeting the pedestrian and bicycle LOS targets may prove very difficult if vehicular capacity increases are provided. The LOS measures for these modes are primarily determined by the number of lanes that must be crossed on foot or by bike and the physical and operational (signalization) elements included to aid in crossing. Depending on the land use context and other functional aspects of the surrounding street network, it may not be possible to both expand capacity and maintain or enhance other travelers' LOS. Where that occurs, the planning and design

team should thoroughly evaluate the overall objectives for the intersection in relation to the rest of the network and the City's goals for provision of multi-modal streets. In many parts of the City, the decision may well be that the capacity improvement cannot or should not occur.

Sight Distance at Corners

Once the decision to make changes at an intersection occurs, the tables found in this chapter are used to decide how, and in which combinations, various design elements should be provided in the design of that intersection. An important design consideration that is not, however, included in Tables 5.1-5.5, is corner sight distance, which impacts the relationship between the street and the buildings adjacent to it.

Sight distance refers to the ability of motorists to see other vehicles or objects in the street without obstructions. Sight distance is applicable where motorists need to decide whether to stop or whether to enter an intersection.

These Urban Street Design Guidelines have some objectives that will change the way that CDOT's current sight distance recommendations are applied. In general, CDOT's Sight Distance

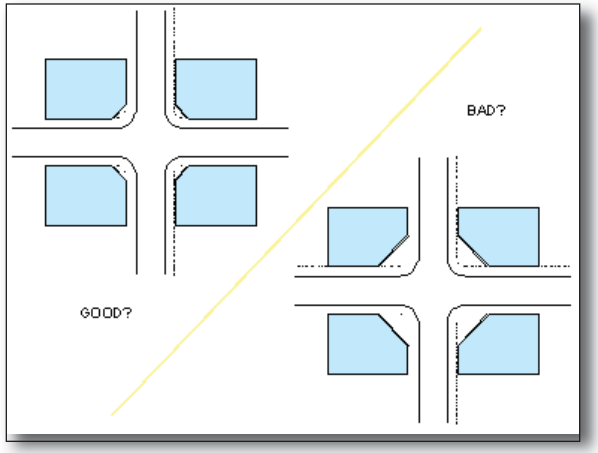


Figure 5.1. Sight Distance Triangles in Urban Locations: Potentially Conflicting Objectives?

Policy will be applied to all intersections, although there are some instances that will call for using the policy with the greatest possible flexibility. For example, in a very urban or pedestrian-oriented context, there may be a conflict between sight triangles (the space available for drivers to see each other as they approach an intersection) and the desire to have buildings situated close to the street or even directly behind the sidewalk (Figure

5.1). Even with the wider sidewalks and amenity zones found in these areas, meeting the requirement of a strictly applied sight triangle for an adjacent intersection may not be possible or desirable. Likewise, the requirements for departure sight triangles along streets (when pulling out of side streets or driveways), if applied strictly, may conflict with the desire to provide bus shelters, street furnishings, or enough street trees of sufficient size to create a canopy.

On the other hand, on streets designed for other contexts, where higher speeds and land uses with deeper setbacks are found, a stricter application of the sight distance recommendations is required. In those cases, the traditional viewpoint of maintaining adequate "room for error" by motorists is necessary for maintaining safety - a worthwhile objective and intended outcome for all streets and intersections defined within these Guidelines.

In summary, corner sight distance must be applied carefully, to avoid unintended and potentially negative consequences. As with many of the recommendations contained within these Guidelines, those designing a street should make an effort to best match the design outcome to the surrounding context.

Traffic Signal Timing

As described earlier in this chapter, designing the physical elements of an intersection to satisfy multiple objectives related to motorists, pedestrians, and cyclists can be challenging. Likewise, there are many tradeoffs to consider when timing traffic signals, because people traveling through one location and using different modes essentially "compete" for green signal time. Specific signal timing recommendations are not included in Tables 5.1 – 5.5, but signal timing is an important and complex component of meeting the multi-modal objectives of these Urban Street Design Guidelines.

Why is signal timing so complex? The following illustrates some of the difficulties of satisfying everyone who is impacted by signal timing at an intersection:

- Not surprisingly, most motorists do not like to be stopped by traffic signals.

Once they do stop, they typically want to move again as soon as possible.

- Traffic signal timing traditionally heavily favors (provides more "green time" to) the higher-volume street over the lower-volume street – sometimes creating noticeably higher delays for motorists waiting on the lower-volume street. Motorists on the higher-volume street are less likely to be stopped at any given side street, but motorists on the lower-volume street often feel that their wait is excessive.
- In addition to "fairly" allocating green time between competing motorists, it is also important to provide enough green time for safe pedestrian crossings – which can have the unintended consequence of increasing overall cycle lengths at the intersection. However, it is important to provide for pedestrians, particularly in pedestrian-oriented areas, and even where it might be more difficult, such as at very large or high-traffic-volume intersections, where pedestrians might otherwise have a difficult time traversing the intersection.
- Like motorists, pedestrians also do not like to wait a long time to cross an intersection and, when the wait is perceived as being "too long", are more likely than motorists to cross against the signal.
- Signalized intersections do not function solely as discrete locations – they are increasingly operated as part of a group of signals and, therefore, signal timing (and "green time" allocation) at any given intersection is typically not considered independent of other, nearby intersections.

Charlotte's signal timing practices are increasingly reflecting a corridor-level, system-oriented approach. This approach also is being refined to reflect our multi-modal objectives. Signal cycle length tradeoff decisions will help meet those objectives, in part through the following assumptions:

- In general, shorter cycle lengths and wait times are desirable, particularly when this can also accommodate pedestrian crossings.
- Signal timing decisions will consider the types of streets that intersect (the intersection "context"), in addition to the nearby (potentially synchronized) intersections that might be affected.

- Signal timing decisions will not always heavily favor the higher-volume streets or flows, although every attempt will be made to maintain satisfactory throughput.

- The objective of minimizing vehicular delay and/or maximizing vehicular throughput is a higher priority for Boulevards and Parkways than for Main Streets or Avenues.

Intersection Design Elements

Tables 5.1 – 5.4 describe the features of non-local intersection types (Main Streets, Avenues, Boulevards, and Parkways). The information in these sections is detailed, but not necessarily prescriptive. The detailed information on dimensions should be used by the design team in conjunction with the design method and tradeoff analyses outlined in Chapter 3 and the LOS guidelines discussed above and described in Appendix A. Note that the plan view diagrams do not show dimensions for these street types, as the focus is on understanding and evaluating the tradeoffs among the various uses and users of the right-of-way.

Table 5.5 describes the design elements for local intersections (Residential, Office/Commercial, and Industrial). The elements and dimensions described are more prescriptive than those for the non-local streets, since these streets are typically provided through the development process.

Some of the design elements described in the following tables represent the "ideal" for which the City is striving, but will require further refinement for an incremental approach to implementation. In many cases, there are specific programs that are responsible for providing such features and it will be necessary to update our approaches to reflect these new Guidelines. These program updates will include evaluating the timing required to meet the design goals for most intersections and developing priorities to ensure practical implementation. Elements that will be subject to such evaluation and prioritization include, for example, enhanced crosswalks, audible pedestrian signals, and bicycle detectors.

5.1 Main Street Intersections

This section describes the features of all (non-local street) intersections that include at least one Main Street approach to the intersection. Main Streets can intersect with all of the other street types, except for Parkways. With the proper application of these Guidelines, Main Street intersections will be located in a pedestrian-oriented context. This is why Main Streets and Parkways should not intersect – because they should exist in mutually exclusive contexts. The design of a Main Street intersection will typically favor the pedestrian orientation of the Main Street leg, whether the intersecting street is a Local Street, an Avenue, or a Boulevard. For example, although Avenues and Boulevards will have higher volumes, more lanes, and higher speeds than do Main Streets, their intersections with Main Streets should be carefully designed to maintain a relatively high pedestrian level-of-service, even with the potential for more through lanes.

General Intent:

(1) Pedestrian-oriented design and very good pedestrian level of service (LOS) should guide the design decision for all Main Street intersections (see Appendix A for a description of how to balance pedestrian and bicycle LOS with vehicular LOS).

(2) At Main Street intersections with Avenues and Boulevards, the physical and operational design should particularly provide very good pedestrian LOS if the Main Street extends across the intersecting street (see Appendix B for a description of the pedestrian LOS methodology).

(3) Some elements will remain constant for all Main Street intersections, such as the use of enhanced pavement markings, countdown signals, not allowing right-turns-on-red, and limiting the use of turn lanes onto and off of Main Streets.

The following table provides guidance in applying design elements to different types of Main Street intersections. The column headings refer to the various possible types of approach legs. The "Main Street Approach" column should be used to assess Main-to-Main intersections, as well as the Main Street approach to any of the other intersection types (Main-to-Avenue and Main-to-Boulevard). Note that the recommendations for Avenues and Boulevards are intended to maintain a relatively high pedestrian LOS at intersections with Main Streets. For a discussion of Main streets intersecting Local Streets, see "Local Street Intersections," Section 5.5.

Main Street Intersections

Main Street Intersections

Diagram reflects possible scenarios and intersection may vary slightly in design. For specific information refer to the guidelines shown on Table 4.1.

Table 5.1 Main Street Intersection Elements

Element:	*Main/Main Intersections or Main Approach to Other Intersection Types:*	*Avenue Approach to Main/Avenue Intersection:*	*Boulevard Approach to Main/Boulevard Intersection:*	*Parkway Approach to Main Street Intersection:*
Level of Service (LOS):				
• Pedestrian LOS Objective	LOS A for the entire Main/Main intersection.	LOS B for the entire Main/Ave intersection.	LOS B for the entire Main/Blvd intersection.	Not a valid intersection type.
• Bicycle LOS Objective	Not applicable (see Appendix A for details).	LOS B for the entire Main/Ave intersection, using the average LOS value of only the Avenue approaches (see Appendix A for details).	LOS B for the entire Main/Blvd intersection, using the average LOS value of only the Blvd approaches (see Appendix A for details).	Not a valid intersection type.
• Motor Vehicle V/C Threshold	1.0, for two consecutive AM or PM hours, for the entire Main/Main intersection.	1.0, for two consecutive AM or PM hours, for the entire Main/Avenue intersection.	.95, for two consecutive AM or PM hours, for the entire Main/Blvd intersection.	Not a valid intersection type.
Median	Atypical, but allowable under special circumstances (see Section 4.1).	Atypical. When provided, should be a minimum width of 6' (for pedestrian refuge) at intersections, 8' preferred.	Should be provided, with a minimum width of 8' (for adequate pedestrian refuge) at intersections.	Not a valid intersection type.

Main Street Intersection Elements (continued) Table 5.1

Element:	*Main/Main Intersections or Main Approach to Other Intersection Types:*	*Avenue Approach to Main/Avenue Intersection:*	*Boulevard Approach to Main/Boulevard Intersection:*	*Parkway Approach to Main Street Intersection:*
Pedestrian Refuge Island	Atypical, but allowable at signalized intersections, if necessary for traffic calming. Where provided, refuges should be a minimum of 6' wide, measured face-of-curb to face-of-curb.	Consider when there are 4 or more lanes on the approach. To be provided either by extending the median to the crosswalk or by providing a separate 6' minimum, pedestrian refuge (measured face-of-curb to face-of-curb).	Yes, typically created by extending the median through the crosswalk (8' minimum width at intersections with Main Streets, due to high speeds on Blvds).	Not a valid intersection type.
Number of Through Lanes	No more than 1 in each direction.	Typically, 1 to 2 lanes in each direction.	Typically, 2 lanes in each direction.	Not a valid intersection type.
Left-Turn Lane	Allowable only with the 3-lane Main Street cross-section. Typically, the turn lane will be 10' wide.	Will be provided with the 3-lane and the 5-lane cross-sections. Allowable on the 4-lane cross-section, if acceptable pedestrian LOS can be maintained. 10' turn lanes suitable.	Should be provided, ideally 11' wide. In constrained situations, may be 10' wide.	Not a valid intersection type.

Table 5.1 Main Street Intersection Elements (continued)

Element:	*Main/Main Intersections or Main Approach to Other Intersection Types:*	*Avenue Approach to Main/Avenue Intersection:*	*Boulevard Approach to Main/Boulevard Intersection:*	*Parkway Approach to Main Street Intersection:*
Dual Left-Turn Lanes	Inapplicable.	Inappropriate.	Inappropriate.	Not a valid intersection type.
Right-Turn Lanes	Inappropriate.	Inappropriate.	Inappropriate.	Not a valid intersection type.
Right-Turn Corner Islands	Inapplicable.	Inapplicable.	Inapplicable.	Not a valid intersection type.
Tapers	Inappropriate.	Inappropriate.	Inappropriate.	Not a valid intersection type.
Bicycle Lanes	Inapplicable. Bikes are expected to travel in mixed traffic.	Should be provided. 4' minimum. When on-street parking exists along the segment, bike lanes should be 5' minimum, with 6' preferred. There should be a "receiving" lane on the opposite side of the intersection. Otherwise, the bike lane should be dropped just prior to the actual intersection, to allow the cyclist to safely merge. The bike lane should never be located to	Should be provided. 5' minimum. 6' preferred. There should be a "receiving" lane on the opposite side of the intersection. Otherwise, the bike lane should be dropped just prior to the actual intersection, to allow the cyclist to safely merge. The bike lane should never be located to the right of an exclusive vehicle turning lane.	Not a valid intersection type.

Main Street Intersection Elements (continued) Table 5.1

Element:	*Main/Main Intersections or Main Approach to Other Intersection Types:*	*Avenue Approach to Main/Avenue Intersection:*	*Boulevard Approach to Main/Boulevard Intersection:*	*Parkway Approach to Main Street Intersection:*
		the right of an exclusive vehicle turning lane.		
Curb Extensions	Should be provided at all corners, at same width as the on-street parking, except at far-side bus stops with high service frequencies.	Should be provided (at the same width as the on-street parking) where full-time, on-street parking exists along the segment, except at far-side bus stops on 2-3 lane cross-sections.	Inappropriate.	Not a valid intersection type.
Bus Stops:	Typically located at far side of intersection.	Typically located at far side of intersection.	Typically located at far side of intersection.	Not a valid intersection type.
• Pullout	No.	No.	Consider for high frequency bus stop locations.	Not a valid intersection type.
• Curb Extension	Not allowable at far-side stops with high service frequencies. May be considered at other stop locations.	Yes, where full-time, on-street parking exists. Do not use at far-side on the 2-3 lane cross-sections.	No.	Not a valid intersection type.
Curb Radii	The intent in these pedestrian-oriented areas is to keep the curb radii small.	The intent in these pedestrian-oriented areas is to keep the curb radii small.	The intent in these pedestrian-oriented areas is to keep the curb radii	Not a valid intersection type.

Table 5.1 Main Street Intersection Elements (continued)

Element:	*Main/Main Intersections or Main Approach to Other Intersection Types:*	*Avenue Approach to Main/Avenue Intersection:*	*Boulevard Approach to Main/Boulevard Intersection:*	*Parkway Approach to Main Street Intersection:*
	(See Appendix C, "Curb Radii" for details)	(See Appendix C, "Curb Radii" for details)	small. (See Appendix C, "Curb Radii" for details)	
ADA Ramps:				
• Type 1	No.	No.	No.	Not a valid intersection type.
• Type 2	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Not a valid intersection type.
Crosswalks:	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Not a valid intersection type.
• Marked	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking, but not enhanced paving.	Not a valid intersection type.

Main Street Intersection Elements (continued) Table 5.1

Element:	*Main/Main Intersections or Main Approach to Other Intersection Types:*	*Avenue Approach to Main/Avenue Intersection:*	*Boulevard Approach to Main/Boulevard Intersection:*	*Parkway Approach to Main Street Intersection:*
• Location	Should not be located on the radius.	Should not be located on the radius.	Should not be located on the radius.	Not a valid intersection type.
Traffic Control:				
• Two-Way Stop	No. A Main/Main intersection, if stop-controlled, should be a four-way stop.	No.	No.	Not a valid intersection type.
• Four-Way Stop	Allowable if both streets are two-lane and established warrants are met.	Allowable if both streets are two-lane and signal warrants not met.	No.	Not a valid intersection type.
• Roundabout	Allowable, except at intersections with Boulevards.	Allowable, as a gateway transition.	No.	Not a valid intersection type.
• Signals	Yes, depending on warrants. Bus priority should be used where appropriate.	Yes, depending on warrants. Bus priority should be used where appropriate.	Yes. Bus priority should be used where appropriate.	Not a valid intersection type.
• Right-Turn on Red	No.	No.	No.	Not a valid intersection type.
• Pedestrian Signals	Yes, with countdown. Where possible, the countdown should show the total number of	Yes, with countdown. Where possible, the countdown should show the total number of seconds	Yes, with countdown. Where possible, the countdown should show the total number of	Not a valid intersection type.

Table 5.1 Main Street Intersection Elements (continued)

Element:	*Main/Main Intersections or Main Approach to Other Intersection Types:*	*Avenue Approach to Main/Avenue Intersection:*	*Boulevard Approach to Main/Boulevard Intersection:*	*Parkway Approach to Main Street Intersection:*
	seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	
• Bicycle Detectors	Provide for all Main Street approaches to signalized intersections.	Provide for through lanes and left turns.	Provide for left turns.	Not a valid intersection type.
• Advance Stop Bars	Yes, at signalized intersections. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow additional maneuvering space for vehicles turning off of the other street.	Yes, at signalized intersections. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow additional maneuvering space for vehicles turning off of the other street.	Yes, should be spaced to allow clear separation and visibility between cars and the crosswalk.	Not a valid intersection type.
• Bike Box	Inapplicable, since bikes are expected to travel in mixed traffic.	Should be considered, but only if a bike lane approaches the intersection.	Should be considered, but only if a bike lane approaches the intersection.	Not a valid intersection type.

Main Street Intersection Elements (continued) Table 5.1

Element:	*Main/Main Intersections or Main Approach to Other Intersection Types:*	*Avenue Approach to Main/ Avenue Intersection:*	*Boulevard Approach to Main/Boulevard Intersection:*	*Parkway Approach to Main Street Intersection:*
		This bike lane approach need not run the entire length of the segment.	This bike lane approach need not run the entire length of the segment.	
• Bicycle Stop Bars	Inapplicable, since bikes are expected to travel in mixed traffic.	Should be provided if there is a bike lane, but no bike box.	Should be provided if there is a bike lane, but no bike box.	Not a valid intersection type.
• Grade Separation	No.	No.	No.	Not a valid intersection type.
Lighting:				
• Street	Yes.	Yes.	Yes.	Not a valid intersection type.
• Pedestrian	Yes.	Yes.	Yes.	Not a valid intersection type.
Traffic Calming	Typically not necessary, but may be used to maintain desired speeds.	Consider a combination of elements on intersection approach to slow traffic approaching intersection. At the intersection, curb extensions may be used, for example (see "curb extensions", above, and CDOT's Traffic Calming Report for more information).	May be appropriate, if necessary to maintain desired speeds. Lateral shifts and some forms of narrowing may be considered. See CDOT's Traffic Calming Report for more information.	Not a valid intersection type.

5.2 Avenue Intersections

This section describes the features of all (non-local street) intersections that include at least one Avenue approach to the intersection. Avenues serve a wide variety of land uses and transportation functions. They are expected to provide a safety and comfort balance among the various modes in all contexts. The majority of non-local street intersections will be with Avenues. There are also several potential cross-sections for Avenues. The mix of possible land uses, cross-sections, and intersection types, along with the desire to provide a balance among the modes, makes Avenue intersections the most complicated in many respects. At intersections with Parkways, in particular, providing the necessary modal balance may prove difficult and plan/design teams might consider transitioning the Parkway to a Boulevard prior to the approach. A pedestrian-oriented Avenue should typically not intersect with a Parkway, if at all possible.

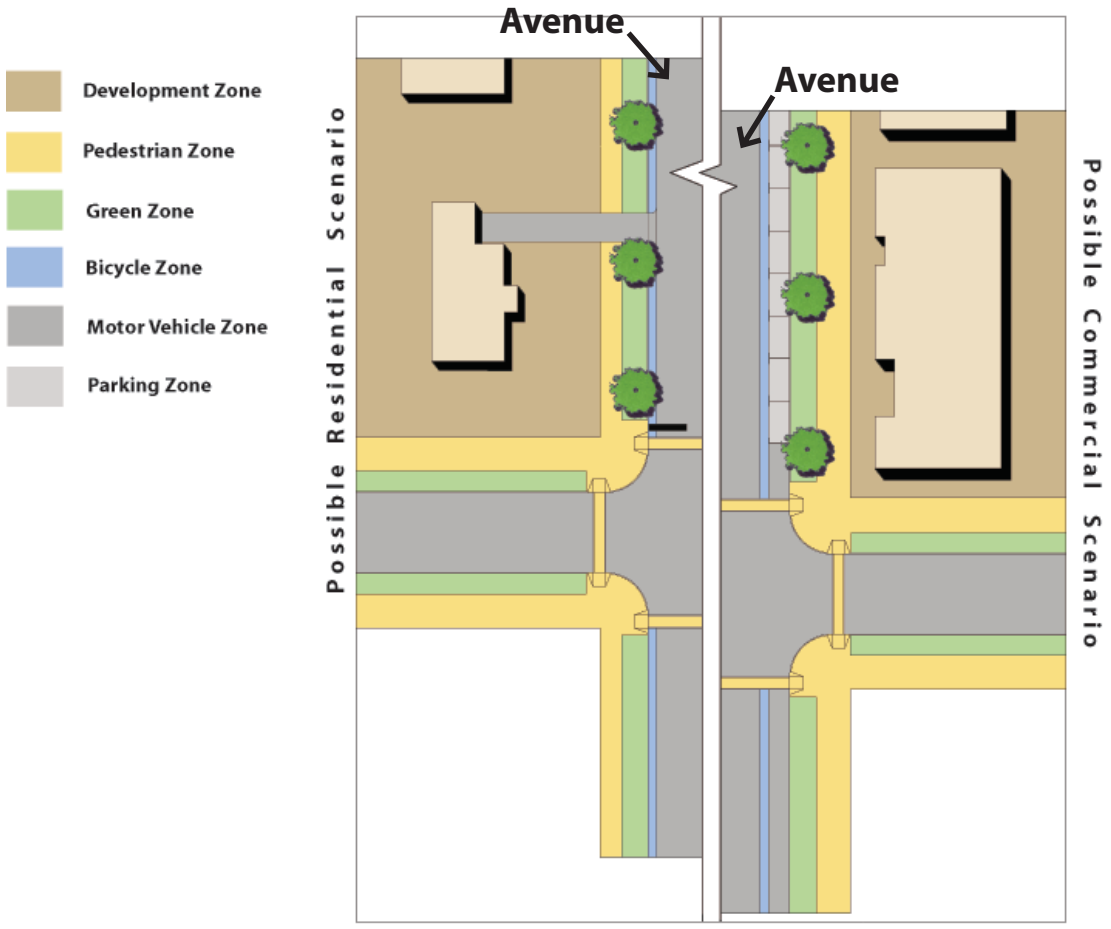
General Intent:

(1) Design decisions will assess and compare the tradeoffs of safe and efficient travel for motorists, pedestrians, and cyclists.

(2) Capacity increases or delay reductions at Avenue intersections will be carefully evaluated against the impacts to all travelers and their level-of-service, as well as the impacts on adjacent land uses.

The following table provides guidance in applying design elements to different types of Avenue intersections. The column headings refer to the various possible types of approach legs. The "Avenue Approach" column should be used to assess Avenue-to-Avenue intersections, as well as the Avenue approach to any of the other intersection types (Avenue-to-Main and Avenue-to-Boulevard). For a discussion of Avenues intersecting Local Streets, see "Local Street Intersections", Section 5.5.

Avenue Intersections 5.2



Avenue Intersections

Diagram reflects possible scenarios and intersection may vary slightly in design.
For specific information refer to the guidelines on Table 4.2.

Table 5.2 Avenue Intersection Elements

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
Level of Service (LOS):				
• Pedestrian LOS Objective	LOS B for the entire Avenue/Main intersection.	LOS B for the entire Avenue/Avenue intersection.	LOS B for the entire Avenue/Blvd intersection.	LOS D for the entire Avenue/Parkway intersection.
• Bicycle LOS Objective	LOS B for the entire Avenue/Main intersection, using the average LOS value of only the Avenue approaches (see Appendix A for details).	LOS B for the entire Avenue/Avenue intersection.	LOS B for the entire Avenue/Blvd intersection.	LOS C/D for the entire Avenue/Parkway intersection.
• Motor Vehicle V/C Threshold	1.0, for two consecutive AM or PM hours, for the entire Avenue/Main intersection.	.95, for two consecutive AM or PM hours, for the entire Avenue/Avenue intersection.	.95, for two consecutive AM or PM hours, for the entire Avenue/Blvd intersection.	.95, for two consecutive AM or PM hours, for the entire Avenue/Parkway intersection.
Median	Atypical, but allowable under special circumstances (see Chapter 4, Section 4.1).	Atypical. When provided, should be a minimum width of 6' (for pedestrian refuge) at intersections (8' preferred if the Avenue has land uses likely to generate heavy pedestrian traffic).	Should be provided, with a minimum width of 6' (for pedestrian refuge) at the intersection (8' minimum if the Avenue approaches have land uses likely to generate pedestrian traffic across the Boulevard approaches).	Yes, preferably 9' wide at the intersection, 6' minimum (for pedestrian refuge). 8' minimum if Avenue approaches have land uses likely to generate pedestrian traffic across Parkway approaches.

Avenue Intersection Elements (continued) Table 5.2

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
Pedestrian Refuge Island	Atypical, but allowable at signalized intersections, if necessary for traffic calming. Where provided, refuges should be a minimum of 6' wide, measured face-of-curb to face-of-curb.	Consider when there are 4 or more lanes on the approach. To be provided either by extending the median to the crosswalk or by providing a separate, 6' minimum, pedestrian refuge (measured face-of-curb to face-of-curb).	Yes, created by extending the median through the crosswalk (6' minimum, face-of curb to face-of-curb; 8' if Avenue approaches have land uses likely to generate pedestrian traffic across the Boulevard approaches).	Yes, created by extending the median to the crosswalk (6' minimum, face-of-curb to face-of-curb; 9' preferred; 8' minimum if Avenue approaches have land uses likely to generate pedestrian traffic across the Parkway approaches).
Number of Through Lanes	No more than 1 in each direction.	Typically, 1 to 2 lanes in each direction.	Typically, 2 lanes in each direction.	2 or 3 lanes in each direction.
Left-Turn Lane	Allowable only with the 3-lane Main Street cross-section. Typically, the turn lane will be 10' wide.	Will be provided with the 3-lane and the 5-lane cross-sections. Allowable on 4 lane cross-section. 10' turn lanes suitable.	Should be provided, ideally 11' wide. In constrained situations, may be 10' wide.	Should be provided, ideally 11' wide. In constrained conditions, may be a minimum of 10' wide. Should preferably include a 4' offset and an edge line, if there is no curb on the median.

Table 5.2 Avenue Intersection Elements (continued)

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
Dual Left-Turn Lanes	Inapplicable.	Inappropriate onto Main Streets. Should be avoided at other Avenue intersections. The preferred option is to try the longest possible storage lane and green time for a single left-turn first and/or to provide additional connections in the surrounding street network. May be considered : 1) when turning movements are greater than through movements, thereby affording the possibility to eliminate a through lane in exchange for the dual left; 2) when turning movements are greater than 400 vehicles per hour;	Should be avoided. The preferred option is to try the longest possible storage lane and green time for a single left-turn first and/or to provide additional connections in the surrounding street network. May be considered: 1) when turning movements are greater than through movements, thereby affording the possibility to eliminate a through lane in exchange for the dual left; 2) when turning movements are greater than 400 vehicles per hour; 3) when it can be shown that dual lefts will still permit an acceptable	Even with the greater emphasis on vehicle capacity for Parkways, dual-lefts should be avoided onto Avenues, as the overall dimensions of the intersection can become detrimental to the Avenue environment. The preferred option is to try the longest possible storage lane and green time for a single left-turn first and/or to provide additional connections in the surrounding street network.

Avenue Intersection Elements (continued) Table 5.2

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
		3.) when it can be shown that dual lefts will still permit an acceptable pedestrian LOS to be maintained.	pedestrian LOS to be maintained.	
Right-Turn Lanes	Inappropriate.	Inappropriate at Main Street intersections. Discouraged at Avenue/Avenue intersections. The preferred option is to provide additional connections in the surrounding street network. May be considered: 1) when turning movements are greater than through movements, thereby affording the possibility to eliminate a through lane in exchange for right-turn lane; 2) when dropping a lane as the street cross-section changes;	Allowable. Where used, Florida slip-lane design, with corner islands, is the preferred treatment . The preferred option is to provide additional connections in the surrounding street network.	Although right-turn lanes are the ideal on Parkways, they should be very carefully considered and designed when they are allowing turns onto Avenues. Where used, Florida slip-lane design, with corner islands, is the preferred treatment.

Table 5.2 Avenue Intersection Elements (continued)

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
		3) when turning movements are greater than 300 vehicles per hour; 4) when acceptable pedestrian LOS can be maintained.		
Right-Turn Corner Islands	Inapplicable.	Inapplicable at Main Street intersections. Allowable at Avenue/Avenue and Avenue/Blvd, but only if necessary to maintain pedestrian LOS or as refuge on wide cross-sections. Where provided, should be a minimum of 50 sf., preferably landscaped.	Allowable, if necessary to maintain pedestrian LOS with the addition of a right-turn lane. Minimum of 50 sf.	Yes, in conjunction with Florida slip-lane design.
Tapers	Inappropriate.	Inappropriate.	Inappropriate.	Inappropriate.
Bicycle Lanes	Inapplicable. Bikes are expected to travel in mixed traffic.	Should be provided. 4' minimum. When on-street parking exists along the segment, bike lanes should be 5' minimum, with 6' preferred. There	Should be provided. 5' minimum. 6' preferred. May also be provided on a parallel frontage road, if that increases bicycle LOS.	Typically inappropriate, but may be allowable to maintain bicycle network connectivity (6' minimum for adequate

Avenue Intersection Elements (continued) Table 5.2

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
		should be a "receiving" lane on the opposite side of the intersection. Otherwise, the bike lane should be dropped just prior to the actual intersection, to allow the cyclist to safely merge. The bike lane should never be located to the right of an exclusive vehicle turning lane.	There should be a "receiving" lane on the opposite side of the intersection. Otherwise, the bike lane should be dropped just prior to the actual intersection, to allow the cyclist to safely merge. The bike lane should never be located to the right of an exclusive vehicle turning lane.	separation from high-speed traffic). Preferred option is to have separate facility outside of right-of-way or on parallel local streets.
Curb Extensions	Should be provided, at same width as the on-street parking, except at far-side bus stops with high service frequencies.	Should be provided (at the same width as the on-street parking) where full-time, on-street parking exists along the segment, except at far-side bus stops on 2-3 lane cross-sections.	Inappropriate.	Prohibited.
Bus Stops:	Typically located at far-side of intersections.	Typically located at far side of intersection.	Typically located at far side of intersection.	Typically located at off-street lots or stops. Far side stops preferred at intersections.

Table 5.2 Avenue Intersection Elements (continued)

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
• Pullout	No.	No.	Consider for high frequency bus stop locations.	Yes.
• Curb Extension	Not allowable at far-side stops with high service frequencies. May be considered at other stop locations.	Yes, where full-time, on-street parking exists. Do not use at far-side on the 2-3 lane cross-sections.	No.	No.
Curb Radii	The intent in these pedestrian-oriented areas is to keep the curb radii small. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.
ADA Ramps:				
• Type 1	No.	No.	No.	No.
• Type 2	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying

Avenue Intersection Elements (continued) Table 5.2

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
	circumstances.			circumstances.
Crosswalks:	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.
• Marked	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking, but not enhanced paving.	Yes, always using enhanced marking, but not enhanced paving.
• Location	Should not be located on the radius.	Should not be located on the radius.	Should not be located on the radius.	Should not be located on the radius.
Traffic Control:				
• Two-Way Stop	No.	No.	No.	No.
• Four-Way Stop	Allowable if both streets are two-lane and established warrants are met.	Allowable if both streets are two-lane and signal warrants not met.	No.	No.

Table 5.2 Avenue Intersection Elements (continued)

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
• Round-about	Allowable as a gateway transition.	Allowable as a gateway transition at Main Streets. Allowable elsewhere, when: 1) volumes are less than 35,000; 2) analysis shows that roundabouts provide higher vehicle LOS than signals; and 3) provision of roundabout does not degrade pedestrian and bicycle LOS.	Allowable, when: 1) volumes are less than 35,000; 2) analysis shows that roundabouts provide higher vehicle LOS than signals; and 3) provision of roundabout does not degrade pedestrian and bicycle LOS.	No.
• Signals	Yes, depending on warrants. Bus priority should be used where appropriate.	Yes. Bus priority should be used where appropriate.	Yes. Bus priority should be used where appropriate.	Yes. Bus priority should be used where appropriate.
• Right-Turn on Red	No.	Not at Main Street intersections. Allowable at other intersections, but should be avoided in locations with a high potential for pedestrian traffic (in areas that are currently or are planned to be	Allowable, but should be avoided in locations with a high potential for pedestrian traffic (in areas that are currently or are planned to be pedestrian-oriented or mixed-use).	Desirable, depending on sight distance and potential for higher volume pedestrian traffic at the intersection.

Avenue Intersection Elements (continued) Table 5.2

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
		pedestrian-oriented retail or mixed-use).		
• Pedestrian Signals	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate).
• Bicycle Detectors	Provide for all Main Street approaches to signalized intersections.	Provide for through lanes and left-turns at Avenue/Main intersections. At Avenue/Avenue and Avenue/Blvd, provide for left-turns and on through lanes of the weaker approach legs.	Provide for left turns.	No.

Table 5.2 Avenue Intersection Elements (continued)

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
• Advance Stop Bars	Yes, at signalized intersections. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow additional maneuvering space for vehicles turning off of the Avenue.	Yes. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow maneuvering space for vehicles turning off of the other street. When right-turn-on-red is allowed with the four-lane cross-section, stagger the stop bars, so that the outside, turning lane's stop bar is closer to the crosswalk than is the inside lane's stop bar. This allows the turning driver to see approaching traffic without encroaching into the crosswalk.	Yes. Should be spaced to allow clear separation and visibility between cars and the crosswalk. When right-turn-on-red is allowed, stagger the stop bars, so that the outside, turning lane's stop bar is closer to the crosswalk than are any adjacent lanes' stop bars. This allows the turning driver to see approaching traffic without encroaching into the crosswalk.	Allowable. Should be spaced to allow clear separation and visibility between cars and the crosswalk. When right-turn-on-red is allowed, stagger the stop bars, so that the outside, turning lane's stop bar is closer to the crosswalk than are any adjacent lanes' stop bars. This allows the turning driver to see approaching traffic without encroaching into the crosswalk.
• Bike Box	Inapplicable, since bikes are expected to travel in mixed traffic.	Should be considered, but only if a bike lane approaches the intersection. This bike lane approach need not run	Should be considered, but only if a bike lane approaches the intersection. This bike lane approach	No. If a bike lane exists, use bicycle stop bars, rather than a bike box.

Avenue Intersection Elements (continued) Table 5.2

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
		the entire length of the segment.	need not run the entire length of the segment.	
• Bicycle Stop Bars	Inapplicable, since bikes are expected to travel in mixed traffic.	Should be provided if there is a bike lane, but no bike box.	Should be provided if there is a bike lane, but no bike box.	Provide in the rare circumstance that a bike lane exists.
• Grade Separation	No.	No.	No.	No.
Lighting				
• Street	Yes.	Yes.	Yes.	Yes.
• Pedestrian	Yes	Should be provided where adjacent land uses or facilities are likely to cause concentrations of pedestrians (at bus stops or in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use, e.g.).	Should be provided where adjacent land uses or facilities are likely to cause concentrations of pedestrians (at bus stops or in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use, e.g.).	Atypical, but should be provided in any circumstance where adjacent land uses or facilities are likely to cause concentrations of pedestrians.

Table 5.2 Avenue Intersection Elements (continued)

Element:	*Main Street Approach to Avenue/Main Intersections:*	*Avenue/Avenue Intersections or Avenue Approach to Other Intersection Types:*	*Boulevard Approach Avenue/Boulevard Intersection:*	*Parkway Approach to Avenue/Parkway Intersections:*
Traffic Calming	Typically not necessary, but may be used to maintain desired speeds.	Consider a combination of elements on intersection approach to slow traffic approaching intersection. At the intersection, curb extensions may be used, for example (see "curb extensions", above, and CDOT's Traffic Calming Report for more information).	May be appropriate, if necessary to maintain desired speeds. Lateral shifts and some forms of narrowing may be considered. See CDOT's Traffic Calming Report for more information.	No.

5.3 Boulevard Intersections

This section describes the features of all (non-local street) intersections that include at least one Boulevard approach to the intersection. Boulevards serve a wide variety of land uses, while providing important intra-city travel functions. Special care must be taken at Boulevard intersections with Main Streets and Avenues, because the higher speeds and volumes of the Boulevard must not overwhelm the pedestrian orientation of the Main Street and the desire for modal balance of the Avenue. This is an important point because the design solutions for the Boulevard approaches may be in conflict with the design requirements for the other approaches for these types of intersections.

General Intent:

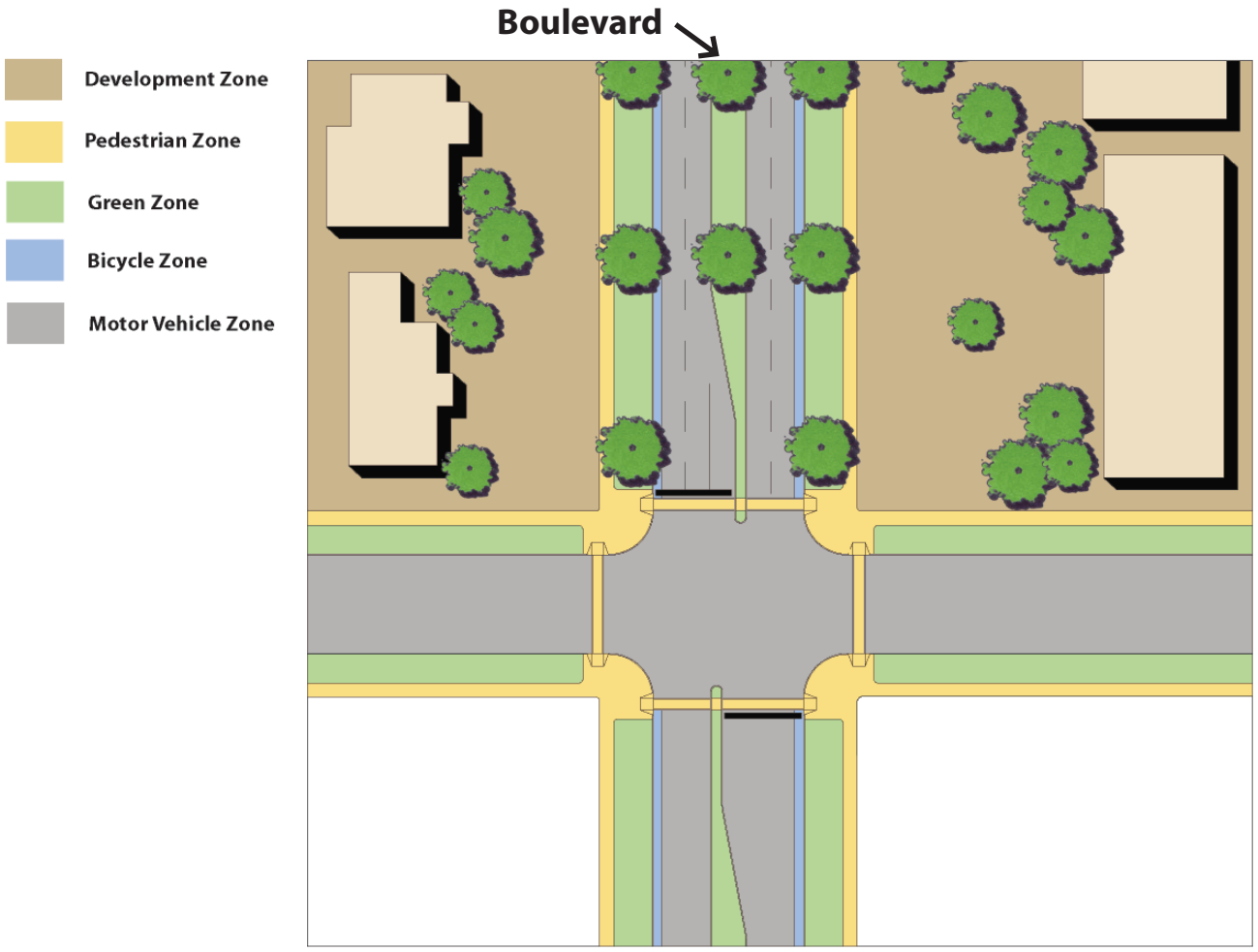
(1) Pedestrians and cyclists will be provided with a safe LOS at Boulevard intersections.

(2) Designing for pedestrians will be particularly important where Boulevards intersect Main Streets and Avenues.

(3) Boulevard intersections are likely to be fairly large, increasing the importance of aesthetics in their design.

The following table provides guidance in applying design elements to different types of Boulevard intersections. The column headings refer to the various possible types of approach legs. The "Boulevard Approach" column should be used to assess Boulevard-to-Boulevard intersections, as well as the Boulevard approach to any of the other intersection types (Boulevard-to-Main, Boulevard-to-Avenue, and Boulevard-to-Parkway). For a discussion of Boulevards intersecting Local Streets, see "Local Street Intersections", Section 5.5.

Boulevard Intersections 5.3



Boulevard Intersections

Diagram reflects possible scenarios and intersection may vary slightly in design.
For specific information refer to the guidelines on Table 4.3.

Table 5.3 Boulevard Intersection Elements

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd. Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
Level of Service (LOS):				
• Pedestrian	LOS B for the entire Blvd/ Main intersection.	LOS B for the entire Blvd/ Avenue intersection.	LOS C for the entire Blvd/ Blvd intersection.	LOS D for the entire Blvd/ Parkway intersection.
• Bicycle	LOS B for the entire Blvd/ Main intersection, using the average LOS value of only the Blvd approaches (see Appendix A for details).	LOS B for the entire Blvd/ Ave intersection.	LOS C for the entire Blvd/ Blvd intersection.	LOS C/D for the entire Blvd/Parkway intersection.
• Motor Vehicle V/C Threshold	.95, for two consecutive AM or PM hours, for the entire Blvd/Main intersection.	.95, for two consecutive AM or PM hours, for the entire Blvd/Ave intersection.	.95, for BOTH one AM and one PM hour, for the entire Blvd/Blvd intersection.	.95, for BOTH one AM and one PM hour, for the entire Blvd/Parkway intersection.
Median	Atypical, but allowable under special circumstances. (Chapter 4, Section 4.1)	Atypical. When provided, should be a minimum width of 6' (for pedestrian refuge) at intersections (8' preferred if the Avenue approaches have land uses likely to generate heavy pedestrian traffic).	Should be provided, with a minimum width of 6' (for pedestrian refuge) at the intersection. 8' minimum at Main Streets and at Avenues if the Avenue approaches have land uses likely to generate pedestrian traffic across the Boulevard.	Yes, preferably 9' wide at the intersection, 6' minimum (for pedestrian refuge).

Boulevard Intersection Elements (continued) Table 5.3

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
Pedestrian Refuge Island	Atypical, but allowable at signalized intersections, if necessary for traffic calming. Where provided, refuges should be a minimum of 6' wide, measured face-of-curb to face-of-curb.	Consider when there are 4 or more lanes on the approach. To be provided either by extending the median to the crosswalk or by providing a separate, 6' minimum, pedestrian refuge (measured face-of-curb to face-of-curb).	Yes, created by extending the median through the crosswalk (6' min. width, face-of-curb to face-of-curb; 8' under conditions described above for "medians").	Yes, created by extending the median to the crosswalk (6' minimum, face-of-curb to face-of-curb; 9' preferred).
Number of Through Lanes	No more than 1 in each direction.	Typically, 1 to 2 lanes in each direction.	Typically, 2 lanes in each direction.	2 or 3 lanes in each direction.
Left-Turn Lane	Allowable only with the 3-lane Main Street cross-section. Typically, the turn lane will be 10' wide.	Will be provided with the 3-lane and the 5-lane cross-sections. Allowable on 4 lane cross-section. 10' turn lanes suitable.	Should be provided, ideally 11' wide. In constrained situations, may be 10' wide.	Should be provided, ideally 11' wide. In constrained conditions, may be a minimum of 10' wide. Should preferably include a 4' offset and an edge line, if there is no curb on the median.

Table 5.3 Boulevard Intersection Elements (continued)

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
Dual Left-Turn Lanes	Inapplicable.	Should be avoided. The preferred option is to try the longest possible storage lane and green time for a single left-turn first and/or to provide additional connections in the surrounding street network. May be considered: 1) when turning movements are greater than through movements, thereby affording the possibility to eliminate a through lane in exchange for the dual left; 2) when turning movements are greater than 400 vehicles per hour;	Inappropriate onto Main Streets. Allowable onto Parkways. Should be avoided onto Avenues and other Boulevards. The preferred option is to try the longest possible storage lane and green time for a single left-turn first and/or to provide additional connections in the surrounding street network. May be considered: 1) when turning movements are greater than through movements, thereby affording the possibility to eliminate a through lane in exchange for the dual left; 2) when turning movements are greater than 400 vehicles per hour;	Allowable, though the overall dimensions of the intersection can become detrimental to the Boulevard environment. The preferred option is to try the longest possible storage lane and green time for a single left-turn first and/or to provide additional connections in the surrounding street network.

Boulevard Intersection Elements (continued) Table 5.3

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
		3) when it can be shown that dual lefts will still permit an acceptable pedestrian LOS to be maintained.	3) when it can be shown that dual lefts will still permit an acceptable pedestrian LOS to be maintained.	
Right-Turn Lanes	Inappropriate.	To be avoided. The preferred option is to provide additional connections in the surrounding street network. May be considered: 1) when turning movements are greater than through movements, thereby affording the possibility to eliminate a through lane in exchange for right-turn lane; 2) when dropping a lane as the street cross-section changes;	Inappropriate onto Main Streets. Allowable onto Avenues, other Boulevards, and Parkways, when necessary to meet vehicle LOS. The preferred option is to provide additional connections in the surrounding street network. Where used, Florida slip-lane design, with corner islands, is the preferred treatment. Not to be used for entrances to commercial properties.	Yes. Where used, Florida slip-lane design, with corner islands, is the preferred treatment. In constrained conditions, provide right turn deceleration lanes at a minimum.

Table 5.3 Boulevard Intersection Elements (continued)

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
		3) when turning movements are greater than 300 vehicles per hour; 4) when acceptable pedestrian LOS can be maintained.		
Right-Turn Corner Islands	Inapplicable.	Allowable, if necessary to maintain pedestrian LOS with a turn lane or as refuge on wide cross-sections. Where provided, should be a minimum of 50 sf., preferably landscaped.	Allowable, if necessary to maintain pedestrian LOS, particularly in conjunction with Florida slip-lane design. Minimum of 50 sf.	Yes, in conjunction with Florida slip-lane design.
Tapers	Inappropriate.	Inappropriate.	Inappropriate onto Main Streets or Avenues. Inappropriate in most circumstances at other Boulevards. Allowable at Parkways.	Allowable.
Bicycle Lanes	Inapplicable. Bikes are expected to travel in mixed traffic.	Should be provided. 4' min. When on-street parking exists along the segment, bike lanes should be	Should be provided. 5' minimum. 6' preferred. May also be provided on a parallel frontage road, if	Typically inappropriate, but may be allowable to maintain bicycle network connectivity (6' minimum

Boulevard Intersection Elements (continued) Table 5.3

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
		5' minimum with 6' preferred. There should be a "receiving" lane on the opposite side of the intersection. Otherwise, the bike lane should be dropped just prior to the actual intersection, to allow the cyclist to safely merge. The bike lane should never be located to the right of an exclusive vehicle turning lane.	that increases bicycle LOS. There should be a "receiving" lane on the opposite side of the intersection. Otherwise, the bike lane should be dropped just prior to the actual intersection to allow the cyclist to safely merge. The bike lane should never be located to the right of an exclusive vehicle turning lane.	for adequate separation from high-speed traffic). Preferred option is to have separate facility outside of right-of-way or on parallel local streets.
Curb Extensions	Should be provided, at same width as the on-street parking, except at far-side bus stops with high service frequencies.	Should be provided (at the same width as the on-street parking) where full-time on-street parking exists along the segment, except at far-side bus stops on 2-3 lane cross-sections.	Inappropriate.	Prohibited.
Bus Stops:	Typically located at far side of intersection.	Typically located at far side of intersection.	Typically located at far side of intersection.	Typically located at off-street lots or stops. Far side stops preferred at intersections.

Table 5.3 Boulevard Intersection Elements (continued)

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
• Pullout	No.	No.	Consider for high frequency bus stop locations.	Yes.
• Curb Extension	Not allowable at far-side stops with high service frequencies. May be considered at other stop locations.	Yes, where full-time, on-street parking exists. Do not use at far-side on the 2-3 lane cross-sections.	No.	No.
Curb Radii	The intent in these pedestrian-oriented areas is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.
ADA Ramps:				
• Type 1	No.	No.	No.	No.
• Type 2	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying

Boulevard Intersection Elements (continued) Table 5.3

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
• Type 2	under varying circumstances.	circumstances.	circumstances.	circumstances.
Crosswalks:	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Should be provided on all legs, unless there is a physical restriction or safety-elated reason that requires otherwise.	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.
• Marked	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking, but not enhanced paving.	Yes, always using enhanced marking, but not enhanced paving.
• Location	Should not be located on the radius.	Should not be located on the radius.	Should not be located on the radius.	Should not be located on the radius.
Traffic Control:				
• Two-Way Stop	No.	No.	No.	No.
• Four-Way Stop	Yes, if both streets are two-lane.	Allowable if both streets are two-lane and signal warrants not met.	No.	No.
• Round-about	No.	Allowable, when: 1) volumes are less than 35,000	Inappropriate at Main Streets and Parkways. Allowable at Avenues and	No.

Table 5.3 Boulevard Intersection Elements (continued)

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
	No.	2) analysis shows that roundabouts provide higher vehicle LOS than signals; and 3) provision of roundabout does not degrade pedestrian and bicycle LOS.	other Boulevards, when: 1) volumes are less than 35,000; 2) analysis shows that roundabouts provide higher vehicle LOS than signals; and 3) provision of roundabout does not degrade pedestrian and bicycle LOS.	No.
• Signals	Yes, depending on warrants. Bus priority should be used where appropriate.	Yes. Bus priority should be used where appropriate.	Yes. Bus priority should be used where appropriate.	Yes. Bus priority should be used where appropriate.
• Right-Turn on Red	No.	Allowable, but should be avoided in locations with a high potential for pedestrian traffic (in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use).	Desirable at Blvd/Blvd and Blvd/Parkway intersections, depending on sight distance and pedestrian volumes. Avoid with opposite dual lefts. Allowable at Blvd/ Avenue intersections, but should be avoided in	Desirable, depending on sight distance and potential for higher volume pedestrian traffic at the intersection.

Boulevard Intersection Elements (continued) Table 5.3

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
			locations with a high potential for pedestrian traffic (in areas that are currently or are planned to be pedestrian-oriented or mixed-use). Inappropriate onto Main Streets.	
• Pedestrian Signals	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval. Will typically be actuated.	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate).
• Bicycle Detectors	Provide for all Main Street approaches to signalized intersections.	Provide for left-turns and on through lanes of the weaker approach legs.	Provide for left-turns and on through lanes of the weaker approach legs.	No.

Table 5.3 Boulevard Intersection Elements (continued)

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
• Advance Stop Bars	Yes, at signalized intersections. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow additional maneuvering space for vehicles turning off of the Boulevard.	Yes. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow additional maneuvering space for vehicles turning off of the Boulevard. When right-turn-on-red is allowed with the four-lane cross-section, stagger the stop bars, so that the outside, turning lane's stop bar is closer to the crosswalk than is the inside lane's stop bar. This allows the turning driver to see approaching traffic without encroaching into the crosswalk.	Yes. Should be spaced to allow clear separation and visibility between cars and the crosswalk. When right-turn-on-red is allowed, stagger the stop bars, so that the outside, turning lane's stop bar is closer to the crosswalk than are any adjacent lanes' stop bars. This allows the turning driver to see approaching traffic without encroaching into the crosswalk.	Allowable. Should be spaced to allow clear separation and visibility between cars and the crosswalk. When right-turn-on-red is allowed, stagger the stop bars, so that the outside, turning lane's stop bar is closer to the crosswalk than are any adjacent lanes' stop bars. This allows the turning driver to see approaching traffic without encroaching into the crosswalk.

Boulevard Intersection Elements (continued) Table 5.3

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
• Bike Box	Inapplicable, since bikes are expected to travel in mixed traffic.	Should be considered, but only if a bike lane approaches the intersection. This bike lane approach need not run the entire length of the segment.	Should be considered, but only if a bike lane approaches the intersection. This bike lane approach need not run the entire length of the segment.	No. If a bike lane exists, use bicycle stop bars, rather than a bike box.
• Bicycle Stop Bars	Inapplicable, since bikes are expected to travel in mixed traffic.	Should be provided if there is a bike lane, but no bike box.	Should be provided if there is a bike lane, but no bike box.	Provide in the rare circumstance that a bike lane exists.
• Grade Separation	No.	No.	No.	No.
Lighting:				
• Street	Yes.	Yes.	Yes.	Yes.
• Pedestrian	Yes.	Should be provided where adjacent land uses or facilities are likely to cause concentrations of pedestrians (at bus stops or in areas that are currently or planned	Yes, at Main Streets. Optional at Blvd/Blvd, Blvd/ Ave. Atypical at Parkways. Should be provided where adjacent land uses or facilities are likely to cause	Atypical, but should be provided in any circumstance where adjacent land uses or facilities are likely to cause concentrations of pedestrians.

Table 5.3 Boulevard Intersection Elements (continued)

Element:	*Main Street Approach to Blvd/Main Intersections:*	*Avenue Approach to Blvd/Avenue Intersections:*	*Blvd/Blvd Intersections or Blvd Approach to Other Intersection Types:*	*Parkway Approach to Blvd/ Parkway Intersections:*
		to be pedestrian-oriented retail or mixed-use).	concentrations of pedestrians (at bus stops or in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use).	
Traffic Calming	Typically not necessary, but may be used to maintain desired speeds.	Consider a combination of elements on intersection approach to slow traffic approaching intersection. At the intersection, curb extensions may be used, for example (see "Curb Extensions", above, and CDOT's Traffic Calming Report for more information).	May be appropriate, if necessary to maintain desired speeds. Lateral shifts and some forms of narrowing may be considered. See CDOT's Traffic Calming Report for more information.	No.

5.4 Parkway Intersections

This section describes the features of all (non-local street) intersections that include at least one Parkway approach to the intersection. Parkways serve as high-volume, relatively high-speed intra-urban thoroughfares. Adjacent land uses are assumed to be auto-oriented in both type and design, with access control much more prevalent than on any other street type. Parkways may intersect with all other street types, except Main Streets. While the basic design of a Parkway intersection is intended to serve high volumes of traffic, some design elements may be adjusted to reflect the type of street the Parkway is intersecting.

General Intent:

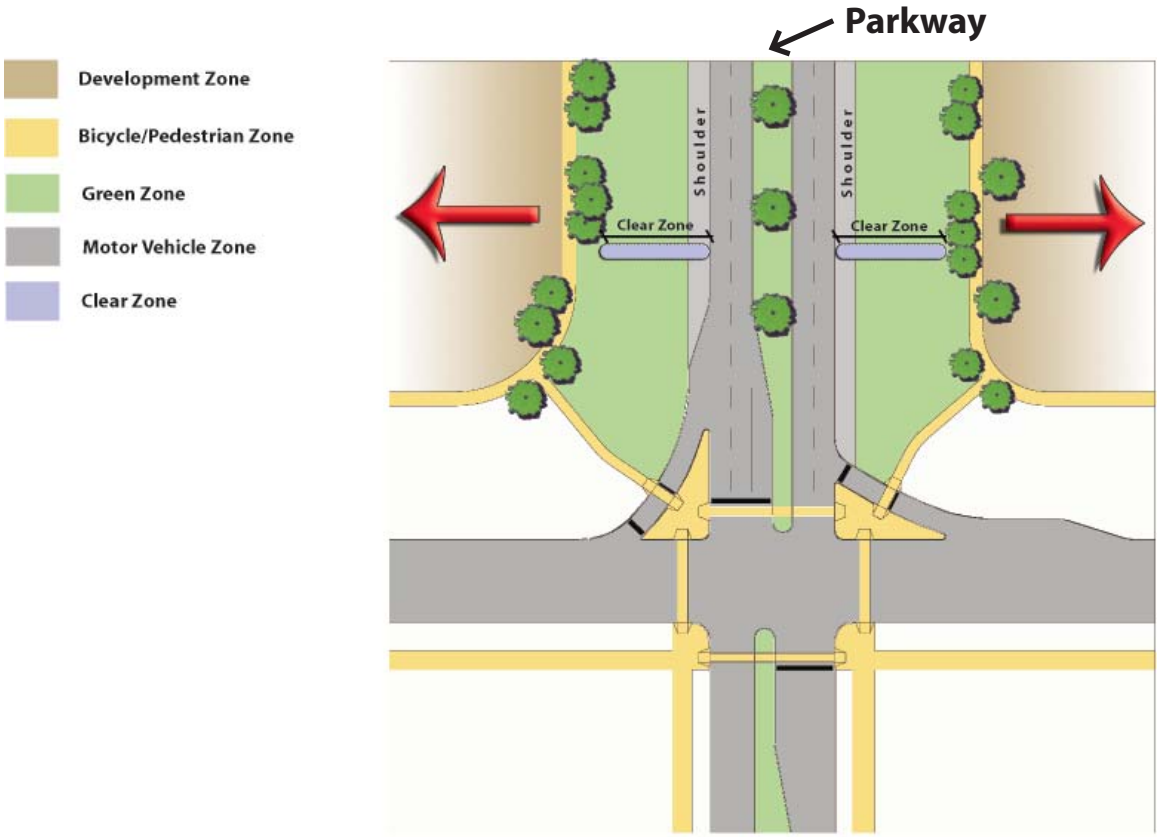
(1) Providing motor vehicle capacity and reducing travel delay is a major design goal for Parkway intersections.

(2) Safety for all users is another important goal, even though motor vehicle level-of-service is emphasized.

(3) Land uses that would generate large numbers of pedestrians wanting to cross the Parkway should be limited near Parkway intersections.

The following table provides guidance in applying design elements to different types of Parkway intersections. The column headings refer to the various possible types of approach legs. The "Parkway Approach" column should be used to assess Parkway-to-Parkway intersections, as well as the Parkway approach to any of the other intersection types (Parkway-to-Avenue, and Parkway-to-Boulevard). For a discussion of Parkways intersecting Local Streets, see "Local Street Intersections", Section 5.5.

Parkway Intersections 5.4



Parkway Intersections

Diagram reflects possible scenarios and intersection may vary slightly in design. For specific information refer to the guidelines on Table 4.4.

Table 5.4 Parkway Intersection Elements

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
Level of Service (LOS):				
• Pedestrian LOS Objective	Not a valid intersection type.	LOS D for the entire Parkway/Avenue intersection.	LOS D for the entire Parkway/Boulevard intersection.	LOS D for the entire Parkway/Parkway intersection.
• Bicycle LOS Objective	Not a valid intersection type.	LOS C/D for the entire Parkway/Avenue intersection.	LOS C/D for the entire Parkway/Boulevard intersection.	LOS D for the entire Parkway/Parkway intersection.
• Motor Vehicle V/C Threshold	Not a valid intersection type.	.95, for two consecutive AM or PM hours, for the entire Parkway/Avenue intersection.	.95, for BOTH one AM and one PM hour, for the entire Parkway/Blvd intersection.	.90, for BOTH one AM and one PM hour, for the entire Parkway/Parkway intersection.
Median	Not a valid intersection type.	Atypical. When provided, should be a minimum width of 6' (for pedestrian refuge) at intersections (8' preferred if the Avenue approaches have land uses likely to generate heavy pedestrian traffic).	Should be provided, with a minimum width of 6' (for pedestrian refuge) at the intersection.	Yes, preferably 9' wide at the intersection, 6' minimum. 8' minimum at Avenues (for pedestrian refuge) if Avenue approaches have land uses likely to generate pedestrian traffic across the Parkway approaches.
Pedestrian Refuge Island	Not a valid intersection type.	Consider when there are 4 or more lanes on the approach. To be provided either by extending the	Yes, created by extending the median through the crosswalk (6' minimum	Yes, created by extending the median to the crosswalk (6'-8 minimum as described

Parkway Intersection Elements (continued) Table 5.4

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
		median to the crosswalk or by providing a separate, 6' minimum, pedestrian refuge, measured face-of-curb to face-of-curb.	width, face-of-curb to face-of-curb).	above for medians, 9' preferred).
Number of Through Lanes	Not a valid intersection type.	Typically, 1 to 2 lanes in each direction.	Typically 2 lanes in each direction.	2 or 3 lanes in each direction.
Left-Turn Lane	Not a valid intersection type.	Will be provided with the 3-lane or the 5-lane cross-sections. Allowable on 4 lane cross-section. 10' turn lanes suitable.	Should be provided, ideally 11' wide. In constrained situations, may be 10' wide.	Should be provided, ideally 11' wide. In constrained conditions, may be a minimum of 10' wide. Should preferably include a 4' offset and an edge line, if there is no curb on the median.
Dual Left-Turn Lanes	Not a valid intersection type.	Should be avoided. The preferred option is to try the longest possible storage lane and green time for a single left-turn first and/or to provide additional connections in the surrounding street network. May be considered:	Allowable. The preferred option is to try the longest possible storage lane and green time for a single left-turn first and/or to provide additional connections in the surrounding street network.	Allowable, though the overall dimensions of the intersection can become detrimental to the Avenue or Boulevard environments. The preferred option is to try the longest possible storage lane and green time for

Table 5.4 Parkway Intersection Elements (continued)

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
		1) when turning movements are greater than through movements, thereby affording the possibility to eliminate a through lane in exchange for the dual left; 2) when turning movements are greater than 400 vehicles per hour; 3) when it can be shown that dual lefts will still permit an acceptable pedestrian LOS to be maintained.		a single left-turn first and/or to provide additional connections in the surrounding street network.
Right-Turn Lanes	Not a valid intersection type.	To be avoided. The preferred option is to provide additional connections in the surrounding street network. May be considered: 1) when turning movements are greater than through movements, thereby affording the possibility to eliminate a	Allowable, when necessary to meet vehicle LOS. The preferred option is to provide additional connections in the surrounding street network. Where used, Florida slip-lane design, with corner islands, is the preferred	Yes, though they should be very carefully considered and designed when they are allowing turns onto Avenues. Where used, Florida slip-lane design, with corner islands, is the preferred treatment. In constrained conditions, provide

Parkway Intersection Elements (continued) Table 5.4

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
		through lane in exchange for right-turn lane; 2) when dropping a lane as the street cross-section changes; 3) when turning movements are greater than 300 vehicles per hour; 4) when acceptable pedestrian LOS can be maintained.	treatment. Not to be used for entrances to commercial properties.	right turn deceleration lanes at a minimum.
Right-Turn Corner Islands	Not a valid intersection type.	Allowable, if necessary to maintain pedestrian LOS with a turn lane or as refuge on wide cross-sections. Where provided, should be a minimum of 50 sf., preferably landscaped.	Allowable, if necessary to maintain pedestrian LOS, particularly in conjunction with Florida slip-lane design. Minimum of 50 sf.	Yes, in conjunction with Florida slip-lane design.
Tapers	Not a valid intersection type.	Inappropriate.	Allowable.	Inappropriate onto Avenues. Allowable onto Boulevards or other Parkways.
Bicycle Lanes	Not a valid intersection type.	Should be provided. 4' minimum. When on-street parking exists along the segment, bike	Should be provided. 5' minimum. 6' preferred. May also be provided on	Typically inappropriate, but may be allowable to maintain bicycle network

Table 5.4 Parkway Intersection Elements (continued)

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
		lanes should be 5' minimum, with 6' preferred. There should be a "receiving" lane on the opposite side of the intersection. Otherwise, the bike lane should be dropped just prior to the actual intersection, to allow the cyclist to safely merge. The bike lane should never be located to the right of an exclusive vehicle turning lane.	a parallel frontage road, if that increases bicycle LOS. There should be a "receiving" lane on the opposite side of the intersection. Otherwise, the bike lane should be dropped just prior to the actual intersection, to allow the cyclist to safely merge. The bike lane should never be located to the right of an exclusive vehicle turning lane.	connectivity (6' minimum, for adequate separation from high-speed traffic). Preferred option is to have separate facility outside of right-of-way or on parallel local streets.
Curb Extensions	Not a valid intersection type.	7' extensions should be provided where full-time, on-street parking exists along the segment, except at far-side bus stops on 2-3 lane cross-sections.	Inappropriate.	Prohibited.
Bus Stops:	Not a valid intersection type.	Typically located at far side of intersection.	Typically located at far side of intersection.	Typically located at off-street lots or stops. Far side stops preferred at intersections.

Parkway Intersection Elements (continued) Table 5.4

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
• Pullout	Not a valid intersection type.	No.	Consider for high frequency bus stop locations.	Yes.
• Curb Extension	Not a valid intersection type.	Should be provided (at the same width as the on-street parking) where full-time, on-street parking exists. Do not use at far-side on the 2-3 lane cross-sections.	No.	No.
Curb Radii	Not a valid intersection type.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.
ADA Ramps:				
• Type 1	Not a valid intersection type.	No.	No.	No.
• Type 2	Not a valid intersection type.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes, if crosswalks are provided. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.

Table 5.4 Parkway Intersection Elements (continued)

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
Crosswalks:	Not a valid intersection type.	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Should be provided on all legs, unless there is a physical restriction or safety-related reason that requires otherwise.	Should be provided on all legs where there are sidewalks, unless there is a physical restriction or safety-related reason that requires otherwise.
• Marked	Not a valid intersection type.	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking, but not enhanced paving.	Yes, always using enhanced marking, but not enhanced paving.
• Location	Not a valid intersection type.	Should not be located on the radius.	Should not be located on the radius.	Should not be located on the radius.
Traffic Control:				
• Two-Way Stop	Not a valid intersection type.	No.	No.	No.
• Four-Way Stop	Not a valid intersection type.	Allowable if both streets are two-lane and signal warrants not met.	No.	No.
• Round-about	Not a valid intersection type.	No.	No.	No.

Parkway Intersection Elements (continued) Table 5.4

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
• Signals	Not a valid intersection type.	Yes. Bus priority should be used where appropriate.	Yes. Bus priority should be used where appropriate.	Yes. Bus priority should be used where appropriate.
• Right-Turn on Red	Not a valid intersection type.	Allowable, but should be avoided in locations with a high potential for pedestrian traffic (in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use).	Desirable, depending on sight distance and pedestrian volumes. Avoid with opposite dual lefts.	Desirable, depending on sight distance and potential for higher volume pedestrian traffic at the intersection (apply carefully at Avenues).
• Pedestrian Signals	Not a valid intersection type.	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate) and leading pedestrian interval. Will typically be actuated.	Yes, where crosswalks exist at the intersection, with countdown. Where possible, the countdown should show the total number of seconds available for crossing. Also consider audible signals (where deemed appropriate).
• Bicycle Detectors	Not a valid intersection type.	Provide on through lanes of the weaker approach legs.	Provide on through lanes of the weaker approach legs.	No.

Table 5.4 Parkway Intersection Elements (continued)

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
• Advance Stop Bars	Not a valid intersection type.	Yes. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow maneuvering space for vehicles turning off of the Parkway. When right-turn-on-red is allowed with the four-lane cross-section, stagger the stop bars, so that the outside, turning lane's stop bar is closer to the crosswalk than is the inside lane's stop bar. This allows the turning driver to see approaching traffic without encroaching into the crosswalk.	Yes. Should be spaced to allow clear separation and visibility between cars and the crosswalk. When right-turn-on-red is allowed, stagger the stop bars, so that the outside, turning lane's stop bar is closer to the crosswalk than are any adjacent lanes' stop bars. This allows the turning driver to see approaching traffic without encroaching into the crosswalk.	Allowable. Should be spaced to allow clear separation and visibility between cars and the crosswalk. When right-turn-on-red is allowed, stagger the stop bars, so that the outside, turning lane's stop bar is closer to the crosswalk than are any adjacent lanes' stop bars. This allows the turning driver to see approaching traffic without encroaching into the crosswalk.
• Bike Box	Not a valid intersection type.	Should be considered, but only if a bike lane approaches the intersection. This bike lane approach need not run the	Should be considered, but only if a bike lane approaches the intersection. This bike lane approach	No. If a bike lane exists, use bicycle stop bars, rather than a bike box.

Parkway Intersection Elements (continued) Table 5.4

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
		entire length of the segment.	need not run the entire length of the segment.	
• Bicycle Stop Bars	Not a valid intersection type.	Should be provided if there is a bike lane, but no bike box.	Should be provided if there is a bike lane, but no bike box.	Provide in the rare circumstance that a bike lane exists.
• Grade Separation	Not a valid intersection type.	No.	No.	Allowable, for Parkway/Parkway. No for other intersections.
Lighting:				
• Street	Not a valid intersection type.	Yes.	Yes.	Yes.
• Pedestrian	Not a valid intersection type.	Optional. Should be provided where adjacent land uses or facilities are likely to cause concentrations of pedestrians (at bus stops or in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use, e.g.).	Atypical. Should be provided where adjacent land uses or facilities are likely to cause concentrations of pedestrians (at bus stops or in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use, e.g.).	Atypical, but should be provided in any circumstance where adjacent land uses or facilities are likely to cause concentrations of pedestrians.

Table 5.4 Parkway Intersection Elements (continued)

Element:	*Main Street Approach:*	*Avenue Approach to Parkway/Avenue Intersection:*	*Boulevard Approach to Parkway/Boulevard Intersection:*	*Pkwy/Pkwy Intersection or Parkway Approach to Other Intersection Types :*
Traffic Calming	Not a valid intersection type.	Consider a combination of elements on intersection approach to slow traffic approaching intersection. At the intersection, curb extensions may be used, for example (see "curb extensions", above, and CDOT's Traffic Calming Report for more information).	May be appropriate, if necessary to maintain desired speeds. Lateral shifts and some forms of narrowing may be considered. See CDOT's Traffic Calming Report for more information.	No.

5.5 Local Street Intersections

There are three different Local street types (residential, office/commercial, and industrial) and multiple cross-sections for two of those street types (residential and office/commercial). Any of these street types can intersect with any other street type. Intersections between two Local streets should be designed to reflect the primary function of Local streets - providing access to land uses. Intersections between Local streets and non-local streets should be designed to accommodate the lower volumes and modal balance of a Local street, balanced against the higher volumes and wide range of possible functions of the intersecting non-local street. The design recommendations for Local streets should be considered more prescriptive than those for non-local streets, particularly at Local/Local intersections.

Assumed Conditions:

(1) Local streets provide access to specific (existing or planned) land uses. Traffic volumes and speeds on Local streets will be low.

(2) Intersections of two Local streets should be designed to maintain low-speed, low-volume conditions similar to or lower than those for Main Streets.

(3) Local streets and their intersections should be designed toward more of a pedestrian orientation than an auto-orientation. This is less the case with local *industrial* streets, where higher volumes of truck traffic will require some design features that are not as pedestrian-oriented as those of other Local streets.

The following table provides guidance in applying design elements to different types of Local intersections. The column headings refer to the various possible types of approach legs. The "Local Approach" column should be used to assess all Local-to-Local intersections, as well as the Local approach to any of the other intersection types (Local-to-Main, Local-to-Avenue, Local-to-Boulevard, and Local-to-Parkway).

Local Street Intersections 5.5

Local Street Intersections

This example shows a Medium Residential Street intersection. For specific information on Local Street intersections, refer to the guidelines on Table 4.5.

Table 5.5 Local Street Intersection Elements

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
Level of Service (LOS) ***at signalized intersections***:					
• Pedestrian LOS Objective	LOS A for the entire Local/Local intersection.	LOS A for the entire Local/Main intersection.	LOS B for the entire Local/Avenue intersection.	LOS B for the entire Local/Boulevard intersection.	LOS D for the entire Local/Parkway intersection.
• Bicycle LOS Objective	Not applicable (see Appendix A for details).	Not applicable (see Appendix A for details).	LOS B for the entire Local/Avenue intersection, using the average LOS value of only the Avenue approaches (see Appendix A for details).	LOS B for the entire Local/Blvd intersection, using the average LOS value of only the Blvd approaches (see Appendix A for details).	LOS C for the entire Local/Parkway intersection, using the average LOS value of only the Parkway approaches (see Appendix A for details).
• Motor Vehicle V/C Threshold	1.0, for two consecutive AM or PM hours, for the entire Local/Local intersection.	1.0, for two consecutive AM or PM hours, for the entire Local/Main intersection.	.95, for two consecutive AM or PM hours, for the entire Local/Avenue intersection.	.95, for BOTH one AM and one PM hour, for the entire Local/Blvd intersection.	.90, for BOTH one AM and one PM hour, for the entire Local/Parkway intersection.
Median	Atypical, but allowable under special circumstances, as an aesthetic or	Atypical, but allowable under special circumstances (see Chapter	Atypical. When provided, should be a minimum width	Should be provided, with a minimum width of 6' at the	Yes, preferably 9' wide at the intersection, 6'

Local Street Intersection Elements (continued) Table 5.5

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
	gateway feature. When provided, should be a minimum width of 6' at intersections (measured face-of-curb to face-of-curb), for pedestrian refuge. Use mountable aprons at the intersection to allow tighter curb radii. Avoid on Local Industrial streets.	4, Section 4.1). When provided, should be a minimum width of 6' at intersections (face-of-curb to face-of-curb), for pedestrian refuge.	of 6' at intersections (face-of-curb to face-of-curb), for pedestrian refuge.	intersection (face-of-curb to face-of-curb), for pedestrian refuge.	minimum (face-of-curb to face-of-curb), for pedestrian refuge.
Pedestrian Refuge Island	Atypical, but, where a median exists, a paved portion may serve as pedestrian refuge at the crosswalk, particularly at intersections with higher volume Avenues or Boulevards. Where provided, refuges should be a minimum of 6' wide (measured face-of-curb	Atypical, but allowable at signalized intersections, if necessary for traffic calming. Where provided, refuges should be a minimum of 6' wide (measured face-of-curb to face-of-curb).	Consider when there are 4 or more lanes on the approach. To be provided either by extending the median to the crosswalk or by providing a separate, 6' minim um, pedestrian refuge (measured face-of-curb to face-of-curb).	Should be provided, by extending the median through through the crosswalk. 6' minimum width (measured face-of-curb to face-of-curb); 8' preferred if Local approaches have land uses likely to	Should be provided, by extending the median to the intersection. 9' preferred width, with 6' minimum (measured face-of-curb to face-of-curb). 8' minimum if Local approaches have

Table 5.5 Local Street Intersection Elements (continued)

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
	to face-of-curb).			generate pedestrian traffic across the Boulevard approaches.	land uses likely to generate pedestrian traffic across the Parkway approaches.
Number of Through Lanes	No more than 1 in each direction.	No more than 1 in each direction.	Typically, 1 to 2 lanes in each direction.	Typically, 2 lanes in each direction.	2 to 3 lanes in each direction.
Left-Turn Lane	Atypical. Local street entrances should not be wider than 3 lanes total, with 2 lanes total preferred.	Allowable only with the 3-lane Main Street cross-section. Typically, the turn lane will be 10' wide.	Will be provided with the 3-lane and the 5-lane cross-sections. Allowable on 4 lane cross-section. 10' turn lanes suitable.	Should be provided where there are median openings or left-overs, ideally 11' wide. In constrained situations, may be 10' wide.	Should be provided where there are median openings or left-overs, ideally 11' wide. In constrained conditions, may be a minimum of 10' wide. Should preferably include a 4' offset and an edge line, if there is no curb on the median.

Local Street Intersection Elements (continued) Table 5.5

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
Dual Left-Turn Lanes	Inappropriate.	Inappropriate.	Typically inappropriate. May be allowable onto "narrow" Local Commercial streets, which would be for access to campus-style office park settings. In that case, a short receiving lane leading into the site would be provided if dual lefts off of a busy thoroughfare are necessary. This solution should be applied only rarely. Dual lefts are inappropriate onto other Local streets.	Typically inappropriate. May be allowable onto "narrow" Local Commercial streets, which would be for access to campus-style office park settings. In that case, a short receiving lane leading into the site would be provided if dual lefts off of a busy thoroughfare are necessary. This solution should be applied only rarely. Dual lefts are inappropriate onto other Local streets.	Inappropriate.

Table 5.5 Local Street Intersection Elements (continued)

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
Right-Turn Lanes	Atypical. Local street approaches should not be wider than 3 lanes total, with 2 lanes preferred.	Inappropriate.	Discouraged. The preferred option is to provide additional connections in the surrounding street network.	Allowable. The preferred option is to provide additional connections in the surrounding street network.	Although right-turn lanes are the ideal on Parkways, they should be very carefully considered and designed when they are allowing turns onto Local Streets. The design of these lanes should discourage continuous flow and, where used, Florida slip-lane design with corner islands is the preferred treatment.

Local Street Intersection Elements (continued) Table 5.5

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
Right-Turn Corner Islands	Not applicable.	Not applicable.	Inappropriate.	Allowable, if necessary to maintain acceptable pedestrian LOS with the addition of a right-turn lane. Minimum of 50 sf, Florida Slip-Lane design preferred .	Yes, if used in conjunction with Florida slip-lane design, as discussed above under "Right-Turn Lanes".
Tapers	Inappropriate.	Inappropriate.	Inappropriate.	Typically inappropriate, but allowable onto Local Industrial streets.	Typically inappropriate, but allowable onto Local Industrial streets.
Bicycle Lanes	Not applicable.	Not applicable.	Should be provided. 4' minimum. 5' minimum and 6' preferred when on-street parking exists along the segment.	Should be provided. 5' minimum. 6' preferred. May also be provided on a parallel frontage road, if that creates the safest cycling treatment.	Typically inappropriate, but may be allowed, to maintain bicycle network connectivity (6' minimum). Preferred option is to have separate facility outside of

Table 5.5 Local Street Intersection Elements (continued)

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
					right-of-way or on parallel local streets.
Curb Extensions	Should be considered at Local/Local intersections (except for Industrial streets), particularly where there is the likelihood of high pedestrian volumes (such as on "wide" Commercial or Residential streets) and/or the need for traffic calming (as on "medium" or "wide" Residential streets). Should be provided at intersections with Main Streets and are allowed at Avenues.	Should be provided, at same width as on-street parking (7'), except at far-side bus stops with high service frequencies.	7' extensions should be provided where full-time, on-street parking exists along the segment, except at far-side bus stops on 2-3 lane cross-sections.	Inappropriate.	Inappropriate.

Local Street Intersection Elements (continued) Table 5.5

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
Bus Stops:	Allowable far side, near side, or mid-segment.	Typically located at far side of intersection.	Typically located at far side of intersection.	Typically located at far side of intersection.	Typically located at off-street lots or stops. Far side stops preferred at intersections.
• Pullout	Inappropriate in most circumstances, though might be considered at high volume bus stops on "narrow" Local Commercial streets.	No.	No.	Consider for high frequency bus stop locations.	Yes.
• Curb Extension	Typically unnecessary at bus stops, except as described above under the general topic of "curb extensions".	Not allowed at far-side stops with high service frequencies. May be considered at other stop locations.	Should be provided (at the same width as the on-street parking) where full-time, on-street parking exists. Do not use at far-side on the 2-3 lane cross-sections.	No.	No.

Table 5.5 Local Street Intersection Elements (continued)

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
Curb Radii	The intent on these low-volume and low-speed streets is to keep the curb radii small. See Appendix C, "Curb Radii" for details.	The intent in these pedestrian-oriented areas is to keep the curb radii small. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.	The intent is to keep the curb radii as small as possible. See Appendix C, "Curb Radii" for details.
ADA Ramps:					
• Type 1	No.	No.	No.	No.	No.
• Type 2	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.	Yes. See CDOT's Guidelines for the Design and Location of Accessible Ramps for details and explanations regarding appropriate ramp designs under varying circumstances.

Local Street Intersection Elements (continued) Table 5.5

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
Crosswalks:	Should be provided on all legs at signalized intersections, unless there is a physical restriction or safety-related reason that requires otherwise. Should also be provided on the Local legs of unsignalized intersections with Non-Local streets. At Local/Local intersections, crosswalks should be provided at locations where there is likely to be a high level of pedestrian activity.	Should be provided on all legs at signalized intersections, unless there is a physical restriction or safety-related reason that requires otherwise. Typically would not provide on Main Street approach to unsignalized intersections with Local streets.	Should be provided on all legs at signalized intersections, unless there is a physical restriction or safety-related reason that requires otherwise. Typically would not provide on Avenue approach to unsignalized intersections with Local streets.	Should be provided on all legs at signalized intersections, unless there is a physical restriction or safety-related reason that requires otherwise. Typically would not provide on Blvd approach to unsignalized intersections with Local streets.	Should be provided on all legs at signalized intersections, unless there is a physical restriction or safety-related reason that requires otherwise. Typically would not provide on Parkway approach to unsignalized intersections with Local streets.
• Marked	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking or enhanced paving.	Yes, always using enhanced marking, but not enhanced paving.	Yes, always using enhanced marking, but not enhanced paving.
• Location	Should not be located on the radius.	Should not be located on the radius.	Should not be located on the radius.	Should not be located on the radius.	Should not be located on the radius.

Table 5.5 Local Street Intersection Elements (continued)

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
Traffic Control:					
• Two-Way Stop	Yes.	No.	No.	No.	No.
• Four-Way Stop	Yes, at other Locals and at Main Streets.	Yes, at other Locals and at Main Streets.	No.	No.	No.
• Round-about	Allowable at other Locals, Mains, and, in rare instances, at Avenues. Not at Boulevards or Parkways.	Allowable as a gateway transition.	Allowable for traffic calming when: 1) volumes are less than 35,000; 2) analysis shows that roundabouts provide higher vehicle LOS than signals; 3) provision of roundabout does not degrade pedestrian and bicycle LOS, and 4) movements are balanced enough to allow safe exit from the Local Street leg. Typically want to avoid multi-lane roundabouts at these intersections.	No.	No.

Local Street Intersection Elements (continued) Table 5.5

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
• Signals	Yes, depending on warrants, though unlikely at Local/Local intersections.	Yes, depending on warrants, with bus signal priority, where appropriate.	Yes, depending on warrants, with bus signal priority, where appropriate.	Allowable, depending on warrants, with bus signal priority, where appropriate.	Rarely.
• Right-Turn on Red	Allowable in rare case where a Local/Local intersection is signalized, but should be avoided in locations with a high potential for pedestrian traffic. Not allowed at Main Street intersections. Allowable at other intersections, but should be avoided in locations with a high potential for pedestrian traffic (in areas that are currently or are planned to be pedestrian-oriented retail or mixed use.	Not allowed.	Allowable, but should be avoided in locations with a high potential for pedestrian traffic (in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use).	Allowable, but should be avoided in locations with a high potential for pedestrian traffic (in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use).	Desirable if signalized, depending on sight distance and potential for higher volume pedestrian traffic at the intersection.

Table 5.5 Local Street Intersection Elements (continued)

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
• Pedestrian Signals	Yes, where signal warrants are met, with countdown. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Also consider audible signals (where deemed appropriate) and leading pedestrian interval.	Yes, with countdown. Also consider audible signals (where deemed appropriate).
• Bicycle Detectors	Provide for all Local Street approaches to signalized intersections.	Provide for all Main Street approaches to signalized intersections.	Provide for through lanes and left turns.	Provide for left turns.	Typically, not applicable. Bicycle facilities should be provided as far as possible from the travel lanes on Parkways.
• Advance Stop Bars	Yes, at signalized intersections. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow for vehicles	Yes, at signalized intersections. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow	Yes. Should be spaced to allow clear separation and visibility between cars and the crosswalk and, where necessary, far enough back to allow for	Yes. Should be spaced to allow clear separation and visibility between cars and the crosswalk. Stagger the stop bars when right-turn on red is allowed. This	Allowable. Should be spaced to allow clear separation and visibility between cars and the crosswalk. Stagger the stop bars when right turn on red

Local Street Intersection Elements (continued) Table 5.5

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
	turning off of the cross street.	for vehicles turning off of the Local Street.	vehicles turning off of the other street. With the four-lane cross-section, stagger the stop bars when right-turn on red is allowed. This allows the turning vehicle to observe approaching traffic without encroaching into the crosswalk.	allows the turning vehicle to observe approaching traffic without encroaching into the crosswalk.	is allowed. This allows the turning vehicle to observe approaching traffic without encroaching into the crosswalk.
• Bike Box	Inapplicable, since bikes are expected to travel in mixed traffic.	Inapplicable, since bikes are expected to travel in mixed traffic.	Should be considered, but only if a bike lane approaches the intersection. This bike lane approach need not run the entire length of the segment.	Should be considered, but only if a bike lane approaches the intersection. This bike lane approach need not run the entire length of the segment.	No. If a bike lane exists, use bicycle stop bars, rather than a bike box.

Table 5.5 Local Street Intersection Elements (continued)

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
• Bicycle Stop Bars	Inapplicable, since bikes are expected to travel in mixed traffic.	Inapplicable, since bikes are expected to travel in mixed traffic.	Should be provided if there is a bike lane, but no bike box.	Should be provided if there is a bike lane, but no bike box.	Provide in the rare circumstance that a bike lane exists.
• Grade Separation	No.	No.	No.	No.	No.
Lighting					
• Street	Yes.	Yes.	Yes.	Yes.	Yes.
• Pedestrian	Should be provided where adjacent land uses or facilities are likely to cause concentrations of pedestrians (at bus stops or in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use, e.g.).	Yes.	Should be provided where adjacent land uses or facilities are likely to cause concentrations of pedestrians (at bus stops or in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use, e.g.).	Should be provided where adjacent land uses or facilities are likely to cause concentrations of pedestrians (at bus stops or in areas that are currently or are planned to be pedestrian-oriented retail or mixed-use, e.g.).	Atypical, but should be provided in any circumstance where adjacent land uses or facilities are likely to cause concentrations of pedestrians.

Local Street Intersection Elements (continued) Table 5.5

Element:	*Local/Local Intersections or Local Approach to Other Intersections:*	*Main Street Approach to Local/Main Intersections:*	*Avenue Approach to Local/Avenue Intersections:*	*Boulevard Approach to Local/ Blvd Intersections:*	*Parkway Approach to Local/Parkway Intersections:*
Traffic Calming	Slow points should be provided on Local streets every 300-500 feet. Stops at intersections can count as slow points. Curb extensions and other devices can also narrow the intersection and serve to calm traffic (see "curb extensions", above, and CDOT's Traffic Calming Report for more information)	Typically not necessary, but may be used to maintain desired speeds.	Consider a combination of elements on intersection approach to slow traffic approaching intersection. At the intersection, curb extensions may be used, for example (see "curb extensions", above, and CDOT's Traffic Calming Report for more information).	May be appropriate, if necessary to maintain desired speeds. Lateral shifts and some forms of narrowing may be considered. See CDOT's Traffic Calming Report for more information.	No.