5 Design Guidance

5.1 Design Zones

The cross section of a street is grouped into three design zones that reflect the activity and movement influences along the roadway. There are overlapping influences within these zones from the different modes that may use a street. For example, a curb extension is part of the pedestrian zone but overlaps the parking/transit zone. If there is on-street parking, then the bicycle may be accommodated in the traffic zone. Buses operate primarily in the traffic zone but often pull into the parking zone for loading. Within the pedestrian zone, there may be an overlap between the planting/furnishing zone and the pedestrian through zone. The general design zones are illustrated in Figure 5-1 and discussed below.

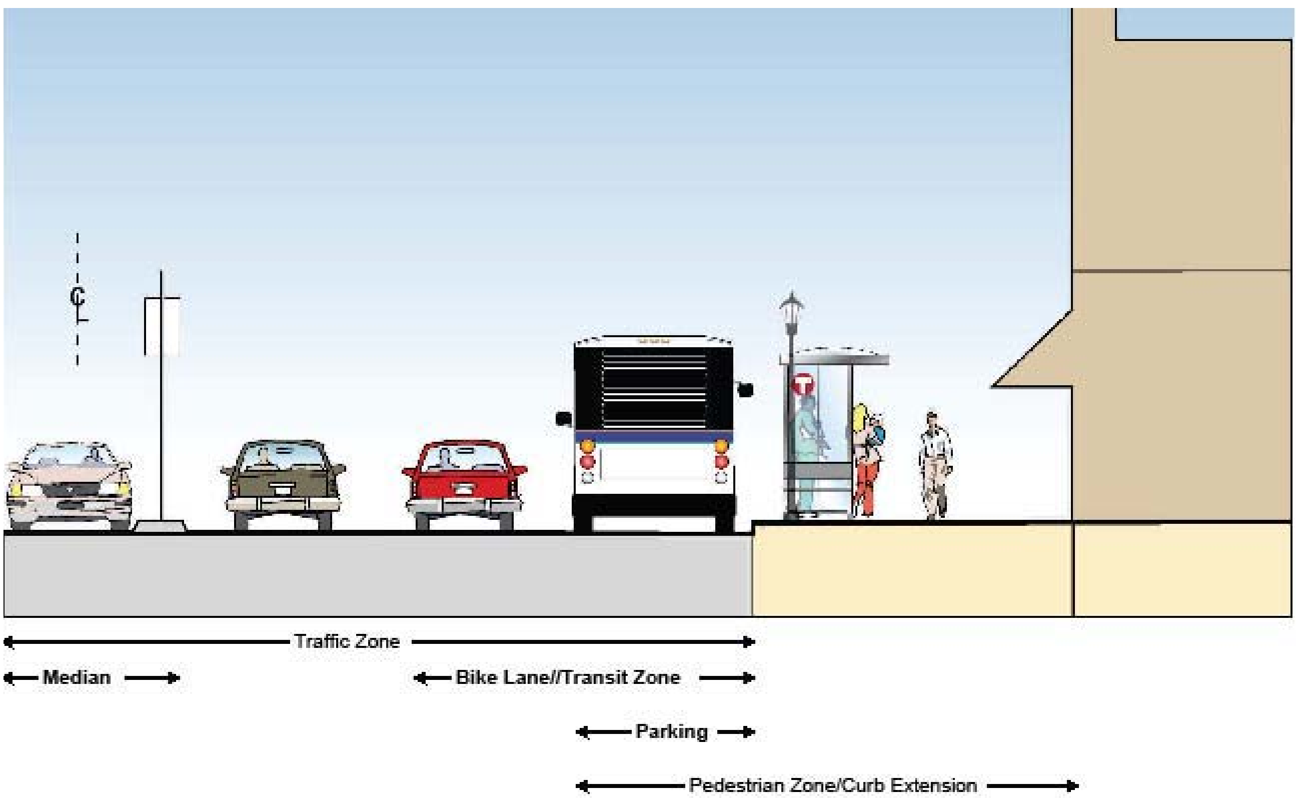


Figure 5-1 Design Zones

5.1.1 Traffic Zone

The traffic zone covers the area for vehicle movement on the street and includes the median/turn area in the center of the street. The median/turn area is used to define the area in the center of the roadway where raised or planted medians and/or turn lanes could be present, either individually or in combination. For the traffic zone, design guidance is provided to reflect the various combinations of lane widths and median treatments, and to reflect how these elements change as edge conditions vary. The traffic zone can extend into the bicycle/parking/transit zone when right turn lanes are provided or the space is used for right turns.

5.1.2 Parking/Bicycle/Transit Zone

This zone is adjacent to the pedestrian zone and reflects the interface between the areas of pedestrian movement and vehicular movement. It overlaps the traffic zone and the pedestrian zone and represents a zone of activity where vehicles (autos, bicycles, and transit) are moving more slowly than in the travel lanes. Design guidance is provided for parking, bicycle facilities and transit elements. The provision of bicycle facilities and transit service is a function of the citywide transportation planning process that precedes the street design process. If a street is on a designated bicycle route, then the appropriate level of bicycle accommodation (marked lane, separated path, shared lane, signing, chevron pavement markings, etc.) for the street type should be added to the design or accommodated on a parallel street. Similarly, if a street is a Primary Transit Network route and is expected to support a particular level of transit service, guidance is provided for how to accommodate stops and service patterns along the street.

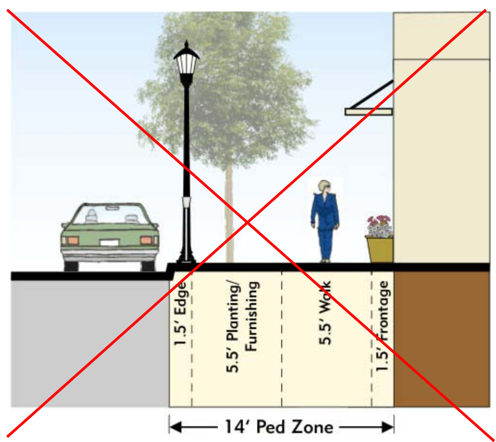
5.1.3 Pedestrian Zone

The subsections of section 5.1.3 are superseded by section 10.2.

The pedestrian zone frames the street and contains the building interface between the movement aspects of the street and adjacent land uses. This zone contains both the area for pedestrian movement and the area used for tree plantings, landscaping and street furnishings. The pedestrian zone is divided into four subzones, the total of which covers the space between the property line and the face of curb.

~~5.1.3.1 Frontage Zone~~

~~The frontage zone is the space at the edge of the walkway adjacent to the property line. It reflects the varying level of activity associated with property frontage and is wider where people are likely to window shop or activities such as sidewalk cafes are allowed. It also reflects the tendency of people to shy away from walls above waist height. The frontage zone may also be used as a secondary area for plantings, street furniture and people activities.~~



~~Figure 5-2 Pedestrian Zones~~

~~5.1.3.2 Through Walk Zone~~

~~The through walk zone contains the basic sidewalk width or clear area for pedestrian travel and is sized to provide for two directions of pedestrian travel.~~

~~5.1.3.3 Planting/Furnishing Zone~~

~~The planting/furnishing zone is an amenity zone that contains planted boulevards, trees, landscaping, planters and space for sidewalk furniture. This zone may be expanded to include transit shelters and extended into the parking zone by the use of curb extensions.~~

~~5.1.3.4 Edge Zone~~

~~The edge zone is closest to the curb and reflects the setback required from the roadway for the placement of signs, light poles, etc.~~

5.2 Lane Widths – Sources for Design Guidance

In the national literature for urban streets, travel lane widths are recommended in the range of 9 to 12 feet, with 9 foot lanes only used on very low volume residential local streets. The principal sources typically used for lane width guidance are noted below. Other sources from peer cities are provided in the bibliography in Appendix A.

5.2.1 AASHTO "Green Book"

AASHTO guidance on lane widths for urban collectors recommends the following:

- 10-12 foot travel lanes
- 10-12 foot turn lanes
- 7-8 foot parking lanes in residential neighborhoods
- 8-11 foot parking lanes in commercial areas
- 4-8 foot sidewalks in residential areas (no specific guidance for commercial areas)
- 2 foot minimum boulevard (planted strip between curb and sidewalk)

It is important to note that, at the national level, recently completed research[8] by the NCHRP is demonstrating that lane widths in the range of 10-12 feet in low speed operating environments have similar safety records (i.e., narrower lane widths do not affect safety). Other research[9] has shown that lane width may influence vehicle operating speed with wider lanes generally showing higher average operating speeds.

5.2.2 ITE RP-036

ITE RP-036 recommends a range of 10 to 12 feet for travel lanes on urban arterial and collector streets and urban parking lane widths of 7 to 8 feet. Narrower travel lane widths are recommended on lower volume and lower speed streets. Narrower parking lane widths are recommended in areas with a low volume of large vehicles (trucks and buses) using the parking lane. Wider parking lanes are recommended for industrial areas regardless of volume or length of time that parking is used to allow space for trucks parked at the curb.

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[8] Potts, Harwood, and Richard, *Relationship of Lane Width to Safety for Urban and Suburban Arterials*, Transportation Research Board Annual Meeting 2007.

[9] Fitzpatrick, Kay, *et al*, *Report 1769-3, Design Factors That Affect Driver Speed on Suburban Arterials,* Texas Transportation Institute, 2000 and Ewing, Reid, *Traffic Calming State of the Practice*, Institute of Transportation Engineers, Washington, D.C., 1999.

5.2.3 Minnesota State-Aid

State Aid requirements[10] allow for travel lane widths of 11 to 12 feet, depending upon posted speed. Parking lane widths vary from 8 to 10 feet on the basis of daily volume and posted speed. On MSA and CSAH routes with daily traffic volumes in excess of 10,000 vehicles per day, the requirement is for 10 foot parking lanes. State Aid requirements for streets without on-street parking include a curb reaction distance that varies from two feet to four feet, depending upon traffic volume, that is added to the minimum lane width. Conflicts with State Aid standards must be addressed on a case by case basis through a variance process.

5.3 Design Guidelines for Lane Widths

The guidance for lane widths presented in this document identifies *desirable* and *minimum* lane widths. *Desirable* lane widths represent the lane width that should be provided where space is available to do so. Wider widths are allowable, but caution must be exercised to avoid creating conditions that will encourage vehicle speeds to rise above target operating speeds. *Minimum* lane widths represent the minimum lane width that should be provided in constrained conditions where it is not feasible to provide the desirable lane widths within the existing right-of-way. Decisions on appropriate lane widths will need to consider all modes of transportation and the modal priorities that best suit the subject street. The City's *desired* lane widths for each of the street design types are provided in Figure 5-3. The desired lane widths are based on the following rationale:

- Accommodates typical vehicle widths (passenger vehicles up to 7 feet wide; buses and trucks up to 8.5 feet wide; mirrors add 1-2 feet width)
- Minimizes impact of snow storage on effective lane widths
- Reduces risk of sideswipe accidents
- Reduces amount of impervious surface and improves stormwater management
- Accommodates desired space for pedestrian zones within existing street rights-of-way

5.3.1 Travel Lanes

For traffic lanes, functional lane width minimums vary depending upon the mix and volume of traffic, traffic speed, volume of trucks, and on-street parking characteristics.

[10] Minnesota Rules 8820.9936 *Geometric Design Standards, Urban; New or Reconstruction Projects*, http://www.revisor.leg.state.mn.us/arule/8820/9936.html.

Figure 5-3 Desired Lane Widths[1]

Street Type	Travel Lane[2]	Left Turn Lane	Bicycle Lane[3]	Typical Curb and Gutter[3]	Parking Lane[5]
Commuter Street	12 ft	12 ft	Off-road trail	2 ft	Not Recommended
Commerce Street Activity Area Street	11 ft	11 ft	5-6 ft	2 ft[3]	8 ft
Community Connector Neighborhood Connector	11 ft	10 ft[5]	5-6 ft	2 ft[3]	8 ft
Industrial Connector	12 ft	12 ft	6 ft	2 ft[3]	10 ft
Parkway	10 ft	10 ft	Parallel paths	2 ft[3]	Recessed in bays (7 ft)
Local Street	9 ft[4]	None	5 ft	2 ft[3]	7 ft

Notes

1. Widths shown are desirable dimensions – these are the widths that should be provided when adequate space is available for all needs. Narrower widths may be necessary in constrained conditions. Wider widths are allowable, but caution must be exercised to avoid creating conditions that will encourage vehicle speeds to rise above target operating speeds. This table establishes desired dimensions – it does not indicate that all elements are required in all street types.
2. Widths measured from edge of gutter pan. Outside lanes adjacent to standard B6/24 curb and gutter would be 13 feet wide to face of curb. Inside lanes adjacent to medians would be 12 feet wide to face of curb.
3. Curb and gutter included in parking lane and bike lane dimensions.
4. 9 ft lanes should only be used on very low volume residential streets (<1000 ADT).
5. Travel lanes and turn lanes less than 11 feet and parking lanes less than 10 feet wide will require a variance if on a state-aid route.

Figure 5-4 Shows functional *minimums* for various conditions, *all for low speed streets (target speeds of 30 mph or less)*. Target speed represents the actual travel speed on the subject roadway. Low speed is a key component in selecting a narrow lane. Slower vehicle speeds reduce the dynamic envelope of the vehicle, which allows the vehicle to operate in a smaller lateral space on the street. Likewise, low volume streets (<6000 ADT) can function adequately with narrower lanes because there are adequate gaps for vehicles to safely pass one another. Similarly, lower speed movements, such as those in turn lanes that must yield to conflicting movements at intersections, can also function in narrower lanes. The presence of large vehicles (trucks and buses) is a factor throughout since wider vehicles in narrow lanes can encroach on adjacent lanes. Choosing to use a functional minimum is something that will occur on a case by case basis. Accordingly, such decisions will need to be well documented and trade-offs will need to be discussed thoroughly with key stakeholders.

Figure 5-4 Functional Minimum Lane Widths for Low Speed Streets (30 mph)[1]

Type of Lane	Minimum Width[2]	Traffic Volume	Percent Large Vehicles	Other Conditions Where Minimum Width Could Be Acceptable
Traffic	10.5 ft	<6,000 ADT	< 3%	Narrower lane allows bike lane to be provided Next to 2' curb and gutter Narrower travel lane allows 8' or wider parking lane
Turn	9-10 ft	NA	< 3%	
Parking[3]	7 ft	<6,000 ADT	NA	Narrower lane allows bike lane to be provided Adjacent land use is residential Low utilization of parking lane Minimal deliveries

[1]Minimum lane widths do not apply to industrial connector streets which carry high volumes of large trucks.
[2]These lane widths will require variances on a state-aid road. The City cannot require the County to obtain a variance on a county road.
[3]9-10' or wider parking lanes are needed if parking lane is used as a travel lane during peak periods

Nine foot travel lanes may be used on low volume, low speed local residential streets. There are many existing local residential streets throughout the city that function adequately today with travel lane widths of 9-10 feet. These streets typically have very low traffic volumes (<1,000 ADT) and low operating speeds (25 mph or less), allowing frequent gaps for vehicles to pass one another.

Ten foot travel lanes are acceptable on parkways and parkway design type streets. These streets tend to have higher traffic volumes than local residential streets and more bicycle use but few trucks or buses.

Eleven foot travel lanes are desirable for all other street design types. However, in constrained conditions, a reduced travel lane width of 10.5 feet may be used if one or more of the following conditions exists:

- Traffic volume is less than 6,000 ADT
- A narrower travel lane makes it possible to provide a bike lane.
- Travel lane is next to a 2 foot curb and gutter
- A narrower travel lane makes it possible to provide a parking lane that is at least 8 foot wide

Optional lane configurations meeting the above lane width guidance are shown in Figure 5-5. It should be noted that other options may be possible and other design approaches may be needed in constrained conditions. It should also be noted that the above described lane widths for constrained conditions would require a variance on a state-aid roadway. Also, the city cannot require Hennepin County to obtain a variance on a county road. The project manager should evaluate each situation and exercise good engineering judgment in making these design decisions.

5.3.2 Turn Lane Widths

Since operating speeds are very low, narrower turn lanes are acceptable. While an eleven foot lane is desirable, a 10 foot width is acceptable for left turn lanes and a 9 foot width is acceptable for right turn lanes in constrained conditions except in cases with a large volume of large trucks or buses or on industrial design type streets.

5.3.3 Parking Lane Widths

Seven foot parking lanes are acceptable on low volume, low speed local residential streets and on parkway streets. The width of the curb and gutter is included in this dimension which is measured from face of curb. Many existing local residential streets and parkway streets in the city function adequately today with seven foot parking lanes. The low volume and low speeds on these roadways provide adequate gaps for vehicles to pass one another.

60' R.O.W. (Neighborhood Connectors and Local Streets)

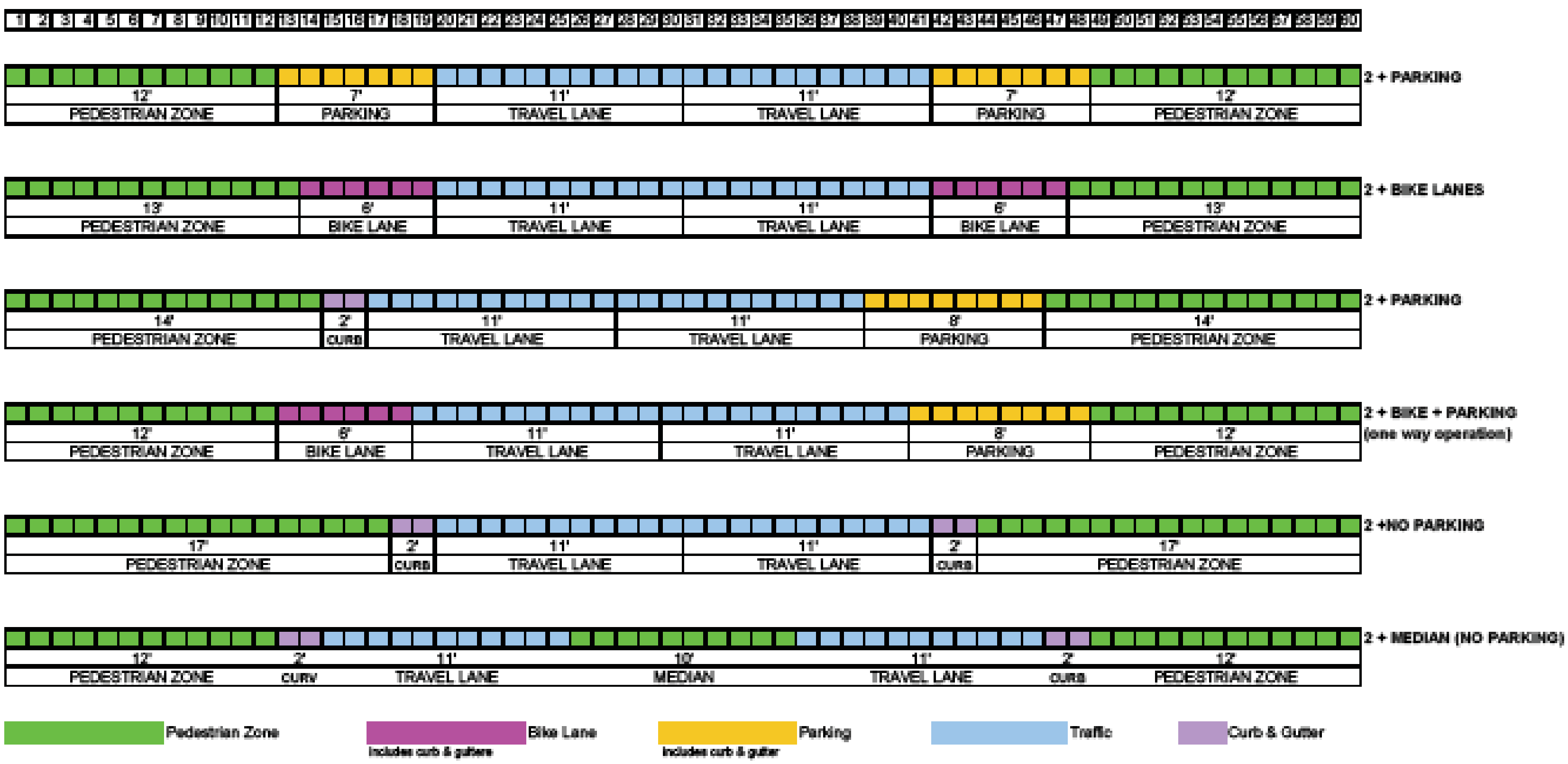

Figure 5-5 Optional Lane Width Configurations

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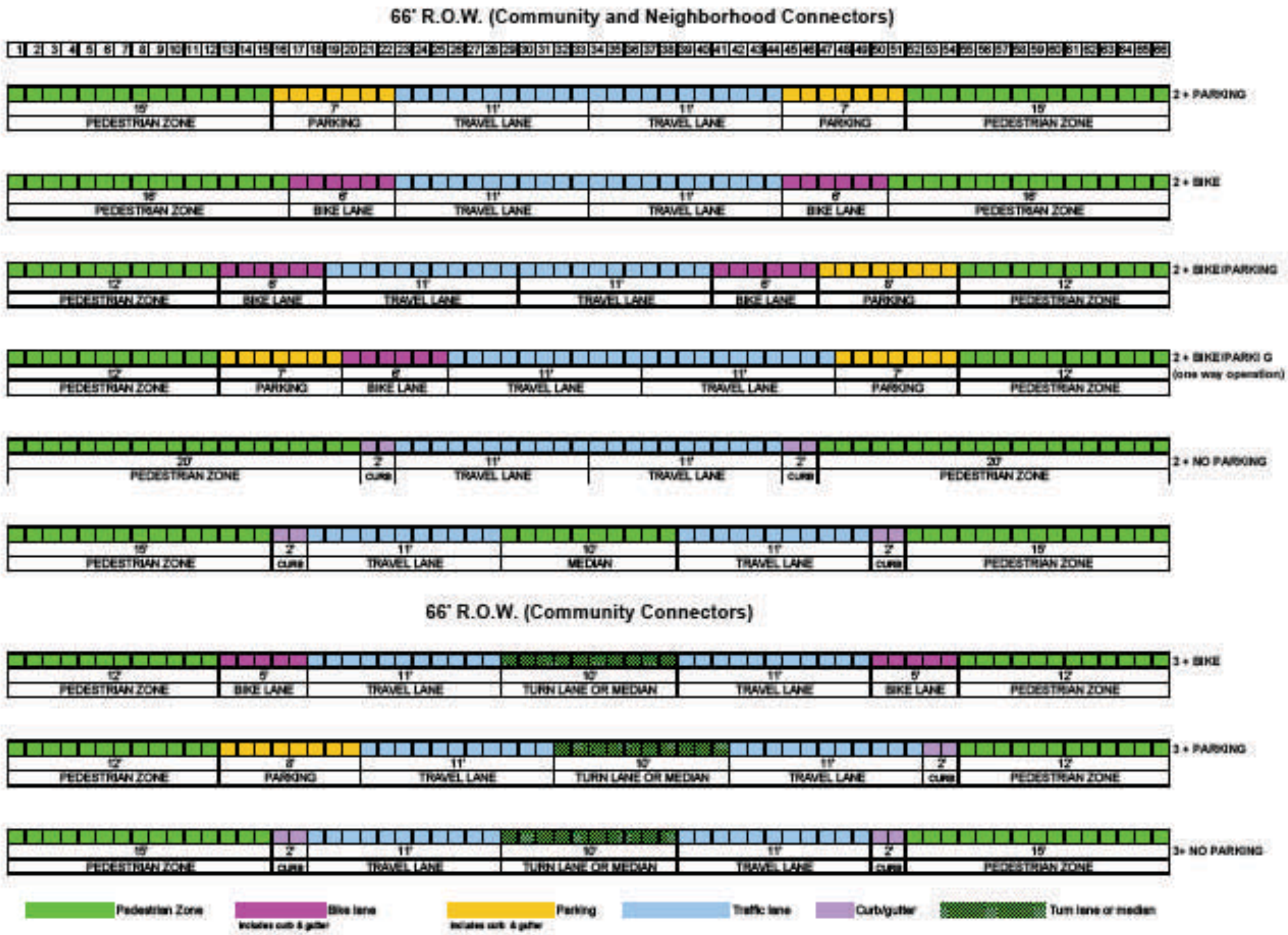

Figure 5-5 Optional Lane Width Configurations (continued)

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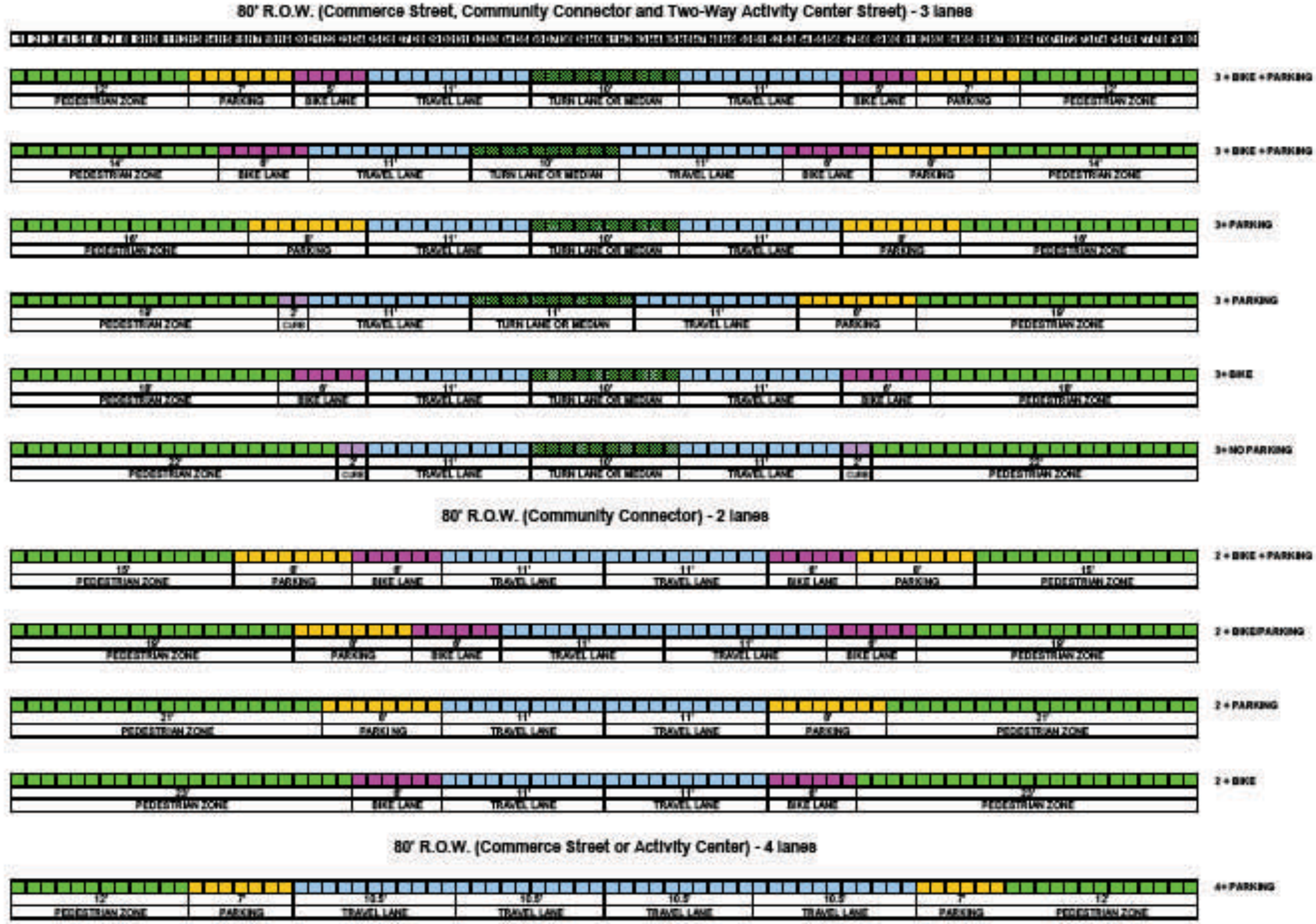

Figure 5-5 Optional Lane Width Configurations (continued)

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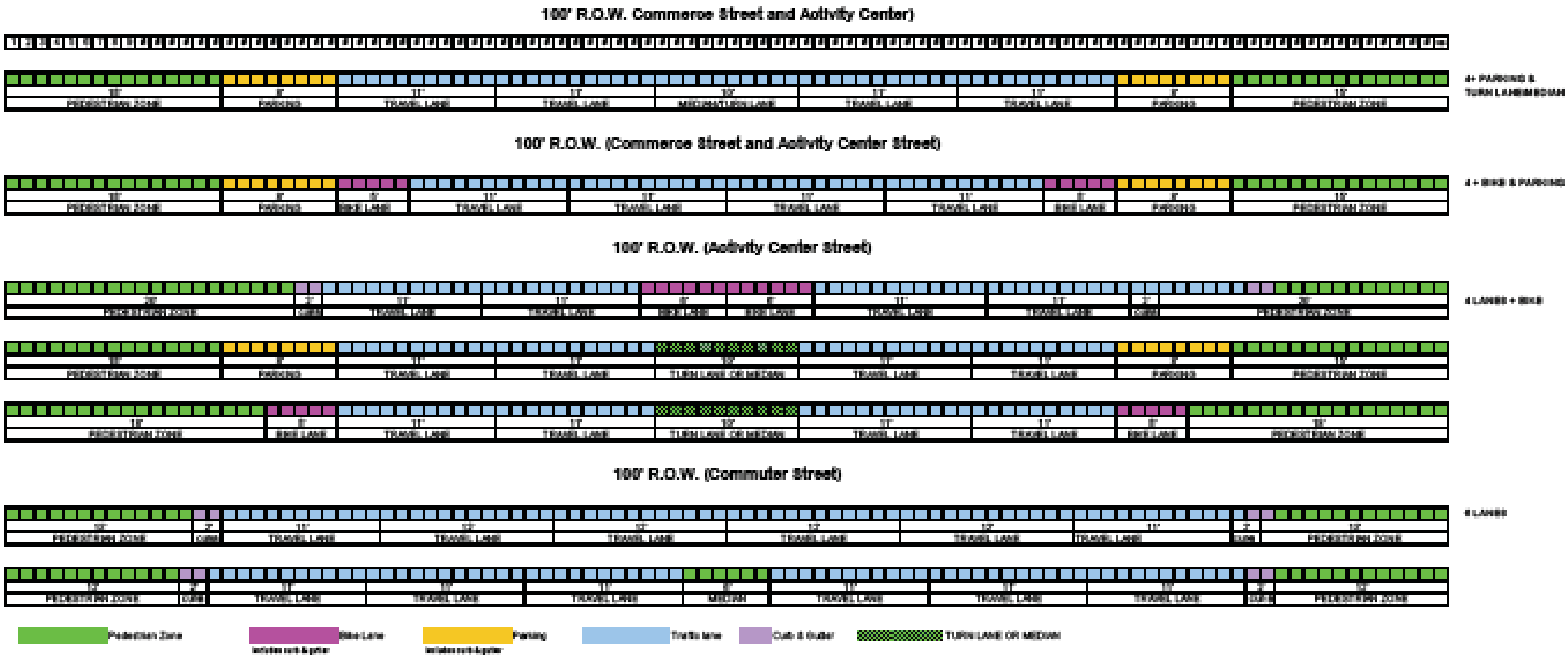

Figure 5-5 Optional Lane Width Configurations (continued)

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Eight foot wide parking lanes are desirable on all other street design types. It should be noted that parking is typically not permitted on commuter streets (such as Olson Memorial Highway) and wider parking lanes may be needed on industrial streets which carry a high percentage of large trucks.

Seven foot parking lanes may be acceptable on other street design types if one or more of the following conditions exists:

- Narrower lane allows a bike lane to be provided
- The adjacent land uses are residential or other land uses that require a minimal amount of truck deliveries
- The parking lane is not heavily utilized

A 9-10 foot or wider parking lane is needed if the parking lane is used as a travel lane during peak periods, is in an industrial area where on-street parking is utilized by large trucks, or other unique circumstances exist requiring wider parking spaces.

Guidance for the width of parking or drop-off bays is the same as for parking lanes. The minimum length of bays should be the equivalent of two parking spaces. Tapers in and out of parking bays are not required. Where tapers are not provided, staking or some other marking may be needed during the winter months for snow removal.

5.3.4 Bicycle Lane Widths

On-street bicycle lane widths are incorporated in Figure 5-5 and are typically five to six feet wide. Where space is available, six foot lanes are desired on streets with traffic volumes over 15,000 ADT or with a high turnover of parking. Five foot lanes are acceptable in constrained conditions. Where the bicycle lane is next to the curb, the width of the curb and gutter (typically 2 feet) is included in the width of the bike lane.

There are a number of ways other than bicycle lanes that bicyclists can be more safely accommodated on streets. The Bicycle Master Plan, which is currently being developed, will address appropriate uses and design characteristics of a variety of strategies including some innovative treatments. This information will be incorporated into the city's design guidelines as appropriate when it becomes available.

5.3.5 Curb and Gutter Widths

The City typically uses a two-foot wide curb and gutter on all streets. In order to protect drainage facilities from excessive wear, travel lanes next to the curb should be offset from the face of curb by two feet. The two-foot curb and gutter width is included in parking lane and bicycle lane widths, which are measured from face of curb. Where a bike lane is being provided next to the curb, consideration should be given to the use of an extra wide gutter, thereby eliminating the crack between the pavement and the gutter pan in the bike lane.

5.3.6 Planted Medians

Planted medians should be considered on those streets where space is available or where pedestrians must cross several lanes. A minimum width of 10 feet is desirable for tree plantings. This width also provides a safe refuge for pedestrians who must wait in the middle of the street to complete their crossing. A 10-foot wide median can be combined with 10-foot wide turn lanes where needed. However, the removal of the median to provide a dedicated left turn lane results in a much wider street for pedestrians to cross without a median refuge. It is very important to address these issues in locations where there is a high number of pedestrians or there are pedestrians with special needs. Examples include transit station areas and transit centers, schools, activity centers and growth centers.

Additional information on medians and pedestrian crossings will be provided in the Pedestrian Master Plan, which is currently being prepared. This information, as appropriate, will be incorporated into the city's design guidelines when it becomes available.

5.3.7 Snow Removal Issues

Snow removal practices and the space available for snow storage on the roadside have an influence on travel and parking lane width. Wider boulevard/sidewalk areas would provide for more snow storage on the sidewalk/boulevard than is currently available. Clearing to the curb to allow for parking in narrower parking lanes may require a two stage process that would require temporary use of the parking lane for snow storage. This will increase the cost of snow removal. The propensity to provide for on-street snow storage to minimize operating costs must be weighed against effects of the wider lane width on travel speeds, pedestrian crossing times, parking operations, and desirable street design for adjacent land uses.

~~*5.4 Pedestrian Zone*~~

Section 5.4 is superseded by section 10.2.

~~Appropriate design arrangements for the pedestrian zone are limited in built urban environments due to existing right-of-way width and past practices. Typical sidewalk conditions seen today in Minneapolis are:~~

- ~~On many arterial streets, the sidewalk is paved to the back of curb (except adjacent to ground floor residential outside of activity centers) and often the sidewalk has been narrowed to allow for an increase in the number of traffic lanes.~~
- ~~The dimensions of the planting/furnishing and frontage zones increase or decrease in relation to the intensity of development in nodes and activity centers and in relation to the proximity of adjacent buildings. Frequently, the planting/furnishing and frontage zones in commercial nodes and activity centers are too narrow to provide adequate space for both plantings/streetscaping and through pedestrian flow.~~
- ~~The through walk dimension is wider for more intensely urbanized areas although this dimension is often significantly reduced by sidewalk uses such as sidewalk cafes and the placement of transit shelters and street furniture.~~
- ~~The placement of signs, signals, fire hydrants, newspaper vending, waste receptacles and other street furniture often impedes pedestrian movement and bus loading.~~

5.4.1 Desired Pedestrian Zone Dimensions

Figure 5-6 illustrates the *desired* dimensions for the various street design types and place types and shows overall pedestrian zone dimensions that range from 12 to 15 feet. Even wider pedestrian zones are needed in very high volume pedestrian areas such as in activity centers, downtown, the University of Minnesota campus, transit station areas and transit centers. These dimensions may not be achievable on many streets, unless the street is being fully reconstructed, except with the use of curb extensions at intersections. Factors that should be considered in determining pedestrian zone width include land use density, transit use, existing curb-to-curb width, design/location of drainage systems, pedestrian volumes, parking demand and overall available right-of-way. As described earlier in this chapter (see Figure 5-2), the pedestrian zone dimension includes the frontage zone, the through walk zone, the planting/furnishing zone and the edge zone.

5.4.2 Sidewalks in Constrained Conditions

For pedestrian zones (which includes sidewalk and boulevard span), the functional minimums vary by place type and street design type. On all streets, pedestrian zone dimensions should not drop below 12 feet. Going below these dimensions may result in the encroachment of utilities, plantings and street furnishings into the through walk zone or the loss of space for plantings and furnishings. Figure 5-6 shows these constrained conditions for most street design types. Examples of pedestrian zone dimensions for the various street design types are shown in Figure 5-8.

5.4.2.1 Edge Zone

The edge zone (also known as the curb zone) is the clear zone needed for safety between an obstruction (for example, a light pole or a tree) and a moving lane of traffic. A minimum clear zone of 1.5 feet between the face of curb and the obstruction is required in all circumstances. However, in areas with planted boulevards, the edge zone can become part of the planted boulevard so long as any obstruction is placed in such a way as to maintain the required 1.5 feet clear zone distance. In constrained conditions, the planting/furnishing zone can overlap the edge zone. A minimum of 0.5 feet, the width of the top of the curb, will be hard surface.

5.4.2.2 Planting/Furnishing Zone

The planting/furnishing zone provides for an important and essential element of the infrastructure: trees, vegetation and stormwater management. This is the area where street trees, landscaping materials, benches, light poles and other fixtures may be located and where pervious materials, plant materials and other strategies can be utilized to better manage stormwater runoff and achieve the associated environmental benefits. The dimension of this area will vary depending on the location of transit stops, sidewalk cafes, street vendors and other sidewalk activities and uses. The minimum width required for tree planting is 4 feet; however, with this width, special planting techniques are required which are very costly. A width of at least 6 feet is desirable in all except the most constrained conditions. This minimum width should be provided in all cases except where the space is required for transit stops or a decision is made to use the available space for a sidewalk café or another sidewalk use. Irregardless of the width and length of the planting zone, a minimum planting depth of five feet is required for tree planting. Thus, utilities and other underground features must be carefully located so that tree planting is possible and trees can be sustained in good health.

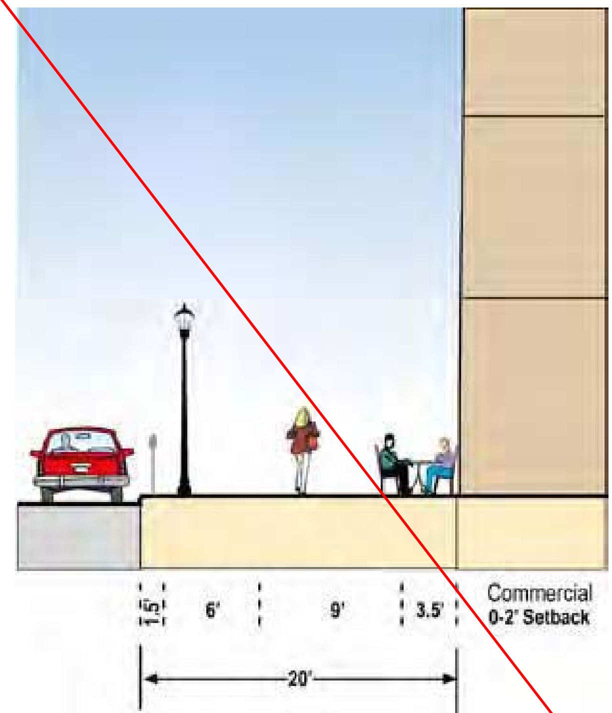
In residential areas, the planting/furnishing zone is made up of a planted boulevard, typically a combination of trees and grass. The planted area may extend to the back of the curb. Signs, parking meters, lamp posts, etc. are located within the planted boulevard area but, as noted above, are typically positioned 1.5 feet from face of curb to maintain a safe clear distance from moving traffic.

Work is currently underway to prepare design guidelines for tree planting, landscaping and stormwater management in public rights of way. When these guidelines are completed, they will be incorporated into the city's design guidance as appropriate.

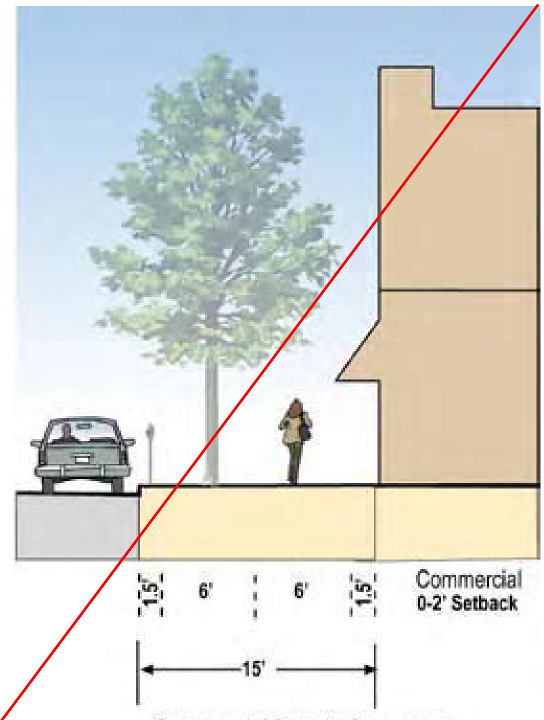
Figure 5-6 Desired and Minimum Pedestrian Zone Dimensions (ft)[1]

ELEMENT	DESIRED DIMENSIONS	CONDITIONS UNDER WHICH LESSER DIMENSIONS MAY BE ACCEPTABLE	FACTORS TO CONSIDER IN DETERMINING PEDESTRIAN ZONE DIMENSIONS
Frontage Zone	1.0-1.5'	▪ Building, wall, fence set back >1' from ROW ▪ Ped through zone 6' or greater	▪ People "shy away" from vertical obstructions (steps, railings, walls, fences) by at least 1 ft.
Through Walk Zone	5' with boulevard 6' or more without boulevard	▪ Obstruction in sidewalk creates unavoidable narrowing for short segment within block. ▪ Passing space provided at maximum of 200' intervals when less than 5'. ▪ Planting/furnishing zone designed with walking surface	▪ Average person requires 2.5'; 5' needed for 2 people to pass each other ▪ 4' minimum proposed ADA requirement ▪ 5' recommended, 4' minimum in ITE Guidelines for Accessible Right of Way ▪ If 5' is used, than frontage zone must be clear of steps, railings, fencing and plantings that may impede pedestrian movement
Planting/Furnishing Zone	5.5' or more	▪ Edge zone is planted as part of boulevard (signs located in planted boulevard) ▪ No additional space available without impacting dimension of through walk zone	▪ 5.5' recommended in Urban Forestry Policy ▪ 4' is absolute minimum required for tree planting (requires special planting techniques that are very costly) ▪ 2' is minimum required for small planters ▪ 2' is minimum required for turf ▪ Minimum 5' depth required for tree pits or trenches
Edge Zone (measured from face of curb)	0.5-1.5'	▪ 0.5 ' (top of curb) acceptable if planting zone includes 0.5-1.0' space for signs and light poles ▪ No signals or poles should be placed in areas with minimum dimensions	▪ Top of curb is 8" (12" for fatback curb used in downtown) ▪ Signs and light poles must be set back 1.5' from face of curb (or 1.0' from back of curb) to prevent being hit by car or bike rider; this also provides space for a conduit raceway behind the curb
TOTAL PEDESTRIAN ZONE	12-15'		

[1]See Pedestrian Master Plan for further details

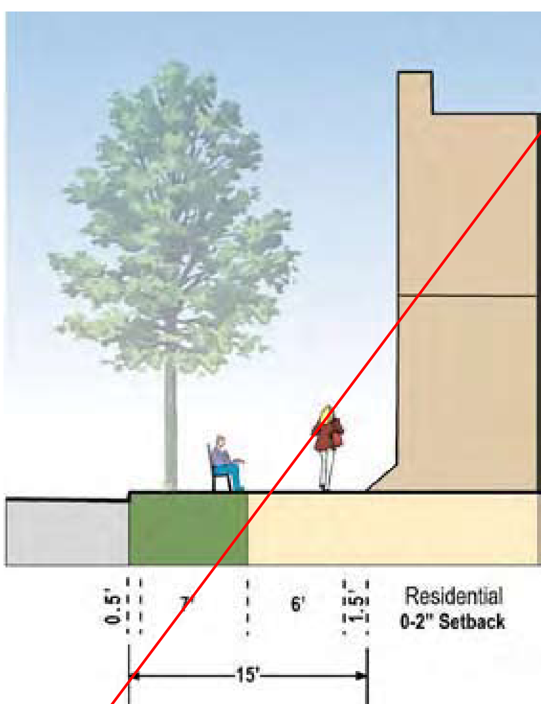


Activity Center Street - Commercial
Dimensions Listed are Desired Requirements

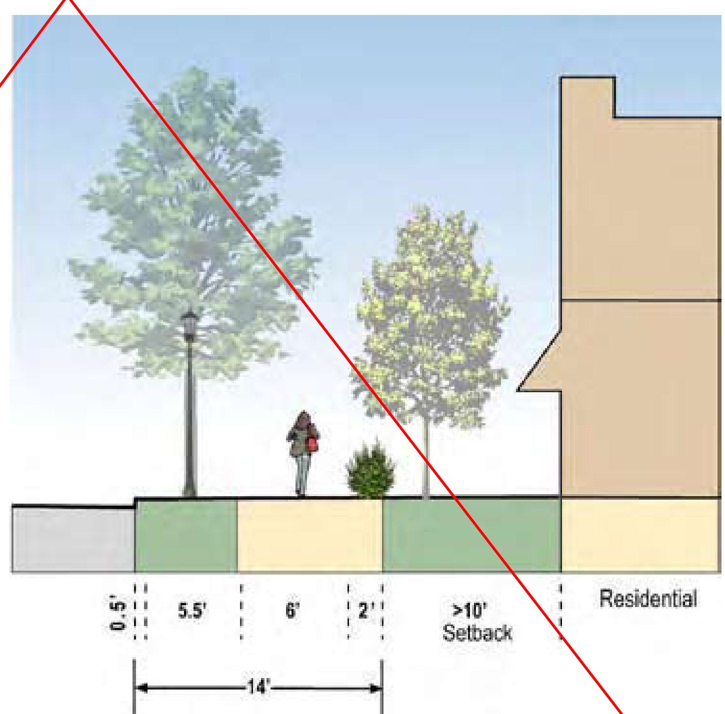


Commercial Street - Commerce
Community Connector - Commerce
Neighborhodd Connector - Commerce
Dimensions Listed are Desired Requirements

ILLUSTRATIVE ONLY: SEE SECTION 6 AND PEDESTRIAN MASTER PLAN FOR ADDITIONAL DETAIL



Community Connector - Residential
Neighborhood Connector - Residential
Dimensions Listed are Desired Requirements



Local Street - Residential
Dimensions Listed are Desired Requirements

Figure 5.7 Examples of Pedestrian Zone Dimensions for Street Design Types

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5.4.2.3 Through Walk Zone

The through walk zone is the area that must remain clear of all obstructions for the safe passage of pedestrians. It is generally based on the space required for two people to pass each other. A minimum through walk zone of 5 to 6 feet should be provided in all cases. It is also important to maintain lateral consistency in the pedestrian through path. Conditions that can impact lateral consistency include sidewalk cafes, building design, placement of street furniture and transit shelters, and variations in setbacks or street width from one block to another. An effort should be made to avoid a meandering through walk zone as this is inconvenient for all pedestrians and hazardous for persons with disabilities.

It is especially important to pay attention to the placement of signs, light poles, signal poles, fire hydrants and other necessary vertical elements that must be located within the pedestrian zone. If not carefully located, these elements can create impediments to walking, impact the ability to plant trees, and create safety hazards. These and other details will be further addressed in the Pedestrian Master Plan. This information will be incorporated into the Design Guidelines when it has been completed.

5.4.2.4 Frontage Zone

The frontage zone represents both the space that people tend to put between themselves and the side of a building and also the space where people stand to window shop; wait for the bus and other similar activities. A minimum clear space of at least one foot is needed between buildings that front the sidewalk and the through walk zone. Additional space is desired in activity centers and commercial nodes where more people activity is likely to occur. Frontage zones can also be utilized as a secondary location for plantings. Plantings in these areas generally take the form of planter boxes, green walls or other materials that do not require a great deal of space. Small building setbacks provide additional opportunities for plantings, street furniture and sidewalk cafes in the frontage zone.

Sidewalk cafes are typically located in frontage zones. They require a minimum width of four feet. If the pedestrian zone is less than 12 feet wide, an unobstructed walkway of four feet must be maintained. If the pedestrian zone is more than 12 feet wide, an unobstructed walkway of six feet must be maintained. Curbside placement is acceptable if parking is prohibited and a two foot clearance to the curb is maintained. Where sidewalk cafes are provided, the through walk zone is adjusted and the space for the sidewalk café is drawn from both the through walk zone and the planting/furnishings zone.

5.4.3 Pedestrian Zone Dimensions on Bridges

Bridges can present particular challenges in providing an adequately sized pedestrian zone that is both safe and attractive for pedestrians. Since bridges are very expensive to construct, many bridges have been built with minimal sidewalk space and some have sidewalks on only one side. At the same time, state design guidance requires, for safety reasons, that the curb location on the roadways approaching a bridge be maintained across the bridge. Most approach roadways in the city have on street parking but parking is not allowed on bridges. Thus, bridges often have very wide roadways but narrow sidewalks. One approach for addressing this issue is to change the curb location on the approach roadway by constructing curb extensions. This then provides the opportunity to widen the sidewalks on the bridge and to provide sidewalks on both sides of the bridge. The minimum sidewalk width on a bridge should be 10 feet. This provides a clear distance of 8 feet for sidewalk maintenance vehicles with an additional two feet for sign post and light pole placement. Additional width may be required if seasonal plantings and/or street furnishings are desired on the bridge.

5.4.4 Pedestrian Zone Dimensions at Transit Stops

Transit stops are required to have a minimum landing pad of four feet that is clear of obstructions for bus loading and unloading. This space is technically located within the edge zone and/or planting/furnishings zone. Where transit stops are provided without curb extensions, the space for the landing pad is drawn from the through walk zone, the planting/furnishings zone and/or the edge zone as needed. A minimum through walk zone of 5-6 feet is desired. A wider area may be needed in locations where there are high passenger waiting and/or pedestrian through volumes.

Because many pedestrian zones in the City of Minneapolis will not likely be much more than 12 feet, the provision of curb extensions for transit stops is very important. A curb extension will typically widen the pedestrian zone by 7-8 feet or more, depending on the width of the parking lane. Curb extensions provide much needed space for the landing pad and transit shelter while maintaining an adequate through walk zone and some space for furnishings, trees and landscaping.

5.5 Curb Extensions

Section 5.5 is supplemented by section 10.3.5.

Curb extensions, which are also known as "bump-outs, bulb-outs, neckdowns and flares", are essentially pedestrian zones that are widened at the intersection or at specific mid-block locations to incorporate the approximate width of the on-street parking lane (Figure 5-8). They provide additional space where pedestrian volumes are higher and where additional space is needed for sidewalk ramps, bus shelters, bicycle parking, waiting areas, signal poles and/or street furniture. Curb extensions reduce the street crossing distance for pedestrians, significantly reducing crossing times and increasing pedestrian visibility. Curb extensions may also provide additional pervious space for plantings and management of stormwater runoff.

Figure 5-8 Example of Curb Extension to Intersection

Curb extensions are recommended on all streets where on-street parking is allowed. Exceptions include intersections where turn lanes are provided, streets where the parking lane is used as a travel lane turning peak periods, and locations where a bus stop is desired outside the travel lane.

Curb extensions should be approximately the same width as the parking lane on the street where they are provided (typically 7-8 feet wide) and they should be at least 30 feet in length. This minimum length is based on typical cross-walk dimensions (10-15 feet) and ordinances requiring no parking within 20 feet of a cross-walk or 30 feet of a stop sign. Additional length may be required, depending on the furnishings and/or uses that need to be accommodated on the curb extension. No catch basins should be placed along the end of a curb extension – they should be placed in the parking area. Curb extensions need to be carefully designed to drain properly and to avoid ice, leaf and road debris buildup. A taper is not required. However, in some locations, the extended curb may need to be marked to improve visibility for snowplow operators.

5.6 Street Furniture, Lighting, Trees and Landscaping

Ample pedestrian zone width is needed, particularly in activity centers, growth centers, transit station areas and neighborhood commercial nodes, to accommodate a wide variety of activities and facilities. More width is desirable to accommodate bus shelters, sidewalk cafes, outdoor retail, street furniture, trees and landscaping, and stormwater management. Additional guidance is currently being developed for these facilities and will be included in other sections of the Design Guidelines. In general, the following guidance should be considered.

- Lighting for sidewalks should be pedestrian-scale and additional illumination should be provided at crosswalks and areas where higher pedestrian volumes are expected. *See City's lighting policies for further guidance (Section7).*

- Street furniture such as benches (or other seating such as low walls, planter edges or wide steps), gathering places, drinking fountains, newspaper racks, clocks, kiosks, recycling bins, public art, etc. can make pedestrian zones more interesting and inviting. However, if not well managed, street furniture can clutter the sidewalk and become a nuisance. It is important to maintain an adequate clear space on the sidewalk for pedestrian movement and transit loading. *See City's street furniture policies and guidelines for further guidance (Section 8).*

- Trees and landscaping are considered an essential infrastructure component of streets. They create comfortable spaces, help to manage stormwater, improve air quality, remove pollutants, provide shade and reduce heat, add value to adjacent properties, buffer the sidewalk area from traffic, provide habitat and provide a distinctive identity. *See City's guidelines for street trees and landscaping for further guidance (Section 9).*

- Street furniture and/or landscaping may be placed within curb extensions so long as the through walk zone, access to transit and access to curb ramps is not obstructed. Curb extensions may also provide space for bicycle parking.

- Streets or intersections identified as gateways into the city or into a particular area may require special architectural design and/or landscaping. Work in these locations should be coordinated with CPED and the Minneapolis Arts Commission.

5.7 Utilities

Section 5.7 is supplemented by section 10.2 and Chapter 9.

Above ground utilities need to be placed outside the area designated for pedestrian flow. Underground utilities need to be placed outside the area designated for tree planting as a minimum depth of 5 feet is required. The design of sidewalks, planted boulevards, medians and other street elements must allow for service access to underground utilities. Attention needs to be paid to the location of light poles, controller boxes, fire hydrants and other similar elements that are required but can impede accessibility if not placed appropriately.

This issue will be addressed in greater detail in the Pedestrian Master Plan and in the design guidelines for tree planting and landscaping. Appropriate elements from these initiatives will be incorporated in the city's design guidelines when the work is completed.

5.8 Intersections

Intersections play an important role in urban design, pedestrian access, efficiency of traffic flow, and safety of all transportation modes. Drivers expect to be able to pass through intersections without conflicting with other vehicles and with a minimum of delay. Pedestrians and bicyclists expect to be able to cross the street safely, comfortably and quickly. Understanding these competitive needs and the associated trade-offs is very important when designing intersections. Each intersection has a unique mix of users, turning movements, operating conditions and physical constraints. Design flexibility is needed to address the complex mix of needs and achieve an effective multi-modal solution. In general, intersections should be designed:

- As compact as practical to minimize pedestrian crossing distance and time.
- Using design speeds and design vehicles appropriate to the context.
- To provide good visibility by pedestrians, bicyclists and motorists.

5.8.1 Curb Return or Corner Radii

Section 5.8.1 is supplemented by section 10.3.

The curb return is the curved connection of curbs where two streets come together to form an intersection. The purpose of the curb return is to guide vehicles in turning corners and to separate vehicular traffic from pedestrian areas at intersection corners. Longer radii are used to accommodate the turning of large trucks and buses but longer radii also significantly increase the distance and time required for pedestrians to cross the street (see Figure 5-9). In general, the smallest practical curb return radii should be used at city intersections to shorten the length of pedestrian crosswalks.

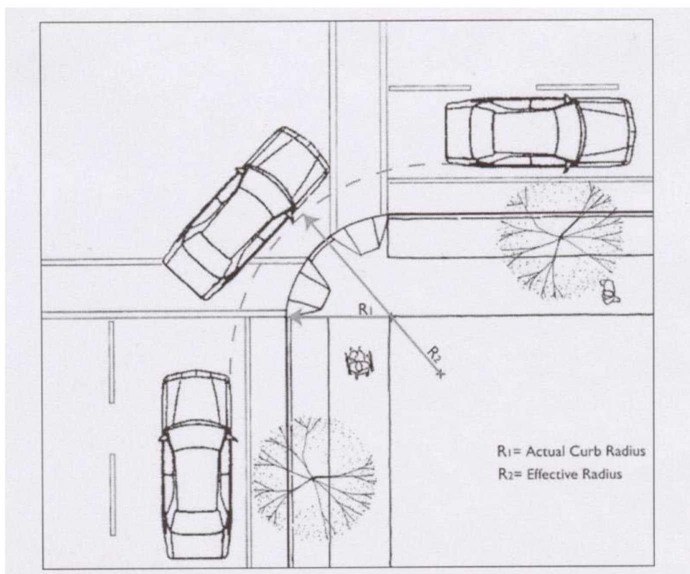
Figure 5-9 Effect of Curb Radii on Pedestrian Crossing Distance

Curb Return Radius (feet)	Added Crossing Distance (feet)	Added Crossing Time (seconds)[1]
15	0	0
25	8	2
50	38	10

[1]Crossing time at 4 ft. per second.
Source: ITE RP-36, Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities.

The following guidelines, which are taken from ITE RP-36 (page 161), should be used to design curb return radii:

- Curb return radii should be designed to accommodate the largest vehicle type that will *frequently* turn the corner (see Figure 4-1 for recommended design vehicles for various street design types). This principle assumes that the occasional large vehicle can encroach into the opposing travel lane when turning. In this circumstance, it may be desirable to place the stop line for opposing traffic further from the intersection.
- Curb return radii should be designed to reflect the "effective" turning radius of the corner, taking into account the width of parking and/or bicycle lanes (Figure 5-10). Using the effective turning radii allows a smaller curb return radius while still accommodating larger design vehicles.
- Curb return radii of different lengths can be used on different corners of the same intersections. This may be applicable, for example, where there is a high frequency of buses turning on a major bus route or where a city street intersects with a high volume county road.
- A typical minimum curb return radius of 10-15 feet should be used where high pedestrian volumes are present, where bicycle and/or parking lanes create additional space to accommodate the "effective" turning radius of vehicles, and where the width of the receiving intersection approach can accommodate a turning passenger vehicle without encroachment into the opposing lane.



Source: ITE RP-036, Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walking Communities (page 163)

Figure 5-10 Effective Turning Radii

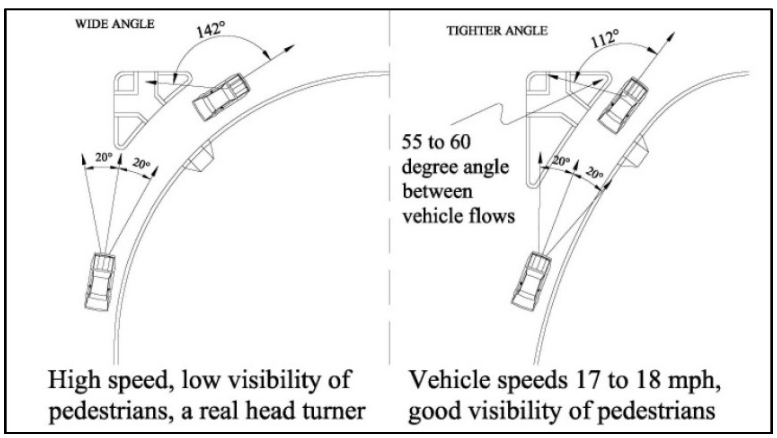
5.8.2 Dedicated Left and Right Turn Lanes

Dedicated left and right turn lanes have the primary benefit of reducing vehicle conflicts and improving vehicular travel times by removing turning vehicles from through traffic lanes. However, the provision of dedicated turn lanes uses precious space when working within constrained right-of-way widths and this is the case with most streets in the City of Minneapolis. Dedicated turn lanes should only be provided where significant safety problems exist and/or where there are unusually high traffic volumes that cannot be managed through signalization or other traffic management techniques. The length of the turn lane and the taper required will need to be determined based on an analysis of expected turning volumes. “No Right Turn on Red” should only be used when there is a demonstrated benefit.

5.8.3 Channelized Right Turn Lanes

In general, channelized right turn lanes should not be provided at urban intersections unless there is a geometric reason or an unusually high volume of right-turning vehicles. Likewise, in most circumstances, channelized right turns are inappropriate because they create additional conflicts with pedestrians and increase the time required and complexity for a pedestrian to cross the street. In rare circumstances, a well-designed channelization island can provide a refuge for pedestrians crossing multiple lanes at a complex intersection (Figure 5-11). The following general principles should apply:

- Channelized right turns should not be used except at intersections where there is complex geometry and/or complex traffic movements. If an urban channelized right-turn lane is provided, it should be designed for slow speeds (5-10 mph) and high pedestrian visibility.
- Where channelized right-turn lanes already exist, pedestrians can best be served by installing pedestrian signals to the right-turn lane crossings.



Source: ITE RP-036, Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities (page 166) – Kimley-Horn and Associates, Inc., adapted from an illustration by Dan Burden.

Figure 5-11 Angle of Dedicated Right-Turn Lane

5.8.4 Roundabouts and Traffic Calming Strategies

The City will consider roundabouts in limited locations (see Figure 5-12). If a roundabout is being considered, the Project Manager should refer to previous documentation (for example, Franklin-Cedar/Riverside Transit Oriented Development Master Plan, Appendix C)[11] for guidance on traffic analysis and design alternatives. Additional design guidance may be developed in the future.

Information on other traffic calming strategies can be found in *Traffic Calming for Neighborhoods*[12], which is currently being updated by the Division of Traffic and Parking Services.

Figure 5-12 Example of Roundabout

~~5.8.5 Crosswalks~~

Section 5.8.5 is superseded by section 10.5.

~~There are legal crosswalks, marked or unmarked, on all legs of all intersections with sidewalks, including T-intersections except where closed by ordinance and appropriately signed. Marked crosswalks alert motorists that they are approaching an area where they should expect pedestrians. Crosswalks should be marked at all signalized intersections and at all unsignalized intersections with significant safety problems along with high pedestrian activity.~~

~~At most crosswalks, a standard crosswalk marking of two parallel stripes is sufficient. In unique circumstances where additional visibility is needed, a zebra or ladder striping pattern may be used (Figure 5-13). However, due to the additional cost to provide and maintain these markings, they should only be used where need has been clearly demonstrated. Colored and/or textured crosswalks may also be used. It may also be desirable to have signs and flashing beacons at some crosswalks to provide maximum visibility and pedestrian safety. Crosswalks should also be well lit. Curb extensions, medians and refuge islands are all important techniques for reducing crossing distances at intersections.~~

~~Figure 5-13 Zebra Pattern Crosswalk Striping~~

[11] *Franklin-Cedar/Riverside Transit Oriented Development Master Plan, Appendix C,* City of Minneapolis Community Planning and Economic Development, 4/12/2001.
[12] *Traffic Calming for Neighborhoods,* City of Minneapolis Traffic and Parking Services, DRAFT, 2/17/2000 (Resource 003) – contact Jim Steffel for updated information.

~~Additional information on designing crosswalks and other pedestrian facilities will be provided in the pedestrian design guidelines being developed as part of the Pedestrian Master Plan.~~

5.8.6 Bike Lanes at Intersections

The design of bicycle lanes in Minnesota is guided by the Mn/DOT Bikeway Facility Design Manual. Additional guidance will be developed by the City of Minneapolis as part of the Bicycle Master Plan. The primary design objective at intersections is to promote a clear understanding of safe paths through the intersection and protect the safety of bicyclists where there is a high potential for conflicts with vehicles. Figure 5-14 provides guidance for bicycle lane treatments through intersections. Such guidance is continually being updated and designers should seek out the latest design guidance and standards.

Figure 5-14 Recommended Practice for Bicycle Lane Treatment at Intersections

With pedestrian crosswalks
• Bike lane striping should not be installed across any pedestrian crosswalks and, in most cases, should not continue through any street intersections.
With no pedestrian crosswalks
• Bike lane striping should stop at the intersection stop line, or the near side cross street right-of-way line projection, and then resume at the far side right-of-way line projection • Bike lane striping may be extended through complex intersections with the use of dotted or skip lines.
Parking considerations
• The same bike lane striping criteria apply whether parking is permitted or prohibited in the vicinity of the intersection.
Bus stop on near side of intersection or high right-turn volume at unsignalized minor intersections with no stop controls
• 6-inch solid line should be replaced with a broken line with 2-ft. dashes and 6-ft. spaces for the length of the bus stop. Bike lane striping should resume at the outside line of the crosswalk on the far side of the intersection.
Bus stop located on far side of the intersection
• Solid white line should be placed with a broken line for a distance of at least 80 ft. from the crosswalk on the far side of the intersection.
T-intersections with no painted crosswalks
• Bike lane striping on the far side across from the T-intersection should continue through the intersection area with no break. If there are painted crosswalks, bike lane striping on the side across from the T-intersection should be discontinued at the crosswalks.
Pavement markings
• Bike lane markings should be installed according to the provision of Chapter 9C of the MUTCD. • The standard pavement symbols are one of two bicycle symbols (or the words “BIKE LANE”) and a directional arrow as specified in the MUTCD. Symbols should be painted on the far side of each intersection. Pavement markings should be white and reflectorized.
Signs
• Bike lanes should be accompanied by appropriate signing at intersections to warn of conflicts (see Chapter 9B of the MUTCD).

Source: ITE RP-036, Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities (page 176)

5.9 Transit Stops

Section 5.9 is supplemented by section 10.4.

The design of transit stops is guided by Metro Transit design guidelines[13] and should meet Americans with Disabilities (ADA) guidelines. A bus stop checklist is also provided to assist in the evaluation of conditions at existing bus stops (Appendix B). This checklist and other information in this section are based on the Easter Seals Project ACTION's "Toolkit for the Assessment of Bus Stop Accessibility and Safety".[14] These guidelines are based on both minimum American with Disabilities (ADA) requirements and "Universal Design" guidelines which are intended to create environments that are usable by all people.

5.9.1 Curbside Bus Stops and Curb Extensions

Bus stops are typically located at curbside, in bus bays or on curb extensions or bus bulbs. These options are illustrated in Figure 5-15. The advantages and disadvantages of these options are summarized in Figure 5-16.

5.9.2 Near Side and Far Side Bus Stops

Bus stops may be located on the near or far side of the intersection and may, in some cases, be located in mid-block. Figure 5-17 illustrates placement of far side stops and Figure 5-18 illustrates placement of near side stops. The advantages and disadvantages of each are shown in Figure 5-19. This decision will need to be made in close coordination with Metro Transit and will need to be based on a thorough understanding of traffic, transit and pedestrian patterns in the subject intersection.

Figure 5-15 Example of Transit Stop on Curb Extension

5.9.3 Design of Transit Shelter/Bus Stop Area and Bus Landing Pads

A bus stop platform is a designated bus stop area clear of obstructions to facilitate boarding and alighting of all users. A bus stop checklist is provided in Appendix B to assist in the evaluation of conditions at existing bus stops. The length of the bus stop should be determined by the number of buses using the stop at any one time with a minimum 70-80 ft length desired (100 ft for mid-block stop). The city typically provides a 100-110 ft no parking zone for bus stops. Bus stop design should be based on Metro Transit's *Guidelines for the Design of Transit Related Roadway Improvements.*[15] Metro Transit should be involved in any design that incorporates transit facilities. To meet minimum ADA requirements, bus stop sites must have:

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[13] *Guidelines for the Design of Transit Related Roadway Improvements,* S.E.H. for Metropolitan Transit Commission, 1983.
[14] *Toolkit for the Assessment of Bus Stop Accessibility and Safety,* Easter Seals Project ACTION
[15] *Guidelines for the Design of Transit Related Roadway Improvements,* S.E.H. for Metropolitan Transit Commission, 1983.

- A firm, stable surface
- A minimum clear length of 8 feet, measured from the face of curb or vehicle roadway edge and a minimum clear width of 5 feet, measured parallel to the vehicle roadway
- Connections to streets, sidewalks or pedestrian paths by an accessible route

Universal Design[16] guidance also recommends the following:

- Locate street furniture to maintain a minimum clear width of 4 feet and a clear headroom of approximately 6.5 feet from the pedestrian pathway to the stop
- Clear the bus stop platform of all obstacles (including trees, newspaper boxes, waste and recycling receptacles)
- Design the sidewalk adjacent to the bus stop platform to be wide enough to handle the expected level of pedestrian activity and for two wheelchair users to pass each other traveling in opposite directions when two-way traffic is frequent
- Keep the front and rear door areas of a bus stop clear of trees, utility poles, wires, hydrants and other street furniture, accounting for the variance in door positions on different types and sizes of buses

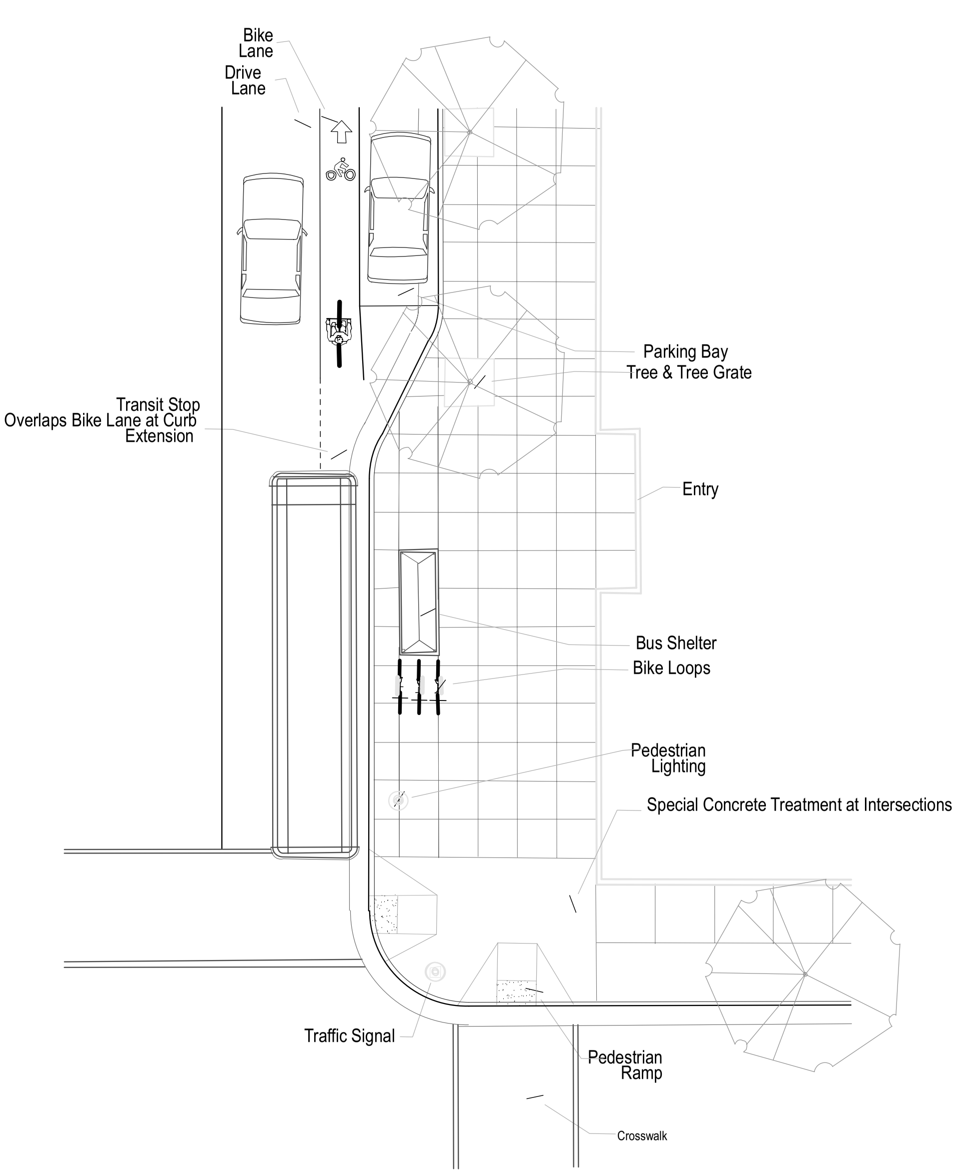
Figure 5-16 Comparative Evaluation of Bus Stop Designs

Type of Stop	Advantages	Disadvantages
Curb-side	• Provides easy access for bus drivers and results in minimal delay to bus • Is simple to design and easy and inexpensive for a transit agency to install • Is easy to relocate	• Can cause traffic to queue behind stopped bus, thus causing traffic congestion • May cause drivers to make unsafe maneuvers when changing lanes in order to avoid a stopped bus
Bus Bay	• Allows patrons to board and alight out of the travel lane • Provides a protected area away from moving vehicles for both the stopped bus and the bus patrons • Minimizes delay to through traffic	• May present problems to bus drivers when attempting to re-enter traffic, especially during periods of high roadway volume • Is expensive to install compared with curbside stops • Is difficult and expensive to relocate
Curb Extension	• Removes fewer parking spaces for the bus stop • Decreases the walking distance (and time) for pedestrians crossing the street • Provides additional sidewalk area for bus patrons to wait • Results in minimal delay for bus	• Costs more to install compared with curbside stops • See Curb-side disadvantages

Source: TCRP Report 19-B, Guidelines for the Location and Design of Bus Stops, Part B

[16] *Toolkit for the Assessment of Bus Stop Accessibility and Safety,* Easter Seals Project ACTION.

Transit Stop on Curb Extension



Transit Stop without Curb Extension

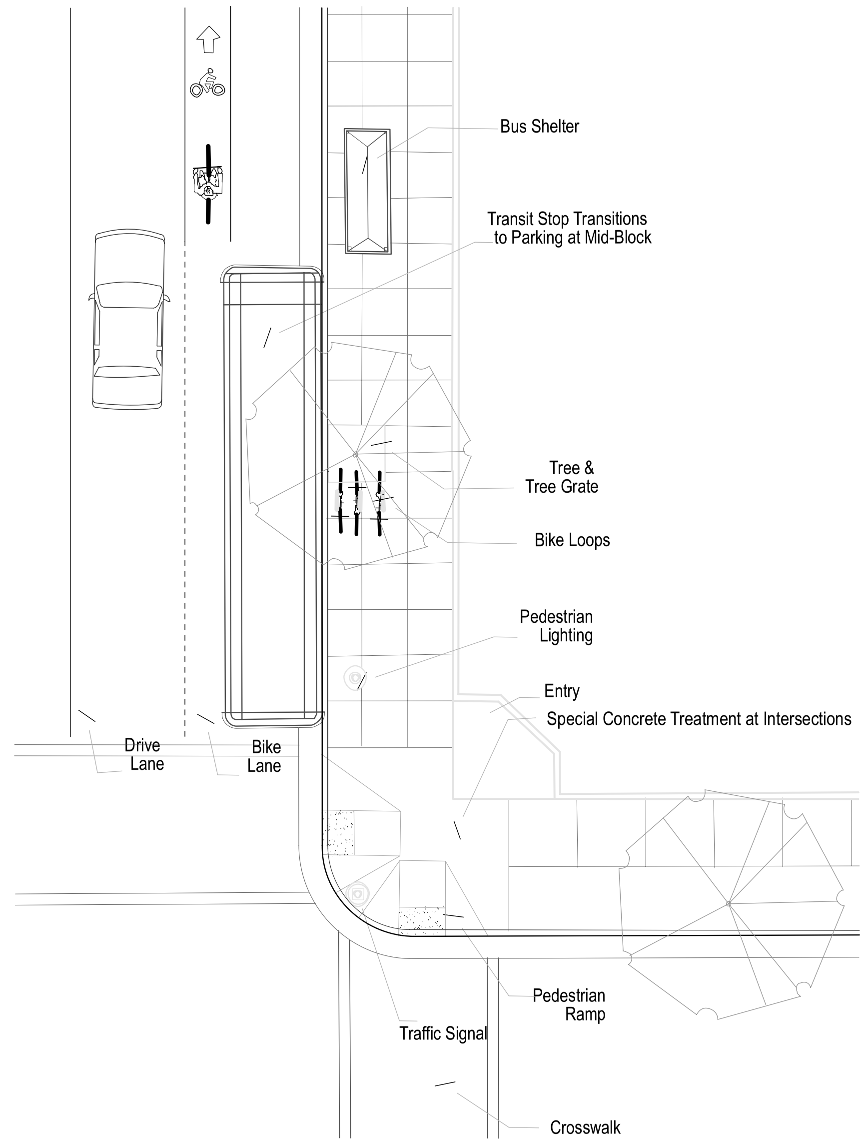
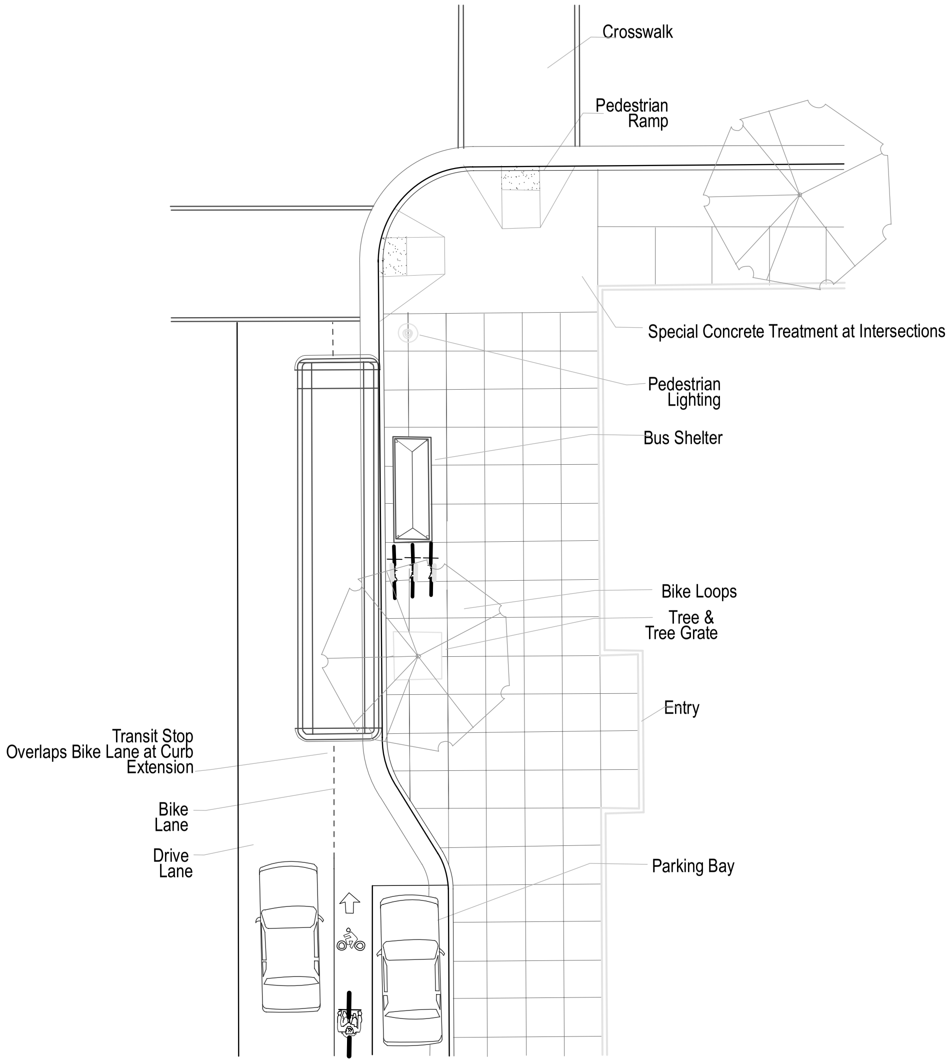


Figure 5.17 Typical Far Side Bus Stops

Transit Stop on Curb Extension



Transit Stop without Curb Extension

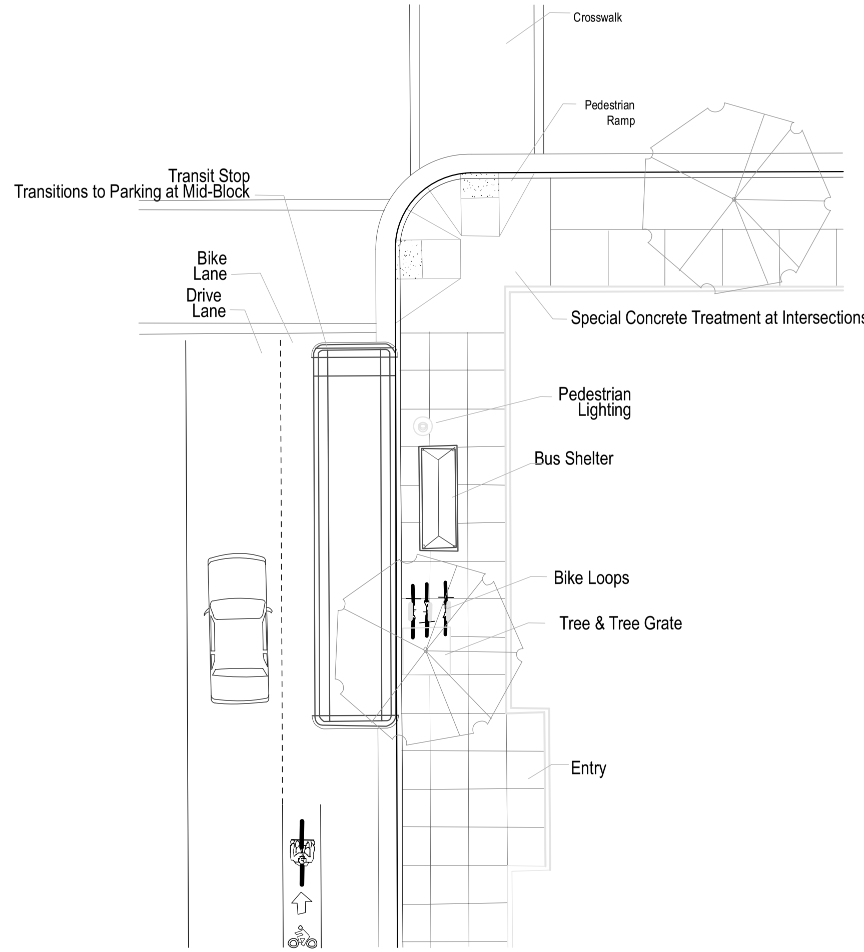


Figure 5.18 Typical Near Side Bus Stops

Figure 5-19 Comparative Evaluation of Bus Stop Locations

	Advantages	Disadvantages
Far-Side Stop	• Minimizes conflicts between right turning vehicles and buses • Provides additional right turn capacity by making curb lane available for traffic • Minimizes sight distance problems on approaches to intersection • Encourages pedestrians to cross behind the bus • Creates shorter deceleration distances for buses since the bus can use the intersection to decelerate • Results in bus operators being able to take advantage of the gaps in traffic flow that are created at signalized intersections	• May result in the intersections being blocked during peak periods by stopping buses • May obscure sight distance for crossing vehicles • May increase sight distance problems for crossing pedestrians • Can cause a bus to stop far side after stopping for a red light, which interferes with both bus operations and all other traffic • May increase number of rear-end accidents since drivers do not expect buses to stop again after stopping at a red light • Could result in traffic queued into intersection when a bus is stopped in travel lane • Snow removal less likely to be done and thus special attention and requirements needed to ensure that snow removal at bus stop is done promptly • Less likely to meet ADA requirements and thus special attention and requirements needed to ensure that ADA requirements are met
Near-side Stop	• Minimizes interferences when traffic is heavy on the far side of the intersection • Allows passengers to access buses closest to the crosswalk • Results in the width of the intersection being available for the operator to pull away from curb • Eliminates the potential of double stopping • Allows passengers to board and alight while the bus is stopped at a red light • Provides operator with the opportunity to look for oncoming traffic, including other buses with potential passengers	• Increases conflicts with right-turning vehicles • May result in stopped buses obscuring curbside traffic control devices and crossing pedestrians • May cause sight distance to be obscured for cross vehicles stopped to the right of the bus • May block the through lane during peak period with queuing buses • Increases sight distance problems for crossing pedestrians
Mid-block Stop	• Minimizes sight distance problems for vehicles and pedestrians • May result in passenger waiting areas experiencing less pedestrian congestion	• Requires additional distance for no-parking restrictions • Increases walking distances for patrons crossing at intersections • Increases distance passengers must walk to make transfer connections • Increases the likelihood of passengers crossing the street at mid-block locations (jaywalking)

Source: TCRP Report 19-B, Guidelines for the Location and Design of Bus Stops, Part B

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