

### ***8.1 GENERAL STREET DESIGN PRINCIPLES***

This Code encourages the development of a network of interconnecting streets that work to disperse traffic while connecting and integrating neighborhoods with the existing urban fabric of the City. Equally as important, the Code encourages the development of a network of sidewalks and bicycle lanes that provide an attractive and safe mode of travel for pedestrians and cyclists.

It is the intent of this ordinance to build streets that are integral components of community design. Streets shall be detailed to compliment neighborhoods and commercial centers and shall be pedestrian in scale. In addition to these standards, streets shall conform to the provisions of City of Belmont Land Development Standards Manual and the City of Belmont Pedestrian Transportation Plan Design Guidelines. Streets are encouraged to be designed with on-street parking. All streets shall be landscaped. In an effort to protect this investment, the City views streets as the most important public space and therefore has developed a set of principles which provide adequate facilities for all types of traffic, including motorists, pedestrians, bicyclists, and transit users, and including of all levels of ability, such as those in wheelchairs, the elderly and the young.

Streets shall interconnect within a development and with adjoining development. Cul-de-sacs are permitted only where topographic conditions and/or exterior lot line configurations offer no practical alternatives for connection or through traffic. Street stubs should be provided with development adjacent to open land to provide for future connections. Streets shall be planned with due regard to the designated corridors shown on the Thoroughfare Plan.

- Streets shall be designed as the main public space of the City and shall be scaled to the pedestrian.
- Streets shall be bordered by sidewalks on both sides, other than conventional lot subdivisions where sidewalk on one side of the street is permitted.
- Streets shall be designed with street trees planted in a manner appropriate to their function. Commercial streets shall have trees which compliment the face of the buildings and which shade the sidewalk. Residential streets shall provide for an appropriate canopy, which shades both the street and sidewalk, and serves as a visual buffer between the street and the home.
- Wherever possible, street locations should account for difficult topographical conditions, paralleling excessive contours to avoid excessive cuts and fills and the destruction of significant trees and vegetation outside of street-rights-of way on adjacent lands.
- All streets shall be constructed in accordance with the design and construction standards in this code and shall permit public access whether by easement or by public dedication. Closed or gated streets are strictly prohibited.
- All on-street parking provided shall be parallel. Curb or angle parking is permitted upon approval of the Planning Board and the City Council when the fronting buildings are more than 22 feet in height to ensure a safe and usable pedestrian realm.
- The use of traffic calming devices such as raised intersections, landscaping bulb-outs, and traffic circles are encouraged as alternatives to conventional traffic control measures.

Minor variations and exceptions to street cross-sections may be permitted with approval of the Planning Director and the City Engineer. Such exceptions include variations to the pavement width, tree planting areas, street grade, and centerline radii in accordance with principles above. Right-of-way widths should be preserved for continuity. All new streets shall be classified in accordance with the street hierarchy detailed in this Chapter.

## 8.2 STREET ENGINEERING AND DESIGN SPECIFICATIONS

Street designs shall permit the comfortable use of the street by cars, bicyclists, and pedestrians. Pavement widths, design speeds, and the number of vehicle lanes should be minimized without compromising safety. The specific design of any given street must consider the building types which front on the street and the relationship of the street to the City's street network. New development with frontages on existing publicly maintained streets shall be required to upgrade all their frontages to meet the standards of this Section. The following specifications shall apply to street design:

### 1. TREES

All street trees shall be installed in accordance with *City of Belmont Land Development Standards Manual*. Large canopy trees shall be planted in a planting strip at an average distance of 40 feet on-center as shown in the cross-sections in **Section 8.3 Street Design**

### 2. STREET MARKERS AND TRAFFIC CONTROL SIGNS

All street markers and traffic control signs posted in accordance with the Manual of Uniform Traffic Control Devices shall be installed by the developer prior to the issuance of any certificates of occupancy for any building on that street.

### 3. SIDEWALKS

Sidewalks shall be constructed along both sides of all streets except alleys and lanes, except for residential streets serving conventional lot subdivisions. Conventional lot subdivisions are only required to install sidewalk on one side of the street. Residential sidewalks shall be a minimum of 5 ft in width. Sidewalks serving mixed use and commercial areas shall be a minimum of 8 ft in width (10-12 ft is preferable in front of shopfronts). All sidewalks shall be paved with brick or concrete pavers, concrete, or a similar material. Concrete sidewalks shall be a minimum of 4" in depth. Sidewalk material may vary according to the overall design and character of the development. The City Council may grant exceptions to this in accordance with the Belmont Public Infrastructure Acceptance Policy. Streets that serve less than 8 Detached Home-Street Lots from the nearest intersection may install sidewalk on one side of the street.

### 4. BIKE PATHS

Bike lanes a minimum of 4 ft in width shall be installed by all development (except single family homes) with frontage along the following collector streets and minor thoroughfares: Perfection Avenue, Belmont-Mt. Holly Road, McAdenville Road, Park Street, Keener Boulevard, Armstrong Ford Road, R.L. Stowe Road, Stowe Road, Nixon Road, and South Point Road. Bike lanes and bike paths shall be designed according to the *North Carolina Bicycle Facilities Planning and Design Guidelines*, published by NCDOT and shall include all appropriate signage and pavement markings.

### 5. PLANTING STRIPS

The minimum width of all planting strips shall be 6 feet. For streets with a design speed greater than 25 miles per hour, the minimum width shall be 8 feet.

## 6. CUL-DE-SACS & CLOSES

Where practical, a close (as defined in Section 8.4-Open Space Types) should be used in place of a cul-de-sac. Cul-de-sacs, if permitted, shall not exceed 250 ft in length from the nearest intersection with a street providing through access (not a cul-de-sac). Cul-de-sacs and closes shall be designed to facilitate the turning radius of emergency vehicles.

## 7. INTERSECTIONS

- A. All streets shall intersect at right angles as nearly as possible and no street shall intersect at less than 60 degrees.
- B. Where practical, intersections should be aligned to create four-way intersections.
- C. Off-set intersections for Local Streets, Parkside Drives, and Minor Street should be at least 125 feet apart measured from centerline to centerline. This dimension may be reduced upon approval of the City Engineer. A larger spacing in accordance with AASHTO standards may be required for all other streets.
- D. Property lines at street intersections shall be rounded with a minimum radius of 20 feet. At an angle of intersection of less than 90 degrees, a greater radius may be required.
- E. Proper sight lines in accordance with the Belmont Land Development Standards shall be maintained at all intersections of streets so as to permit adequate sight distance. Where the posted speed limit is less than 20 mph the intersection sight distance may be reduced to 105 feet.
- F. Bulb-outs are discouraged on narrow streets (less than 30' face-of-curb to face-of-curb) but encouraged on wider streets.
- G. The sight triangle for all streets under the jurisdiction of the City of Belmont shall be formed by a diagonal line connecting two points located on intersecting property lines (or a property line and the curb or a driveway), each point being 35 feet from the point of intersection. At the intersection of two streets, each with a posted street limit of 20 mph or less, this dimension may be reduced to 5 feet subject to the approval of the City Engineer.

## 8. CURB RADII

Curb radii shall be designed to reduce pedestrian crossing times along all streets requiring sidewalks. In general, curb radii should not exceed 20 ft.

## 9. UTILITY LOCATION

Underground utilities shall be located in alleys and lanes. If no alley or lane is provided, then a 5-foot (minimum) utility easement shall be provided behind the sidewalk located within either the right-of-way or a public utility easement.

## 10. CURBS AND DRAINAGE

Curbs shall be constructed in accordance with *City of Belmont Land Development Standards*. Vertical face curbing is required along all streets with on-street parking and around all required landscaping areas and parking lots. Mountable curbing is permitted around center medians, roundabouts, and other features in order to facilitate the infrequent use by vehicles with larger turning radii. Valley curbing is permitted along streets which serve homes with front-loaded off-street parking or that have infrequent on-street parking. Streets with a grade exceeding 2% shall use standard curbs. Drainage shall be provided using curb and gutter piped systems along all streets except in Rural Residential areas, Suburban Residential areas with conventional lot subdivisions where lots average  $\frac{3}{4}$  acre or greater, and along parkways that may use open swales upon approval of the Planning Director and the City Engineer. All drainage grates must be safe for bicyclists. Bicycle-safe drainage grates are Types E, F, and G as approved by the NCDOT.

**11. CENTERLINE RADIUS**

A 90 ft. minimum centerline radius shall be used for Local Streets, Parkside Drives, and Minor Streets between reverse curves though they may be reduced to 45 ft for design speeds less than 20 mph. All other streets shall be in accordance with AASHTO standards.

**12. STREET LIGHTS**

Street lights shall be installed by the developer on all streets.

**13. POSTED STREET SIGNS**

All streets shall be posted with signs in accordance with the Manual of Uniform Traffic Control Devices.

**14. RESERVED****15. ACCESS MANAGEMENT ON A COLLECTOR STREET**

In order to promote public safety and to minimize the probability of collisions between vehicles/vehicles and vehicles/pedestrians, automobile and vehicle access to houses in a new subdivision (major developments) on a collector street shall meet the one of the following requirements:

- Driveways directly accessing the collector street shall be limited to a maximum of ten (10) per one thousand (1,000) linear feet of street. For street segments less than one thousand (1,000) feet, the ratio shall remain one (1) driveway per one hundred (100) feet on average. For houses on corner lots, driveways and garages openings should be located on the side (non-collector) street.
- Alternatively, vehicular access must be provided by a public or private alley with no direct access to the collector street.

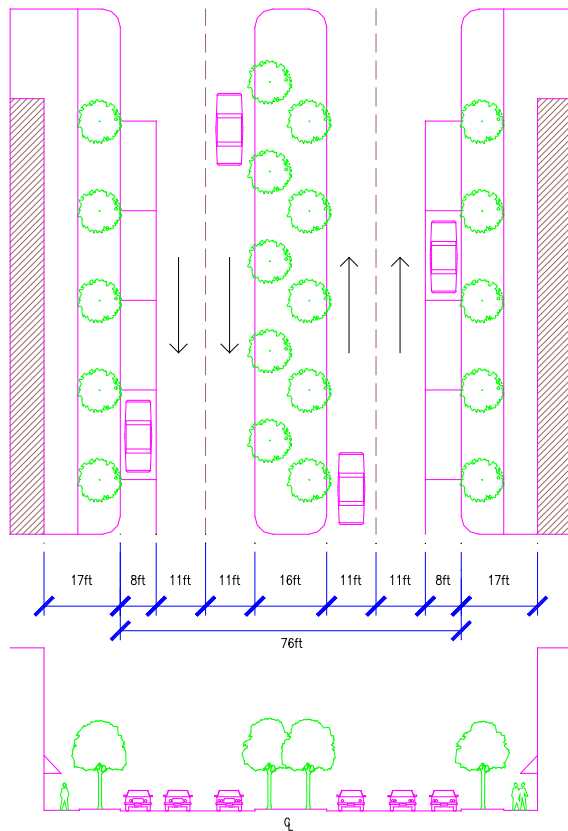
The following roads are designated as collector streets:

Acme Road	Main Street (N. and S.)
Armstrong Road	McAdenville Road
Armstrong Ford Road	McLeod Avenue
Beatty Drive	Mellon Road
Belmont-Mount Holly Rd.	Myrtle Street
Boat Club Road	Nixon Road
Boat Launch Road	Park Street
Cason Street	Parkdale Road
Central Avenue (N. and S.)	Perfection Avenue
Davis River Road	R. L. Stowe Drive
Eagle Road	Reese Wilson Road
East Catawba Avenue	South New Hope Road
Gaither Road	South Point Road
Henry's Chapel Road	Stowe Road
Hickory Grove Road	Tucker Road
Jim Grier Road	Wilkinson Boulevard
Keener Boulevard	Woodlawn Avenue

8.3 STREET DESIGNS

**A. BOULEVARD**  
*110 ft ROW*

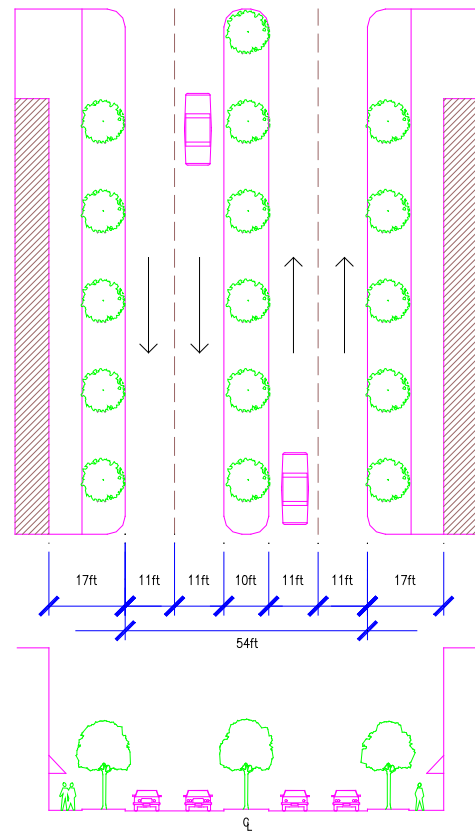
The boulevard serves as a long-distance, medium-speed vehicular corridor which traverses an urbanized area. It is usually lined by parallel parking, wide sidewalks, or side medians planted with trees. Center medians may be continuously planted or have trees in individual planting areas. Buildings uniformly line the edges.



<b>Design Speed</b>	25-35 mph
<b>Min. Centerline Radius</b>	90 ft
<b>Pavement Width (F-F)</b>	30-16-30 ft
<b>ROW Width</b>	110 ft
<b>Curb Radius</b>	15 ft
<b>Drainage</b>	Curb & Gutter
<b>On Street Parking</b>	Yes
<b>Street Trees</b>	Yes
<b>Sidewalks</b>	Yes

**B. BOULEVARD**  
*100 ft ROW*

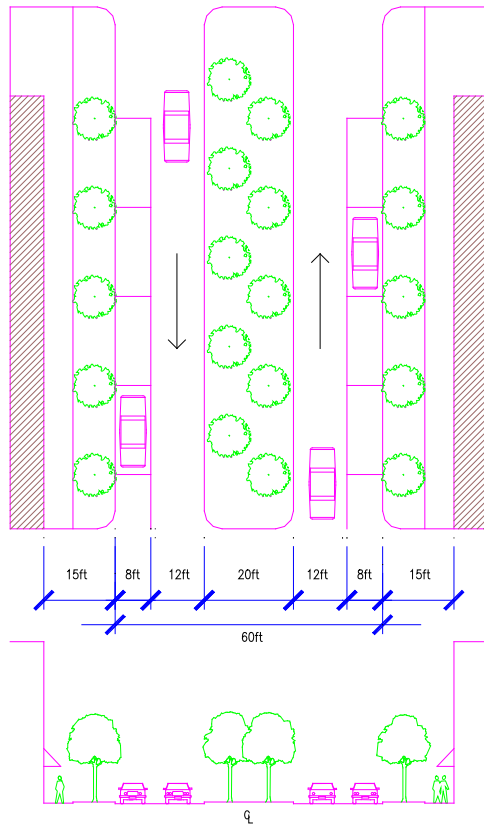
The boulevard serves as a long-distance, medium-speed vehicular corridor that traverses an urbanized area. It is usually lined by wide sidewalks or side medians planted with trees. Center medians may be continuously planted or have trees in individual planting areas. Buildings uniformly line the edges.



<b>Design Speed</b>	25-35 mph
<b>Min. Centerline Radius</b>	90 ft
<b>Pavement Width (F-F)</b>	22-10-22 ft
<b>ROW Width</b>	100 ft
<b>Curb Radius</b>	15 ft
<b>Drainage</b>	Curb & Gutter
<b>On Street Parking</b>	No
<b>Street Trees</b>	Yes
<b>Sidewalks</b>	Yes

**C. AVENUE**  
*90 ft ROW*

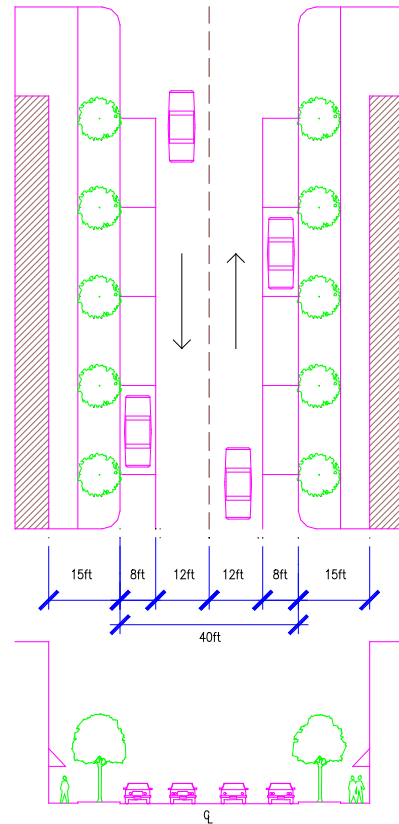
The avenue is a short-distance, medium-speed connector which transverse an urbanized area. It is unlike a Boulevard, in that its axis is terminated by a civic building or monument. The avenue is typified by carefully landscaped edges including three or more individual rows of street trees within the ROW.



<b>Design Speed</b>	25-30 mph
<b>Min. Centerline Radius</b>	260 ft
<b>Pavement Width (F-F)</b>	18-14-18 ft
<b>ROW Width</b>	90 ft
<b>Curb Radius</b>	15 ft
<b>Drainage</b>	Curb & Gutter
<b>On Street Parking</b>	Yes (Marked)
<b>Street Trees</b>	Yes
<b>Sidewalks</b>	Yes

**D. MAIN STREET**  
*70 ft ROW*

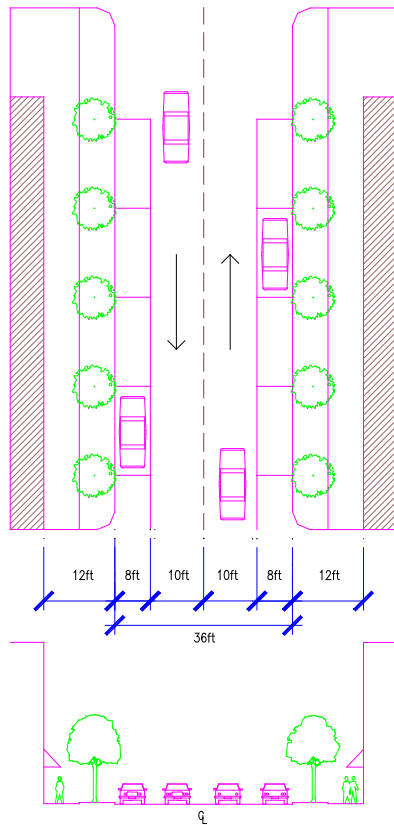
The main street serves as a small-scale, low-speed connector. Main streets provide frontage for high-density buildings such as offices, shops, apartment buildings, and rowhouses. A main street is urban in character, with raised curbs, closed drainage, wide sidewalks, parallel parking, trees in individual planting areas, and buildings aligned on short setbacks.



<b>Design Speed</b>	25-30 mph
<b>Min. Centerline Radius</b>	260 ft
<b>Pavement Width (F-F)</b>	38 ft
<b>ROW Width</b>	70 ft
<b>Curb Radius</b>	15 ft
<b>Drainage</b>	Curb & Gutter
<b>On Street Parking</b>	Yes (Marked)
<b>Street Trees</b>	Yes
<b>Sidewalks</b>	Yes

**E. RESIDENTIAL MAIN STREET**  
*60 ft ROW*

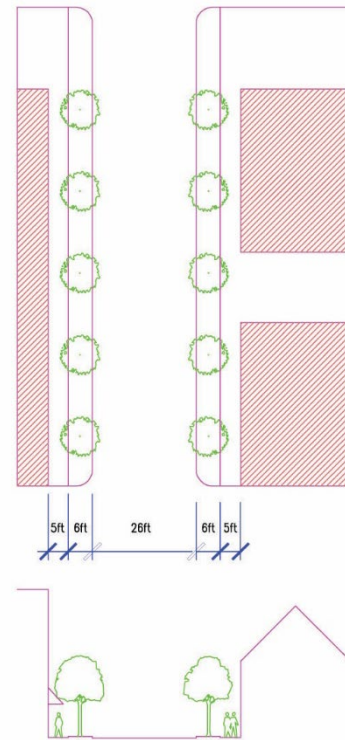
The residential main street serves as a small-scale, low-speed connector. Residential main streets provide frontage for high-density residential buildings such as apartment buildings and rowhouses. A residential main street is urban in character, with raised curbs, closed drainage, wide sidewalks, parallel parking, trees in individual planting areas, and buildings aligned on short setbacks.



<b>Design Speed</b>	20-25 mph
<b>Min. Centerline Radius</b>	90-165 ft
<b>Pavement Width (F-F)</b>	36 ft
<b>ROW Width</b>	60 ft
<b>Curb Radius</b>	15 ft
<b>Drainage</b>	Curb & Gutter
<b>On Street Parking</b>	Yes (Marked)
<b>Street Trees</b>	Yes
<b>Sidewalks</b>	Yes (6 ft min)

**F. LOCAL STREET**  
*50 ft ROW*

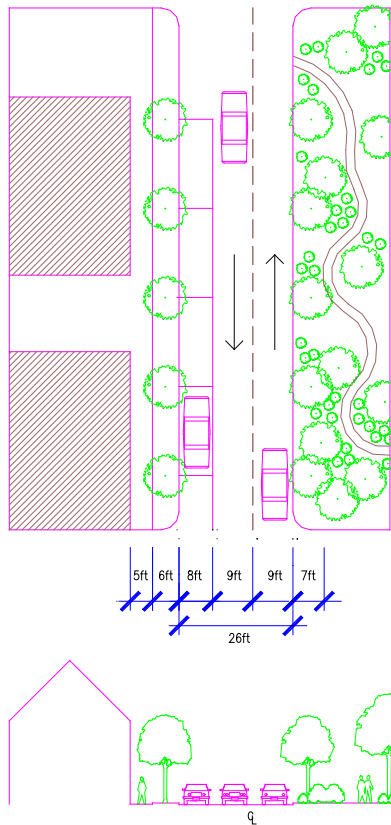
The local street serves as a small-scale, low-speed connector. Local streets provide frontage for medium-to-low-density residential buildings such as detached homes and duplexes. A local street is urban in character, with raised or rolled curbs, closed drainage, sidewalks, occasional parallel parking on one side, trees in continuous planting areas, and buildings aligned on medium setbacks.



<b>Design Speed</b>	20-25 mph
<b>Min. Centerline Radius</b>	50-90 ft
<b>Pavement Width (F-F)</b>	26 ft
<b>ROW Width</b>	50 ft
<b>Curb Radius</b>	15 ft
<b>Drainage</b>	Curb & Gutter
<b>On Street Parking</b>	Yes (Expected but not marked)
<b>Street Trees</b>	Yes
<b>Sidewalks</b>	Yes (5 ft min)

**G. PARKSIDE DRIVE**  
*42-50 ft ROW*

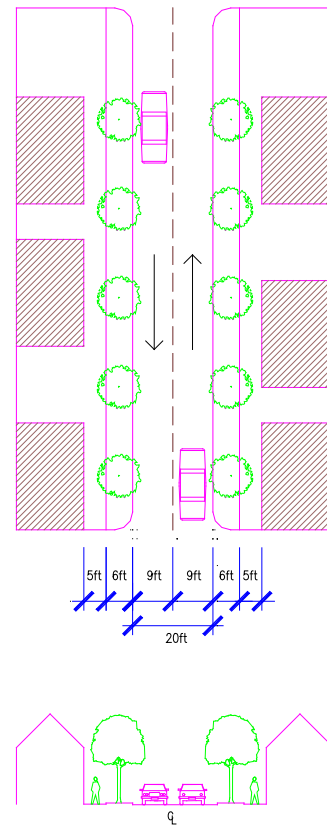
The drive defines the natural edge between an urban and a natural condition, usually along a waterfront, a park, or a greenbelt. One side of the drive has the urban character of a main street with sidewalk, parallel parking, and buildings, while the other has the natural qualities of a rural road with naturalistic plantings and rural detailing.



<b>Design Speed</b>	20 mph
<b>Min. Centerline Radius</b>	50-90 ft
<b>Pavement Width (F-F)</b>	26 ft
<b>ROW Width</b>	42-50 ft
<b>Curb Radius</b>	15 ft
<b>Drainage</b>	Curb & Gutter / Open Swale
<b>On Street Parking</b>	Yes (Expected but not marked)
<b>Street Trees</b>	Yes (One Side)
<b>Sidewalks</b>	Yes (One Side)

**H. MINOR STREET**  
*40-50 ft ROW*

The minor street is a small-scale, low-speed connector. It serves low-density residential buildings which accommodate all parking on-site. A minor street tends to be more rural in character with rolled curbs, open or closed drainage, narrow sidewalks, continuous plantings, and buildings set way back though this condition may also be appropriate for short urban blocks where on-street parking is not expected



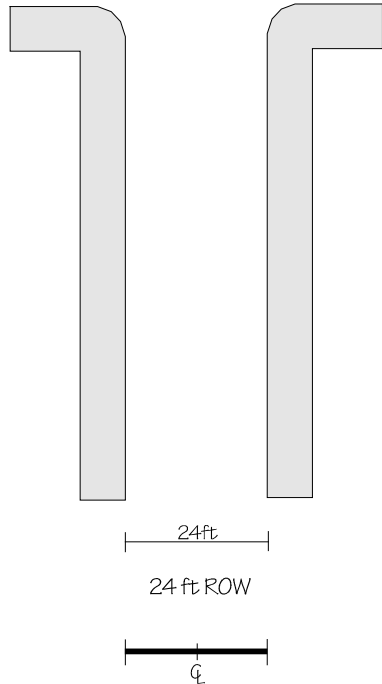
<b>Design Speed</b>	15 mph
<b>Min. Centerline Radius</b>	50-90 ft
<b>Pavement Width (F-F)</b>	18-24 ft
<b>ROW Width</b>	40-50 ft
<b>Curb Radius</b>	15 ft
<b>Drainage</b>	Curb & Gutter / Open Swale
<b>On Street Parking</b>	Yes (One way streets only)
<b>Street Trees</b>	Yes
<b>Sidewalks</b>	Yes



**I. REAR ALLEY**

*24 ft ROW*

The alley is a narrow access route which services the rear of buildings on a street. Alleys have no sidewalks, landscaping or building setbacks. Alleys are used by trucks and must accommodate dumpsters. They are usually paved to the edges, with center drainage via an inverted crown.

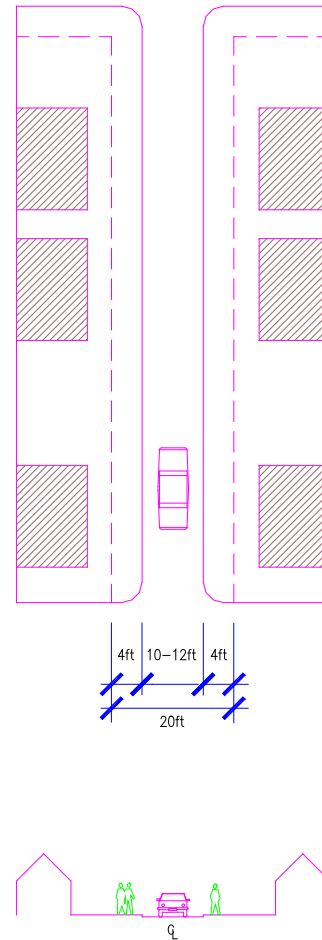


<b>Design Speed</b>	N/A
<b>Min. Centerline Radius</b>	N/A
<b>Pavement Width</b>	24 ft
<b>ROW Width</b>	24 ft
<b>Curb Radius</b>	5 ft
<b>Drainage</b>	Curb & Gutter
<b>On Street Parking</b>	Yes
<b>Street Trees</b>	No
<b>Sidewalks</b>	No

**J. REAR LANE**

*20 ft ROW*

The rear lane is a narrow access route behind neighborhood streets. Lanes generally have a narrow strip of paving in the center and serve as areas for underground utilities.



<b>Design Speed</b>	N/A
<b>Min. Centerline Radius</b>	N/A
<b>Pavement Width</b>	10 ft with 1 ft ribbon curb on each side
<b>ROW Width</b>	20 ft
<b>Curb Radius</b>	20 ft
<b>Drainage</b>	Open Swale / Closed Inverts
<b>On Street Parking</b>	N/A
<b>Street Trees</b>	No
<b>Sidewalks</b>	No

### ***8.5 GENERAL GREENWAY DESIGN PRINCIPLES***

The Code encourages the development of a network of multipurpose trails that connect active and passive parks, schools, cultural sites, neighborhoods, and commuter destinations. When a greenway is part of a development, the following standards apply:

- A. Greenways shall be planned following the designated circulation system shown on the Comprehensive Plan map, the Parks and Recreation Master Plan, and the City of Belmont Pedestrian Transportation Plan.
- B. Greenways shall connect to new development wherever possible. Greenway stubs should be provided when development is adjacent to open land scheduled for greenway construction to provide for future connections. Stubs must extend to the neighboring property line
- C. Greenways should be designed to fit the contours of the land and should minimize removal of significant trees.
- D. All greenways shall be constructed in accordance with the design and construction standards in this code, and the City of Belmont Pedestrian Transportation Plan and shall be maintained for public access whether by easement or by public dedication.

Minor variations and exceptions to greenway cross-sections may be permitted with approval of the Planning Director and the Parks and Recreation Director.

### ***8.6 GREENWAY ENGINEERING AND DESIGN SPECIFICATIONS***

Greenway designs shall permit comfortable use by both bicyclists and pedestrians. Refer to the North Carolina Bicycle Facilities Planning and Design Guidelines and the City of Belmont Pedestrian Transportation Plan for specific information on engineering details.

#### **1. Floodway Trails**

Multi-use trails within the floodway (within the “Managed Use Zone”, see Stream Buffers, Section 22) are designed to accommodate a variety of user including walkers, joggers, cyclists, and rollerbladers. These trails are typically positioned within the floodway, but not directly adjacent to streams. A minimum of 20’ vegetative buffer between the stream and trail should be left intact. . Floodway trails shall be a minimum of 10’ wide. These trails shall be 2” machine-laid asphaltic concrete surface with a 4” aggregate base over compacted soil.

#### **2. Floodplain Trails**

These multi-use trails are positioned outside of the floodway, within the floodplain (within the “Managed Use Zone”, see Stream Buffers, Section 17). Significant vegetative buffer between the stream and trail should be left intact. Floodplain trails shall be a minimum of 10’ wide. These trails shall be composed of 2” machine-laid asphaltic concrete surface with a 4” aggregate base over compacted soil.

#### **3. Upland Trails**

Upland multi-use trails are positioned completely outside designated floodplains (within the “Upland Zone”, see Stream Buffers, Section 17). The existing vegetation in the Streamside Zone and Managed Use Zone shall remain intact. Upland trails provide the most habitat and water quality benefits. They shall be a

minimum of 10' wide, and composed of 2" machine-laid asphaltic concrete surface with a 4" aggregate base over compacted soil.

#### **4. Boardwalk Trails**

Boardwalks, or wood surface trails, are typically required when crossing wetlands or other poorly drained areas. The supporting members for boardwalk trails shall be treated lumber or equivalent. Decking material shall be composite (wood/polymer) recycled material or equivalent. Boardwalk trails must be a minimum of 5' wide.

#### **5. Drainage**

Greenways must have a cross slope of 2% to adequately provide for drainage. Slope should be in one direction instead of crowning. On curves, the cross slope should be towards the inside of the curve. In addition, to insure proper stormwater runoff and trail longevity, catch basins with drains and underground culverts may be required. Natural ground cover should be preserved on each side of the path for erosion control.

#### **6. Bridges**

Railings or barriers on both sides of a bicycle path bridge must be a minimum of 54" high. Ends of railings must be offset away from the adjoining path to minimize the danger of cyclists running into them. Bridge decks shall be designed for a live load of 85 psf. Concrete decks must have bicycle-safe expansion joints. Wood decks must have smooth joints and be laid at least 45 degrees to the direction of travel.

#### **7. Clearance**

The vertical clearance to obstructions must be 8' minimum. 10' may be required for the passage of maintenance vehicles.

#### **8. Grades**

Long downhill grades should be avoided through careful planning. A 5% grade is the maximum grade recommended. Sustained grades should be limited to 2%.

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