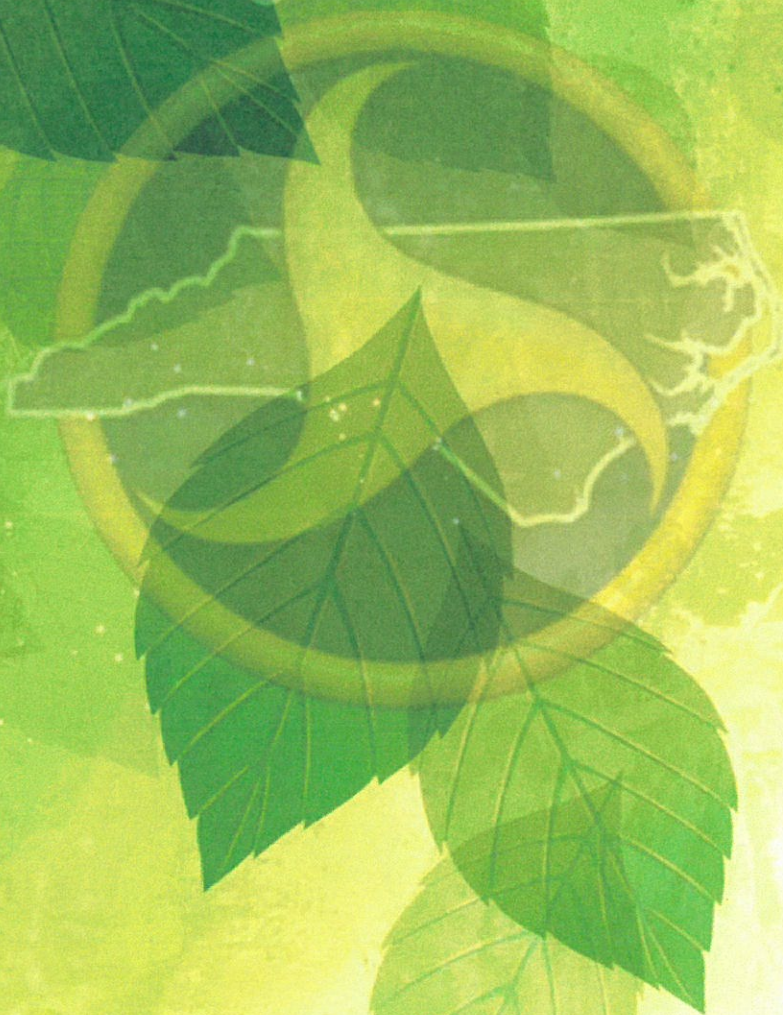
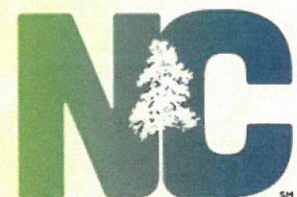


North Carolina Department of Transportation

GUIDELINES FOR PLANTING WITHIN HIGHWAY RIGHT-OF-WAY



Roadside Environmental Unit



March 2016

GUIDELINES FOR PLANTING WITHIN HIGHWAY RIGHT-OF-WAY

The aesthetic quality of North Carolina's roadsides is influenced by a number of factors. Among these factors are right-of-way width, adjacent land use, roadway structures, topography, overhead utilities, signage, drainage elements, and existing vegetation.

In order to protect the public investment in highways the North Carolina Department of Transportation Division of Highways uses grass and legume cover to prevent roadside erosion and shrubs, trees and wildflower plantings to reduce mowing areas and improve roadside aesthetics.

Shrubs and trees within highway rights-of-way result by retaining desirable vegetation in conjunction with highway construction, allowing natural regeneration, or planting/reforestation selected areas. Limited funding and manpower prevent the North Carolina Division of Highways from planting and maintaining shrubs and trees on all roadsides. Planting and maintenance of specific roadside areas is frequently undertaken by municipalities, garden clubs, or individuals after permission is granted from the Division of Highways.

As defined by North Carolina General Statute 136-93:

" . . . no vegetation, including any tree, shrub, or underbrush, in or on any right-of-way of a State road or State highway shall be planted, cut, trimmed, pruned, or removed without a written selective vegetation removal permit issued pursuant to G.S. 136-133.2 and in accordance with the rules of the Department, . . . without a written permit, and then only in accordance with the regulations of said Department of Transportation or its duly authorized officers or employees; and the work shall be under the supervision and to the satisfaction of the Department of Transportation or its officers or employees, and the entire expense of replacing the highway in as good condition as before shall be paid by the persons, firms, or corporations to whom the permit is given, or by whom the work is done."

These guidelines should be used in coordination with NCDOT Complete Streets Guidelines, the NCDOT Traditional Neighborhood Development Manual, Department policies governing road construction, environmental mitigation, utility placement, signing, billboards and aesthetics.

PROCEDURES FOR HANDLING REQUESTS FOR PERMITS FOR PLANTING ON HIGHWAY RIGHT-OF-WAY

Many requests are received by the Department from municipalities, civic organizations, and individuals for permission to plant within highway right-of-way. In order to protect the public investment and to promote safety, utility, economy, and highway aesthetics, the following procedures for handling planting requests have been developed:

Interstate and Other Controlled Access Highways

Planting close to Interstate or other Controlled-Access Highways is discouraged. These facilities are designed for high speed, unencumbered traffic movement and are usually fenced to prevent people, animals, or other impediments from entering the rights-of-way. The safety of highway users is paramount. Traffic control devices and procedures are required when working within the rights-of-way.

In those instances where landscape planting is desired by entities other than Division of Highways personnel, the requesting party should arrange a conference with the Division Roadside Environmental Engineer who will explain Division of Highways criteria for sight distances, recovery areas, and minimum setback distances. Following this explanation, the requesting party must prepare a detailed planting plan (see Plan Development requirements) describing the various species of plants to be used and the proposed locations of plants. The plan is to be submitted to the Division Engineer for approval.

State System Right-of-Way

The attached Guidelines for Tree, Shrub, and Groundcover Planting on Highway Right-of-Way other than Controlled-Access or Interstate are to be followed.

Upon receipt of a request for planting, accompanied by a plan and typical cross section, the Division Engineer or his representative, will make an on-site investigation of the proposed planting. If the planting proposal does not conform with the attached guidelines, the request may be denied by the Division Engineer. If the proposed planting conforms with Department guidelines and policies, the Division Engineer will issue a letter-type permit for planting (with a copy of such permit, together with a plan and typical cross section, to the State Roadside Environmental Engineer).

Before any action will be taken on a request for a permit for planting within a municipality, the request must have the approval of the local governing body since the planting permit will be issued to the municipality. Requests for planting outside municipalities will be considered using the attached guidelines and permits for planting will be issued to the party requesting the permit.

**PROCEDURES FOR HANDLING REQUESTS FOR PERMITS
FOR PLANTING ON HIGHWAY RIGHT-OF-WAY**

Standard conditions to be enumerated in planting permits are:

1. In the event that plants require relocation or removal for highway construction, reconstruction, maintenance or safety, such removal or relocation will be done immediately by the permittee (municipality/civic group/individual) upon notification by the Division of Highways, entirely at the expense of the permittee.
2. The Division of Highways will not be responsible for any damage to the planting which may be done by third parties.
3. Maintenance of the plantings will be the responsibility of the permittee.

Other conditions as determined by the Division Engineer and Roadside Environmental Engineer, distinctive to the specific planting proposal, will be enumerated along with the standard conditions above.

The Central Roadside Environmental Unit may be consulted regarding any planting proposal that the Division Engineer and Division Roadside Environmental Engineer determine has merit, but which does not conform with standards as previously described due to extenuating circumstances.

Three Methods by which Planting Request May be Approved:

1. A planting permit can be issued to allow planting and maintenance of the planting by the permittee;
2. The permittee can furnish funds to the Department for the landscape planting costs where project installation is coordinated by the Division Roadside Environmental Engineer.
3. The Division of Highways can assume the project entirely, bearing the cost of plant materials as well as performing the planting and plant maintenance. These planting projects will normally be included in the Transportation Improvement Program with approved funding by the Board of Transportation.

It is highly recommended that any additional maintenance incurred, due to the implemented landscape planting, be the responsibility of the applicant, permittee, or associated local government entity.

The Roadside Environmental Unit Aesthetic Engineering Design & Development personnel may assist the requesting parties in the development of a landscape planting proposal (for the highway right-of-way) as policy and workloads permit

PLANTING ENCROACHMENT PROCESS WITHIN HIGHWAY RIGHT-OF-WAY

Plan Development

1. Requesting party obtains approval of municipality (only if the right-of way is within a municipality).
2. Conference with the Roadside Environmental Field Operations Engineer to explain planting criteria to the applicant:
 - a) Sight distance
 - b) Recovery areas
 - c) Safety setbacks
 - d) Ditches, shoulders, and utilities
 - e) Maintenance considerations
 - f) Acceptable plant material.
3. Requesting party then submits a planting plan to the Division Engineer, consisting of:
 - a) Scale drawing (include site location, road names, north arrow, name of applicant, graphic scale, etc.).
 - b) Show proposed location of plants.
 - c) Plant list (include botanical names, common names, size, caliper, and spacing).
 - d) Note adjacent land uses.
 - e) Show bridge locations, signage, utilities, existing vegetation, and drainage features.
 - f) Delineate travel lanes and pavement areas.

Permitting Process

1. Division Engineer requests investigation by the Division Roadside Environmental Engineer.
2. Division Engineer denies request, or
3. Division Engineer approves request and issues letter-type permit.
4. Copy of the permit is sent to the State Roadside Environmental Engineer.

GUIDELINES FOR PLANTING WITHIN HIGHWAY RIGHT-OF-WAY

The following are setback standards for highways and streets with posted speed limits as indicated, and plan views of diamond and cloverleaf interchanges; showing guidelines for planting trees, shrubs (and groundcovers). Planting that involves exceptions to these criteria will be considered on an individual basis.

Distance from Travel Lane - The standard setbacks define the minimum distances from the the edge of travel lanes for new plantings. Where existing tree distances have been established, replacement trees should conform with established set-back distances.

Sight Distances - Shrubs must be kept low, and trees and large shrubs under-trimmed sufficiently to permit clear sight in the area between 2 feet and 6 feet above roadway elevations. Due to widely varying conditions of topography, highway alignment and grade, type and volume of vehicular and pedestrian traffic; necessary sight distances in excess of the minimums described on the following pages must be individual site determinations.

Selection of Plants - Tall-growing trees should not be selected for planting beneath utility lines and wide-spreading trees should not be used unless there is sufficient width of planting area to accommodate them without continued severe pruning. Small trees and large shrubs should be used which are adaptable to under-trimming without destroying their desired appearance.

- **NCDOT highly recommends the use of native species on the right-of-way.**

For insight on landscape plants and their characteristics, please refer to the following websites:

<https://plants.ces.ncsu.edu/> or <http://www.onlineplantguide.com/Index.aspx>

Pavement Removal - When pavement remains beneath traffic channelization islands, such pavement may not be broken or removed without written permission by the Department.

Effect on Mowing and Drainage - Trees should be placed sufficiently far apart, or grouped in shrub beds and mulched in a shape that will facilitate mower operation, avoid excessive mower maneuvering, or hand trimming. Trees/large shrubs shall be minimum of 5 feet behind ditch line (in cut sections) and 5 feet outside shoulder break (in fill sections), or the minimum distance from edge of travel lanes as shown on Typical Sections, whichever is the greater.

Traffic Operation and Safety

All plantings shall be maintained in a condition that will not interfere nor endanger vehicular or pedestrian traffic.

GUIDE FOR PLANTING WITHIN HIGHWAY RIGHT-OF-WAY

Purpose:

The North Carolina Department of Transportation (NCDOT) recognizes the greater environmental and community value of trees and vegetation on the roadside. As guided by policy and N.C. General Statute, no fixed object, tree or vegetation shall be placed upon the right-of-way except in accordance with a written permit from the Department of Transportation or its duly authorized officers. It is further our mission to connect people, products, and places safely and efficiently with customer focus, accountability and environmental sensitivity to enhance the economy and vitality of North Carolina.

The placement of trees on the roadside supports healthy communities. It is critical to maintain setbacks and clear zones to for the safety of the traveling public. Minimum setbacks are defined as follows:

Minimum Small Trees and Shrub Setbacks – All Routes:

Posted Speed	Section	Description	Distance Clear Zone (setback)
≤ 35 mph	Curb & Gutter	to foliage line of shrub	1'
		to center of small tree	5'
	Shoulder	to foliage line of shrub	2'
		to center of small tree	8'
>35 - 45	Curb & Gutter	to foliage line of shrub	6'
		to center of small tree	8'
	Shoulder	to foliage line of shrub	8'
		to center of small tree	10'
Greater than 45 mph	Curb & Gutter	to foliage line of shrub	10'
		to center of small tree	20'
	Shoulder	to foliage line of shrub	15'
		to center of small tree	20'

Minimum Large Tree Setbacks –Interstate, Primary, and State Routes:

Design Speed	Section	Distance Clear Zone (setback)
≤ 35 mph	Curb / Gutter and Shoulder	12'
> 35 - 45	Curb / Gutter and Shoulder	20'
> 45	Curb / Gutter and Shoulder	30'

Distances measured to the center line of the tree.

Any tree whose trunk reaches or exceeds 4" diameter (caliper) at maturity qualifies as an immovable object, and therefore is considered a 'large tree'.

Minimum Large Tree Setbacks – Municipal and Local Roads:

URBAN / SUBURBAN			RURAL		
Posted Speed	Urban Street Type	Clear Zone (setback)	Posted Speed	Rural Street Type	Clear Zone (setback)
≤ 25 mph	Main Street, Avenue, Boulevard	8'	≤ 25 mph	Village Main Street	8'
>25 - 35 mph	Avenue, Boulevard	10'	>25 - 35 mph	Avenue, Boulevard, Rural Road	14'
>35 - 45 mph	Boulevard, Parkway	12'	>35 - 45 mph	Boulevard Parkway, Rural Road	20'
> 45 mph	Parkway	30'	> 45 mph	Parkway, Rural Road	30'

Distances measured to the center line of the tree.

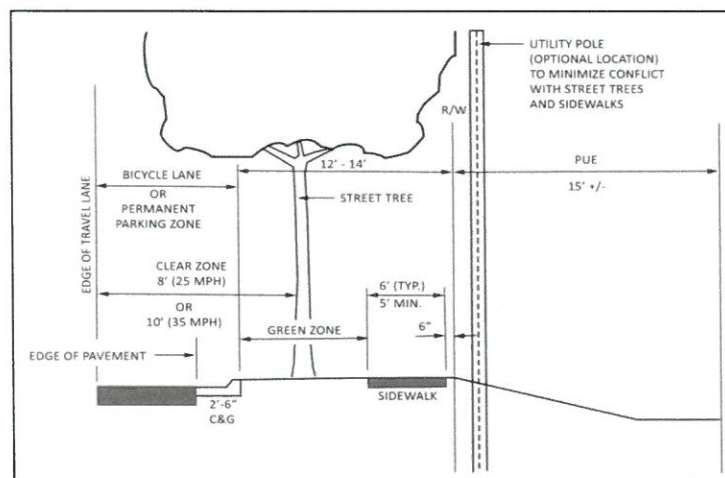


Figure 1 Recommended Green Zone and Sidewalk Zone
(Complete Streets Planning and Design Guide)

Notes:

- In urban/suburban and rural environments, where speeds are higher and there are fewer constraints, a clear zone appropriate for the traffic volumes, design speed and facility type should be provided in accordance with the current edition of the AASHTO Roadside Design Guide.
- All vegetation must maintain a minimum 5' setback from all ditches and drainage structures.
- Suggested spacing for street trees- 20 feet for small-maturing trees, 30 feet for medium-maturing trees, and 40 feet for large-maturing trees.
- Traffic circles and roundabouts shall be reviewed on a case by case basis.
- Bike lanes and parallel parking strips may be included in buffer setback measurements.
- Vertical clearances of 16' above streets and 7' above sidewalks must be maintained at all times.
- Shrubs must be kept low, and trees and large shrubs under-trimmed sufficiently to permit clear sight in the area between 2 feet and 6 feet above roadway elevations.
- Sightlines to roadway signs must be visible and unobstructed.
- Setback distances are measured from the travel way. If no line markings delineate the edge of travel way, the width of the travel lane will be assumed to be 11' wide.
- NCDOT maintains the right to remove trees that are determined to be hazardous.
- Where communities want a variance to place trees closer to the road for aesthetics, environmental, recreational, or appearance issues, it is the responsibility of the interested party to submit a request to the NCDOT defining such need. It is the NCDOT's responsibility to evaluate the request based on established safety standards.
- Where plantings are permit approved encroachments, the applicant and/or property owner shall be responsible for all maintenance associated in order to preserve a healthy vigorous tree.

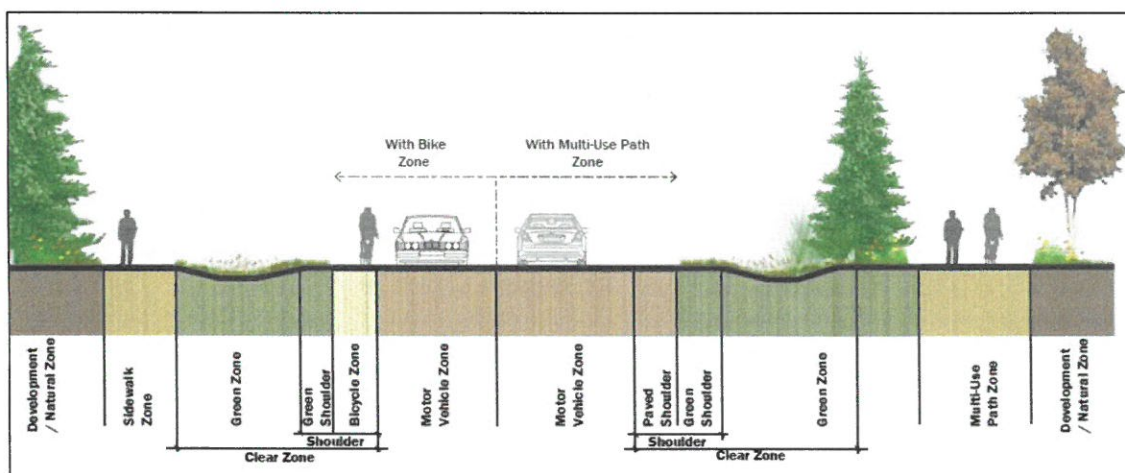


Figure 2 Rural Road Illustrative Cross-Section for Streets with posted speeds of 25 to 35 mph; dimensions may vary based on context and available right of way and/or easements (Complete Streets Planning and Design Guide)

Setback Variance:

NCDOT may be flexible in the setback distance in reasonable urban or rural conditions. Each planting design and/or request should be reviewed on a case by case basis. What is and shall take priority is the safety of the public. In the process of review, multiple elements need to be weighed and considered. A few items to consider are:

- Number of curb cuts or driveways within the study area.
- Maintaining safety sightlines.
- History of crashes in the study area.
- Location of pedestrian crosswalks.
- Location of intersecting street/drives, bike lanes, and parking.
- Location of adjacent store fronts or structures.
- Location of parallel walks.
- Location of horizontal curves and turning lanes.
- Primary use(s) of adjoining walks and pedestrian areas.
- Drainage.
- Location of existing or proposed signage, traffic signals, lighting, and subsurface utilities.
- Emergency access to adjacent areas.
- Applicable local ordinances.
- Type of tree and spacing of street trees proposed.
- Width of planting area (sufficient root zone area is needed for trees).
- Soil conditions.
- Severe shading or icing issues.

The requesting party shall follow standard procedures for the submittal of a landscape encroachment. With the submittal of the site plan, further detailed information shall be provided showing associated site elements (as noted above). The permit application shall be reviewed by Division staff and final approval or denial will be determined by the local Division Engineer.

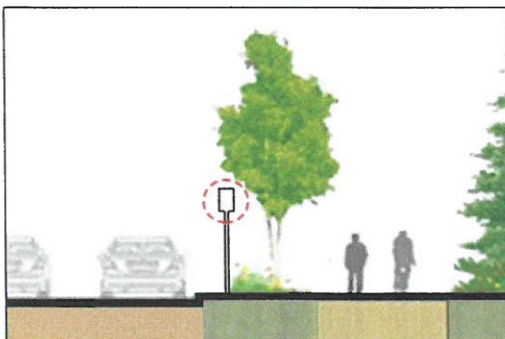


Figure 3 Maintain visibility to signs through proper selection and maintenance of trees.

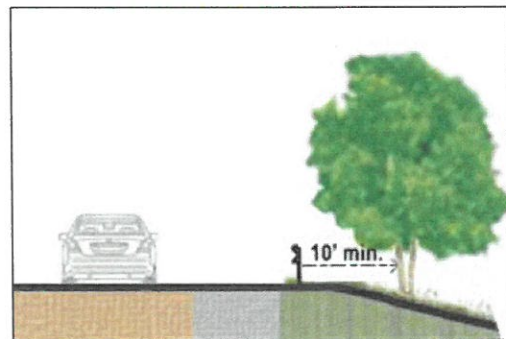


Figure 4 10' min. setback for trees and shrubs planted behind guardrail.

Intersection Sight Distances (ISD)

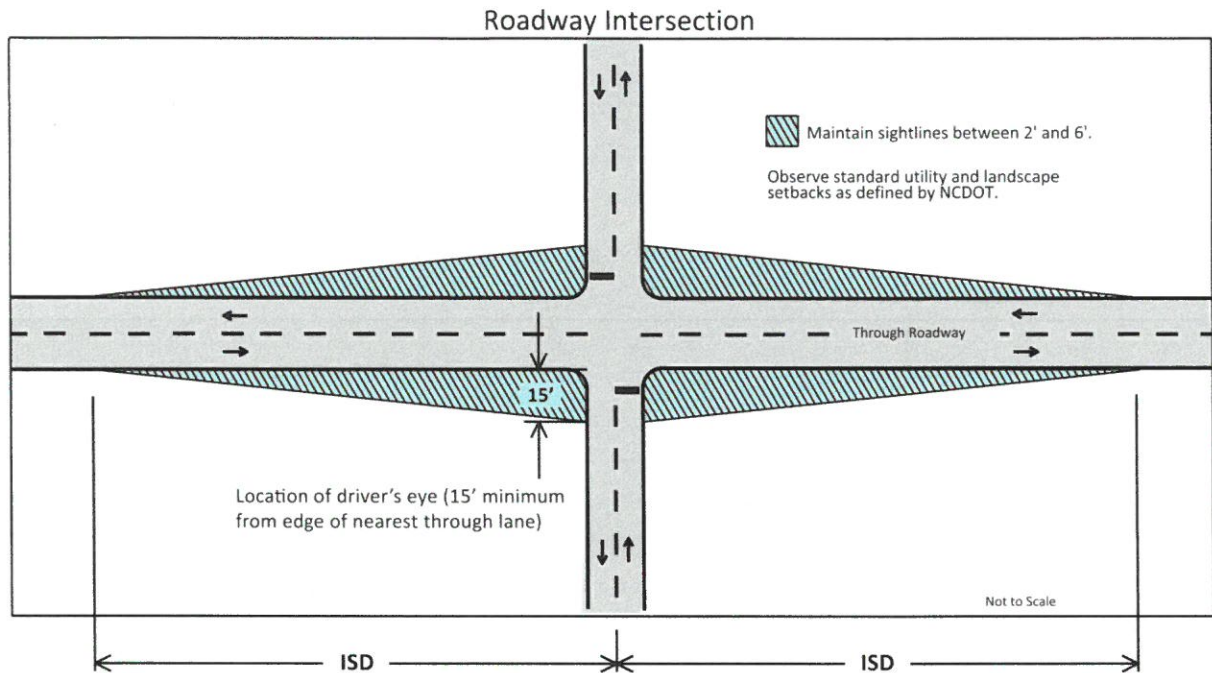


Figure 3 Sightline visibility triangles for non-signalized intersection (FHWA)

Sight Distance at Intersections

Speed (mph) *	Stopping Sight Distance (ft.)	ISD- Design Intersection Sight Distance (ft.)
25	155	280
30	200	335
35	250	390
40	305	445
45	360	500
50	425	555
55	495	610
60	570	665
65	645	720

Source : A Policy on Geometric Design of Highway and Streets, 5th Edition, American Association of State Highway and Transportation Officials (AASHTO), 2004.

Roundabouts

Landscaping of roundabouts plays an important role in improving the aesthetics of an area. However, landscaping has a number of functional purposes:

- It makes the center island more conspicuous making the geometry and function of the facility more obvious.
- It focuses driver attention on key conflict areas by blocking the view of other areas; and
- It discourages pedestrian traffic through the center island.

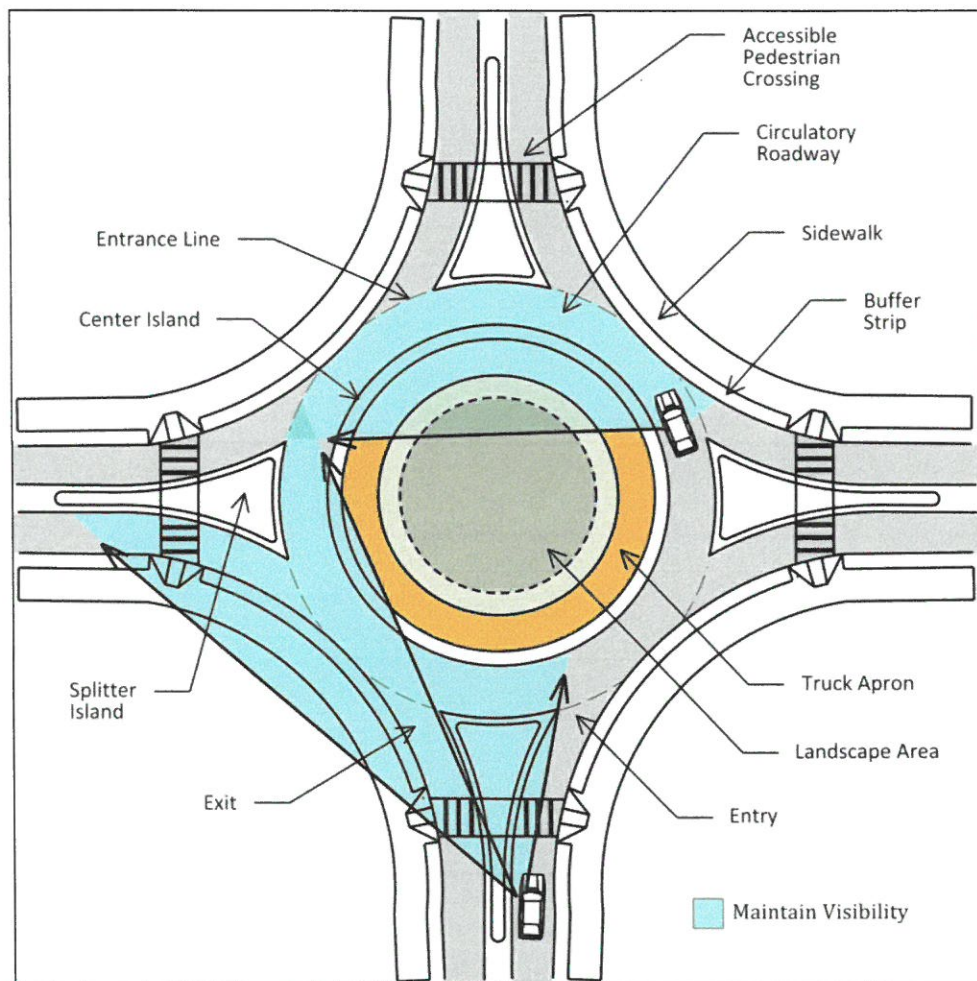


Figure 4 Roundabouts offer unique opportunities for landscaping. Sightlines and setbacks are critical. Each roundabout needs to be reviewed on a case by case basis.

MAIN STREET INTERSECTION

- STREET ZONES**
-  **Development Zone:** Development should be pedestrian-oriented with narrow setbacks and an active street environment.
 -  **Sidewalk Zone:** The pedestrian walk area is of sufficient width to allow pedestrians to walk safely and comfortably. Pedestrians are the priority on a main street.
 -  **Green Zone:** Consists of the area between the sidewalk zone and curb. Includes street trees and other landscaping, as well as interspersed street furnishings and pedestrian-scale lighting in a hardscaped amenity zone.
 -  **Motor Vehicle/Shared Vehicle Zone:** The primary travel way for vehicles. A shared vehicle zone has mixed traffic (cars, trucks, buses and bicycles).
 -  **Parking/Transit Zone:** Accommodates on-street parking and transit stops. Width and layout may vary.

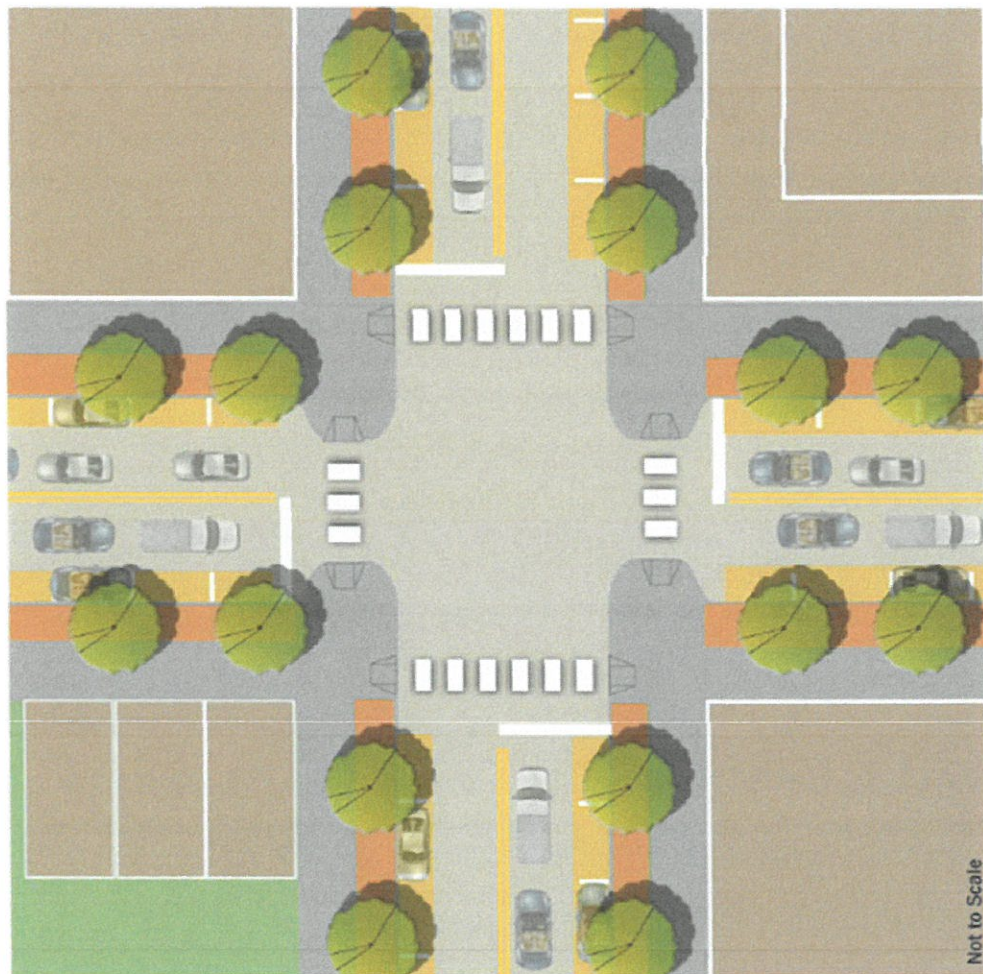


Figure 5 Main Street Development - Urban Setting (Complete Streets Planning and Design Guide)

The diagram illustrates a four-way interchange with an 'INTERSTATE OR FREEWAY' running vertically. The interchange features four quadrants, each with a circular island and a triangular acceleration/deceleration lane. Key dimensions and labels include:

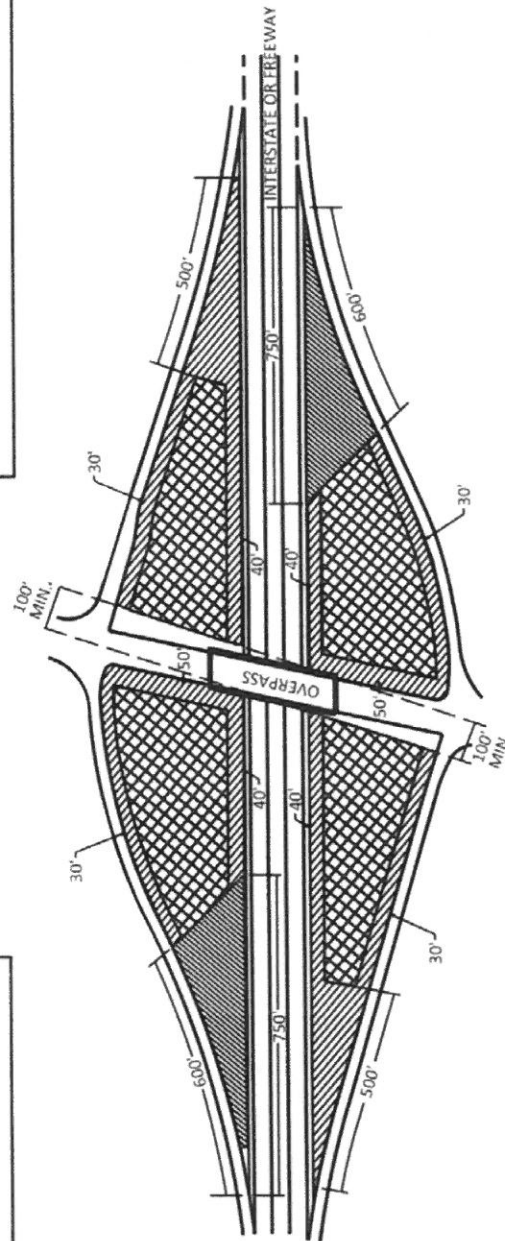
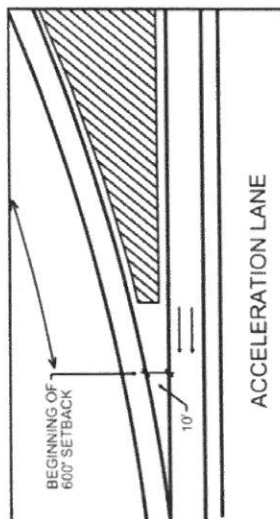
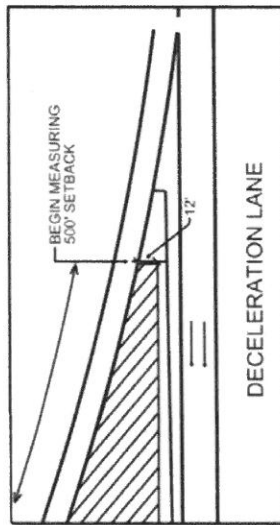
- Acceleration Lane:** Located on the left side of the interchange, with a width of 10' and a length of 600'.
- Deceleration Lane:** Located on the right side of the interchange, with a width of 12' and a length of 600'.
- Islands:** Four circular islands, each with a diameter of 50'.
- Dimensions:** Various dimensions are provided for the interchange, including 30', 50', 60', 75', 100', 150', 200', 300', 400', 500', 600', 750', 1000', and 1500'.
- Legend:**
 - TALL TREES AND SHRUBS PERMITTED IN THESE AREAS WHERE THEY DO NOT EFFECT LIGHTING:** Represented by a cross-hatched pattern.
 - LOW SHRUBS NOT TO OBSTRUCT DRIVER'S VIEW PERMITTED IN THESE AREAS EXCEPT ON SHOULDERS AND DITCHES:** Represented by a diagonal line pattern.
 - LOW SHRUBS NOT TO OBSTRUCT DRIVER'S VIEW OF THE PAVEMENT ON SHOULDERS AND DITCHES (SEE DETAIL A):** Represented by a solid black pattern.
- Sightline Diagram:** A separate diagram shows two vehicles on a road. The driver's eye level is indicated by a dashed line. The sightline is labeled 'DRIVER'S EYE LEVEL' and '3.75'.
- Maintain Sightlines:** A note states 'MAINTAIN SIGHTLINES WHENEVER POSSIBLE'.

TALL TREES AND SHRUBS PERMITTED IN THESE AREAS WHERE THEY DO NOT EFFECT LIGHTING

LOW SHRUBS NOT TO OBSTRUCT DRIVER'S VIEW FROM PAVEMENT ON SHOULDERS AND DITCHES

LOW SHRUBS NOT TO OBSTRUCT DRIVER'S VIEW OF THE PAVEMENT ON SHOULDERS AND DITCHES (SEE DETAIL A)

GUIDE FOR PLANTING AT DIAMOND INTERCHANGES



- TALL TREES AND SHRUBS PERMITTED IN THESE AREAS WHERE THEY DO NOT EFFECT LIGHTING
- LOW SHRUBS NOT TO OBSTRUCT DRIVER'S VIEW PERMITTED IN THESE AREAS EXCEPT ON SHOULDERS AND DITCHES
- LOW SHRUBS NOT TO OBSTRUCT DRIVER'S VIEW OF THE PAVEMENT ON SHOULDERS AND DITCHES (SEE DETAIL A)

