

TRIANGLE EXPRESSWAY

Landscape Concept Report



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TABLE OF CONTENTS

1.0	Executive Summary	1
2.0	Introduction	
2.1	Project Description	1
2.2	Stakeholder interaction	2
2.3	Design Goals	4
3.0	Existing Conditions	
3.1	Existing Vegetation	4
3.2	Existing Soils	5
3.3	Stormwater Management Facilities.....	6
3.4	Sound Walls	6
3.5	Interchanges	6
3.6	Surrounding Land Use	7
3.7	Medians.....	7
4.0	Design Development Considerations	
4.1	Design Objectives	8
4.2	Design Criteria	9
4.3	Planting Priorities	26

Section 1.0 Executive Summary

The principle intent of this concept report is to present criteria for the design of the revegetation of the right of way along the Triangle Expressway in Wake and Durham Counties, North Carolina. Four primary goals will be accomplished with the execution of the design guidance found in this report:

- Safety and Aesthetics will be enhanced
- Sustainable Design will be showcased
- Environmental Stewardship will be displayed
- Community Pride will be increased

The design criteria herein and the concept plans present an atypical landscape design approach. The Triangle Region is known for sophisticated and developed landscape projects that are ordered and highly maintained. This project will provide many of the same plant materials used in commercial landscapes of the region, but the design and installation will model a natural vegetative community. The project could be characterized as a restoration or revegetation project.

In order to stay within budget boundaries, the plant sizes will be relatively small for the areas of revegetation. Gateway areas will include larger sizes of plant materials, but will be smaller than is commonly installed in projects found in the Triangle Region. This project will mature over time, be ever-changing and truly an investment for the future.

A proposed plant list, utilizing indigenous plant materials, is presented graphically and in narrative form herein. The concept plans are in a separate document—Triangle Expressway Landscape Concept Plans.

Section 2.0 Introduction

2.1 Project Description

The Triangle Expressway corridor is comprised of concurrent projects that extend the Durham Freeway (NC 147) from the current I-40 interchange to the existing Raleigh Outer Loop (NC 540/I 540). The existing portion of NC 540 is being modified to include tolling and to finish construction of the western portion of the Raleigh Outer Loop from NC 55 south to the NC 55 Bypass in Holly Springs. Landscape construction will be broken into two phases. Phase One will plant the Durham Freeway portion of the project known as the “Triangle Parkway” and the existing portion of NC 540 to its current terminus at NC 55. Phase Two will include the balance of the roadway to the south. These phase limits are graphically depicted in the Triangle Expressway Landscape Concept Plans on Sheet 11 of 35.

These projects offer an opportunity to improve area-wide mobility and safety, as well as improving the quality of life by creating a sustainable landscape that showcases the distinct and beautiful natural features of the Triangle Region.

In a practical sense, the right of way will require revegetation of the areas disturbed by the Expressway construction. This must be done in such a way as to combine proper erosion control and stormwater treatment, with the goal of providing a cost-effective, sustainable landscape. Also important will be the landscape enhancement and treatment of expressway features, including bridges, toll gantries, and entry gateways. Sound walls will require landscape treatment, and vegetated buffers will be required to provide visual screening for residential neighborhoods. In response to the Stakeholder desires to create a “destination roadway”, particular attention will be paid to the screening of engineered stormwater structures to provide a visual character for the roadway that is dominated by scenic views. In areas that are outside the limits of clearing and grubbing and where existing forested parcels are preserved, flowering understory trees and shrubs will be planted to provide diversity and year-round visual interest to the forest edge.

2.2 Stakeholder Interaction

The Design Team worked with Stakeholders along the corridor throughout the planning of this landscape program. An initial meeting was conducted in December 2009 between the NCTA Design Team and the Stakeholder group that included representatives from the North Carolina Department of Transportation, the Research Triangle Park, the Town of Cary, the United States Environmental Protection Agency and the Town of Apex. The purpose of the meeting was to discuss the project’s challenges and opportunities, prioritization of planted areas, timelines, goals, desires and other related issues.

The outcome of the meeting was a list of Stakeholders’ desires for the project and direction for the Design Team to develop goals for the landscape program. The needs and desires of the Stakeholders included the following themes:

- Year round color
- Buffers for adjacent development
- Reestablishment of vegetation on the corridor
- Plant rescue and reestablishment
- Piedmont Prairie vegetation
- Use of native plants
- Interchanges enhanced with plantings
- Creation of a “destination roadway”
- Limiting mowed turf areas
- Providing a “sustainable design”
- Use of locally and regionally appropriate plants.

Based upon that initial meeting with the Stakeholders, a preliminary landscape concept for the corridor was developed. In a series of follow-up meetings held in April and May 2010, the Design Team presented the concept plans, typical plans and sections, and plant palettes to the following Stakeholders:

- 1) NC Department of Transportation
- 2) Research Triangle Park
- 3) Town of Cary
- 4) Town of Apex
- 5) United States Environmental Protection Agency
- 6) Town of Morrisville

The purpose of these follow-up meetings was to review the plant palettes, discuss the direction of the landscape concept and solicit comments. Upon review of the landscape concept materials and the preliminary plant lists, the Stakeholders provided comments to the Design Team which included the following:

- Limit fruiting trees on near slopes to reduce wildlife feeding within the right of way.
- Incorporate native plant plugs for cost-effective implementation.
- Investigate compost seeding and native grasses applications.
- Develop landscape installation and long-term maintenance management.
- Liked the use of native plants, the planning process and the concept plans.
- Replace some of the plant species to faster growing and hardier species.
- Address buffer treatments at additional residential and commercial development locations.
- Incorporate approved planned development adjacent to corridor and provide buffers as needed.
- Conduct soil testing and amend soil as part of installation.
- Mow to prevent volunteer/unwanted species.
- Require qualified installation contractor with maintenance experience.

The Design Team made revisions to the overall landscape concept, incorporated comments from the Stakeholders, and revised the landscape cost estimates. The team also revised the prioritization of planted areas that included existing residential, other buffer areas such as schools, the baseball stadium, industrial uses, gateways and restoration zones. The final landscape concepts have been presented to the Stakeholder group to ensure that their comments were addressed and incorporated into the plan.

2.3 Design Goals

A summary of the Stakeholders' desires can be simply stated as the Primary Design Goal:

Provide an attractive, sustainable and memorable landscape that reflects the natural character of the Triangle Region through the seasons and showcases the communities along the corridor.

The NCTA design team then determined that the Primary Goal can be broken down into four main design categories that should be incorporated into the final landscape design of the project corridor.

1. **Safety and Aesthetics:** Provide visual interest throughout the corridor to reinforce the correlation between the reduction of roadway monotony and increased motorist alertness.
2. **Sustainability:** Establish native plants appropriate to the existing soils, topography, solar aspect and hydrology that are sustainable without regular care and adaptive to disturbed sites.
3. **Environmental Stewardship:** Demonstrate stewardship through removal and exclusion of exotic invasive plants and noxious weeds; vegetative filtration and stormwater treatment through increased on-site groundwater percolation; and revegetation of natural areas disturbed during roadway construction.
4. **Community Pride:** Provide gateways into the adjacent communities that will evoke pride, demonstrate local character, create a sense of place and provide a positive lasting impression of the Triangle Region for passing travelers.

Section 3.0 Existing Conditions

3.1 Existing Vegetation

Four primary vegetative communities dominate the Expressway corridor: the Piedmont Alluvial Forest, Mixed Pine-Hardwood Forest, Oak-Hickory Forest, and disturbed lands from urban development.

The Piedmont Alluvial Forest occurs along river and stream floodplains and is characterized primarily by wooded wetlands and floodplains. The floodplains are comprised of a plant community dominated by *Acer rubrum* (Red Maple), *Platanus occidentalis* (Sycamore), and *Ulmus americana* (American Elm) with other common species including *Liquidambar styraciflua* (Sweet Gum), *Liriodendron tulipifera* (Tulip Tree), *Prunus serotina* (Black Cherry), *Nyssa sylvatica* (Black Gum), and *Juniperus virginiana* (Eastern Red Cedar). The wooded wetlands are comprised of the same dominant canopy but include increased diversity of herbaceous plants and grasses in the ground plane layer, including *Carex* spp (various sedges) and *Juncus* spp (various rushes).

The Mixed Pine-Hardwood Forest community occurs on lower slopes along the Expressway, usually immediately upslope of the Piedmont Alluvial community. It includes mostly uneven aged stands that lack older trees of 60 years or greater due to a history of forest disturbance. Gaps in the canopy resulting from recent development are in early succession with even-aged stands of young pines and early succession hardwoods such as sweet gum and tulip tree with a dense herbaceous layer dominated by *Andropogon virginicus* (Broomsedge Bluestem) and *Rubus spp.* (Blackberry). Dominant species comprising the canopy of the community include *Pinus taeda* (Loblolly Pine), *Quercus rubra* (Northern Red Oak), *Juniperus virginiana* (Eastern Red Cedar), *Liquidambar styraciflua* (Sweet Gum), and *Acer rubrum* (Red Maple). Additional species in the canopy include *Fagus grandifolia* (American Beech), *Quercus alba* (White Oak), *Pinus echinata* (Shortleaf Pine), and *Pinus virginiana* (Virginia Pine).

The Oak-Hickory Forest represents a small percentage of the forested area along the corridor because of historical disturbance that limits the development of the climax succession community. Dominant canopy species are *Quercus falcata* (Southern Red Oak), *Quercus stellata* (Post Oak), *Carya glabra* (Pignut Hickory), *Carya ovata* (Shagbark Hickory), and *Carya alba* (Mockernut Hickory). Other canopy species include *Juniperus virginiana* (Eastern Red Cedar), and *Acer saccharum* (Southern Sugar Maple) with *Cornus florida* (Dogwood) and *Ilex opaca* (American Holly) in the understory.

Urban developed landscapes, comprising a significant portion of the existing vegetative cover, consist of sparse tree canopy and open turf lawns with cultivated shrub borders and herbaceous bedding plants. Common tree species include *Cupressocyparis leylandii* (Leyland Cypress), *Liriodendron tulipifera* (Tulip Tree), *Pyrus calleryana* "Bradford" (Bradford Pear), *Lagerstroemia indica* (Crape Myrtle) and *Magnolia grandiflora* (Southern Magnolia).

3.2 Existing Soils

The soils that remain within the Expressway corridor, having been disturbed by construction, are generally characterized by poor organic content and a high erosion factor. The Piedmont Region of North Carolina sits on top of a geologic formation known as the Triassic Basin. Parent soils in the area are primarily from three major groups, White Store, Creedmore, and Mayodan. These soils are typically acidic and, with between 12% and 36% clay content, it is likely that soil conditioning will be required for successful planting. Soil testing and custom formulation of soil conditioners and amendments will be an important requirement of the contract documents to ensure successful plant establishment.

These existing major soil groups also exhibit an RUSLE2 erosion factor Kf of between .17 and .43, indicating a potential for severe erosion on steep gradients. Soil stability during vegetative establishment will be an important consideration. The nature of the design style does not require large expanses of mulch beds. In most locations, trees and shrubs in the typical details are to be planted directly into the existing turf grass. Each individual planting hole is to be mulched. This technique should prevent erosion. However, the contractor should plan to monitor and prevent erosion during design and construction.

Some of the tree species that commonly occur on these soils include *Juniperus virginiana*, *Pinus taeda*, *Quercus stellata*, *Pinus virginiana*, *Quercus alba*, *Carya spp.*, *Quercus falcata*, *Pinus echinata*, *Liquidambar styraciflua*, and *Liriodendron tulipifera*. The plant palette that is proposed for the Triangle Expressway contains these species.

3.3 Stormwater Management Facilities

Stormwater management facilities along the Expressway include armored conveyances and treatment basins that are constructed from rock and concrete materials. These facilities should be buffered from view of the Expressway with herbaceous vegetation that is managed outside of the established mowing limits. In order to fulfill the Stakeholder desire of creating a “destination roadway”, plantings are proposed that will be placed so no rip-rap or man-made drainage structures (excluding flush-to-grade inlets) will be seen from the travel lane. However, none of the landscape improvements shall impact the function of and access to these structures and facilities. These plantings are referred to as “transitional” plantings and are described later in the document.

3.4 Sound Walls

Sound walls will be constructed along specific portions of the Expressway to buffer residential neighborhoods and schools adjacent to the roadway. Some walls will be very near the right of way line with no existing vegetation remaining between the wall and roadway. In other cases the sound walls are very near the travel lanes. Each scenario will require a landscape treatment tailored to the individual site, providing maintenance access to the backside of the wall. The walls will be constructed of precast, brick patterned concrete panels between concrete columns with architectural decoration. The visible walls require landscape treatments to reestablish a vegetated buffer. If the architectural decoration is visible from the roadway, it is desirable to showcase that decoration by allowing views to that portion of the wall, framing the feature with trees or shrubs depending upon location.

3.5 Interchanges

Six major interchanges exist within the project limits at NC 55, Green Level Road, US 64, Old US 1, US 1, and NC 55 Bypass. These interchanges serve as gateways into the Research Triangle Park and the communities of Morrisville, Cary, Apex and Holly Springs. The interchanges should be designed to have distinct landscape themes or styles that reflect the individual character of those communities. It will be necessary to coordinate with the communities to determine if a special tree theme is desired.

Extensive landscape plantings of native materials from local or regional sources should be concentrated at the interchanges to create a substantial and sustainable landscape treatment reflecting the expectations of the community. The citizens of each community are proud of the heritage of their native landscape and the cultural history of the region resulting from the beauty and value of the indigenous forest.

3.6 Surrounding Land Use

Much of the existing land use surrounding the corridor is either low to medium density residential or suburban commercial land uses. There is a significant amount of planned mixed-use development and new residential and commercial construction near the corridor. Those residential developments without sound wall treatments should be considered for vegetative visual buffering from the Expressway.

3.7 Medians

The Triangle Expressway medians vary in width, requiring different planting schemes and treatments to successfully landscape this highly visible roadway feature. Wide medians should be landscaped in conjunction with the enhanced plantings associated with community gateways, overpasses with bridge planters and toll gantries.

4.0 Design Development Considerations

4.1 Design Objectives

With the Goal categories of the project firmly in place, design objectives have been identified to fulfill the goals.

1. **Safety and Aesthetics:**

- a. Maintain NCDOT design standards relating to horizontal and vertical clearance
- b. Provide an undulating, contextual forested edge
- c. Provide visual buffers to adjacent land uses
- d. Provide plant materials with a variety of color and texture

2. **Sustainability:**

- a. Select plants that are durable and hardy
- b. Minimize landscape maintenance
- c. Select plants that are regionally appropriate and regionally available
- d. Prepare planting designs that are not dependent on the success of individual plants

3. **Environmental Stewardship:**

- a. Utilize native plant materials of local provenance
- b. Revegetate areas that have been disturbed by roadway construction
- c. Minimize mowing maintenance

4. **Community Pride:** Provide gateways into the adjacent communities that will evoke pride, demonstrate local character, create a sense of place and provide a positive lasting impression of the Triangle Region for passing travelers.

- a. Enhance the entrances and exit points of the Expressway
- b. Incorporate color and texture at bridge planters and medians
- c. Frame the views of tolling areas and other desirable views
- d. Showcase the variety of Piedmont Region plant material

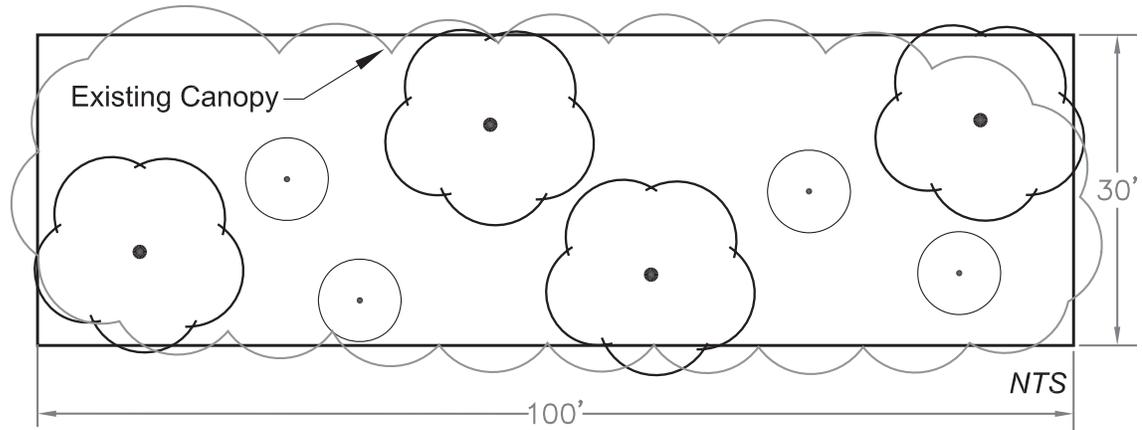
4.2 Design Criteria

Conceptual design for the project has been completed and is included in this document and in the Triangle Expressway Landscape Concept Plans in the form of schematic details and concept plans. The procedure for final design development should lead to the identification of all opportunities and constraints and develop the framework for design decision making from objective criteria. Three main zones of landscape opportunity have been identified for this project. The zones are described in detail below, and the proposed locations of these zones are indicated in the concept plans.

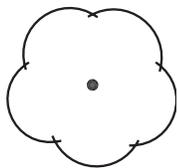
Zone 1: Preservation

A portion of the corridor right of way remains undisturbed by construction activities and presents the opportunity for preserving and enhancing these natural areas. These areas have been marked on the landscape concept plan sheets with a forest green color to identify potential sites for improvement with a species of outstanding visual interest. Understory trees and shrubs that are particularly colorful in spring or fall shall be planted at the edge of preserved forests to enhance the view. Limited, selective understory clearing may be allowed to provide openings for these preferred species.

PRESERVATION



Legend



Understory Trees
(Qty. 4)



Shrubs
(Qty. 4)

Plan specifics: Understory trees and shrubs shall be planted in the forest edge that is viewed from the roadway in right of way areas where existing forest has been protected from clearing and grubbing operations. In the first 30’ into the forest edge four understory trees and four shrubs should be planted for each 100 linear feet. Individual selection of tree species should be determined by site conditions. A sample of species is given in the plant palette table.

PLANT PALETTE

PRESERVATION ZONE		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Size</i>
TREES - Understory		
Amelanchier arborea	Downy Serviceberry	B&B or 3 gal. equivalent
Cercis canadensis	Eastern Redbud	B&B or 3 gal. equivalent
Cornus florida	Flowering Dogwood	B&B or 3 gal. equivalent
Crataegus viridis	Green Hawthorn	B&B or 3 gal. equivalent
Halesia carolina (tetraptera)	Carolina Silverbell	B&B or 3 gal. equivalent
Magnolia macrophylla	Bigleaf Magnolia	B&B or 3 gal. equivalent
Magnolia tripetala	Umbrella Magnolia	B&B or 3 gal. equivalent
Vaccinium arboreum	Sparkleberry	B&B or 3 gal. equivalent
SHRUBS		
Euonymous americana	Strawberry Bush	1 gal.
Hydrangea quercifolia	Oakleaf Hydrangea	1 gal.
Kalmia latifolia	Mountain Laurel	1 gal.
Rhododendron canescens	Piedmont Azalea	1 gal.

Zone 2: Revegetation

Portions of the right of way include areas that have been impacted by construction activities and are best returned to a naturally sustainable vegetated system. These areas are to be designed utilizing xeriscape principles, without irrigation, and will serve to reduce the resources necessary to manage the roadside vegetation by mowing. These areas have been marked in the design concept sheets with an olive green color to identify their locations. A plant palette appropriate to the requirements and goals of individual locations is listed for each category.

Transitional Areas

Areas that are relatively flat or gently sloping should be established with native shrubs and grasses appropriate to the soil type, gradient, solar aspect and hydrology of the slope. These plantings shall be used to provide visual buffering as described in Section 3.3 and shall be designed to create a varying vegetated transition zone in front of treed areas. These areas should be established, in the existing turf grass or vegetated cover, beyond the ditch line, outside of established mowing limits and managed for long term sustainability.

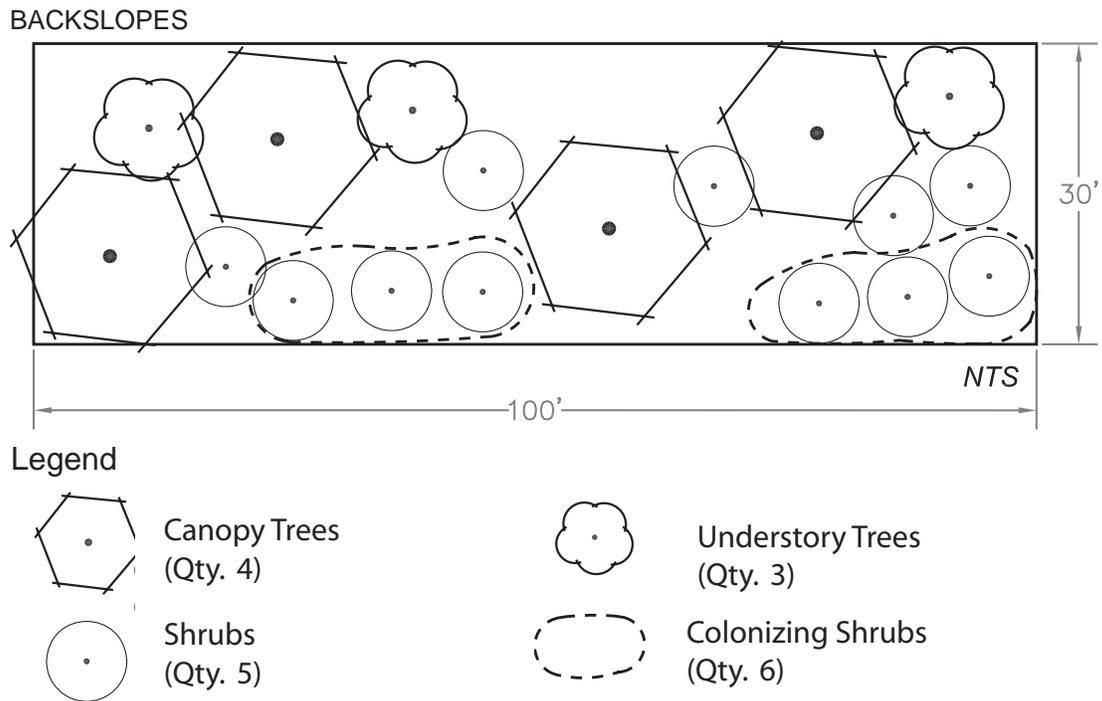
Plan specifics: Elements described in Section 3.3 should be visually buffered from the roadway with a 15’ zone of tall grasses and colonizing shrubs. This vegetation can be periodically mowed to exclude unwanted volunteer tree species. Typical transitional areas should be planted with six colonizing shrubs and 253 native grasses should be planted for each 1,500 square feet of area. A sample of species is given in the plant palette table.

PLANT PALETTE

REVEGETATION ZONE - Transitional Area		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Size</i>
SHRUBS		
Cornus sericea 'Cardinal'	Redozier Dogwood	BR Seedling Liners 12-30" ht.
Euonymous americana	Strawberry Bush	BR Seedling Liners 12-30" ht.
Itea virginica	Virginia Sweetspire	Tubling
Rhus glabra	Sumac	BR Seedling Liners 12-30" ht.
GRASSES		
Andropogon ternarius	Splitbeard Bluestem	2" DP (Deep Plug (1x5.5"))
Elymus virginiana	Virginia Wild Rye	2" DP (Deep Plug (1x5.5"))
Juncus effusus	Softrush	2" DP (Deep Plug (1x5.5"))
Panicum virgatum	Switchgrass	2" DP (Deep Plug (1x5.5"))
Schizachyrium scoparium	Little Bluestem	2" DP (Deep Plug (1x5.5"))
Sorghastrum nutans	Yellow Indian Grass	2" DP (Deep Plug (1x5.5"))
Tridens flavus	Purpletop	2" DP (Deep Plug (1x5.5"))

Backslopes

Backslopes beyond the ditch line and/or clear zone shall be stabilized with native canopy and understory trees and shrubs appropriate to the soil type, tree community type, gradient, solar aspect, and hydrology of the slope to provide for restoration of the right of way in selected areas. The goal of these plantings is to return these areas to natural forested communities and reduce the areas of intense turf maintenance.



Plan specifics: Typical restoration of the areas beyond the ditch line and/or clear zone should be accomplished with four canopy trees, three understory trees, five shrubs and nine colonizing shrubs for each 3,000 square feet of area. The plantings should occur in the existing turf grass or vegetated cover. Fifty percent of the tree species shall be evergreen in areas of existing residential development but no more than fifty percent of the canopy trees shall be pines. Individual selection of species should be determined by site conditions. A sample of species is given in the plant palette table.

PLANT PALETTE

REVEGETATION ZONE - Backslopes		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Size</i>
TREES - Canopy & Understory		
Acer rubrum	Red Maple	B&B or 3 gal. equivalent
Acer barbatum	Southern Sugar Maple	B&B or 3 gal. equivalent
Betula nigra	River Birch	B&B or 3 gal. equivalent
Carya glabra	Pignut Hickory	B&B or 3 gal. equivalent
Chionanthus virginicus	White Fringetree	B&B or 3 gal. equivalent
Fagus grandifolia	American Beech	B&B or 3 gal. equivalent
Fraxinus pennsylvanica	Green Ash	B&B or 3 gal. equivalent
Juniperus virginiana *	Eastern Red Cedar	B&B or 3 gal. equivalent
Liquidambar styraciflua	Sweetgum	B&B or 3 gal. equivalent
Liriodendron tulipifera	Tulip Poplar	B&B or 3 gal. equivalent
Magnolia grandiflora *	Southern Magnolia	B&B or 3 gal. equivalent
Malus angustifolia	Southern Crabapple	B&B or 3 gal. equivalent
Pinus palustris *	Longleaf Pine	B&B or 3 gal. equivalent
Pinus virginiana	Virginia Pine	B&B or 3 gal. equivalent
Platanus occidentalis	Sycamore	B&B or 3 gal. equivalent
Quercus alba	White Oak	B&B or 3 gal. equivalent
Quercus coccinea	Scarlet Oak	B&B or 3 gal. equivalent
Sassafras albidum	Common Sassafras	B&B or 3 gal. equivalent
Taxodium distichum	Bald Cypress	B&B or 3 gal. equivalent
Tilia americana 'Sentry'	Linden	B&B or 3 gal. equivalent
SHRUBS		
Callicarpa americana	American Beautyberry	1 gal.
Cornus alternifolia	Pagoda Dogwood	1 gal.
Cornus sericea 'Cardinal'	Redozier Dogwood	1 gal.
Cornus amomum	Silky Dogwood	1 gal.
Ilex verticillata	Winterberry	1 gal.
Ilex vomitoria *	Yaupon Holly	1 gal.
Itea virginica	Virginia Sweetspire	1 gal.
Morella (Myrica) cerifera *	Southern Wax Myrtle	1 gal.
Rhododendron catawbiense	Mountain Rosebay	1 gal.
Rhus glabra	Sumac	1 gal.
Viburnum prunifolium	Blackhaw Viburnum	1 gal.
Viburnum rufidulum	Rusty Blackhaw	1 gal.
* <i>Evergreen</i>		

Piedmont Prairie

Selected open areas that are flat or nearly flat shall be planted in native grass communities and maintained as Piedmont Prairie. Erosion control shall be accomplished with the use of cover crops in place of non-native invasives. Seed should be applied at a rate of at least 20# per acre. A sample of seed mixes is given in the seed mix tables.

SEED MIXES

REVEGETATION ZONE - Piedmont Prairie		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Mix %</i>
SEED MIX #1: (Normal to Dry) *		
Andropogon gerardii	Big Bluestem	0.05
Elymus virginicus	Virginia Wild Rye	0.05
Eragrostis spectabilis	Purple Lovegrass	0.02
Schizachyrium scoparium	Little Bluestem	0.50
Sorghastrum nutans	Indian Grass	0.10
Tridens flavus	Purpletop	0.05
Andropogon ternarius	Splitbeard Bluestem	0.08
Coreopsis tinctoria	Golden Tickseed	0.05
Penstemon laevigatus	Eastern Smooth Beardtongue	0.05
Bouteloua curtipendula	Sideoats Grama	<u>0.05</u>
<i>* Replaces NCDOT (East) mixes</i>		1.00
Temporary Cover Crop		
Fescus brevipila (Fall/Spring)	Hard Fescue	
Secale cereale (Fall)	Winter Rye	
Urochloa ramosa (Spring/summer)	Browntop Millet	

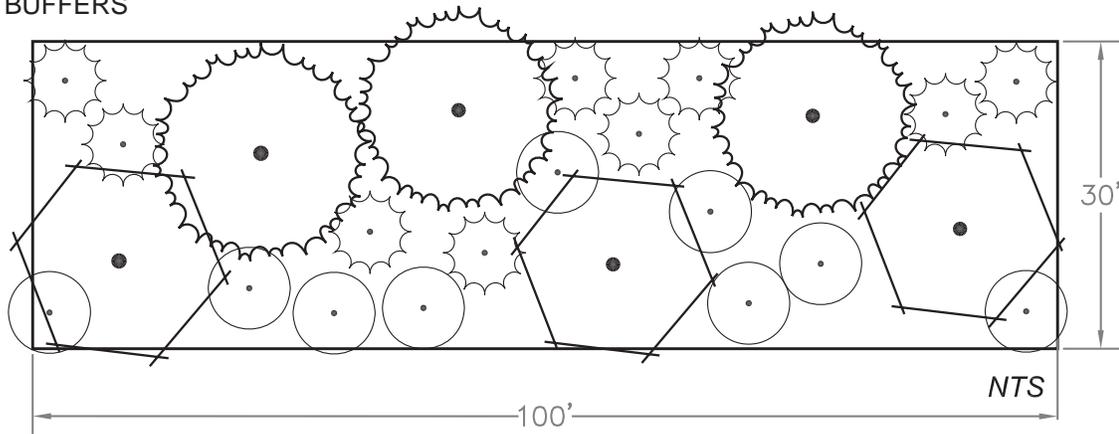
REVEGETATION ZONE - Piedmont Prairie (Continued)		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Mix %</i>
SEED MIX #2: (Normal to Dry; most color) *		
Andropogon gerardii	Big Bluestem	0.05
Asclepias syriaca	Common Milkweed	0.01
Chamaecrista fasciculata	Partridge Pea	0.03
Elymus virginicus	Virginia Wild Rye	0.10
Eragrostis spectabilis	Purple Lovegrass	0.04
Monarda fistulosa	Wild Bergamot	0.02
Rudbeckia hirta	Black-Eyed Susan	0.05
Schizachyrium scoparium	Little Bluestem	0.35
Senna hebecarpa	Wild Senna	0.03
Solidago bicolor	White Goldenrod	0.01
Sorghastrum nutans	Indian Grass	0.10
Tridens flavus	Purpletop	0.05
Andropogon ternarius	Splitbeard Bluestem	0.06
Coreopsis tinctoria	Golden Tickseed	0.05
Penstemon laevigatus	Eastern Smooth Beardtongue	<u>0.05</u>
* Replaces NCDOT (East) mixes		1.00
Temporary Cover Crop		
Fescus brevipila (Fall/Spring)	Hard Fescue	
Secale cereale (Fall)	Winter Rye	
Setaria italica (Summer)	Foxtail Millet	
SEED MIX #3: (Normal to somewhat wet; includes Wildflowers) *		
Elymus virginicus	Virginia Wild Rye	0.10
Tripsacum dactyloides	Eastern gammagrass	0.12
Panicum virgatum	Switchgrass	0.10
Agrostis scabra	Rough bentgrass	0.10
Carex vulpinoidea	Fox Sedge	0.10
Tridens flavus (VA ecotype)	Purpletop	0.10
Schizachyrium scoparium	Little Bluestem	0.08
Coreopsis lanceolata	Lanceleaf Tickseed	0.05
Sorghastrum nutans	Indian Grass	0.05
Elymus hirtix	Bottlebrush Grass	0.05
Festuca ovina var. duriuscala	Hard Fescue	0.04
Rudbeckia hirta (NC Ecotype)	Black-Eyed Susan	0.01
Chasmanthium latifolium	River Oaks	0.05
Helianthus angustifolia	Narrow Leaved Sunflower	<u>0.05</u>
* Replaces NCDOT native grass with Bermuda mixes		1.00
Temporary Cover Crop		
Fescus brevipila (Fall/Spring)	Hard Fescue	
Secale cereale (Fall)	Winter Rye	
Setaria italica (Summer)	Foxtail Millet	

REVEGETATION ZONE - Piedmont Prairie (Continued)		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Mix %</i>
SEED MIX #4: (Moderately wet to wet) *		
Elymus virginicus	Virginia Wild Rye	0.10
Panicum virgatum	Switchgrass	0.15
Agrostis stolonifera	Creeping Bentgrass	0.10
Rudbeckia hirta (NC Ecotype)	Black-Eyed Susan	0.06
Coreopsis lanceolata	Lanceleaf Tickseed	0.10
Panicum clandestinum	Deertongue	0.10
Andropogon gerardii	Big Bluestem	0.05
Juncus effusus	Softrush	0.03
Schizachyrium scoparium	Little Bluestem	0.03
Sorghastrum nutans	Indian Grass	0.05
Tripsacum dactyloides	Gamma	0.05
Carex vulpinoidea	Fox Sedge	0.08
Chasmanthium latifolium	River Oaks	0.05
Helianthus angustifolia	Narrow Leaved Sunflower	0.05
* Replaces NCDOT native grass with Bermuda mixes		1.00
Temporary Cover Crop		
Fescus brevipila (Fall/Spring)	Hard Fescue	
Secale cereale (Fall)	Winter Rye	
Setaria italica (Summer)	Foxtail Millet	
SEED MIX #5: (Shade)		
Elymus virginicus	Virginia Wild Rye	0.35
Andropogon gerardii	Big Bluestem	0.15
Schizachyrium scoparium	Little Bluestem	0.15
Chamaecrista fasciculata	Partridge Pea	0.05
Carex vulpinoidea	Fox Sedge	0.08
Desmodium canadense	Showy Tick Trefoil	0.05
Bidens aristosa	Bidens	0.03
Carex intumescens	Star Sedge	0.03
Chasmanthium laxum	Slender Wood Oats	0.03
Agrostis perenniens	Autumn Bentgrass	0.08
		1.00
Temporary Cover Crop		
Fescus brevipila (Fall/Spring)	Hard Fescue	
Secale cereale (Fall)	Winter Rye	
Setaria italica (Summer)	Foxtail Millet	

Buffers

Suburban residential neighborhoods and commercial establishments which are in proximity to the corridor shall have vegetative buffering installed in the most effective location of the backslope. These buffers shall be densely planted with the appropriate plant palette to restore and or amend the naturally occurring plant community. One area of special note is the Cameron Pond development in the Town of Cary. The Town is providing \$23,000 to enhance the buffers between Stations 613 and 632. The final length, location, species and sizes included in this buffer will require design coordination with the Town of Cary. The design of this buffer area should remain consistent with other proposed buffers; however plant sizes will be increased to provide a denser buffer upon installation. Buffers have been marked in the design analysis sheets with a brick red color to identify their locations.

BUFFERS



Legend

- | | | | |
|--|------------------------------|--|------------------------------|
| | Evergreen Trees
(Qty. 3) | | Deciduous Trees
(Qty. 3) |
| | Evergreen Shrubs
(Qty. 9) | | Deciduous Shrubs
(Qty. 9) |

Plan specifics: A typical buffer area should be planted, in the existing turf grass or vegetated cover, with six trees and eighteen large evergreen shrubs for each 3,000 square feet of area. Fifty percent of trees and shrubs shall be evergreen. Individual location and selection of species should be determined by site conditions. A sample of species is given in the plant palette table.

PLANT PALETTE

REVEGETATION ZONE - Buffers		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Size</i>
TREES - Canopy & Understory		
Acer rubrum	Red Maple	10 gal.; 6-8'
Acer barbatum	Southern Sugar Maple	10 gal.; 6-8'
Betula nigra	River Birch	10 gal.; 6-8'
Carya glabra	Pignut Hickory	10 gal.; 6-8'
Chionanthus virginicus	White Fringetree	10 gal.; 6-8'
Fraxinus pennsylvanica	Green Ash	10 gal.; 6-8'
Juniperus virginiana *	Eastern Red Cedar	10 gal.; 6-8'
Liquidambar styraciflua	Sweetgum	10 gal.; 6-8'
Liriodendron tulipifera	Tulip Poplar	10 gal.; 6-8'
Magnolia grandiflora *	Southern Magnolia	10 gal.; 6-8'
Malus angustifolia	Southern Crabapple	10 gal.; 6-8'
Pinus palustris *	Longleaf Pine	10 gal.; 6-8'
Quercus alba	White Oak	10 gal.; 6-8'
Quercus coccinea	Scarlet Oak	10 gal.; 6-8'
Sassafras albidum	Common Sassafras	10 gal.; 6-8'
Taxodium distichum	Bald Cypress	10 gal.; 6-8'
SHRUBS		
Callicarpa americana	American Beautyberry	B&B or 7 gal. equivalent
Cornus alternifolia	Pagoda Dogwood	B&B or 7 gal. equivalent
Cornus sericea 'Cardinal'	Redozier Dogwood	B&B or 7 gal. equivalent
Cornus amomum	Silky Dogwood	B&B or 7 gal. equivalent
Ilex verticillata	Winterberry	B&B or 7 gal. equivalent
Ilex vomitoria *	Yaupon Holly	B&B or 7 gal. equivalent
Itea virginica	Virginia Sweetspire	B&B or 7 gal. equivalent
Morella (Myrica) cerifera *	Southern Wax Myrtle	B&B or 7 gal. equivalent
Rhus glabra	Sumac	B&B or 7 gal. equivalent
Styrax grandiflora	Snowbell	B&B or 7 gal. equivalent
Viburnum prunifolium	Blackhaw Viburnum	B&B or 7 gal. equivalent
Viburnum rufidulum	Rusty Blackhaw	B&B or 7 gal. equivalent
* <i>Evergreen</i>		

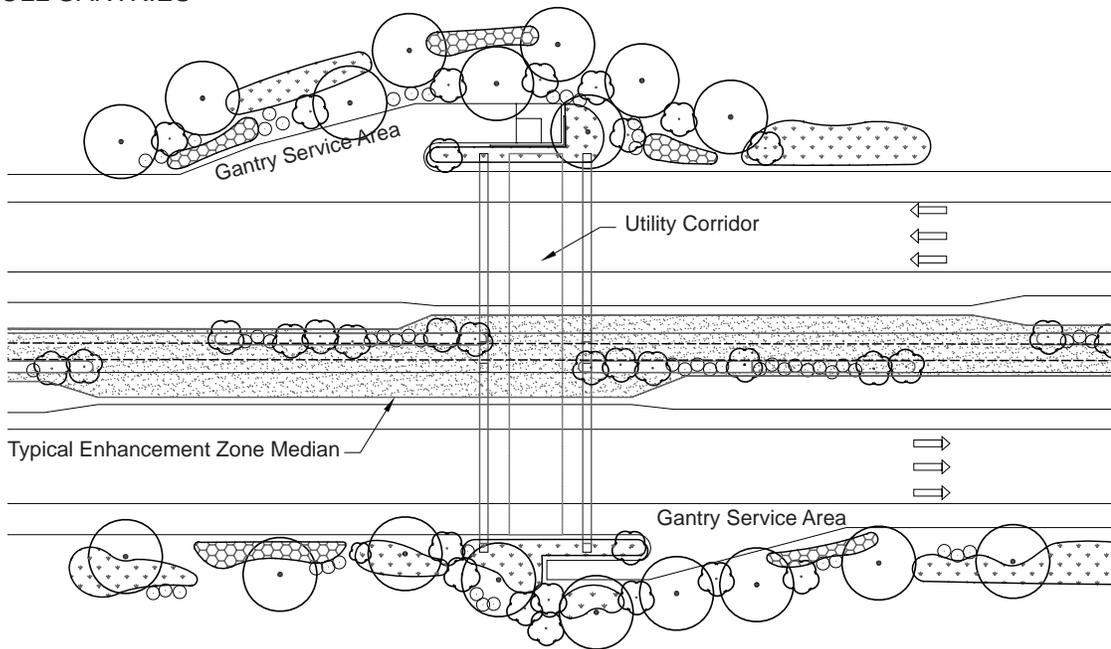
Zone 3: Enhancement

A portion of the right of way includes areas that have been disturbed by construction activities and will receive landscape treatments beyond the scope of natural revegetation. These areas include interchanges, toll gantries, gateway entry ramps, bridge planters, and the medians associated with these roadway features. These areas have been marked in the landscape concept plan sheets with a red color to identify their locations. The Enhancement zones shall be designed to have a distinct landscape theme or style that reflects the individual character of the adjacent communities. It will be necessary to coordinate with the communities to determine if a special vegetation theme is desired

Gateways and Toll Gantries

Provide extensive and more ordered landscape treatments at interchanges, select infield areas and associated ramps and at toll gantries and service areas to provide “gateways” into the communities served. The design should announce the gateways and provide a more detailed level of design.

TOLL GANTRIES



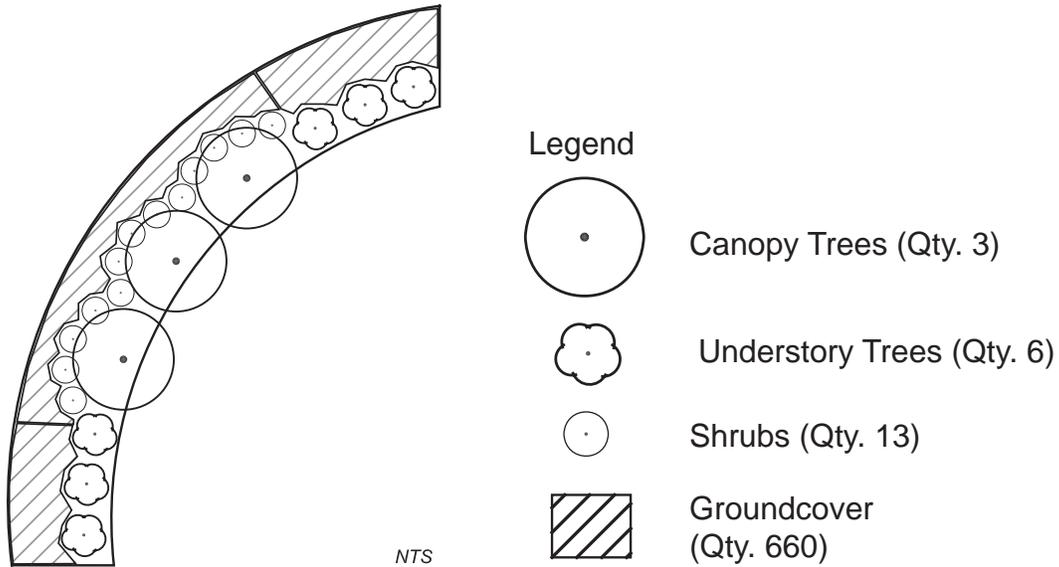
Legend

-  Canopy Trees (Qty. 9)
 -  Understory Trees (Qty. 9)
-  Shrubs (Qty. 15)
 -  Colonizing Shrubs (Qty. 65)
 -  Groundcover Grasses (Qty. 1550)

Note: Plant quantities shown are for one side of a typical mainline gantry.

Plan specifics: Landscape enhancement of the gateway entries and toll gantries shall be accomplished with a more ordered yet natural arrangement of canopy and understory trees with large and colonizing shrubs grouped in clusters. Trees will not be planted on top of utility corridors. The planting design will respond to sight distance and clear zone requirements. Native grasses should be the primary component of the groundcover planting. Informal arrangements of plant groupings should characterize the planting instead of equidistantly spaced rows of plants. A typical gantry service area should include nine canopy trees, nine understory trees, fifteen large shrubs and approximately sixty-five colonizing shrubs in mulched beds. Individual selection of species and quantities shall be determined by locations and site conditions. A sample of species is given in the plant palette table.

GATEWAYS



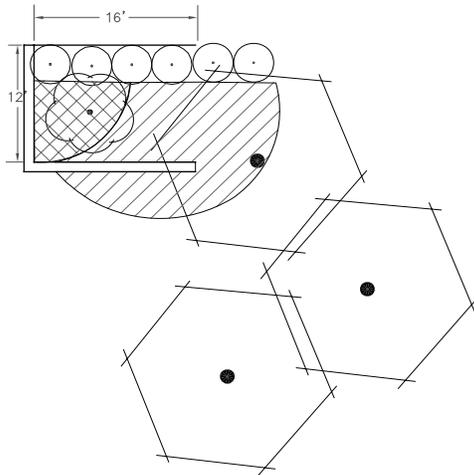
PLANT PALETTE

ENHANCEMENT ZONE - Gantries and Gateways		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Size</i>
TREES - Canopy & Understory		
Acer rubrum	Red Maple	Field grown; 3" caliper
Acer barbatum	Southern Sugar Maple	Field grown; 3" caliper
Carya glabra	Pignut Hickory	Field grown; 3" caliper
Cercis canadensis	Redbud	Field grown; 3" caliper
Chionanthus virginicus	White Fringetree	Field grown; 3" caliper
Cornus florida 'Cherokee Princess'	Flowering Dogwood	Field grown; 3" caliper
Fagus grandifolia	American Beech	Field grown; 3" caliper
Lagerstroemia indica (very limited use)	Crape Myrtle	Field grown; 3" caliper
Magnolia grandiflora	Southern Magnolia	Field grown; 3" caliper
Nyssa sylvatica	Black Gum	Field grown; 3" caliper
Oxydendrum arboreum	Sourwood	Field grown; 3" caliper
Pinus virginiana	Virginia Pine	Field grown; 3" caliper
Platanus occidentalis	Sycamore	Field grown; 3" caliper
Quercus falcata	Southern Red Oak	Field grown; 3" caliper
Quercus shumardii	Shumard Oak	Field grown; 3" caliper
Tilia americana 'Sentry'	Linden	Field grown; 3" caliper
SHRUBS		
Aesculus parviflora	Bottlebrush Buckeye	B&B or 7 gal. equivalent
Buddleia davidii	Butterfly Bush	B&B or 7 gal. equivalent
Callicarpa americana	American Beautyberry	B&B or 7 gal. equivalent
Cornus alternifolia	Pagoda Dogwood	B&B or 7 gal. equivalent
Cornus sericea 'Baileyi'	Redozier Dogwood	B&B or 7 gal. equivalent
Cornus amomum	Silky Dogwood	B&B or 7 gal. equivalent
Forsythia x intermedia	Border Forsythia	B&B or 7 gal. equivalent
Ilex verticillata	Winterberry	B&B or 7 gal. equivalent
Ilex vomitoria	Yaupon Holly	B&B or 7 gal. equivalent
Itea virginica	Virginia Sweetspire	B&B or 7 gal. equivalent
Kalmia latifolia	Mountain Laurel	B&B or 3 gal. equivalent
Myrica pensylvanica	Northern Bayberry	B&B or 7 gal. equivalent
Rhododendron canescens	Piedmont Azalea	B&B or 7 gal. equivalent
Rhododendron periclymenoides	Pinxterbloom Azalea	B&B or 3 gal. equivalent
Spiraea cantoniensis	Reeves Spirea	B&B or 7 gal. equivalent
GRASSES		
Andropogon ternarius	Splitbeard Bluestem	1 gal.
Elymus virginiana	Virginia Wild Rye	1 gal.
Juncus effusus	Softgrass	1 gal.
Panicum virgatum	Switchgrass	1 gal.
Schizachyrium scoparium	Little Bluestem	1 gal.
Sorghastrum nutans	Yellow Indian Grass	1 gal.
Tridens flavus	Purpletop	1 gal.

Bridge Planters

Provide memorable landscape treatments in mulched beds for the bridge planters in selected locations. The treatments should fill and encompass the planters, framing the views of the bridge and the local road name that is cast in the bridge abutment.

PLANTERS



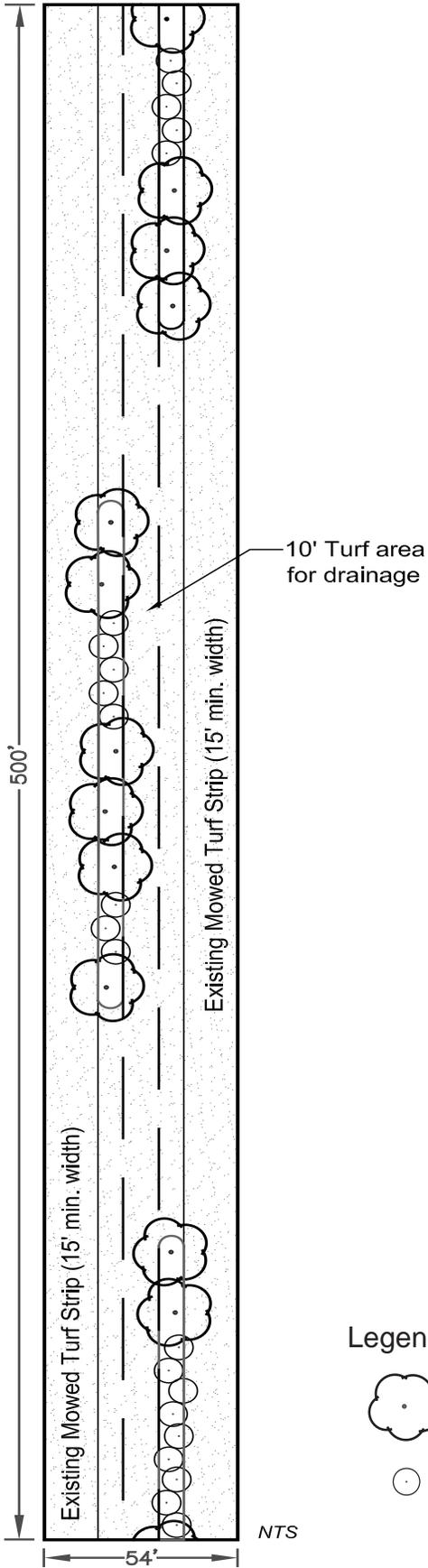
Legend

-  Canopy Trees (Qty. 3)
-  Understory Trees (Qty. 1)
-  Shrubs (Qty. 6)
-  Grasses (Qty. 50)
-  Herbaceous (Qty. 27)

Plan specifics: Landscape enhancement of the bridge planters, due to their size and configuration, offer the challenge for unique presentation by plant arrangement. The unique feature that will set apart each community’s bridges will likely come in the choice of plants. A sample of species is given in the plant palette table.

PLANT PALETTE

ENHANCEMENT ZONE - Bridge Planters		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Size</i>
TREES - Understory		
Chionanthus virginicus	White Fringetree	Field grown; 3" caliper
Cornus florida 'Cherokee Princess'	Flowering Dogwood	Field grown; 3" caliper
Ilex opaca	American Holly	Field grown; 3" caliper
Lagerstroemia indica (very limited use)	Crape Myrtle	Field grown; 3" caliper
Magnolia grandiflora 'Little Gem'	Southern Magnolia	Field grown; 3" caliper
Oxydendrum arboreum	Sourwood	Field grown; 3" caliper
SHRUBS		
Aesculus parviflora	Bottlebrush Buckeye	B&B or 7 gal. equivalent
Buddleia davidii	Butterfly Bush	B&B or 7 gal. equivalent
Callicarpa americana	American Beautyberry	B&B or 7 gal. equivalent
Cornus alternifolia	Pagoda Dogwood	B&B or 7 gal. equivalent
Cornus sericea 'Baileyi'	Redozier Dogwood	B&B or 7 gal. equivalent
Cornus amomum	Silky Dogwood	B&B or 7 gal. equivalent
Forsythia x intermedia	Border Forsythia	B&B or 7 gal. equivalent
Ilex verticillata	Winterberry	B&B or 7 gal. equivalent
Ilex vomitoria	Yaupon Holly	B&B or 7 gal. equivalent
Itea virginica	Virginia Sweetspire	B&B or 7 gal. equivalent
Myrica pensylvanica	Northern Bayberry	B&B or 7 gal. equivalent
Rhododendron canescens	Piedmont Azalea	B&B or 7 gal. equivalent
Spiraea cantoniensis	Reeves Spirea	B&B or 7 gal. equivalent
HERBACEOUS		
Coreopsis lanceolata	Tickseed Coreopsis	1 gal.
Liatris graminifolia	Blazing Star	1 gal.
Oenothera fruiticosa	Sundrops	1 gal.
Phlox carolina	Carolina Phlox	1 gal.
Rudbeckia hirta	Black-eyed Susan	1 gal.
GRASSES		
Muhlenbergia capillaris	Muhly Grass	1 gal.



Medians

Median areas that are in proximity to gateway, gantry, and bridge plantings shall receive extensive landscape treatment to reinforce their enhanced appearance. Wide medians should be planted with groupings of frangible understory trees and shrubs in a natural manner that imparts a non-uniform but rhythmic pattern. The design should allow for a 15' mowed turf strip on either side of the plantings to provide a recovery zone and emergency pull off space for motorists. All planting designs in the medians shall respond to locations of drainage structures and flow patterns.

Legend



Understory Trees (Qty. 12)



Shrubs (Qty. 22)

Plan Specifics: Typical medians should be planted in mulched beds with a mix of 20 small trees and 22 shrubs (within 500 linear feet) adjoining the 15' mowed turf strip. A sample of species is given in the plant palette table.

PLANT PALETTE

ENHANCEMENT ZONE - Medians		
<i>Scientific Name</i>	<i>Common Name</i>	<i>Size</i>
TREES - Understory		
<i>Cercis canadensis</i>	Eastern Redbud	Field grown; 2" caliper
<i>Chionanthus virginicus</i>	White Fringetree	Field grown; 2" caliper
<i>Cornus florida</i> 'Cherokee Princess'	Flowering Dogwood	Field grown; 2" caliper
<i>Ilex x attenuata</i> 'Savannah'	Savannah Holly	Field grown; 2" caliper
<i>Ilex opaca</i>	American Holly	Field grown; 2" caliper
<i>Magnolia grandiflora</i> 'Little Gem'	Southern Magnolia	Field grown; 2" caliper
<i>Prunus serrulata</i> 'Kwanzan'	Kwanzan Cherry	Field grown; 2" caliper
SHRUBS		
<i>Aesculus parviflora</i>	Bottlebrush Buckeye	B&B or 7 gal. equivalent
<i>Buddleia davidii</i>	Butterfly Bush	B&B or 7 gal. equivalent
<i>Callicarpa americana</i>	American Beautyberry	B&B or 7 gal. equivalent
<i>Cornus alternifolia</i>	Pagoda Dogwood	B&B or 7 gal. equivalent
<i>Cornus sericea</i> 'Baileyi'	Redozier Dogwood	B&B or 7 gal. equivalent
<i>Cornus amomum</i>	Silky Dogwood	B&B or 7 gal. equivalent
<i>Forsythia x intermedia</i>	Border Forsythia	B&B or 7 gal. equivalent
<i>Ilex verticillata</i>	Winterberry	B&B or 7 gal. equivalent
<i>Ilex vomitoria</i>	Yaupon Holly	B&B or 7 gal. equivalent
<i>Itea virginica</i>	Virginia Sweetspire	B&B or 7 gal. equivalent
<i>Kalmia latifolia</i>	Mountain Laurel	B&B or 3 gal. equivalent
<i>Myrica pensylvanica</i>	Northern Bayberry	B&B or 7 gal. equivalent
<i>Rhododendron canescens</i>	Piedmont Azalea	B&B or 7 gal. equivalent
<i>Rhododendron periclymenoides</i>	Pinxterbloom Azalea	B&B or 3 gal. equivalent
<i>Spiraea cantoniensis</i>	Reeves Spirea	B&B or 7 gal. equivalent
GRASSES		
<i>Andropogon ternarius</i>	Splitbeard Bluestem	1 gal.
<i>Elymus virginiana</i>	Virginia Wild Rye	1 gal.
<i>Juncus effusus</i>	Softrush	1 gal.
<i>Panicum virgatum</i>	Switchgrass	1 gal.
<i>Schizachyrium scoparium</i>	Little Bluestem	1 gal.
<i>Sorghastrum nutans</i>	Yellow Indian Grass	1 gal.
<i>Tridens flavus</i>	Purpletop	1 gal.

4.3 Planting Priorities

In order to meet the budget requirements for the project, it may be necessary to prioritize the implementation of the various zones to provide the overall visual impact. It is desirable that some level of treatment is provided that will showcase each of the proposed planting zones at some point along the Expressway corridor. For instance, it is not necessary that all slopes are planted as a part of this project. However, based upon the conceptual designs and the proposed plant list and sizes, it appears that all of the areas indicated on the plans can be planted to some degree while remaining within the project budget. The following priority list is presented in an effort to insure maximum benefit for cost allocated:

1. Enhancement Zones
 - a. Gantries
 - Mainline gantry
 - Mainline median
 - Ramp gantry
 - b. Bridges with Planters
 - Planters
 - Medians
 - c. Medians
 - d. Gateways (entrance ramps)
2. Buffers (based on Stakeholder input and existing land uses)
 - a. High density residential
 - Cameron Pond buffers (with cost sharing)
 - Existing developments
 - Developments under-construction
 - b. Low density residential
 - c. Commercial / Industrial
3. Revegetation: Backslope areas
 - a. Adjacent to residential areas
 - b. Ramp Entrance and Terminus
 - c. All other areas
4. Revegetation: Transitional areas
 - a. Ramp Entrance and Terminus
 - b. All other areas
5. Preservation: Improvement of existing landscape
 - a. Ramp Entrance and Terminus
 - b. All other areas

TRIANGLE EXPRESSWAY

Landscape Concept Report

