E-1 Guide for Protecting Existing Trees
§307 provides for the retention and protection of large trees when land is developed. To better ensure the survival of existing trees, the developer should heed the following guidelines (in addition to the mandatory requirements of §307):
(a) Protect trees with fencing and armoring during the entire construction period. The fence should enclose an area equal to 1.25’ per inch of tree caliper, or to the dripline (canopy edge) of the tree at a very minimum.

(b) Avoid compacting the soil around existing trees due to heavy equipment. Do not pile dirt or other materials beneath the crown of trees.

(c) Keep fires or other sources of extreme heat well clear of existing trees.

(d) Repair damaged roots and branches immediately. Exposed roots should be covered with topsoil. Injured trees must be thoroughly watered during the ensuing growing year.

Amended August 17, 2015

E-2 Standard for Street and Parking Lot Trees
Trees planted in compliance with the requirements of §306 and §308 shall have most or all of the following qualities. The trees recommended in E-10 represent the best combinations of these characteristics:
(a) Hardiness
   (1) Resistance to extreme temperatures.
   (2) Resistance to drought.
   (3) Resistance to storm damage.
   (4) Resistance to air pollution.
   (5) Ability to survive physical damage from human activity.

(b) Life Cycle
   (1) Moderate to rapid rate of growth.
   (2) Long life.

(c) Foliage and Branching
   (1) Tendency to branch high above the ground.
   (2) Wide spreading habit.
   (3) Relatively dense foliage for maximum shading.

(d) Maintenance
   (1) Resistance to pests.
   (2) Resistance to plant diseases.
   (3) Little or no pruning requirements.
   (4) No significant litter problems.

Amended August 17, 2015

E-3 Formula for Calculating Shading of Vehicle Accommodation Areas
The following is the formula for determining the number of shade trees required in and around paved parking lots in order to satisfy the shading requirements of §308. The minimum quantity of shade trees shall be one (1) large or two (2) small trees per each twenty (20) parking spaces.

Amended August 17, 2015 & November 21, 2016
E-4 Typical Parking Lot Planting Islands

Amended August 17, 2015

E-5 Guide for Planting Trees
The trees recommended in E-10 have minimal maintenance requirements. However, all trees must receive a certain degree of care, especially during and immediately after planting. To protect an investment in new trees, the developer should ensure that the following guidelines are followed when planting:
(a) The best times for planting are fall, winter, and early spring. Trees planted in the summer run the risk of dehydration.
(b) Plant all trees at least three and one-half (3 ½) feet from the end of head-in parking spaces to prevent damage from car overhangs.
(c) Dig the tree pit at least twice the width of the root ball and no deeper than the ball's vertical dimension.
(d) Especially in areas where construction activity has compacted the soil, follow the recommendations for vertical mulching to improve compacted soils as provided by the University of Florida (http://hort.ifas.ufl.edu/woody/break-compaction.shtml).

(e) After the pit is dug, observe subsurface drainage conditions. Where poor drainage exists, select a tree species that tolerates these conditions such as river birch and willow oak and follow recommended guidelines for planting.

(f) In all but exceptional circumstances where the soil is very poor, extensive research on trees clearly shows that there is no need to incorporate any amendments or fertilizers into the backfill soil. Water is the best amendment. Simply use the loosened soil that came out of the planting hole. The exception to this rule is where existing soil is so terrible or contaminated, such as in a parking lot island or in a small cutout in a sidewalk, that all soil over a large area is replaced with good-quality soil.

(g) Newly planted trees should only be staked if they are unable to stand on their own or if they are planted in an extremely windy site. The purpose of staking in these situations is to hold the root ball firmly in place as the root system begins to develop. Unstaked trees will establish and grow faster than staked trees except in the stated circumstances. Remove stakes and ties after one (1) year. For current recommendations for staking methods please see http://hort.ifas.ufl.edu/woody/staking.shtml.

(h) Spread at least three (3) inches of mulch over the entire excavation (with none on root ball or against the trunk) in order to retain moisture and keep down weeds.

(i) Wrapping is not necessary, but if it is applied in the fall it should be removed in the spring. Protection from equipment (mowers and trimmers) is encouraged using black plastic drain pipe slipped around the base of the trunk (protection should be removed as the tree matures).
(j) Conscientious post planting care, especially watering, pruning and fertilizing, is a must for street and parking lot trees. Branches should only be pruned at planting time to improve structure or to remove damaged limbs.

(k) Any tree planted near or beneath an overhead utility line shall be shorter than the overhead utility line at maturity. The trees recommended in E-10(g) represent trees that may meet the above standard.

(l) No tree shall be located within a sight distance triangle as provided in Appendix C.  
Amended August 17, 2015
E-6 Typical Opaque Screens (Type A)

(a) Small trees (see planting list E-10a) planted 50’ on center including:
   a. 6’ high evergreen screening shrubbery (see planting list E-10e) planted 4’ on center; or
   b. 6’ high opaque fence; or
   c. 6’ high stone wall; or
   d. 6’ high seeded earth berm.

(b) Large trees (see planting list E-10c) planted 75’ on center including:
   a. 6’ high evergreen screening shrubbery (see planting list E-10e) planted 4’ on; or
   b. 6’ high opaque fence; or
   c. 6’ high opaque stone wall; or
   d. 6’ high seeded earth berm.

(c) Tall evergreen trees (see planting list E-10b) stagger planted with branches touching the ground.

Amended August 17, 2015 & November 21, 2016
E-7 Typical Semi-Opaque Screens (Type B)

(a) Small trees (see planting list E-10a) planted 50’ on center including:
   a. 3’ high evergreen screening shrubbery (see planting list E-10d) planted 15’ on center; or
   b. 3’ high split rail fence.

(b) Large trees (see planting list E-10c) planted 75’ on center including:
   a. 3’ high evergreen screening shrubbery (see planting list E-10d) planted 15’ on center; or
   b. 3’ high split rail fence.

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E-8 Typical Broken Screens (Type C)

(a) Small trees (see planting list E-10a) planted 50’ on center including:
   a. Assorted shrubbery (see planting list E-10f) planted 25’ on center.

(b) Large trees (see planting list E-10c) planted 75’ on center including:
   a. Assorted shrubbery (see planting list E-10f) planted 25’ on center.

Amended August 17, 2015 & November 21, 2016
E-9 Guide for Planting Shrubs

Shrubs planted for screening purposes should be given a proper culture and sufficient room in which to grow. Many of the guidelines for tree planting listed in §E-4 also apply to shrubs. However, because specific requirements vary considerably between shrub types, this appendix does not attempt to generalize the needs of all shrubs. Shrubs that block the view of motorists, pedestrians, and bicyclists are prohibited within sight distance triangles as provided in Appendix C. For detailed planting information on individual species, refer to: NC Cooperative Extension Lawn and Garden Publications.

Amended August 17, 2015

E-10 Lists of Recommended Trees and Shrubs

The following lists indicate plantings which will meet the screening and shading requirements of Article XIX. The lists are by no means comprehensive and are intended merely to suggest the types of flora which would be appropriate for screening and shading purposes. Plants were selected for inclusion on these lists according to four principal criteria: (i) general suitability for the climate and soil conditions of this area, (ii) ease of maintenance, (iii) tolerance of town conditions, and (iv) availability from area nurseries. When selecting new plantings for a particular site, a developer should first consider the types of plants which are thriving on or near that site. However, if an introduced species has proven highly effective for screening or shading in this area, it too may be a proper selection.

(a) Small Trees for Partial Screening

(1) American Holly
(2) American Hornbeam or Ironwood
(3) Carolina Cherry-Laurel
(4) Chinese Pistache
(5) Crape Myrtle
(6) Eastern Redbud
(7) Flowering Dogwood
(8) Golden Rain Tree
(9) Mountain Silverbell
(10) Nellie Stevens Holly
(11) Okame Cherry
(12) River Birch
(13) Sourwood
(14) Sweet Bay
(15) Trident Maple
(16) Washington Hawthorn

(b) Large Trees for Evergreen Screening

(1) Deodar Cedar
(2) Green Giant Thuja
(3) Leyland Cypress are not recommended because of serious pest and disease issues
(4) Southern Magnolia

(c) Large Trees for Shading

(1) Eastern Red, Nutall, Scarlet, Shumard, White, or Willow Oak
(2) Ginkgo
(3) Green or White Ash are strictly prohibited due to Emerald Ash Borer
(4) Honeylocust
(5) Lacebark Elm
(6) Littleleaf Linden
(7) Red Maple (Limit planting to parks, residential areas, or areas not surrounded by pavement)
(8) Sycamore
(9) Zelkova
(d) Small Shrubs for Evergreen Screening
   (1) Azaleas and Rhododendrons
   (2) Carissa Holly
   (3) Drooping Leucothoe
   (4) Dwarf Yaupon Holly
   (5) Frostproof Gardenia
   (6) Glossy Abelia
   (7) Inkberry
   (8) Japanese yew
   (9) Littleleaf boxwood
   (10) William Penn Barberry

(e) Large Shrubs for Evergreen Screening
   (1) Burford Holly
   (2) Cleyera
   (3) Fortune Tea Olive
   (4) Foster’s Holly
   (5) Hedge Bamboo
   (6) Holly Osmanthus
   (7) Lauretinus Viburnum
   (8) Needlepoint Holly
   (9) Thorny Elaeagnus
   (10) Wax Myrtle
   (11) Wintergreen Barberry
   (12) Yaupon Holly

(f) Assorted Shrubs for Broken Screens
   (1) Border Forsythia
   (2) Doublefile Viburnum
   (3) Firepower Nandina
   (4) Indian Hawthorn
   (5) Judd Viburnum
   (6) Northern Bayberry
   (7) Pfitzer Juniper
   (8) Winter Honeysuckle
(g) Planting Near or Under Utility Lines – Note: In reference to electric lines, this list is for normal distribution power lines because there are different requirements for high transmission power lines.

1. American smoketree
2. Amur maple
3. Blackhaw viburnum
4. Chinese or Texas redbud
5. Crabapple
6. Crape myrtle
7. Dahoon
8. Dogwood
9. Doublefile viburnum
10. Dr. Kassab holly
11. Green hawthorn
12. Japanese dogwood
13. Little Gem magnolia
14. Osmanthus
15. Seven-son flower
16. Star Magnolia
17. Trident maple
18. Wax Myrtle
19. Witchhazel
20. Yaupon

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E-11 Small Trees for Partial Screening
The following trees are recommended for use in all types of screens. Though smaller than the trees listed in planting lists E-12 and E-13, each of these trees will reach a height of at least twenty (20) feet.

(a) River Birch (Betula nigra). Height: 20-40 feet; Spread: 8-16 feet. The River Birch is a native tree which usually grows along stream banks. In landscape design, it is adaptable to either high or low locations. This tree has an interesting papery bark and a graceful branching habit. It has no special pest or maintenance problems.

(b) American Hornbeam, Ironwood (Carpinus carolina). Height: 20-30 feet; Spread: 15-20 feet. This native tree has a natural yet refined appearance. It is slow growing, but at maturity it serves as an excellent shade tree. Its fluted muscular trunk is an interesting feature. In the wild, the American Hornbeam is common in moist rich soil, yet, when used in landscape design, it is soil tolerant and does not require an unusual amount of water. It has no pests and no special maintenance problems.

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E-12 Large Trees for Evergreen Screening
The following trees are ideal for screening large scale areas such as shopping centers and industrial sites. They are also effective in combination with other smaller screening plants. Both are moderate to fast growers. They are not considered to be shade trees.

(a) Deodar Cedar (Cedrus deodara). Height: 40-150 feet; Spread: 30 feet +. The Deodar Cedar is a useful and attractive evergreen. It should be allowed plenty of room in order to assume its beautiful natural form. Its pendulous branches should be allowed to touch the ground. It prefers relatively dry soils, grows rapidly, and is easy to maintain. "True Cedars" such as the Deodar are not native to North America, but they have become quite popular in the South as a landscape tree.
Southern Magnolia (Magnolia grandiflora). Height: 40-60 feet; Spread: 25 feet +. Magnolias are striking trees which serve well as screens when their branches are allowed to grow to the ground. Generally this tree does well in town conditions, but it should be planted in quite rich acidic soils. Furthermore, magnolias require ample space for growth. If planted in full sunlight, they will grow rapidly. Because it drops large waxy leaves, seed pods, and flowers, the magnolia may present a litter problem.

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E-13 Large Trees for Shading

The following trees may be used for screening, but they are recommended especially for shading streets and parking lots. Unless otherwise noted, they will grow rapidly. Each species will attain a mature spread of at least thirty (30) feet.

(a) Red maple (Acer rubrum). Height: 40-50 feet; Spread: 25 feet +. This tree is an example of a maple which is not recommended where there will be high concentrations of air pollution. However, with its excellent shading characteristics and beautiful colors, it should not be ignored. This tree grows rapidly, but, unlike the Norway Maple, it does not become brittle with age. The Red Maple is a native tree which is usually found in moist, even swampy areas, but it adapts well to a variety of situations. Although subject to maple insects and diseases, it is usually a long-lived tree. Limit planting to parks, residential areas, or areas not surrounded by pavement.

(b) Honeylocust (Gleditsia triacanthos). Height: 50-75 feet; Spread: 25 feet +. Its open, spreading form and feathery leaves may give the Honeylocust a frail appearance, but it is in fact a quite sturdy tree, notable for its resistance to storm damage. It is a native tree which is drought resistant and adaptable to town conditions. Grass and shrubs thrive beneath a Honeylocust because it casts light shade. This tree is especially useful for its ability to be transplanted at a relatively advanced age. Accordingly, it may be used for immediate effect in a landscape design. The Honeylocust has its pests and diseases, but it is fairly hardy. Thornless and fruitless varieties such as "Moraine" are recommended.

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E-14 Small Shrubs for Evergreen Screening

The following shrubs are recommended for informal (unclipped) hedges or screens. Each species grows to a height of less than six (6) feet; therefore, these shrubs are appropriate for semi-opaque screens.

(a) Glossy Abelia (Abelia grandiflora). Height: 4-6 feet; Spread: 3-5 feet. Abelia is quite common in local nurseries and tends to be less expensive than other shrubs on this list. It bears pale pink flowers throughout summer. Although it has proven quite popular for informal hedges, it has several drawbacks. Abelia should be pruned and thinned to maintain its best form. It may drop its leaves due to low temperatures, lack of pruning, or starvation.

(b) Carissa Holly (Ilex cornuta). Height: 3-4 feet; Spread: 4-6 feet. Carissa holly is a compact, dense evergreen shrub with small, glossy, dark green leaves, each with a single terminal spine. The somewhat-showy clusters of fragrant, springtime, white
flowers are followed in fall and winter by bright red berries. However, the berry display is mostly inferior to Ilex cornuta 'Burfordii'. The shrub stays small, eventually growing to about 8 feet. Most carissa holly plants are kept smaller than this. The plant occasionally reverts back to a 'Rotunda' holly leaf form, a plant to which it is closely related. 'Rotunda' has many spines along the margins of the leaf.

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E-15 Large Shrubs for Evergreen Screening

The following shrubs are recommended for high hedges or screens. Each species grows to a height of more than six (6) feet; therefore, these shrubs are appropriate for opaque screens.

(a) Hedge Bamboo (Bambusa multiplex). Height: 10-12 feet; Spread: 4-6 feet. Hedge Bamboo grows rapidly yet is more easily confined to a limited area than most types of bamboo. It is adaptable to a variety of situations, but requires plenty of water. For best effect as a screen, Hedge Bamboo should be stagger planted.

(b) Thorny Elaeangus (Elaeagnus pungens). Height: 8-10 feet; Spread: 6-10 feet. This shrub tolerates many adverse conditions. It will grow rapidly in relatively infertile, dry soils. Its dense thorny branches form an excellent natural hedge. It is one of the most common evergreen shrubs in the south.

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E-16 Assorted Shrubs for Broken Screens

The following is a sampling of shrubbery that would be appropriate in a broken screen. Because many of these plants are deciduous, they are not suitable for opaque and semi-opaque screens. (Note: Many of the evergreen shrubs described in planting lists E-14 and E-15 are also suitable for broken screens.)

(a) Border Forsythia (Forsythia x intermedia). Height: 8-10 feet; Spread: 10-12 feet. Bright yellow flowers in spring; autumn color is green with a tinge of purple (mild interest only). Full sun; well-drained soils; tolerates alkaline soil and air pollution. Irregular, due to a mix of upright and arching stems.

(b) Winter Honeysuckle (Lonicera fragrantissima). Height 6-10 feet; Spread: 6-10 feet. Easily grown in average, dry to medium, well-drained soil in full sun to part shade. Adapts to wide range of soils, including dry ones, but prefers moist, loamy soils. Prune to shape after flowering. Winter honeysuckle is a somewhat stiff-branched, deciduous shrub with a bushy, spreading habit. Extremely fragrant (lemony), short-tubed, creamy white flowers appear in early spring before the leaves emerge. Flowers are followed by small, somewhat inconspicuous, red berries which mature in late spring to early summer. Oval, dark green foliage sometimes has bluish tinge. Flowers are a harbinger of spring. Budded branches may be cut for an early, fragrant, indoor arrangement. No serious insect or disease problems. Some susceptibility to leaf spot, blight and powdery mildew. Potential insect pests include aphids, scale, sawfly, whitefly, loopers, plant hoppers, flea beetles and webworm. Clipped or informal hedge, screen or background plant in a shrub border.

Amended August 17, 2015
E-17 Vegetation qualification standards; plant size
(a) Unless otherwise provided, all plant material shall meet the following minimum size standards at the time of planting and/or qualification in the case of existing materials:

<table>
<thead>
<tr>
<th>Planting Material Type</th>
<th>Minimum Planting Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Large Tree</td>
<td>1 inch caliper</td>
</tr>
<tr>
<td>Small Tree</td>
<td>¾ inch caliper</td>
</tr>
<tr>
<td>Multi-stem Tree</td>
<td>4.5 feet (height)</td>
</tr>
<tr>
<td>Large Shrub</td>
<td>18 inches (height)</td>
</tr>
<tr>
<td>Small Shrub</td>
<td>15 inches (height)</td>
</tr>
</tbody>
</table>

(b) Height measurements shall be taken at grade.
(c) Caliper measurements shall be taken at six (6) inches above grade.
(d) For purposes of this section the minimum size of all plants shall be an approximate measurement, provided however, the intent of this section shall be to insure that materials are generally in compliance with the required standards.
(e) In addition, physical characteristics of all plant material shall be in accordance with the American Standard for Nursery Stock (most current edition)

Amended August 17, 2015

E-18 Minimum Bufferyards
(a) Bufferyards are the open space setbacks which separate site improvements from adjacent property lines and street rights-of-way. These may contain natural materials including but not limited to vegetation, ground cover, mulch and other pervious materials.

(b) The provisions contained in the bufferyard requirements shall not apply to those uses located within the C-C (downtown commercial) zoning district.
(c) Prior to issuance of any permit or granting of any other approval the applicant shall indicate on all required plans the location and dimension of all bufferyards.
(d) Bufferyards shall be required when one of the three screen types is required (Type A, B, or C) per §297 Compliance with Screening Standard and the Table of Screening Requirements.
(e) Bufferyard setbacks shall be measured from lot boundary lines except as further provided.
(f) Bufferyards shall be a minimum of ten (10) feet in width.

Amended August 17, 2015