SECTION 800

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SECTION 800

BUFFER AREAS, LANDSCAPING AND TREE COVER REQUIREMENTS

801.00 POLICY

801.01 Intent and Purpose:

A. The purpose of this section is to enhance the appearance and environment of Prince William County by providing minimum standards for tree cover requirements, buffer areas, basic landscaping, landscaping of public streets, storm water management areas, parking lots, residential lots and screening and by encouraging the conservation of the County's native woodlands. Further, the purpose of this section is to improve the safety of citizens by establishing minimum standards for the treatment of trees impacted by new development. These provisions will contribute to the quality of life of the County. The preservation and planting of trees will aid in stabilizing the environment's ecological balance by contributing to the processes of air purification, oxygen regeneration, ground water recharge, and storm water runoff retardation, while aiding in noise, glare, and heat abatement. Woodland conservation, replanting and reforestation standards are also appropriate and essential to ensure that the County's native woodlands are preserved and replenished, as well as for maintaining and creating wildlife habitats.

B. In the furtherance of the general policy above, a development proposal may include a comprehensive landscaping plan. The comprehensive landscaping plan must be submitted with the preliminary or sketch plan and shall reflect the intent of the tree cover provisions of this section. Recognition shall be given to the fact that each site has its own unique character, and the purpose of the comprehensive landscaping plan is to tailor the tree cover provided to the unique character of the site on a case-by-case basis. Accordingly, a comprehensive landscaping plan, which complies with the intent and purpose of this section, shall not be required to show literal compliance with every minimum standard set forth in this section, and when approved by the director of Planning, shall control the development of the site with respect to tree cover only. All other landscaping requirements shall be fulfilled as required under this section.

801.02 Definitions: The following standards and terminology shall apply to the design, submission requirements, installation, and maintenance of all required buffer areas, basic landscaping, screening, street planting, storm water management facility landscaping, and establishment and preservation of woodland conservation areas:

A. Buffer Area: A buffer area is a strip of land that preserves existing vegetation and/or contains landscaping, possibly in combination with a man-made barrier (e.g., fence, wall, earthen berm), located along the common property line of two dissimilar abutting land uses or properties, between a storm water management facility and buildings, along the edge of a street in a Highway Corridor Overlay District, or where proffered.

B. Tree Cover Requirements: A requirement referring to the preservation and/or planting of trees within a project to the extent that at maturity of ten years after planting, a minimum tree cover shall be provided.

C. Basic Landscaping: The introduction or selective retention of flourishing trees and shrubs carefully selected and arranged to perform a design purpose or environmental function, such as controlling visual direction, providing definition to architecture, modifying climate, filtering air pollution, controlling runoff and erosion, and establishing a wildlife habitat. Basic landscaping includes parking lot landscaping, storm water management landscaping, street planting and residential landscaping and may be counted towards the tree cover requirement.

D. Conservation Areas – areas designated for a specific environmental purpose or purposes including but not limited to best management practices, tree preservation, stream protection, buffering, etc., during the development review process and generally intended to remain undisturbed except for re-vegetation or planting of trees as approved by the Department of Public Works. Conservation areas are to be conveyed, with appropriate restrictions as to use, to a fee title owner, a bona fide homeowners association or other entity that would maintain the conservation area in perpetuity.

E. Screening: A natural or physical barrier providing a visual separation for loading areas, trash receptacles, maintenance and storage areas and consisting primarily of opaque fences or walls, berms and/or evergreen trees and shrubs.

F. Specimen Tree: A tree having a diameter, measured at four and one-half (4.5) feet above the ground, of thirty (30) inches or more, or a tree having a diameter measuring seventy-five percent (75%) or more of the diameter of the current state champion of that species; includes county and state champion trees.

G. Street Planting: Planting used in a specific relationship to the street which defines the street space with overhead canopy and with a vertical element, i.e., the trunk. Street planting generally provides a street with an aesthetic appearance, connecting disparate elements along its course.

H. Tree Preservation Area: A defined area intended for the purpose of preserving an individual tree or a biotic community dominated by tree species and/or other woody plants.

I. Comprehensive Landscaping Plan: An overall landscaping plan for a large or multi-phased site which shows how the tree cover requirement will be met by the phases or sections covered by the preliminary and/or sketch plan as a whole, rather than phase by phase or section by section; and which evidences compliance with the purpose and intent of this section. The proposed plan will show the locations and dimensions, where appropriate, of all tree save areas, buffers, screening, tree coverage, and landscaped areas on the site.

J. Cemetery Preservation Area: A strip of undisturbed land surrounding a cemetery, beginning at the edge of the archaeologically defined limits of burials and graves and extending outward 25 feet.

801.03 Applicability:

A. Buffer areas, basic landscaping, tree cover requirements, and screening shall be provided for all development plans, where required by the Zoning Ordinance, and in accordance with Section 802.00.

B. On sites for which a comprehensive landscaping plan is submitted and approved, the comprehensive landscaping plan shall govern development of the site with respect to tree cover and tree preservation. Where no comprehensive landscaping plan is submitted and approved, the standards contained in this section shall serve as minimum standards for development. However, the standards are not intended to be arbitrary or to inhibit creative solutions. Project or site conditions may arise where normal compliance is impractical or impossible, or where maximum achievement of the objectives can only be obtained through alternative compliance.

C. Requests for alternative compliance may be made for a buffer or landscaping standard specified in Section 800 and shall be reviewed when one or more of the following conditions are present:

1. Topography, soil, vegetation, or other site conditions are such that full compliance is impossible or impractical, or improved environmental quality would result from the alternative compliance.

2. Space limitations, unusually shaped lots, and prevailing practices in the surrounding neighborhood may justify alternative compliance for in-fill sites, and for improvements and redevelopment in older communities.

3. Change of use on an existing site increases the buffer area required by Section 802.00 of this manual more than it is feasible to provide.

4. Safety conditions make alternative compliance necessary.

D. Requests for alternative compliance shall be submitted to the Office of Planning as part of the site plan submission requirements and shall be accompanied by sufficient explanation and justification, written and/or graphic, to allow appropriate evaluation and decision. The alternative method of compliance must be comparable to the minimum standards in terms of quality, effectiveness, and durability, and shall be limited to the specific project under review. The director of Planning shall evaluate the alternatives and accept them or modify them.

E. When a site is developed in phases or sections, each phase or section shall contain the required basic landscaping, buffer areas, and tree cover requirement. However, a comprehensive landscaping plan for meeting tree cover requirements may be submitted for the overall project. In such case, tree cover shall be in accordance with the comprehensive landscaping plan, which was submitted and approved as part of the approved preliminary or sketch plan for the entire site. A cumulative tabulation of tree cover from all previously submitted phases or sections covered by the comprehensive landscape plan shall be included with each site plan submitted, which shows details of how the overall canopy coverage is being met.

801.04 Landscape Escrow:

A. An escrow in the form of cash, letter of credit or bond, posted in accordance with the administrative manual shall be posted for all required planting shown on the approved landscape plan. This escrow shall also be used to correct violations for failure to comply with any requirements of this section or with the approved plan. Refer to Section 802.33 of this manual.

B. Final inspection of all items covered by the landscape escrow shall take place at the time of bond release inspection. If all items are accepted, then the escrow will be released with the bond. However,-any requirements covered by the landscape escrow that are not in conformance with the approved plan shall be corrected prior to release of the escrow.

802.00 PLANNING AND DESIGN

802.10 Buffer Areas in General:

A Certain uses, when abutting each other, are incompatible and create conflict that may be reduced or eliminated by appropriate measures. Buffer areas established between incompatible uses minimizes these conflicts and the adverse impacts of essentially incompatible development. These provisions are intended to provide a mechanism whereby adjoining properties may be shielded from the adverse consequences of such development, where buffers separate and partially obstruct the view of incompatible abutting land uses or properties from one another. Buffers may also be required when properties abut a Highway Corridor Overlay District, with rezonings or special use permits, and, where certain zoning designations require perimeter buffers.

B. The primary means of buffering should be through the preservation of healthy native woodlands. If preserved native woodlands sufficient to meet the intent of the buffer are not provided, then buffering shall be provided through supplemental landscaping.

C. Except where otherwise permitted in the Zoning Ordinance or by proffers, buildings, structures, retaining walls three (3) feet or greater in height (except where utilized to retain existing vegetative cover), active recreation facilities, parking areas, loading areas, and golf cart paths shall not be located in the buffer areas between dissimilar uses. Sidewalk, trail, and golf cart path crossings may be allowed within a buffer upon approval of the director of Public Works, as long as comparable performance standards are maintained.

D. The minimum buffer area width is generally a uniform width across the entire length of the common property line between properties on which uses are located that require a buffer area.

E. Buffer areas shall be established as separate common open space in residential areas when conveyed to a homeowners' association or similar entity created to own and maintain the common open space within the project. Buffer areas platted within residential lots by deed restriction shall be located such as to provide the minimum yard depth and minimum lot size required by the Zoning Ordinance outside of the buffer area. If a homeowners' association is formed, it is required that buffers are established as separate common open space.

F. Minimal utility crossings may be included within a buffer area upon approval of the director of Public Works, as long as comparable performance standards are maintained. Landscaping with shrubs, ornamental grasses and perennials may be permitted in utility easements. However, planting of trees in utility easements is not allowed, unless specifically approved by the agency controlling the easement.

G. Any expansion of a nonconforming use shall not be permitted within buffer areas, except as specifically allowed by the Zoning Ordinance.

H. Buffer areas can be penetrated by joint entrances connecting abutting land uses, providing the disturbed area is kept to a minimum.

I. For non-residential lots of three acres or less, up to a 25% reduction of a buffer width shall be allowed for landscaped runoff reduction BMP facilities (bioretention, etc) and for utility easements proposed parallel to one edge of the buffer. The maximum buffer reduction shall be 25% and shall be as provided in Part 250 of the Zoning Ordinance.

802.11 Buffer Width Requirement:

A. The buffer area requirements are based on the compatibility between the proposed use and that of the adjoining property. Table 8-1 identifies the minimum buffer area required to be provided by a developing property, based on the compatibility of the proposed use with the existing use of the adjoining property. Any buffer width specified within this part may be waived or modified through a request for a waiver or modification. Requests for modifications or waivers of buffer widths are subject to the review and approval of the director of Planning, with the consultation of the Public Works director, as appropriate. Paragraph 'D' of this section is not subject to modification.

B. The following buffers required by the Zoning Ordinance shall be planted as defined in this section. Plant units are as defined in Table 8-3.

1. Railroad Right-of-way. As specified in the County Code Sec. 32-250.31(8), the 100-foot wide buffer for residential uses that abut a railroad right-of-way shall be planted with 600 plant units per each 100 linear feet and in accordance with the provisions of this section.

2. Existing cemeteries within a developing property shall have a 25-foot wide perimeter cemetery preservation area. Where a cemetery abuts a property line a buffer as required in Table 8-1 or a 25-foot wide cemetery preservation area shall be provided, whichever is greater. The provisions of DCSM 802.12A.1-A.5, C and D shall not apply to cemetery preservation areas. Dead, diseased, or dying trees or shrubbery, noxious weeds, and non-native invasive species within this cemetery preservation area, in accordance with Section 802.33 of this Manual may be removed by hand (that is, without the use of heavy equipment). Removed plants shall be replaced with plantings of native or historical ground covers, including grasses and periwinkle.

3. Rural Cluster. Where the one hundred (100) foot wide buffer contains existing healthy trees, shrubs or other vegetation adequate to provide the equivalent of a one hundred (100) foot wide rural buffer, the existing vegetation shall be retained. Where such vegetation is not existing, native landscaping in accordance with Tables I-2 shall be provided adequate to screen the development from the external street. Landscaping shall be appropriate to a rural location and may include vegetation types such as old field successional trees and shrubs, flowering meadows and meadow grasses. The provisions of DCSM 802.12C and D shall not apply to rural cluster buffers.

4. The 50' wide buffer between a golf course and any adjoining property zoned, used as, or planned for residential or agricultural uses shall be planted as a Type C buffer in accordance with Table 8-2. However, plant units may be reduced by up to 50% if approved by the director of Public Works and providing that tree species compose the entire remaining plant unit requirement.

C. The buffer width may vary, through an administrative approval process at the time of site plan, by up to twenty percent (20%) from the minimum width required at any point along a property line, as long as the buffer area provided remains equal to the minimum buffer area required along the same property line. The reduction in width shall be allowed only if the adjoining property has provided the full width of the buffer area applicable to it.

D. The required buffer area for a developing property may be provided on the abutting property, if agreed to by the respective owners and the director of Planning. (This does not release the abutting property from any obligation to meet buffering requirements, should it become a developing property). An agreement among the respective owners and the director of Planning, allocating the present and future buffer areas between the new properties shall be executed and recorded among the land records.

E. The buffer width required in accordance with Table 8-1 may be reduced for one or more land bays of a planned mixed use development if the following conditions are met:

1. The land bays were part of one single preliminary plan and the final plans are diligently pursued for the individual projects;

2. The reduction will occur on only one side of the common property line; and

3. The maximum reduction allowable is from one buffer category to the next lower one (e.g., from type C to type B or from type B to type A).

802.12 Buffer Planting Requirements: Where native woodland conservation is not provided to achieve the intent of a required buffer, landscaping shall be provided. The buffer area planting requirements are determined from Table 8-2.

A. To achieve the intent of buffers, the following apply (Note: buffers adjacent to roadways do not need to meet requirement (4), below):

1. A combination of large trees, medium, small and/or compact trees, and shrubs shall be used to achieve the desired buffering effect. The categories of large/medium/small/compact trees are defined in Table I-2-T of the Plant Selection Guide.

2. A maximum of thirty percent (30%) of the plant units may be large deciduous trees. A maximum of thirty percent (30%) of the plant units may be large evergreen trees. If large deciduous and large evergreen trees are used in combination, then a maximum of 40 plant units per 100 linear feet of large deciduous and large evergreen trees combined may be used.

3. The use of ornamental grasses, perennials and mulched beds is encouraged. See Table 8-3 for plant unit credits. However, when used, ornamental grasses and perennials (combined) shall not compose more than 25% of the total plant units required.

4. The limits on plant percentages of plant types listed in paragraphs 2 and 3, above, shall be applied along each property line where the buffer is required.

5. All species used shall be indigenous to Virginia, unless otherwise approved by the director of Public Works (see Tables I-2 in the Plant Selection Guide).

6. Requirements for the spacing of the various categories of trees are given in Table I-4.

B. The proposed combination of plants must yield a total number of plant units equal to or greater than the requirement for the buffer area type. Plant unit equivalencies are in accordance with Table 8-3.

C. Where the buffer width will allow, a berm may be substituted for thirty percent (30%) of the plant unit requirement. The berm should be graded to appear smooth, rounded and naturalistic. The berm shall be a minimum of four (4) feet higher than the elevation of the adjacent ground. Its slope shall not exceed three-to-one (3:1), except in unusual situations where a two-to-one (2:1) slope would be allowed with special ground cover. In such instance where the reduction in plant units applies, at least fifty percent (50%) of the plant unit requirement shall be evergreen trees and shrubs.

D. A six (6) foot tall opaque fence (board-on-board, masonry, or similar material) or wall may be substituted for thirty percent (30%) of the plant unit requirement. For non-residential lots of three acres or less, a 6-foot-tall board on board, solid masonry fence/wall, or equivalent barrier may be substituted for 50% of the plant unit required by the Design and Construction Standards Manual.

E. When existing woodland is located within the entire minimum buffer area, preservation of the woodland shall be allowed to substitute for the required plant material, provided that:

1. The woodland meets the minimum size requirement of Table 8-5, and

2. The visual screen provided by the woodland meets the intent of this code.

802.13 Buffer Areas Against Vacant Properties:

A. If a developing property with a nonresidential use is adjoining a vacant property zoned or planned residential, the full buffer width, as identified in Table 8-1, shall be provided. If the vacant property is zoned and planned nonresidential and a buffer would be required, the buffer may be reduced to the next lower category. However, at a minimum, Buffer A shall be provided.

B. If a developing property with a residential use is adjacent to a vacant property zoned or planned residential with a different density than the developing lot, and a buffer would be required, the buffer may be reduced to the next lower category. However, at a minimum, Buffer A shall be provided.

C. For the purpose of applying the reduction in buffer width identified above, a vacant property is one which is not occupied, nor is the subject of any development activities planned at the time the buffer reduction is applied.

802.20 Tree Canopy Requirements in General: Preservation or replanting of trees in a development is required to provide a minimum amount of tree cover which will yield a permanent environmental and aesthetic benefit to the development. Such cover is calculated at ten (10) year maturity of the trees. Compliance with the requirement should be achieved primarily by preserving existing woodland areas.

802.21 Tree Canopy Determination:

A. All developments shall be subject to the tree canopy requirements identified in Table 8-4, unless specifically exempted by the director of Public Works, if the requirement would result in unreasonable and unnecessary hardship. Tree cover requirements are based on the density and intensity of a development and not on use.

B. The tree canopy requirement identified in Table 8-4 can be reduced by twenty-five percent (25%) for a development which was previously devoid of trees an
d which was utilized for agricultural/horticulture or forestry purposes, prior to the submission of an application to rezoning or submission of a site/subdivision plan.

C. The tree cover requirement can be met by providing tree preservation areas, basic landscaping in the form of residential lot planting, parking lot landscaping, street planting, storm water management landscaping, planting within required buffer and setback areas, replacement planting for over-clearing, and/or reforestation. See Table I-2 in the appendix for tree cover credits for landscaping.

D. All landscaping applied toward meeting the tree cover requirement must meet the minimum size requirements of Section 804.01G. Existing trees applied toward meeting this requirement shall be a minimum of five (5) feet in height.

E. Reforestation within Chesapeake Bay Resource Protection Areas: Where a reforestation plan, for areas within RPAs which are devoid of trees prior to preliminary or sketch plan

approval, is approved by the County as part of the site plan, 100% of the total area reforested may be deducted from the total site area for the tree canopy requirement. The reforestation plan shall meet the following minimum requirements:

1. Planting density shall be a minimum of 450 trees per acre.

2. The minimum size of seedlings shall be 12" - 18" in height.

3. All species shall be indigenous to Virginia.

4. A combination of understory and overstory species shall be used. The number of trees from either category shall not exceed 70% of the total number of trees planted.

5. Protective tree shelters a minimum of 4' in height and weed mats or mulch shall be used for all trees. Installation shall be per manufacturers instructions.

6. The cost of the reforestation shall be included in the Landscape Escrow for the development.

7. Planting shall occur either in the spring, between March 15 and May 1, or in the fall, between October 1 and November 15.

8. If mortality of all understory or overstory trees exceeds 25% then all dead trees in that category shall be replaced prior to landscape escrow release.

802.30 Tree Preservation Credit:

A. The preservation of trees is preferred over the replacement of trees. Accordingly, where voluntary preservation of woodland is proposed, credit towards the canopy cover shall be provided in accordance with Table 8-5. Each tree preservation area may receive credit from only one category in Table 8-5. To receive credit tree preservation must meet these minimum requirements:

1. An acceptable cover of trees.

2. A minimum acceptable area to be left undisturbed as defined in Table 8-5.

B. To receive credit for "Wooded slopes equal to or greater than fifteen percent (15%) adjacent to intermittent streams" (See Table 8-5) the following minimum conditions must be met:

1. The area shall not be within an RPA or 100-year floodplain.

2. The minimum width of forested area preserved must be 50', the minimum length must be 200' or the entirety of the stream length on the subject property, whichever is lesser.

C. To receive credit for "Connecting Forested Areas" (See Table 8-5) the following minimum conditions must be met:

1. The area must be outside of any RPA or 100-year floodplain.

2. The minimum length connecting to an adjacent forested area must be 200' and the minimum width 50'. All of the 200' length must abut the adjacent forested area.

3. The adjacent forested area may be RPA, 100-year floodplain, or on a neighboring property. If it abuts a neighboring property, the developer/builder must be able to demonstrate that the neighboring forest will be preserved in the long-term.

4. A permanent conservation area must be established for the entire area to receive credit.

5. The area must be entirely within common area if part of a residential development.

The credit factor allowed for Connecting Forested Areas will be determined by the director of the Department of Public Works, but will be within the range listed in Table 8-5. The developer/builder is encouraged to meet with the Department of Public Works to discuss the viability of the proposal and level of credit to be granted. The credit factor will be based on the degree to which the proposed preserved area connects to other forested areas, protects sensitive environmental resources, and provides a high quality forest.

D. When a tree preservation area for which credit was applied has been disturbed during construction, it shall be replaced by either (1) an equivalent undisturbed tree preservation area on-site, or (2) twice the amount of plantings, which would have been required to satisfy tree canopy requirements if this area was not originally identified as preservation area.

802.31 Site Planning for Tree Preservation Areas: Tree preservation areas are for the purpose of retaining undisturbed native forest communities and the benefits associated with them. For this reason, even the retention of dead and dying plant material within a tree preservation area is considered desirable, primarily for the wildlife habitat such trees supply. However, this section shall not be construed to prohibit a developer or builder from removing any dead, dying or damaged tree that poses a threat to either life or structures, as determined by the director of Public Works.

A. The following guidelines are to be considered when tree preservation is proposed in a development area:

1. Preservation of the overall composition of the forest stand. Retaining the dominant trees and understory is necessary for the health of the stand.

2. Overall good health, generally free of insects and disease and of structurally sound condition.

3. Giving preference to groves of young vigorously growing trees, which adapt more readily to changing site conditions.

B. Buildings shall be located a minimum distance of twelve (12) feet from the limits of disturbance line of the tree preservation area, unless otherwise approved by the director of Public Works.

802.32 Standards for Field Practices for Tree Preservation Areas:

A. Marking the Limits of Clearing and Grading:

1. Prior to the start of construction, the limits of clearing shall be visibly marked with either tree protection fencing or surveyor's tape placed on stakes. Markings for the limits of clearing and grading shall not be placed on trees to be saved. The limits of clearing and grading shall not exceed that shown on the approved plans.

2. When the aforementioned marking has been completed, a meeting shall be requested with the director of Public Works to inspect the marked limits of clearing. All clearing limits shall be inspected and approved, prior to any clearing taking place.

3. The permittee has the option to retain additional vegetation over and above that which is required by the approved plan. However, it is recommended that additional vegetated areas on the site that are to be preserved should be protected from encroachment by construction activity. If a natural area or individual tree not shown on the plans to be preserved is retained on site and is intended to be preserved throughout the duration of construction activity, then the permittee should protect these trees the same as designated preservation areas.

4. When areas shown on the approved plans to be preserved do not contain any significant vegetation, it shall be the responsibility of the permittee to obtain approval from the director of Public Works for an exemption from preservation and protection requirements prior to commencing work in the area.

5. If at any time, subsequent to the initial clearing, it becomes necessary to remove additional trees which were shown on the plan to be preserved, the director of Public Works shall be notified and must grant approval prior to performing any additional clearing.

B. Tree Protection Requirements:

1. The permittee shall be responsible for the protection of tops, trunks and roots of all existing trees, as well as other vegetation to be retained on the site. After vegetation has been removed within the area authorized to be cleared, protective devices shall be installed along the limits of clearing and grading, prior to any construction work beginning on site. Protection shall be maintained until all work in the vicinity has been completed and shall not be removed without the consent of the director of Public Works. If the director of Public Works finds that the protective devices are insufficient to protect the vegetation retained on the site, additional protective devices shall be installed to insure adequate protection.

2. Once clearing is completed and protective devices installed, an inspection shall be requested to approve these items prior to commencing further construction.

3. Barricades, in accordance with the details in Section 810 of this manual, with appropriate signs to identify tree preservation areas shall be located along the limits of clearing line. The limits of clearing and grading line should generally be located at the drip line of the trees to be retained or spaced from the edge of the trunks equivalent to one foot for every inch in the diameter of the trees at breast height (DBH), whichever is greater. The following standards shall apply to the area within the established limits of clearing and grading line.

a. The soil shall not be disturbed or compacted.

b. Heavy equipment, vehicular traffic, stockpiling or any materials, or deposition of sediment, shall not be permitted.

c. Trees being removed shall not be felled, pushed or pulled into trees being retained. Equipment operators shall not clean any part of their equipment by slamming it against the trunks of trees to be retained.

d. No toxic materials shall be stored within fifty (50) feet of the limits of clearing and grading.

e. Burn pits shall not be permitted within one hundred (100) feet of vegetated area retained, unless approved by the director of Public Works. They shall be limited in size so as to not to adversely affect the vegetation.

f. No protective devices, signs, utility boxes, or other objects shall be nailed to the trees to be retained on the site.

g. Additional trees may be left standing as protection between the trunks of the trees to be retained and the limits of grading. If the trunks of trees in this preservation area are more than six (6) feet apart, additional protection devices may be required to prevent passage of equipment and material through the area. When additional trees are used as protection, the limits of clearing shown on the approved plan shall be flagged in the field so that the additional preservation area is delineated. When this method of protection is used, these additional trees shall be removed prior to completion of the project if required by the director of Public Works.

h. Sediment-laden runoff shall be diverted away from the preservation area. When the edge of a parking lot abuts a tree preservation area, curb and gutter rolled asphalt or similar type of guttering material shall be used to divert concentrated runoff away from the tree preservation area.

802.33 Dead, Dying or Damaged Trees:

A. Dead and Dying Trees and Replacements: If any trees shown on the approved plan to be saved are dead or dying, due to acts of negligence by the permittee, they shall be removed and replaced.

1. Over-cleared areas within Chesapeake Bay Resource Protection Areas and areas proffered to remain undisturbed shall be replanted in their entirety.

2. The number of replacement trees shall be based on guidelines specified by the director of Public Works.

3. The size of replacement trees shall be as specified by the director of Public Works or as set forth in 804.01G.

4. Replacement trees shall be planted as nearly as possible to the location of the trees which were removed, unless other arrangements are agreed to by the owner or the permittee and the director of Public Works.

B. Hazardous Trees:

1. In the event any tree or portion thereof is dead, dying, or damaged, due to construction or environmental changes brought about by construction and/or clearing, and poses a hazard to either life or structures, the permittee shall be required to take such action as required by the director of Public Works to eliminate the hazard carefully.

2. Trees that are required to be removed by the permittee shall be cut down flush with the ground (as low as conditions permit), and cut into movable lengths to prevent the creation of a new hazard. If site conditions interfere with the permittee's ability to do this, then an inspection by County staff will be necessary to determine if the remaining stump can be left or must be removed by other means.

3. If a stump created by the removal of a hazardous tree is determined by the director of Public Works to pose a hazard in itself, i.e., jagged stumps, stumps of hollow trees, then the stump shall be removed by acceptable means, in conjunction with the removal of the tree.

C. Pruning:

1. In the event any tree or portion thereof is damaged, due to construction or environmental changes brought about by construction and/or clearing and is determined by the director of Public Works to be in a state of decline, the permittee may be required by the director of Public Works to perform remedial action to correct the damage.

2. All pruning of branches shall be done in accordance with ANSI A300, Tree, Shrub and Other Woody Plant Maintenance - Standard Practices, published by the American National Standards Institute and by Tree Pruning Guidelines, published by the National Arborist Association. Trees which are further damaged by pruning practices not recognized in the standards above may be rejected, and the trees may be required to be removed and replaced.

3. When pruning above ground level, a climbing method other than one requiring tree spikes shall be used, unless otherwise approved by the director of Public Works.

4. Any damage caused by the permittee to the crown, trunk or root system of trees retained on the site shall be repaired immediately.

5. Remedial treatment required may include pruning, cabling, bracing, fertilization, aeration, and/or vertical mulching.

D. It shall be the responsibility of the permittee to obtain written permission from the property owner or his/her agent to enter upon such property for the purpose of complying with the paragraphs above, prior to commencing action. In the event such permission is denied and such denial is demonstrated to the satisfaction of the director of Public Works, the permittee will be relieved of the obligations under the paragraphs above.

E. When trees must be taken down, removed, or pruned as a result of the paragraphs above, the wood from these operations shall remain the property of the property owner.

802.40 Basic Landscaping:

802.41 Nonresidential Landscaping in General: The purpose of landscaping nonresidential developments is to soften the visual impact of large expanses of paving from the right-of-way and from adjacent properties, to provide shaded areas, to control runoff and to assist in meeting clean air goals. This shall be accomplished by parking lot landscaping and providing a landscape strip along the right-of-way, in addition to landscaping around storm water management facilities and along internal streets, where applicable.

802.42 Landscape Strip Along Right-of-way:

A. For non-residential developments adjacent to a right-of-way, other than "freestanding retail uses" with buildings equal to or exceeding eighty-thousand (80,000) square feet, items 1 through 5 are required~~:~~. Whenever the parking lot of a development meeting the standards of 802.43 abuts a right-of-way this Section shall govern.

1. A minimum ten (10) foot wide landscape strip along the right-of-way shall be provided.

2. Eighty (80) plant units per 100 linear feet are required within this landscape strip. The plant unit credits shall be in accordance with Table 8-3. A maximum of thirty (30) plant units per 100 linear feet may be large deciduous trees. A maximum of forty (40) plant units per 100 linear feet may be large evergreen trees. If large deciduous and large evergreen trees are used in combination, then a maximum of 40 plant units per 100 linear feet of large deciduous and large evergreen trees combined may be used. A maximum of 25% of the plant units required may be ornamental grasses and/or perennials. Given these limits on quantities of certain plant types, a mixture of plant types should be utilized.

3. Utilities and the Landscape Strip: The 10' landscape strip shall be provided outside of all existing and proposed utility easements, except for crossings (meaning perpendicular crossings), unless scenario a. or b., below is fully met. See Detail 810.15 for a graphic

depiction of the scenarios described in this paragraph. For storm sewer easements, paragraph c. must be met.

a. Utilities in Conduit: Proposed or existing utility easements shall not be located in the ten (10) foot wide landscape strip~~s~~, except as perpendicular crossings, unless the utility is located underground in conduit such that normal maintenance of the utility can be accomplished at limited access points. In such situations, planting in the easement must be specifically approved in writing by the entity controlling such easement and approval ~~is~~ must be obtained from the director of Public Works or designee.

b. Utilities Not Required to be in Conduit: Proposed or existing utility easements shall not be located in the ten (10) foot wide landscape strips. However, if the landscape strip is widened to a total of fifteen (15) feet in width, then the utility easement may overlap up to nine (9) feet of the 15' landscape strip. A minimum of six (6) feet of the 15' width must be outside of all utility easements and the entire width of the 15' foot strip must be planted. In such situations, planting in the easement must be specifically approved in writing by the entity controlling such easement and approval must be obtained from the director of Public Works or designee. Large deciduous trees shall not be used where they would interfere with overhead utilities. The number of plant units shall be as for a ten (10) foot wide landscape strip.

c. Storm sewer easements: Storm sewers where the top of the pipe is equal to or less than 3' from the proposed grade shall not be located within the landscape strip except as perpendicular crossings. When the pipe is more than 3' from the proposed grade, the easement may be located within the landscape strip if the following conditions are met:

i. Any length of storm pipe where the top of the pipe is greater than 5' from the proposed grade may have a tree located within the easement without a root barrier installed.
ii. Any length of pipe where the top of the pipe is greater than 3' but less than 5' from the proposed grade may have trees planted within the easement provided a root barrier is laid around the storm pipe.
iii. A typical detail depicting the root barrier shall be provided in the site plan, subject to the approval of the Director of Public Works, or designee. The root barrier shall encircle the pipe so as to prevent the tree's root system from contacting the storm pipe.
iv. The locations necessitating use of a root barrier shall be depicted on the site grading and landscape plans. The length of root barrier required shall run along the pipe a minimum of 30' from the tree trunk, or until there are site features that would preclude the presence of tree roots due to soil conditions (such as high compaction for curbing or road construction).

4. LID in the Landscape Strip: Low Impact Development (LID) features designed to control storm water runoff, that meet the Zoning Ordinance requirements with regard to structures and that employ landscaping in accordance with this section, may be allowed within the ten (10) foot wide landscape strip subject to the approval of the Director of Public Works or designee.

5. A wall cannot be used as an acceptable alternative for landscape strips along the right-of-way.

B. For all "freestanding retail uses" with buildings equal to or exceeding eighty-thousand (80,000) square feet, the following is required:

1. A minimum twenty-five (25) foot wide landscape strip along all existing and proposed rights-of-way.

2. One hundred fifty (150) plant units per 100 linear feet of landscape strip. A maximum of thirty (30) plant units per 100 linear feet may be large deciduous trees. A maximum of forty (40) plant units per 100 linear feet may be large evergreen trees. A maximum of 25% of the required plant units may be ornamental grasses and perennials.

3. This landscape strip shall be provided outside of any utility easements or existing or proposed public right-of-way but may contain pedestrian and utility crossings

4. Plant units shall be in accordance with Table 8-3.

802.43 Perimeter Parking Lot Landscaping:

A. For parking lots of nonresidential developments, which contain twenty (20) spaces or more, and for all townhouse and multi-family developments, any of which abut a property line, and which do not abut buffer areas or other required screening/landscaping, a ten (10) foot landscape strip along the perimeter of the property line shall be required. For the purposes of this section, a parking lot is considered abutting a property line where any part of it is within thirty (30) feet of the property line.

B. Eighty (80) plant units per 100 linear feet are required within this landscape strip. A maximum of thirty (30) plant units per 100 linear feet may be large deciduous trees. The plant unit credits shall be in accordance with Table 8-3. A maximum of forty (40) plant units per 100 linear feet may be large evergreen trees. If large deciduous and large evergreen trees are used in combination, then a maximum of 40 plant units per 100 linear feet of large deciduous and large evergreen trees combined may be used. A maximum of 25% of the plant units required may be ornamental grasses and/or perennials. Given these limits on quantities of certain plant types, a mixture of plant types should be utilized.

C. Utility easements shall not be located in the landscape strips, unless planting in the easement is specifically approved by the entity controlling such easement.

D. Low Impact Development (LID) features designed to control and infiltrate storm water runoff and that employ landscaping in accordance with this section, are encouraged within landscape strips and planting areas described in this section, subject to the approval of the Director of Public Works or designee.

802.44 Interior Parking Lot Landscaping:

A. Any surface parking lot containing twenty (20) or more spaces (except for shopping centers and shopping malls) shall be provided with interior landscaping area covering not less than five percent (5%) of the total area of the parking lot. The total area of a parking lot shall include the parking spaces, planting islands, curbed areas, loading spaces, interior driveways, travelways, and aisles, exclusive of the parking and loading areas for tractor trailer trucks. For shopping centers and shopping malls, see paragraph L, below.

B. Only islands containing large or medium deciduous trees or evergreen trees shall count toward meeting the five percent (5%) requirement. Islands four hundred (400) square feet in area or smaller may not contain evergreen trees, in order to avoid line of sight problems. For the purpose of this section, an island is defined as an area within the perimeter curbing or edge of pavement of the total area of the parking lot (as defined in A above) or an area contiguous to the perimeter curbing or edge of pavement, which protrudes into the parking lot (e.g., corners of parking lots).

C. At least one (1) large or medium deciduous tree or evergreen tree shall be provided for each two hundred (200) square feet of interior landscape area required. These large and medium deciduous trees at planting shall have a clear trunk at least six (6) feet above finish grade.

D. The predominant landscaping materials used to meet the interior parking lot landscaping requirement shall be large and/or medium deciduous trees suitable for a parking lot environment and having a spreading canopy as their typical form. The intent is that deciduous trees capable of providing shade shall be the predominant element of interior parking lot landscaping. Evergreen trees are allowed, due to their desirability as wind and visual breaks, in large parking lots. However, evergreen trees may not be the sole type of tree within any island that contributes to the five percent (5%) requirement. Shrubs and ornamentals may be used to complement the large and medium deciduous trees, but shall not count toward meeting the five percent (5%) requirement. Refer to the plant selection guide, for aid in species selection. Designs which make effective use of shrubs and ornamentals and seek credit toward the five percent (5%) requirement are encouraged to be submitted through the use of alternative compliance.

E. The landscape areas shall be reasonably dispersed throughout the parking lot so as to give maximum shading effect over paved surfaces, while minimizing impacts on sight lines and ease of access. However, landscaped areas may be grouped in wide islands at selected locations, if appropriate.

F. Plant material at entrances shall be located so as to maintain safe sight distances in accordance with County and VDOT standards.

G. Trees in or at the edge of parking lots should be species that branch no lower than eight (8) feet from the ground at maturity, to allow cars and trucks to circulate beneath the canopy without causing damage.

H. Good visibility in the parking lot is important both for security and traffic safety reasons. Plants which restrict visibility, such as tall shrubs and low branching trees, must be avoided.

I. The interior width, soil volume and soil quality of any planting area shall be sufficient to protect the plants and allow for mature growth of the species. Accordingly, the following minimum standards and guidelines are established:

1. A minimum planting area of one hundred fifty (150) square feet of continuous pervious area shall be provided for each tree. No tree planting area shall be less than eight (8) feet wide in any direction with the exception that, if parking spaces are located on only one (1) side of a planting island perpendicular to the parking spaces, then the island may be reduced to a minimum of six (6) feet wide.

2. A curb or similar devices, such as wheel stops or railroad ties, should be installed around the perimeter of all planting areas to prevent contact with the plant material. If a curb or other device is not used, then the soil within the island shall be mounded to a minimum of twelve (12) inches above grade.

3. All planting areas, including parking lot islands, shall contain soils suitable for planting. Soils shall be clean and free of all construction materials. The top three (3) feet of soil shall be loose. If previously compacted, it shall be loosened by tilling or other measure to a depth of three (3) feet. The top six (6) inches of soil shall be clean topsoil, or other clean soils amended with organic material. This requirement shall be met prior to the installation of landscaping.

J. Utility easements shall not be located within the planted portion of parking lot islands, unless planting in the easement is specifically approved by the agency controlling such easement.

K. For freestanding retail uses of eighty thousand (80,000) square feet or greater the requirements of 802.44 above shall apply with the following changes:

1. A minimum of ten (10) percent of the total area of the parking lot shall contain landscape areas. Landscape areas may include: plantable areas up to 6' from the perimeter curbing of the parking lot, corner islands, and interior islands.

2. No individual landscape area shall be less than six hundred (600) square feet in size. The minimum dimension shall be twelve (12) feet or greater.

3. All landscaped areas shall be irrigated.

L. For all shopping centers and shopping malls (as defined in the Zoning Ordinance), exclusive of any freestanding retail use of eighty thousand (80,000) square feet or greater, interior planting areas and landscaping shall be provided in addition to and outside of any planting areas and landscaping required by the Zoning Ordinance or Design and Construction Standards Manual for buffers, landscape strips along rights-of-way, perimeter parking lot landscaping and storm water management facilities (per Section 802.45) as follows:

1. Planting areas equal to or greater than 17% of the total site impervious area for the shopping center shall be provided. These planting areas may be contiguous to perimeter planting areas listed in Paragraph L, however the emphasis shall be on planting areas reasonably dispersed throughout the interior of the site with, as described in Paragraph B, for the purpose of shading the parking lot. Area within any Chesapeake Bay Resource Protection Area or within a 100 year floodplain shall not be credited toward meeting the 17%.

2. All areas credited toward the 17% shall be landscaped with ornamental grasses, perennials, shrubs and/or trees. Landscaping shall be provided at a rate of 50 plant units per 1000sf of the planting area determined under L.1, above. Plant unit credits shall be in accordance with Table 8-3. A minimum of 40% of the plant units required shall be large or medium deciduous trees.

3. The minimum width (i.e., the narrowest dimension) and surface area of all planting areas shall be in accordance with Table I-5.

4. Schedule J, Shopping Center & Shopping Mall Interior Planting, shall be provided.

5. Any building within a shopping center that has a building footprint less than fifteen thousand (15,000) square feet shall provide a minimum of one (1) plant unit for each three (3) linear feet of building foundation perimeter. Planting shall be provided interior to the site and within eighty (80) feet of the building foundation, although not necessarily contiguous to the foundation. These planting areas may be credited toward the 17% requirement of paragraph L.1. The remaining planting areas required to meet the 17% shall be reasonably dispersed throughout the interior of the site. Schedule K shall be provided.

6. Areas credited toward these requirements shall be clearly identified on the landscape plan.

7. Combining planting areas within the parking lot is encouraged so that they are larger than the minimum set forth in Table I-5 and more suited to the long-term health of the plant material and to LID practices.

8. Any new building not previously shown on an approved site plan shall meet the requirements of this section. The total site impervious area shall be based on the area occupied by the proposed building, proposed or required parking (whichever is greater) and all other impervious areas proposed or required as part of the proposed development.

802.45 Storm Water Management (SWM) Facilities:

A. Landscaping of storm water management facilities is intended to insure that these important urban open spaces are developed in a manner that will yield the greatest environmental and amenity benefit to the community. The plant credits shall be in accordance with Table 8-3. Consideration of the landscape elements of the SWM facility should begin at the concept stage with the formulation of design objectives.

B. For dry ponds, no trees shall be planted on or within twenty (20) feet of the dam embankment, on the emergency spillway, below the 2-year water surface elevation, or on the access road. However, at a minimum:

1. Landscaping shall surround the basin within the storm water management easement.

2. Eighty (80) plant units per 100 linear feet of the 100-year water surface elevation, exclusive of the dam embankment and spillway, shall be provided. A maximum of fifty (50) plant units per 100 linear feet may be large deciduous or large evergreen trees. If large deciduous and large evergreen trees are used in combination, then a maximum of fifty (50) plant units per 100 linear feet of large deciduous and large evergreen trees combined may be used. A maximum of 25% of the plant units required may be ornamental grasses and/or perennials. Given these limits on quantities of certain plant types, a mixture of plant types should be utilized.

3. A combination of shade, ornamental and/or evergreen trees, and shrubs shall be used. Perennials and ornamental grasses may be used.

4. If plantings are approved within the two (2) year water surface elevation they shall be specified as wet-cultivated on the plant schedule.

C. For wet ponds, no trees shall be planted on or within twenty (20) feet of the dam embankment, on the access road, or the emergency spillway. However, at a minimum:

1. Landscaping shall surround the basin within the storm water management easement.

2. Eighty (80) plant units per one hundred (100) linear feet of the 100-year water surface elevation, exclusive of the dam embankment and spillway, shall be provided above the 10-year water surface elevation. A maximum of fifty (50) plant units per 100 linear feet may be large deciduous or large evergreen trees. If large deciduous and large evergreen trees are used in combination, then a maximum of fifty (50) plant units per 100 linear feet of large deciduous and large evergreen trees combined may be used. A maximum of 25% of the plant units required may be ornamental grasses and/or perennials. Given these limits on quantities of certain plant types, a mixture of plant types should be utilized.

3. A combination of shade, ornamental and/or evergreen trees and shrubs shall be used. Perennials and ornamental grasses may also be used.

4. Where possible, shade trees should be planted near the water's edge to moderate thermal impact on the pool, and some open areas provided for access to dredge the facility.

5. Where a wet pond is provided as a golf course feature and does not abut adjacent properties, the landscaping requirements of this Paragraph C.1 through C.7, above do not apply; however the buffer requirement of DCSM 802.11.B.4 shall be met.

6. Where an amenity that is a hard structure (for example, a deck or patio) or where a building is proposed to the water's edge, the length of the 100-year water surface elevation abutting the hard structure or building may be deducted from the linear feet of the 100-year water surface elevation used to calculate the plant units required. This concept of a hard structure shall not include retaining walls, trails/sidewalks, parking lots or features where landscape planting is possible.

7. If plantings are approved below the ten (10) year water surface elevation they shall be specified as wet-cultivated on the plant schedule.

D. Additional area may be needed to fulfill the design objectives. With the overall goal of maximizing the benefits of the facility, objectives such as the following, shall be considered for SWM landscape design:

1. Enhancement of water quality.

2. Creation of passive recreation opportunities.

3. Assurance of aesthetic compatibility with community.

4. Ease of maintenance.

E. To allow flexibility in the planning of landscapes for SWM facilities and to encourage creative and innovative approaches to design, the following criteria shall apply to ensure the safety of the public and the functionality of the facility:

1. Pond slopes shall be three-to-one (3:1) or flatter when existing slopes are three-to-one (3:1) or flatter. Steeper slopes may be approved on a case-by-case basis to allow for the preservation of natural vegetation and topography.

2. Where possible, vegetative strips should be used in place of fencing around outfalls into the pond. These plantings shall be adequate to restrict easy access.

3. Trees or shrubs shall not be allowed around structural items without the approval of the Department of Public Works.

4. Where required, fences should be compatible with the environmental and architectural surroundings of the facility site.

5. Only herbaceous plants such as low maintenance ground covers and required stabilization grasses/legumes shall be permitted on the dam unless they are associated with plantings on a public road and are approved by the director of Public Works.

6. Rip-rap areas or fill embankments may be screened or enhanced with plant materials.

7. Plantings, bollards (sturdy freestanding posts) or a park-type post and rail may be used to discourage use of grassed areas by vehicles.

8. Opportunities for passive recreation should be provided whenever possible. Fishing, hiking, birding, picnicking, and nature study are among the activities appropriate on many SWM facility sites.

F. When wet ponds are allowed by the Zoning Ordinance to be located in buffer areas, additional landscaping features must be provided to enhance their appearance.

802.46 Optional Street Tree Planting:

A. Street plantings in the right-of-way are optional, however, when provided within the right-of-way they shall be in accordance with VDOT's Subdivision Street Design Guide. Where VDOT and County standards differ, the stricter standard shall apply. The following requirements are intended to insure that street trees are selected and planted in a manner that will promote their long-term health and survival, enhancing streets throughout the County, both visually and environmentally.

B. General Standards for All Street Trees:

1. Trees shall be the primary element of all streetscapes. Complimenting street trees with shrubs, perennials, annuals, grasses, etc. is encouraged.

2. Species Selection. The species (or cultivar) of tree selected for any streetscape design (median or alongside the roadway) shall be compatible with the width and function of the street and shall be in accordance with Tables I-2. Generally, all street trees planted along the side of the roadway shall be single stemmed. Multi-stemmed trees may be permitted if selected sizes and varieties or cultivars will not conflict with pedestrian and vehicle movement and at the discretion of the director of Public Works.

3. Only those trees planted within fifteen (15) feet of the curb or edge of pavement shall be considered street trees.

4. The location of street trees shall be designed so as to avoid conflicts with existing and proposed utility easements.

C. Soils (for median or alongside the roadway) shall meet VDOT requirements and specifications. They shall be clean and free of concrete, debris, trash, gravel, or other foreign materials, and shall be loose soils, lightly tamped but otherwise uncompacted.

802.47 Residential Landscaping:

A. Residential Landscaping: The purpose of landscaping residential lots is to provide a minimum amount of tree canopy cover which will yield a permanent environmental and aesthetic benefit to the development. Residential landscaping in accordance with Table 8-6 is required, in addition to the other requirements for storm water management facilities landscaping and street

planting. They all may be used to meet the tree canopy cover requirement. Residential landscaping shall comply with the standards in Table 8-6.

B. Community Facilities. Community facilities, such as community recreational facilities (i.e., tennis court, swimming pools, club houses) or meeting houses, when constructed as freestanding uses internal to a residential development, shall be treated as non-residential development for landscaping purposes. The following landscaping is required:

1. A minimum fifteen (15) foot wide landscaped area shall be established and maintained around the perimeter of the community facility and landscaped in accordance with a Type A buffer.

2. Parking areas shall meet the requirements of this section.

3. When a community facility is located along the property boundary at the edge of the residential development it serves, a buffer shall be provided in accordance with the buffering requirements of this section.

802.48 Buffering Residential Development From Major Roadways:

A. The purpose of these requirements is to ensure that the rear and side yard and the lowest story of the rear outside wall of any single family attached or detached dwelling is screened from the view of any street classified as a major collector or higher. It is not the intent of these regulations to provide uniform linear strips of completely opaque screening but to provide an attractive view of residential neighborhoods from major streets and ensure adequate buffering for the residential neighborhood from the street.

B. When the rear or side yards of single-family attached or detached dwellings in any district are oriented toward a major collector, parkway, arterial street, freeway, or an interstate, a buffer area shall be provided between the rear or side lot lines and the public right-of-way, as part of the common open space owned and maintained by the homeowners' association. If allowed within individual lots, the buffer area must be such that it still provides the minimum back and side yard depth required by the Zoning Ordinance outside the buffer area.

C. The width of the buffer area and the plant units required within the buffer area shall be in accordance with Table 8-7. The buffer width may be reduced by up to twenty percent (20%) when the line of sight from the traveling lane is at least ten (10) feet above the rear yard elevation at the entrance to the dwelling.

D. When existing woodland is located within the entire buffer area, preservation of that woodland will be allowed to substitute for the required plant materials, provided that the woodland meets the minimum size requirements of Table 8-5 and the intent of the buffer expressed in Paragraph A, above.

E. Fences, walls, or berms may also be employed within the required buffer area to interrupt the views of the rear yards. If six (6) foot high opaque fence or wall or a four (4) foot high berm is used within the buffer area, the requirement for plant materials in accordance with Table 8-7 may be reduced by thirty percent (30%).

802.49 Screening

A. When screening of certain on-site functions (e.g., loading, dumpsters, trash collection, outside storage areas, maintenance areas and equipment, mechanical equipment, etc.) is required by the Zoning Ordinance, the following screening options shall be used, depending on the type of function being screened:

1. A minimum six (6) foot high opaque fence or wall, the height of the fence or wall shall be no lower than the functions/items being screened. An appropriate gate shall be provided, if applicable.

2. A three (3) foot high berm with plantings of six (6) feet high evergreen screening is provided.

3. For mechanical and similar equipment, any architectural element compatible with the building is acceptable, as long as it covers the view of the equipment.

B. The site functions listed above shall be oriented on the site so as to be as inconspicuous as possible, and shall be screened from all public streets and adjoining properties.

803.00 LANDSCAPING - SUBMISSION REQUIREMENTS

803.01 General Requirements:

A. A landscape plan is a required element of all development plans. The landscape plan must address the requirements for buffer areas, basic landscaping, as well as tree canopy cover requirement calculations, as applicable.

B. The landscape plan shall be made part of the site development plan and shall be submitted and reviewed in accordance with this section and Section 100.00 of this manual.

C. The plan shall be prepared by a certified or registered landscape architect, a registered professional engineer, or a certified land surveyor.

D. A comprehensive landscape plan shall reflect the intent of the provisions of this section, while allowing for modifications based on the particulars of a site and its unique characteristics. This plan shall be submitted with all future site development plans to which it applies. At a minimum, the comprehensive landscape plan shall include:

1. The approximate limits of clearing and grading.

2. A tree stand description providing the proposed save areas (forest cover type(s), average size of the dominant canopy species, and the approximate area).

3. Calculations demonstrating how the required tree cover is proposed to be met.

E. Alternate compliance shall be accepted in accordance with Section 801.03, paragraph C.

803.02 Plan Elements:

A. The landscape plans shall be drawn to the same scale as the site and subdivision plan details but no less than 1" = 50' scale.

B. A tabulation showing how each required element of Section 802.00 has been met and where credit was used, when applicable, shall be shown on the plan.

C. Planting elements shall be shown as follows:

1. Location, general type, and quality of the existing vegetation and specimen trees to be retained. Drip line of specimen trees to be retained shall be shown.

2. Methods and details for protection of existing vegetation during construction and tree protection after construction.

3. Location and labels of all proposed plants, with tree symbols shown to scale for their ten (10) year canopy.

4. Location and description of other landscape improvements.

5. Proposed grading.

6. The zoning and use of all abutting properties.

7. Planting methods and installation details as necessary to ensure conformance with the standards in this section.

8. Schedules or lists showing required and proposed quantities for items called for by this section.

9. Location, size, and description of all elements which are required to be screened.

10. Maintenance schedule. In addition, every site plan or subdivision plan submitted shall include the following note on the landscape plan and plat: The owner of fee title to any property on which plant material has been established in accordance with an approved landscape/planting plan, shall be responsible for the maintenance, repair and replacement of the approved plant material, as required by the ordinance.

11. The location, type, size, and quantity of trees to be planted in the right-of-way and in accordance with the Guidelines for Planting Along Virginia Roadways.

12. Where applicable, habitat enhancement features in storm water management facilities such as islands, nesting boxes, and loafing/nesting platforms.

13. Collected plants or transplanted trees may be specified on the plan, provided that planting location and conditions will permit.

14. All proposed and existing easements and utilities as shown on other plan sheets.

803.03 Substitution of Plant Materials:

The plants that are planted shall be of the species and size specified on the approved plans, unless substitutions have been approved by the director of Public Works prior to planting. Substitutions that have been planted without prior approval by the director of Public Works shall be removed and replaced by acceptable species, if required by the director of Public Works. See Tables I-2, "Plant Selection and Cover Guides", and Table I-3, "Plants Not Acceptable for General Use", appendices to Section 800, for more information on acceptable species.

804.00 LANDSCAPING - SPECIFICATIONS

804.01 Specifications:

A. Plant names used in the plant schedule shall be identified in accordance with Hortus Third, by Liberty Hyde Bailey Horitorium, latest edition.

B. All plant materials shall be specified to be equal to or better than the standards for nursery stock, by the American Nursery and Landscapers Association (ANLA).

C. Trees and shrubs shall be nursery grown, unless otherwise approved, and shall be healthy and vigorous plants, free from defects, decay, disfiguring roots, sun-scald, injuries, abrasions of the bark, plant diseases, insect pest eggs, borers and all forms of infestations or objectionable disfigurements, as determined by the director of Public Works. Container plants shall have roots established throughout the pot, but shall not be root bound. Plants shall be in accordance with the current American Nursery and Landscape Association and conform in general to representative species.

D. Plants should be predominately native species. Species to be planted in woodland conservation areas shall be native and suited to the site conditions. Exceptions to this paragraph are allowed with approval of the director of Public Works, provided they are suited to the site.

E. Plants collected within the site or transplanted trees may be specified on the plans, provided that planting locations and soil conditions will permit, and provided that the plants meet the specifications of subsection G below.

F. In order to curtail the spread of disease or insect infestation, projects containing two hundred (200) trees or more, shall plant no more than thirty percent (30%) of the required newly planted trees from one taxonomic family. Not more than thirty percent (30%) of the required newly planted trees shall be of the same genus, and not more than twenty percent (20%) may be of the same species.

G. Plant measurements: All plants shall conform to the measurements specified in the plant schedule of the landscape plan. All plant sizes specified in the plans shall generally be the median for the size ranges indicated in the ANLA standards and, at a minimum, shall comply with the following. (Certain species may be planted at smaller sizes than those specified below. With the approval of the director of Public Works, any species in the Tree Selection and Cover Guide, which has tree cover area noted under a given size category, may be planted at that size category. However, only trees a minimum of 5' in height at the time of planting shall receive tree cover credit.):

1. Caliper measurements shall be taken six (6) inches above grade for trees under four (4) inches caliper, and twelve (12) inches above grade for trees four (4) inches in caliper and over.

2. Minimum branching height for all shade trees shall be six (6) feet.

3. Minimum size for planting large deciduous trees shall be two to two and one-half (2-2 1/2) inch caliper, twelve (12) feet to fourteen (14) feet in height.

4. Minimum size for planting all other deciduous trees shall be one to one and one-half (1- 1 1/2) inch caliper, six (6) feet to eight (8) feet in height.

5. Minimum size for planting evergreen trees shall be six (6) feet to seven (7) feet in height.

6. Minimum size for planting shrubs shall be eighteen (18) to twenty-four (24) inches ~~in~~ height or spread, except for quality dwarf varieties.

7. Minimum size for planting perennials and ornamental grasses shall be #1 Containers (aka. 1 gal.). A typical #1 container measures approximately 6" to 7" in diameter at the top by 7" deep. Plants shall be appropriate sizes for the container.

H. Spacing: All landscaping shall be designed and planted in accordance with Table I-4 of the Plant Selection Guide.

804.02 Plant Selection and Cover Guide: Plants from Tables I-2, of the Plant Selection Guides, an appendix to Section 800, shall be used to fulfill all planting requirements. Species, varieties or cultivars listed in Table I-3, "Plants Not Acceptable for General Use", shall not be accepted. Exceptions to this paragraph may be allowed if approved by the director of Public Works and provided they are suited to the site.

804.03 Planting:

A. Plants shall be protected during delivery to prevent desiccation of leave.

B. Insofar as is practicable, all plants shall be planted on day of delivery. If this is not possible, the contractor shall protect unplanted plants by keeping them in shade, well protected with soil, mulch or other acceptable material and shall keep all plant material well watered. Plant material shall not remain unplanted for more than two (2) weeks.

C. All plants shall be planted in such a manner as to ensure their survival. This shall include the planting of intact balls, planting at proper depth, properly backfilling and watering, and construction of a planting saucer (for trees). All planting areas shall contain soils suitable for planting. Soils shall be clean and free of all construction materials. (See planting procedures for trees and planting procedures for shrubs in the latest edition of Landscape Specification Guidelines for Baltimore, Washington Metropolitan Area, prepared by the Landscape Contractors Association of Metropolitan Washington and American Society of Landscape Architects for adequate specifications.)

D Any rope or wire binding the ball shall be cut prior to the conclusion of backfilling operations to prevent girdling of the tree trunk

E. If a non-biodegradable material is used around the ball, it shall be completely removed prior to backfilling.

804.04 Landscape Plantings on Fences and Walls: When a wall or a solid fence is used for landscaping/buffering purposes, plantings should be provided on both sides of the fence to soften its visual impact and to deter access for graffiti vandals. Suggested plantings to restrict access to walls susceptible to graffiti vandalism:

- Barberry or pyracantha to block access to the wall.

- Ivy or other plantings to cover the wall. Use of vine type plantings should depend on the type of material used for the wall, as some building materials can be damaged by the plants.

TABLE 8-1 MINIMUM BUFFER AREA REQUIRED													
Proposed Use/Development	**Adjoining Existing Use/Development**												
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**
RESIDENTIAL 1. Single-Family Detached		A	B	B	B	D	D	B	C	B	C	C	C
2. Single-Family Weak-Link (used only for previously approved weak-link developments that are still valid)	A		A	B	B	D	D	B	C	B	C	C	C
3. Single-Family Attached	B	A		B	B	D	D	B	C	B	C	C	C
4. Multifamily	B	B	B		B	D	D	A	C	B	C	C	C
PUBLIC/SEMIPUBLIC 5. Institutional (e.g., schools, church, library)	B	B	B	B		A	D	A	A	A	B	C	C
6. Public Recreational Use - Passive	D	D	D	D	D		D	B	B	B	B	B	C
7. Public Recreational Use - Active	D	D	D	D	D	D		D	D	D	D	D	D
8. Care Facilities (e.g., nursing home)	B	B	B	A	C	B	D		C	A	B	C	C
9. Public Facilities (e.g., pump station, treatment plant)	C	C	C	C	A	B	D	C		B	B	A	A
10. **OFFICE**	B	B	B	B	A	B	D	A	B		A	B	B
11. **COMMERCIAL/RETAIL**	C	C	C	C	B	B	D	B	B	A		A	B
INDUSTRIAL 12. Light	C	C	C	C	C	B	D	C	A	B	A		A
13. Heavy	C	C	C	C	C	D	D	C	A	B	B	A	

A, B, C – Buffer width in accordance with Table 8-2.

D – Determined on a case-by-case basis, depending on the activity.

TABLE 8-2 BUFFER AREA WIDTH AND PLANT REQUIREMENTS		
Type	**Width feet**	**# of Plant Units Per 100 Feet of R/W or Property Line**
A	15	110
B	30	180
C	50	320
D	Case by case – Minimum 15’	Based on approved width

TABLE 8-3 PLANT UNIT EQUIVALENTS	
Plant Type*	**Plant Unit***
1 large deciduous tree	10
1 medium, small, or compact deciduous understory tree~~)~~	5
1 large evergreen tree	10
1 medium, small, or compact evergreen tree~~)~~	5
1 shrub	2
1 ornamental grass	1
1 perennial	0.25
*Minimum plant size in accordance with Section 804.01G	

TABLE 8-4 REQUIRED TREE CANOPY COVER AT TEN YEAR MATURITY	
Developed Type	**% of Area of Site**
Residential developments where density does not exceed 10 units/acre	20%
Residential developments with density over 10 units/acre but less than 20 units/acre	15%
Residential developments with density of 20 units/acre or higher	10%
Commercial, industrial, and institutional developments	10%

TABLE 8-5 TREE PRESERVATION CREDIT		
VEGETATION COVER OF PRESERVATION AREA	**MINIMUM SIZE**	**CREDIT FACTOR**
Environmentally Sensitive Areas: RPA & Floodplains	10,000 sq. ft.	1.0
Environmentally Sensitive Areas: Wooded Slopes ≥ 15% adjacent to an intermittent stream.	See 802.30B	2.0
Connecting Forested Areas (See 802.30 C)	10,000 sq.ft.	1.7-2.0
Older hardwood forest with dominant canopy trees of diameters larger than 12 inches	30 ft. by 50 ft.	1.7- 2.0 *
Young hardwood forest with dominant canopy trees of diameters of 4 to 12 inches	30 ft. by 30 ft.	1.5-1.7 *
Old field with successional growth of predominantly eastern red cedar, short leaf pine or Virginia pine, with diameters of 3 to 6 inches, mixed with deciduous trees	30 ft. by 30 ft.	1.2
Younger, old field successional growth of eastern red cedar or Virginia pine up to 3 inches mixed with deciduous trees	20 ft. by 20 ft.	1.1
Stands predominantly of Virginia pine, greater than 6”	75 ft. by 75 ft.	1.0
* To receive credit for young or older hardwood forests, a tree preservation plan must be submitted in the first submission of the site plan and approved by the director of Public Works. This plan will meet the minimum standards set forth in the Plant Selection Guide.		

TABLE 8-6 ON-SITE RESIDENTIAL PLANTING REQUIREMENTS		
Residential Type	**Minimum Number of Trees***	**Notes**
Single-family detached lots one acre or larger.	3 LD per lot 3 AT per lot	Preserved trees which meet the minimum area requirement of Table 8-4 and are located on an individual lot within 60 ft. of a dwelling, and which are in good health, may be counted on a one-to-one basis towards fulfillment of the requirement for trees on that lot.
Single-family detached lots 20,000 sq. ft. to one acre	2 LD per lot 2 AT per lot	
Single-family detached and weak link lots smaller than 20,000 sq. ft	1 LD per lot 1 AT per lot	Preserved trees which meet the minimum area requirements of Table 8-4 and are located on an individual lot within 30 feet of a dwelling, and which are in good health, may be considered as fulfilling the requirement for residential trees on that lot.
Single-family detached cluster subdivision	Minimum number of large deciduous trees and other trees will be provided, as for a conventional subdivision, but based on the average lot size provided in the cluster subdivision	Total number of trees to be located on lots and in common open space must meet or exceed the requirement under the conventional subdivision.
Townhouses, single-family attached, two-family	1 LD or MD per end unit and 1 SD or CD per unit	If space does not permit, the LD and MD required per end unit may be located in common open space for the site. Existing shade trees exceeding two-inch caliper, located anywhere in the open space area, may be counted on a one-to-one basis towards fulfilling the requirement for large and medium deciduous trees on that site.
Multifamily	1 LD per 1,600 sq. ft. of open space area 1 AT per 1,600 sq. ft. of open space area	A) Trees which count toward a perimeter parking lot landscaping may be counted towards fulfillment of this requirement. B) Preserved trees which meet the minimum area requirement of Table 8-4 and are located within 60 ft. of a building, and which are in good health, may be counted on a one-to-one basis towards fulfillment of the requirement.
*LD = Large Deciduous Tree; MD = Medium Deciduous Tree; SD = Small Deciduous Tree; CD = Compact Deciduous Tree; AT = Trees from any category of the Plant Selection and Cover Guide.		

TABLE 8-7 RESIDENTIAL BUFFER FOR RIGHT-OF-WAYS		
Street Classification	**Width of the Buffer (feet)**	**Number of Plant Units Per 100 ft. of Right-of-way or Property Line**
Major Collector/Minor Arterial	30	180 (no more than 60 for shrubs)
Parkway and Principal Arterial	50	320 (no more than 100 for shrubs)
Freeway/Interstate	75	400 (no more than 140 for shrubs)

TABLE 8-8 MINIMUM PLANTING ZONE DIMENSIONS FOR STREET TREES		
Tree Category	**Minimum Planting Zone Width (at top of soil)**	**Minimum Soil Volume of Planting Zones or Planters * (cubic ft.)**
Large Street Tree	8 ft.	970 cf
Medium Street Tree	8 ft.	750 cf
Small Street Tree	6 ft.	500 cf
*All volumes are based on a soil depth of 3.0 feet.		

SAMPLE PLANT SCHEDULES

SCHEDULE A BUFFER AREA PLANTING
1) Minimum required buffer area (A, B, or C): 2) Minimum width of landscaped yard: 3) Linear feet of buffer strip required along property line and/or right-of-way: 4) Percentage of required buffer area occupied by existing woodland _____ 5) Fence or wall or berm employed in buffer area: _____ Yes _____ No 6) Total number of plant units required in buffer strip: _____ 7) Number of large deciduous tree provided: _____ x 10 p.u. = _____ p.u. Number of large evergreen trees: _____ x 10 p.u. = _____ p.u. Number of evergreen understory trees (medium, small or compact): _____ x 5 p.u. = _____ p.u. Number of deciduous understory trees (medium, small or compact): _____ x 5 p.u. = _____ p.u. Number of shrubs: _____ x 2 p.u. = _____ p.u. Number of Ornamental Grasses: _____ x 1 p.u. = _____ p.u. Number of Perennials: _____ x 0.25 p.u. = _____ p.u. 8) Total number of plant units provided in buffer strip: _____

SCHEDULE B
NONRESIDENTIAL LANDSCAPED STRIP ALONG RIGHT-OF-WAY

1) Linear feet of street frontage, not including driveway entrances:

2) Total number of plant units required: _____

3) Number of large deciduous tree provided: _____ x 10 p.u. = _____ p.u.
Number of large evergreen trees: _____ x 10 p.u. = _____ p.u.
Number of evergreen understory trees (medium, small or compact): _____ x 5 p.u. = _____ p.u.
Number of deciduous understory trees (medium, small or compact): _____ x 5 p.u. = _____ p.u.
Number of shrubs: _____ x 2 p.u. = _____ p.u.
Number of Ornamental Grasses: _____ x 1 p.u. = _____ p.u.
Number of Perennials: _____ x 0.25 p.u. = _____ p.u.

4) Total number of plant units provided: _____

SCHEDULE C
PARKING LOT INTERIOR PLANTING

1) Area of parking:
2) Interior landscaped area required (% and sq. ft): _____
Interior landscaped area provided (% and sq. ft): _____
3) Number of large/medium trees required: _____
Number of large/medium trees provided: _____

SCHEDULE D
TREE COVER CALCULATIONS

Tree cover required:

1) Gross site area: _____

2) Percent of tree cover required: _____

3) Total area of tree cover required: _____

Tree cover provided:

4) Tree cover from landscaping: _____

5) Tree cover from preservation: _____

6) Total tree cover provided: _____

SCHEDULE E PARKING LOT PERIMETER AREA
1) Linear feet of property line adjacent to parking lot 2) Total number of plant units required: _____ 3) Number of plants provided adjacent to property line: Number of large deciduous tree provided: _____ x 10 p.u. = _____ p.u. Number of large evergreen trees: _____ x 10 p.u. = _____ p.u. Number of evergreen understory trees (medium, small or compact): _____ x 5 p.u. = _____ p.u. Number of deciduous understory trees (medium, small or compact): _____ x 5 p.u. = _____ p.u. Number of shrubs: _____ x 2 p.u. = _____ p.u. Number of Ornamental Grasses: _____ x 1 p.u. = _____ p.u. Number of Perennials: _____ x 0.25 p.u. = _____ p.u. 4) Total number of plant units provided: _____

SCHEDULE F RESIDENTIAL REQUIREMENTS
1) Development type: 2) Number of lots: 3) Number of trees required per lot: _____ LD/MD Trees _____ SD/CD Trees _____ AT Trees 4) Total number of trees provided: _____ LD/MD Trees _____ SD/CD Trees _____ AT Trees

SCHEDULE G
BUFFER AREAS FOR RESIDENTIAL DEVELOPMENT ALONG MAJOR ROADWAYS

1) Type of street adjacent to rear or side yards:

2) Minimum width of required buffer:

3) Linear feet abutting rear or side yards:

4) Total number of plant units required: _____

5) Percentage of required buffer strip occupied by existing woodland:

6) Fence or wall or berm employed in buffer strip: _____ Yes
_____ No

7) Number of plants provided:

Number of large deciduous tree provided:	_____	x	10 p.u. =	_____ p.u.
Number of large evergreen trees:	_____	x	10 p.u. =	_____ p.u.
Number of evergreen understory trees (medium, small or compact):	_____	x	5 p.u. =	_____ p.u.
Number of deciduous understory trees (medium, small or compact):	_____	x	5 p.u. =	_____ p.u.
Number of shrubs:	_____	x	2 p.u. =	_____ p.u.
Number of Ornamental Grasses:	_____	x	1 p.u. =	_____ p.u.
Number of Perennials:	_____	x	0.25 p.u. =	_____ p.u.

8) Total number of plant units provided: _____

SCHEDULE H TYPICAL PLANT LIST							
Symbol	**Botanical Name**	**Common Name**	**Quantity**	**Caliper**	**Height**	**Tree Cover Credit (sq. ft.**	**Remarks**

SCHEDULE I
STORM WATER MANAGEMENT POND LANDSCAPING

For Wet and Dry Ponds:

1) Linear feet of the 100-year water surface elevation: _____

2) Linear feet of the 100-year water surface elevation
Deducted for hardscape _____

3) Total number of plant units required at 80pu/100lf : _____

4) Number of plants provided*:

Number of large deciduous tree provided: _____ x 10 p.u. = _____ p.u.
Number of large evergreen trees: _____ x 10 p.u. = _____ p.u.
Number of evergreen understory trees
(medium, small or compact): _____ x 5 p.u. = _____ p.u.
Number of deciduous understory trees
(medium, small or compact): _____ x 5 p.u. = _____ p.u.
Number of shrubs: _____ x 2 p.u. = _____ p.u.
Number of ornamental grasses: _____ x 1 p.u. = _____ p.u.
Number of perennials: _____ x 0.25 p.u. = _____ p.u

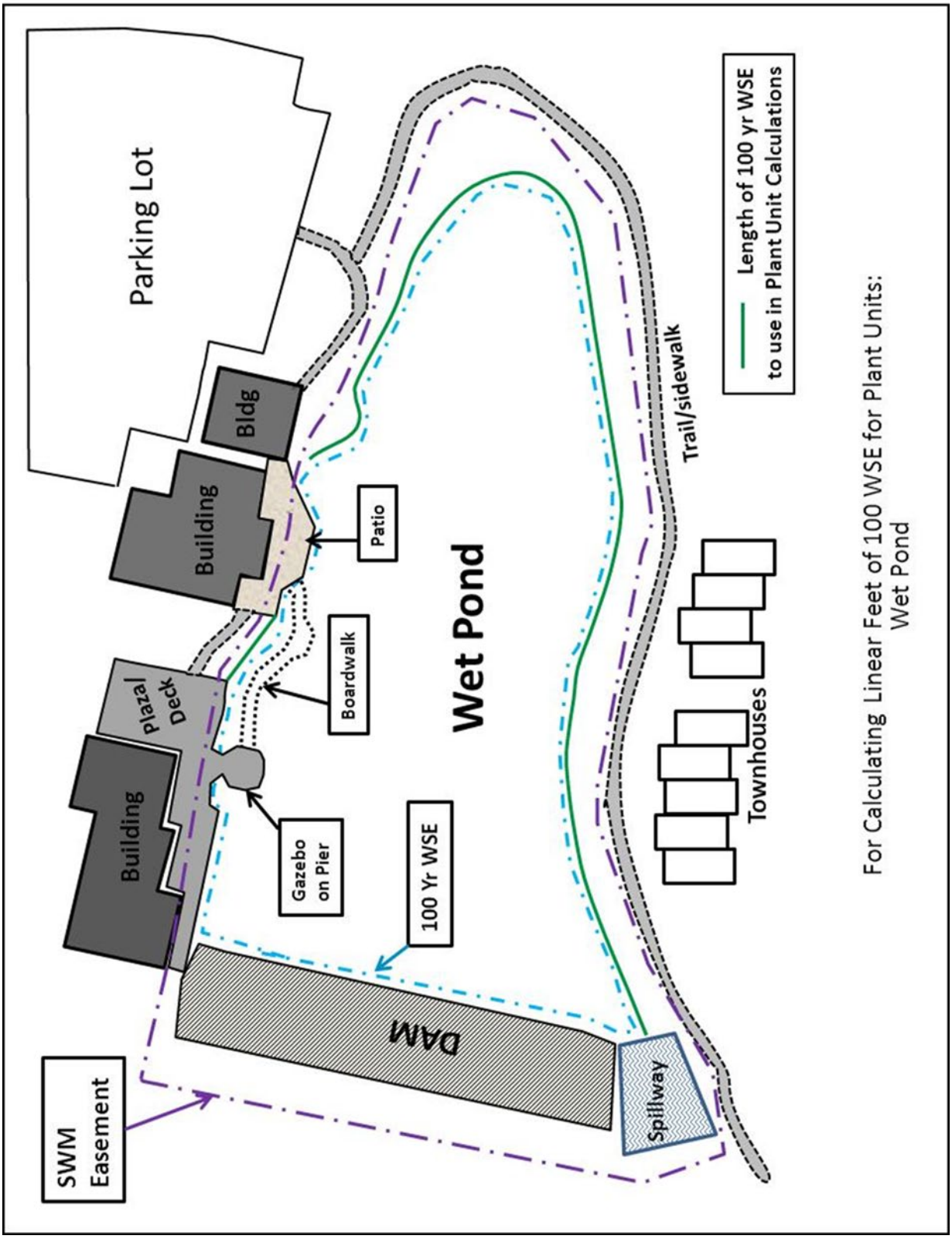
5) Total number of plant units provided*: _____

*Note: Plant units shall not include plantings for the aquatic bench.

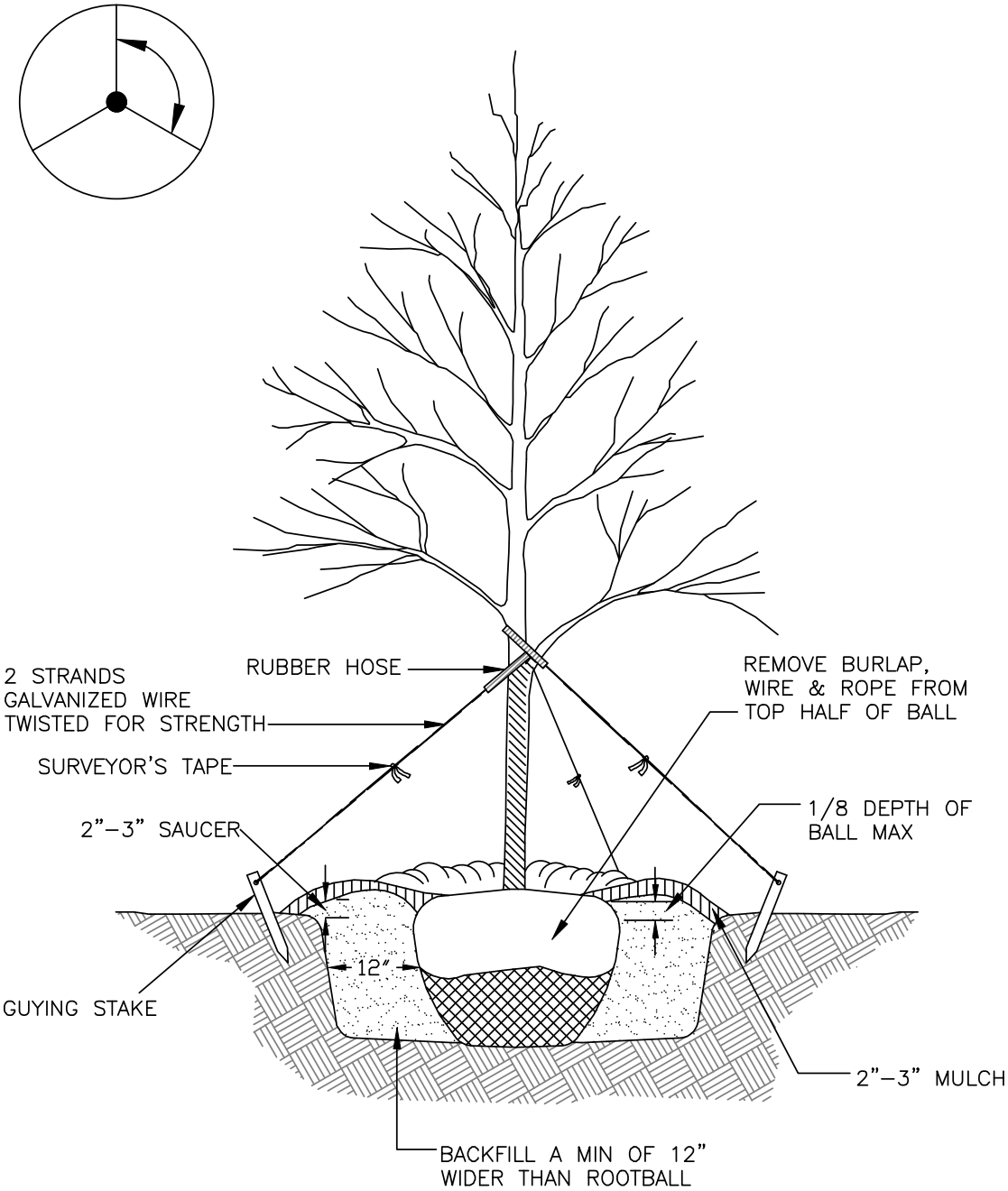
SCHEDULE J SHOPPING CENTER & SHOPPING MALL INTERIOR PLANTING
1) Total site impervious area: _____ (sf) 2) Interior planting area required (17%) _____ (sf) 3) Total number of plant units required: _____ 4) Plant units provided: Number of large deciduous trees: _____ x 10 p.u. = _____ p.u. Number of deciduous understory trees: _____ x 5 p.u. = _____ p.u (medium, small or compact) . Number of large evergreen trees: _____ x 10 p.u. = _____ p.u. Number of evergreen understory trees: _____ x 5 p.u. = _____ p.u. (medium, small or compact) Number of shrubs: _____ x 2 p.u. = _____ p.u. Number of ornamental grasses: _____ x 1 p.u. = _____ p.u. Number of perennials: _____ x 0.25 p.u. = _____ p.u. 5) Total number of plant units provided: _____

SCHEDULE K SHOPPING CENTER AND SHOPPING MALL BUILDING PERIMETER PLANTING AREA
1) Total perimeter of building footprint: _____ (lf) 2) Total number of plant units required: _____ 4) Plant units provided: Number of large deciduous trees: _____ x 10 p.u. = _____ p.u. Number of deciduous understory trees: _____ x 5 p.u. = _____ p.u (medium, small or compact) . Number of large evergreen trees: _____ x 10 p.u. = _____ p.u. Number of evergreen understory trees: _____ x 5 p.u. = _____ p.u. (medium, small or compact) Number of shrubs: _____ x 2 p.u. = _____ p.u. Number of ornamental grasses: _____ x 1 p.u. = _____ p.u. Number of perennials: _____ x 0.25 p.u. = _____ p.u. 5) Total number of plant units provided: _____

Exhibit 1


Parking Lot
Bldg
Building
Patio
Boardwalk
Plazal Deck
Building
Gazebo on Pier
100 Yr WSE
DAM
SWM Easement
Wet Pond
Trail/sidewalk
Spillway
Townhouses
Length of 100 yr WSE to use in Plant Unit Calculations
For Calculating Linear Feet of 100 WSE for Plant Units: Wet Pond

TYPICAL TREE GUYING DETAIL



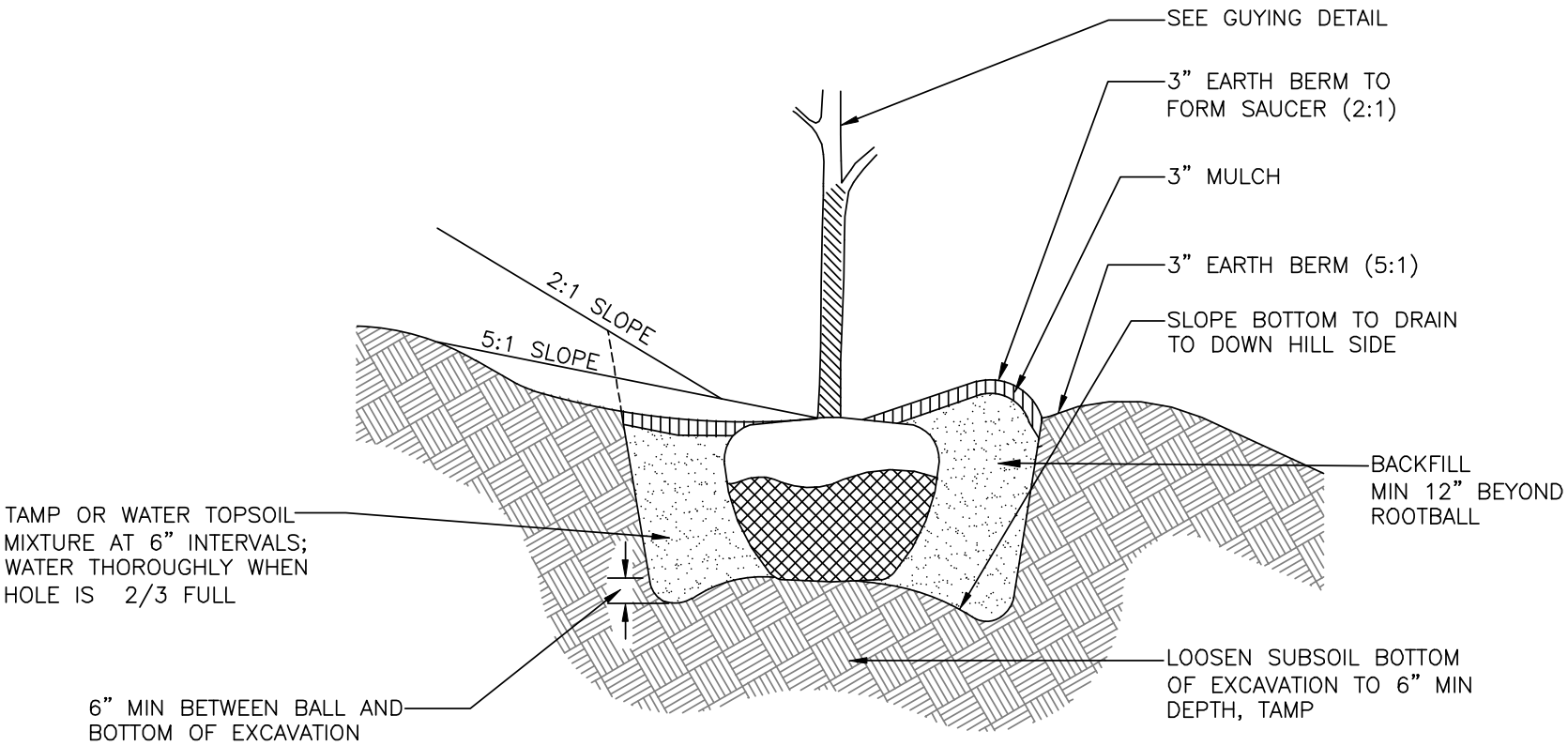
Date
7/15/14

TYPICAL TREE GUYING DETAIL

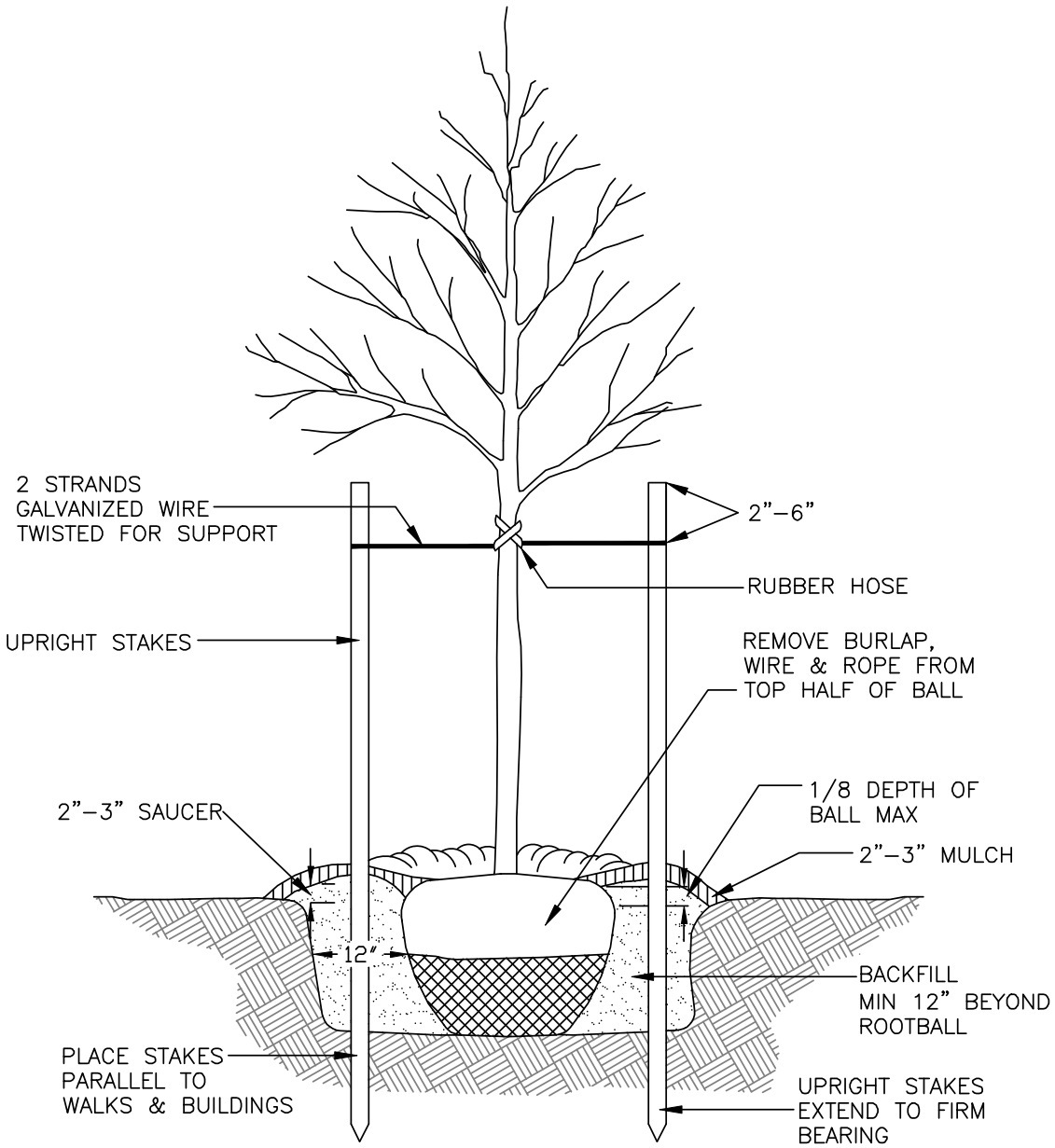
COUNTY OF
PRINCE WILLIAM
VIRGINIA

PLANTING
DETAIL

Detail No.
810.01



Detail No.	PLANTING DETAIL		COUNTY OF PRINCE WILLIAM VIRGINIA	SLOPE PLANTING	Date 7/15/14
810.02					



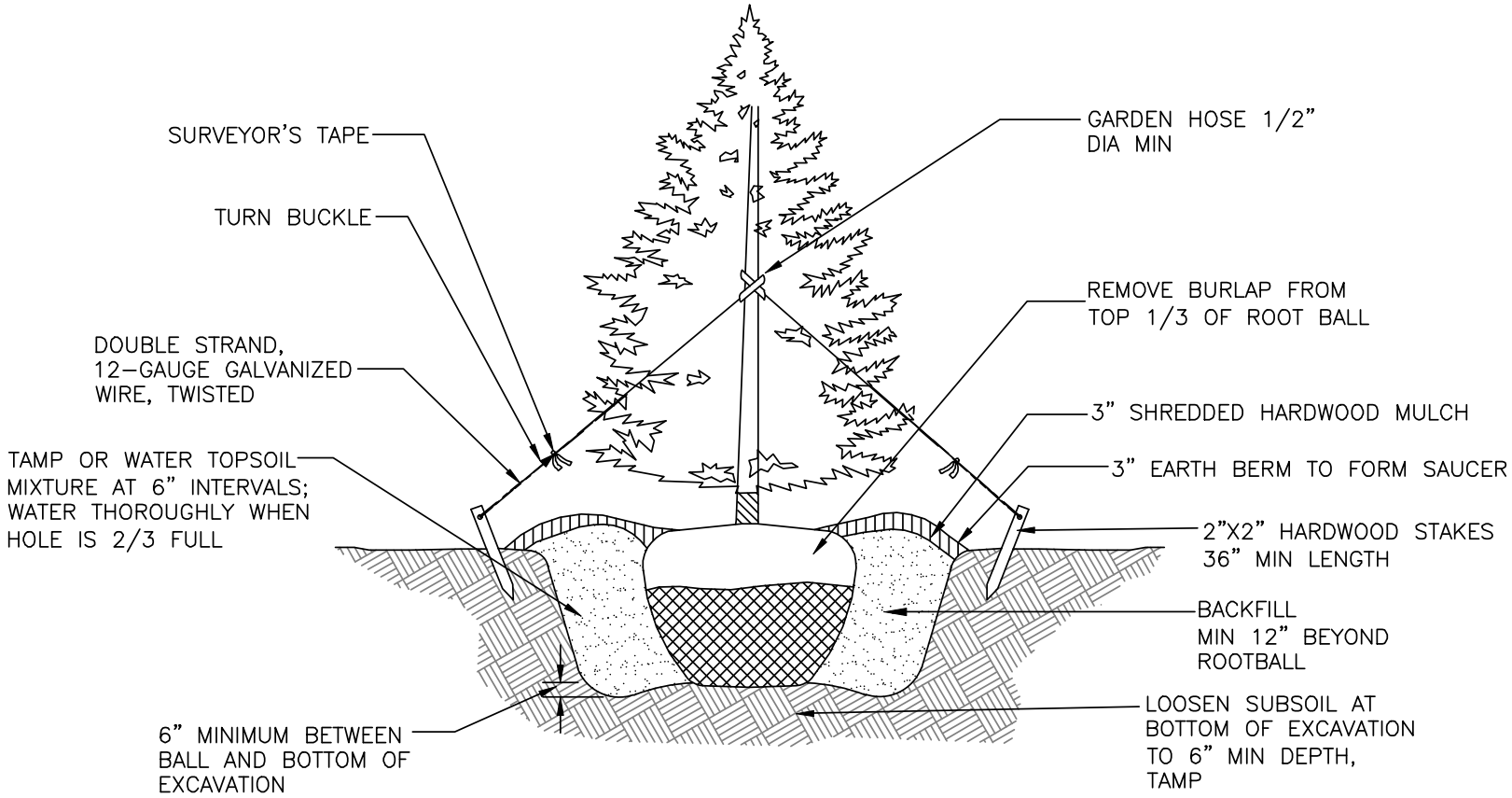
Date
7/15/14

TYPICAL UPRIGHT PLANTING
AND STAKING DETAIL

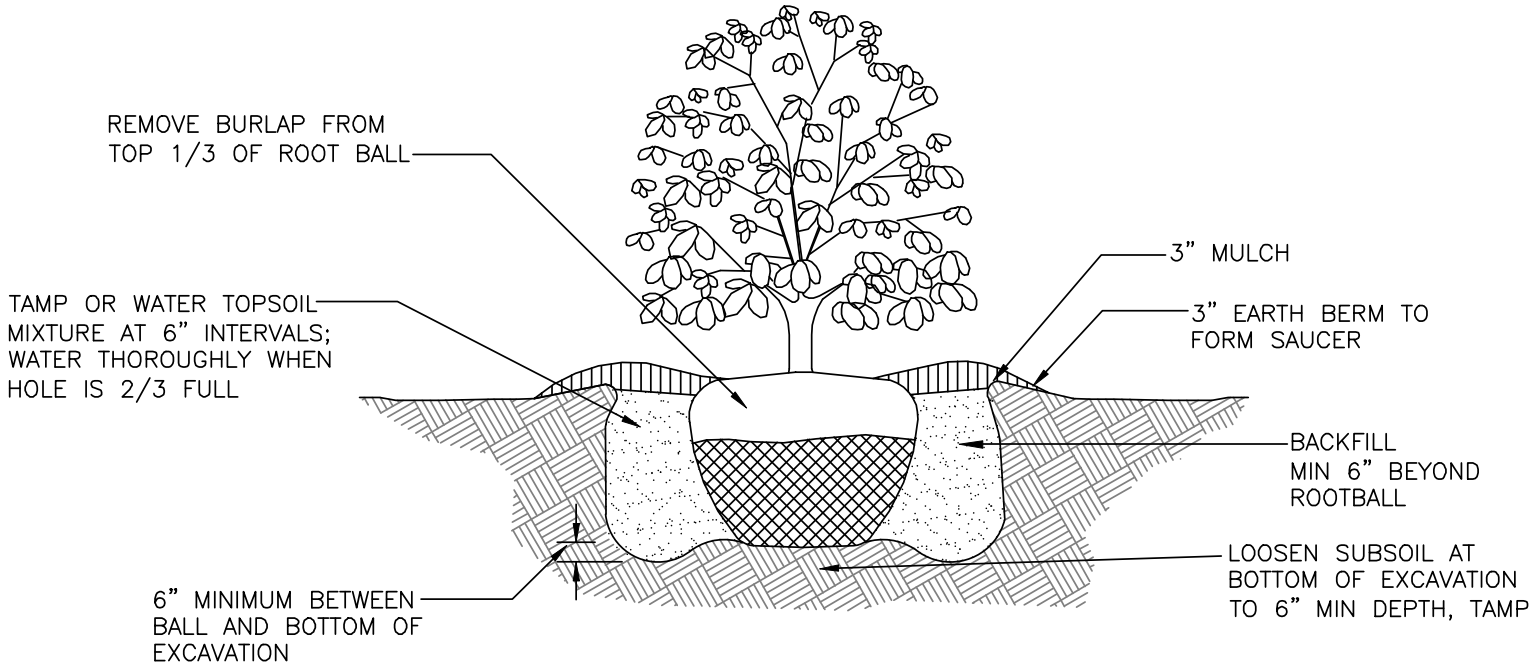
COUNTY OF
PRINCE WILLIAM
VIRGINIA

PLANTING
DETAIL

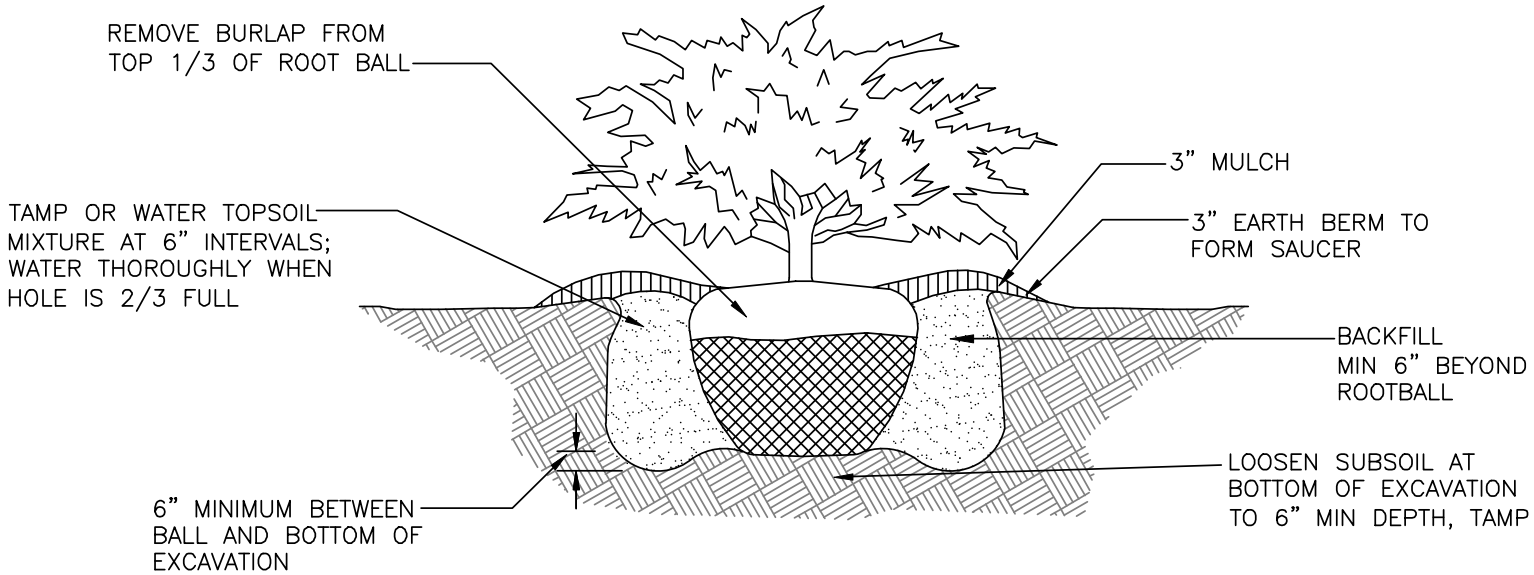
Detail No.
810.03



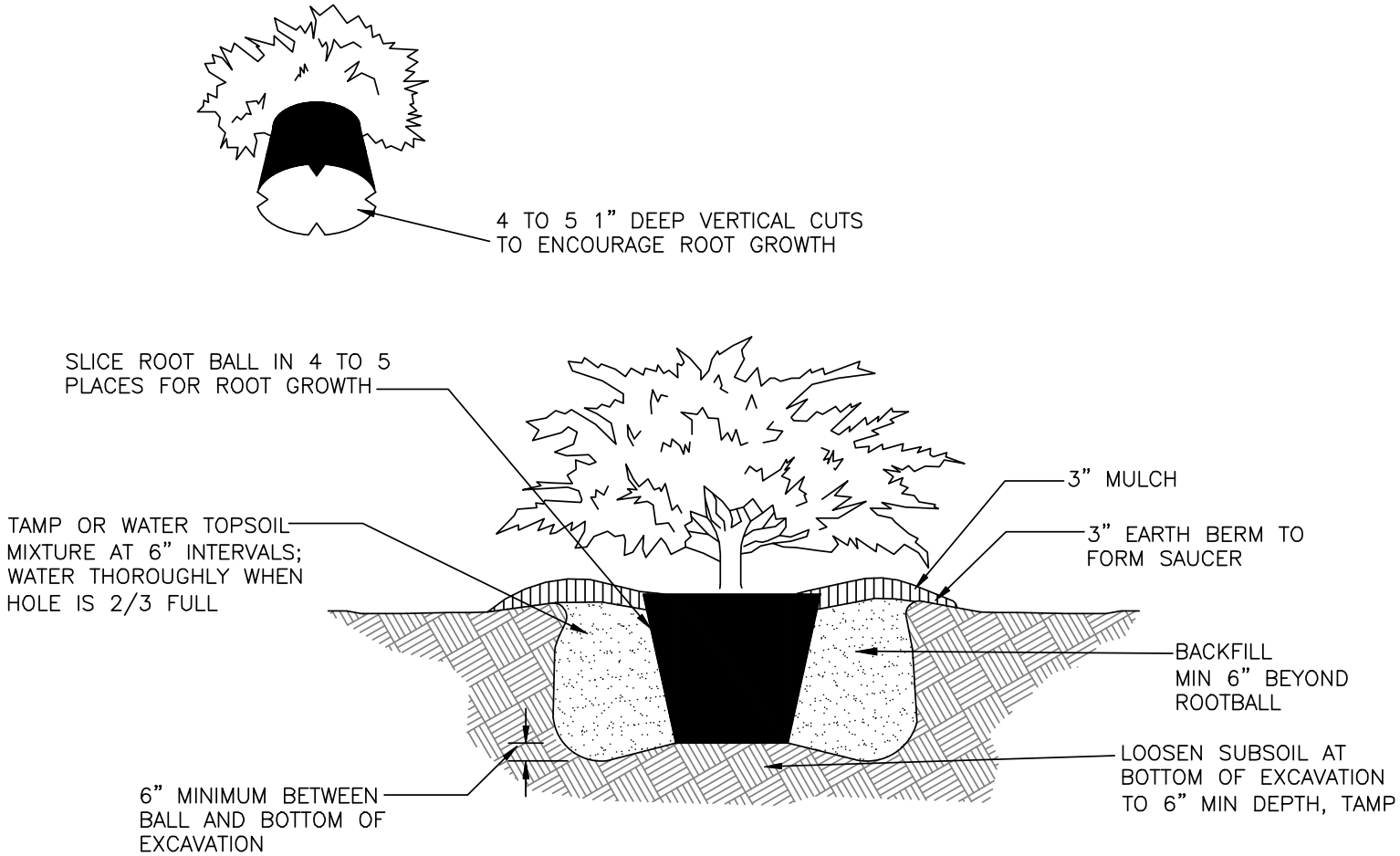
Detail No.					
810.04	PLANTING DETAIL		COUNTY OF PRINCE WILLIAM VIRGINIA	EVERGREEN TREE	Date 7/15/14



Detail No.	PLANTING DETAIL		COUNTY OF PRINCE WILLIAM VIRGINIA	DECIDUOUS SHRUB	Date 7/15/14
810.05					



Detail No.					
810.06	PLANTING DETAIL		COUNTY OF PRINCE WILLIAM VIRGINIA	EVERGREEN SHRUB	Date 7/15/14

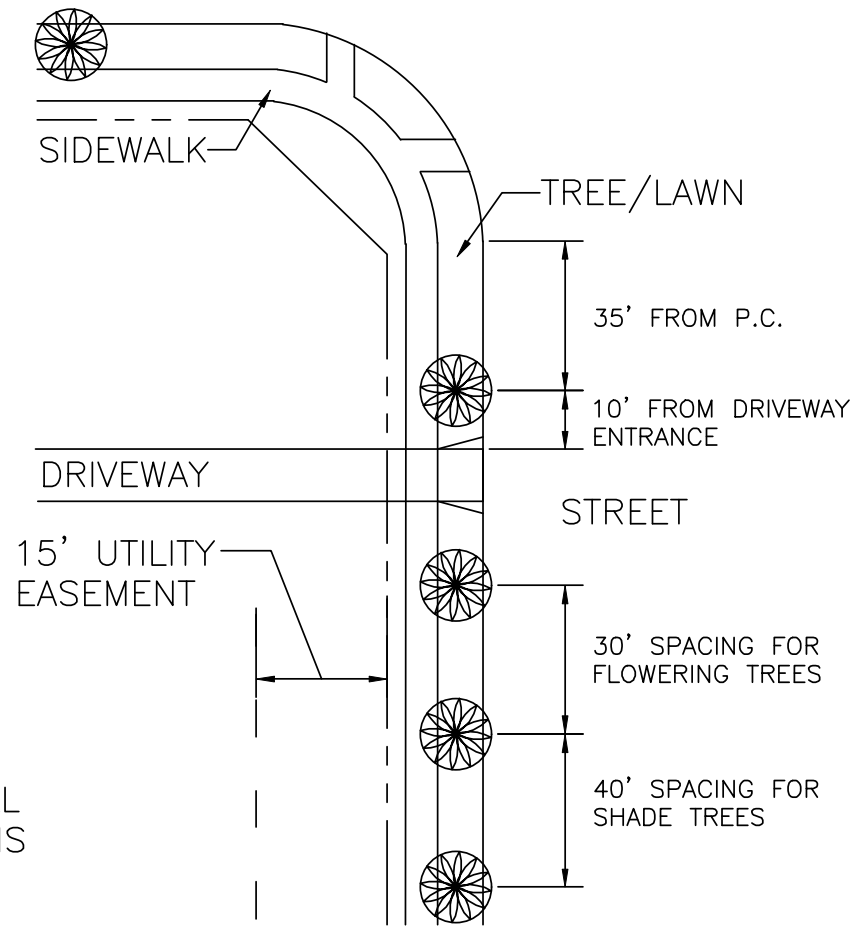


Detail No.	PLANTING DETAIL		COUNTY OF PRINCE WILLIAM VIRGINIA	CONTAINER SHRUB	Date 7/15/14
810.07					

NOTES:

TREES TO BE LOCATED AS FOLLOWS:

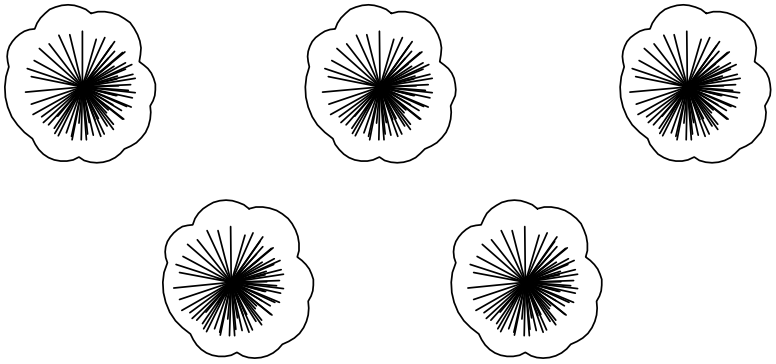
5' FROM WATER METER
5' FROM GAS BOX
5' FROM INLET OR MANHOLE
10' FROM FIRE HYDRANT
15' FROM LAMP POST



THE DIMENSIONS SHOWN HEREON ARE TYPICAL AND MAY BE MODIFIED IN SPECIFIC SITUATIONS BY THE DEPARTMENT OF PUBLIC WORKS.

Detail No.					
810.08	PLANTING DETAIL		COUNTY OF PRINCE WILLIAM VIRGINIA	STREET TREES WITH CURB AND GUTTER	Date 7/15/14

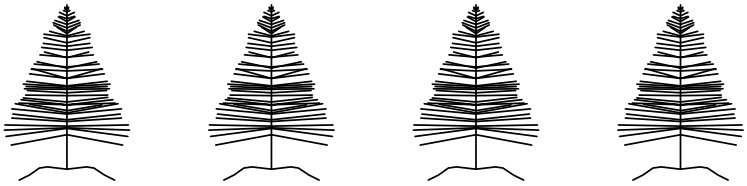
TOP VIEW OF PLANTINGS



Planting description – Random plantings of one or more of the following types of trees: Eastern Red Cedar, Loblolly Pine, Virginia Pine or White Pine. A minimum of 40 trees per acre shall be provided.		RATES		DATES		
		Per Acre	Per 1,000 sq.ft.	3/1 to 4/15	4/15 to 8/1	8/1 to 10/15
LOW MAINTENANCE GENERAL USE	Tall fescue 50% Ladino Clover 10% Red Clover 10% Korean lespedeza 15% Annual ryegrass 15%	50 lbs.	2 lbs.	X	(a,b) X	X
	Tall fescue 50% Sencea lespedeza 30% Annual ryegrass 20%	70 lbs.	1½ lbs.	X	(a) X	X
DROUGHT AREAS, SANDY SOILS	Tall fescue 50% Sencea lespedeza 20% Korean lespedeza 15% Annual ryegrass 15%	80 lbs.	2 lbs.	X	(a,b) X	X
POORLY DRAINED AREAS	Tall fescue 65% Korean lespedeza 20% Annual ryegrass 10% Redtop 5%	80 lbs.	2 lbs.	X	(a,b) X	X

a. After May 1, use 10 lbs./A German millet or 2 lbs./A weeping lovegrass is place of annual ryegrass.

b. After May 2, Korean lespedeza will not reseed itself. You may increase the amount of other legumes.



FRONT VIEW OF ULTIMATE GROWTH

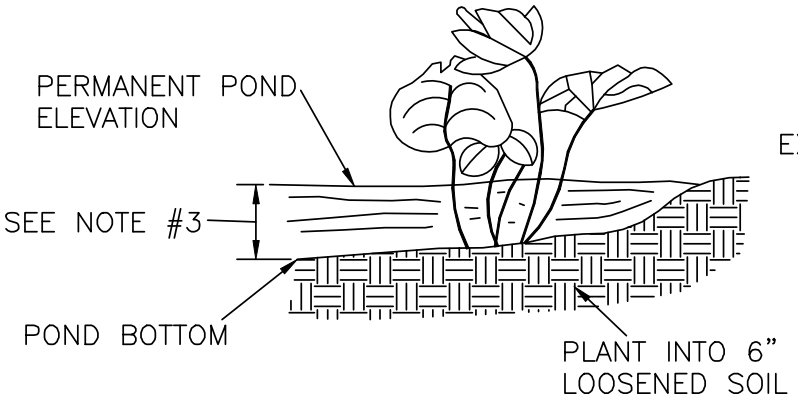
Date 7/15/14

REVEGETATED STANDAND

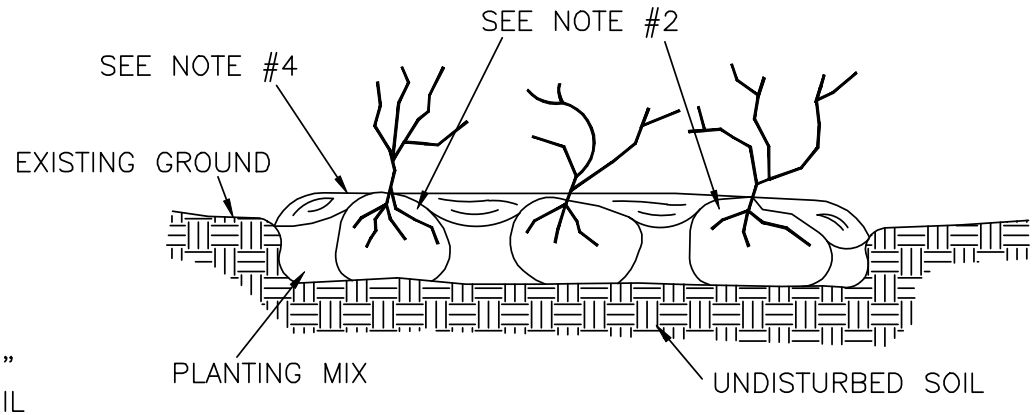
COUNTY OF PRINCE WILLIAM VIRGINIA

PLANTING DETAIL

Detail No. 810.09



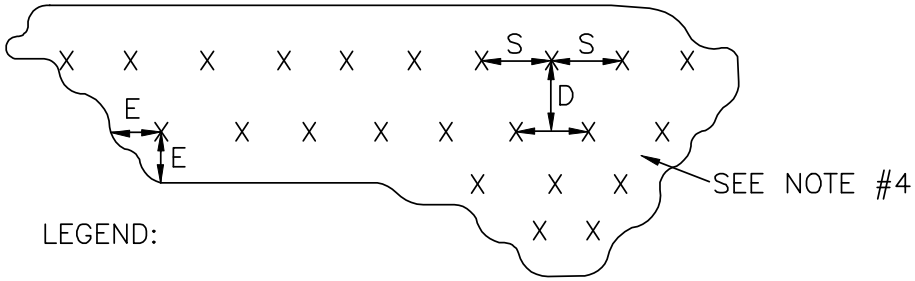
AQUATIC PLANTING DETAIL



SHRUB BED PLANTING DETAIL

NOTES:

1. SPADE EDGE PERIMETER OF BED.
2. TOP OF ROOT BALL SHALL BE 2" ABOVE THE EXISTING GRADE
3. PLANT DEPTH WILL VARY ACCORDING TO PLANT TYPE.
4. THE ENTIRE BED SHALL BE COVERED TO A DEPTH OF 3" WITH MULCH.



LEGEND:

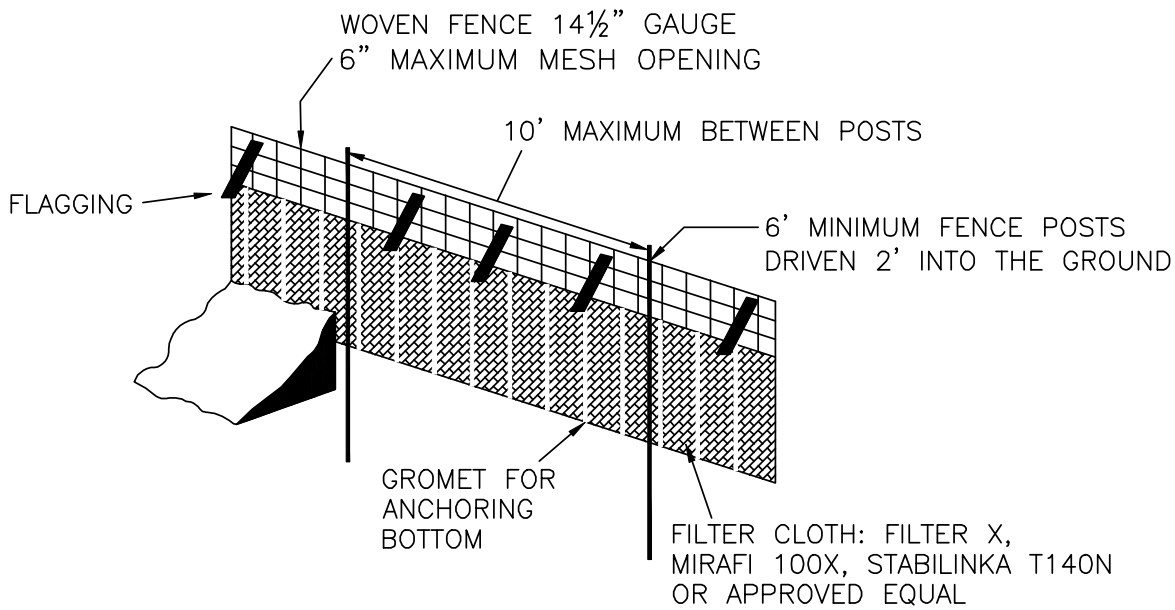
D = DISTANCE BETWEEN ROWS
S = PLANT SPACING IN ROWS
E = 1/2 S (TO EDGE OF BED)

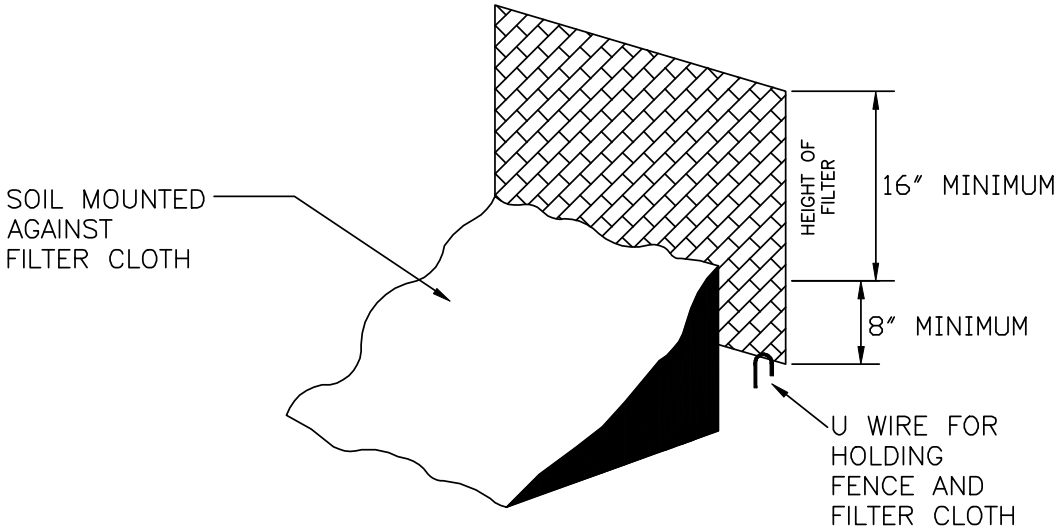
SHRUB & PERENNIAL BED DETAIL

Detail No.	PLANTING DETAIL		COUNTY OF PRINCE WILLIAM VIRGINIA	STORM WATER MANAGEMENT FACILITIES	Date 7/15/14
810.10					

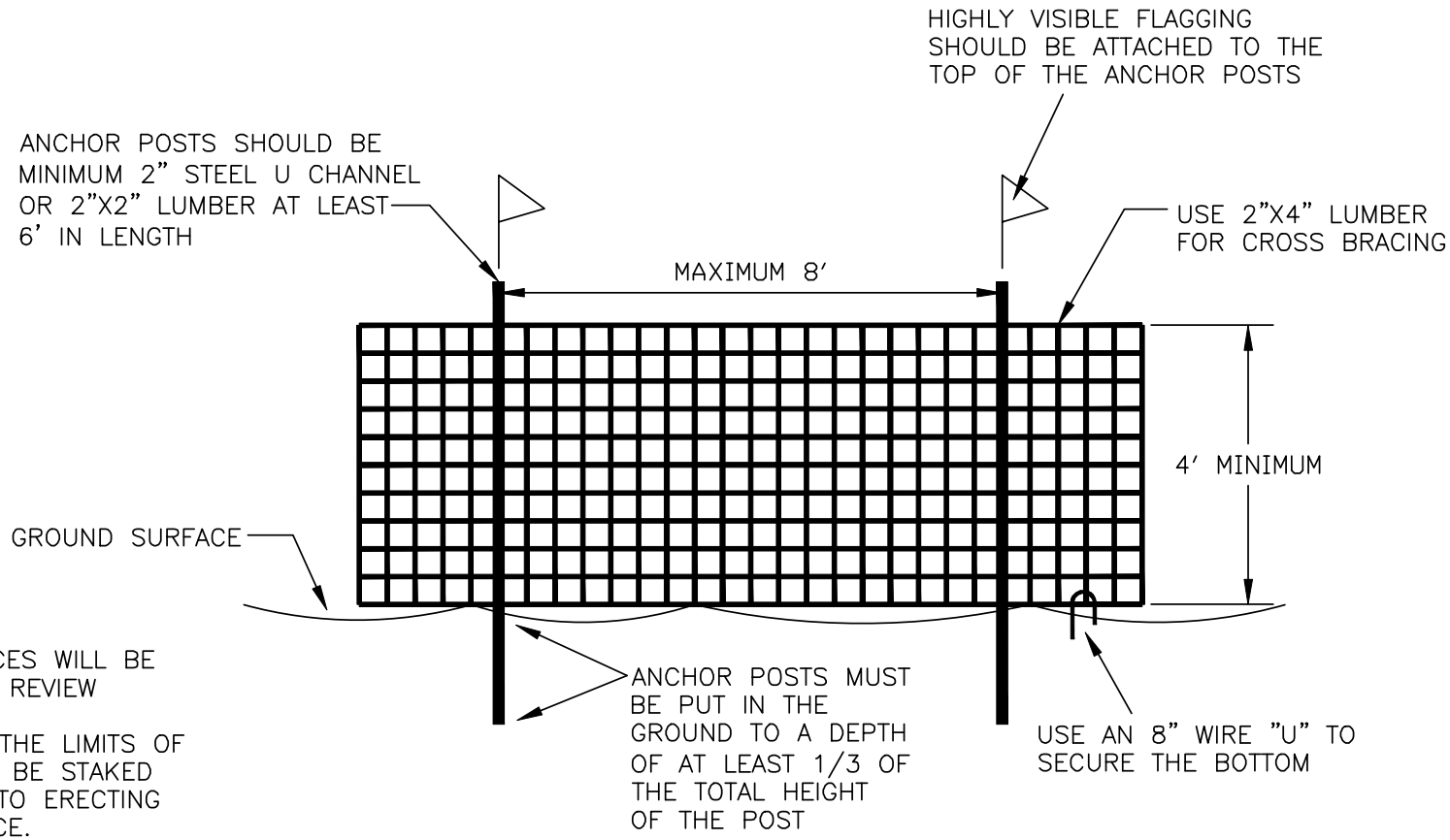
NOTES:

1. LIMITS OF DISTURBANCES WILL BE SET AS PART OF THE REVIEW PROCESS.
2. THE BOUNDARIES OF THE LIMITS OF DISTURBANCE SHOULD BE STAKED AND FLAGGED PRIOR TO ERECTING THE PROTECTIVE DEVICE.
3. ANCHOR POSTS SHOULD BE PLACED TO AVOID SEVERING OR DAMAGING LARGE TREE ROOTS.
4. FENCING MATERIAL SHOULD BE FASTENED SECURELY TO THE ANCHOR POSTS.





Detail No.	TEMPORARY TREE PROTECTION DEVICE		COUNTY OF PRINCE WILLIAM VIRGINIA	WOVEN WIRE FENCE WITH FILTER CLOTH	Date 7/15/14
810.11					



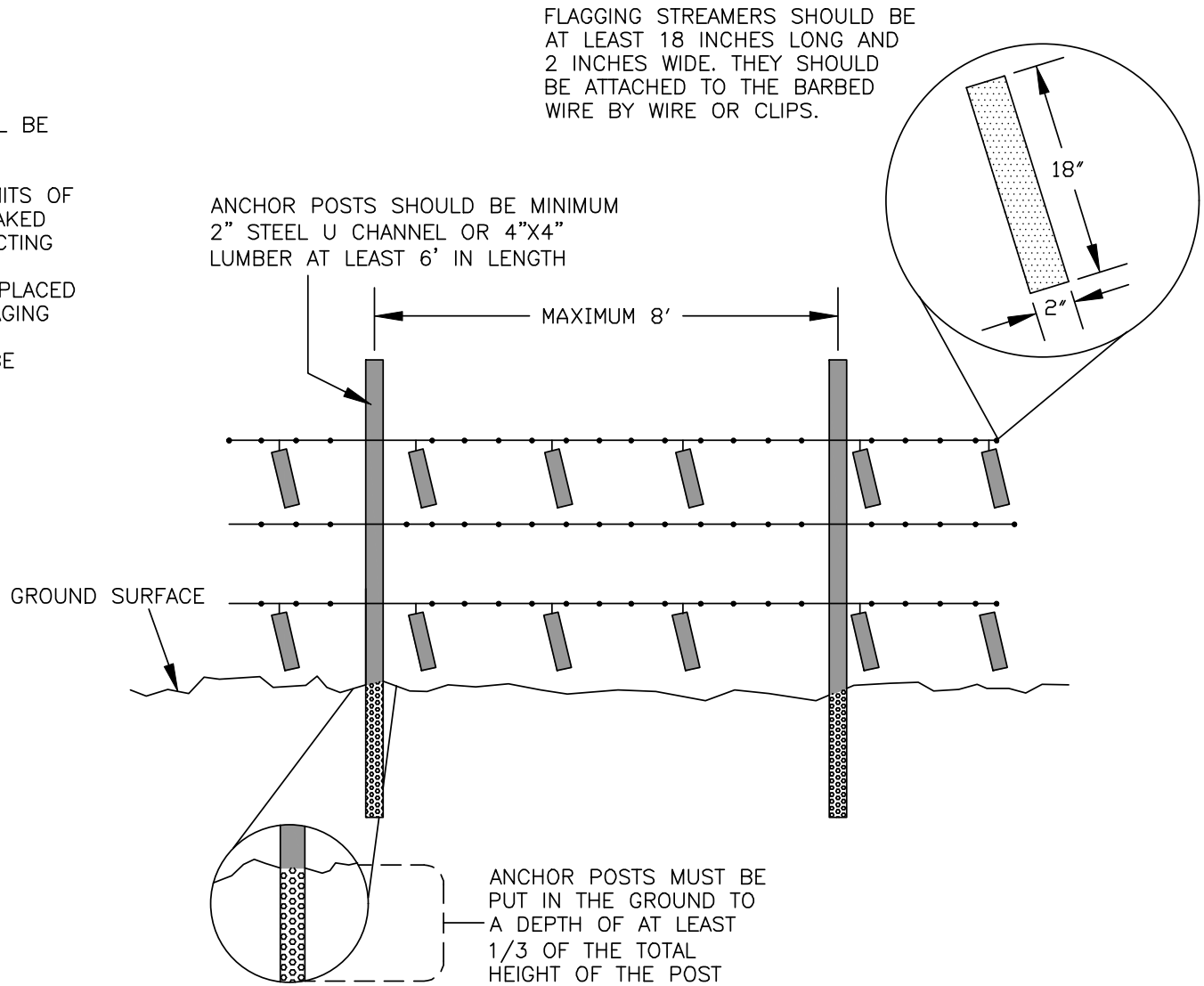
NOTES:

1. LIMITS OF DISTURBANCES WILL BE SET AS PART OF THE REVIEW PROCESS.
2. THE BOUNDARIES OF THE LIMITS OF DISTURBANCE SHOULD BE STAKED AND FLAGGED PRIOR TO ERECTING THE PROTECTIVE DEVICE.
3. ANCHOR POSTS SHOULD BE PLACED TO AVOID SEVERING OR DAMAGING LARGE TREE ROOTS.
4. FENCING MATERIAL SHOULD BE FASTENED SECURELY TO THE ANCHOR POSTS.

Detail No.	TEMPORARY TREE PROTECTION DEVICE		COUNTY OF PRINCE WILLIAM VIRGINIA	BLAZE ORANGE PLASTIC MESH	
810.12					Date 7/15/14

NOTES:

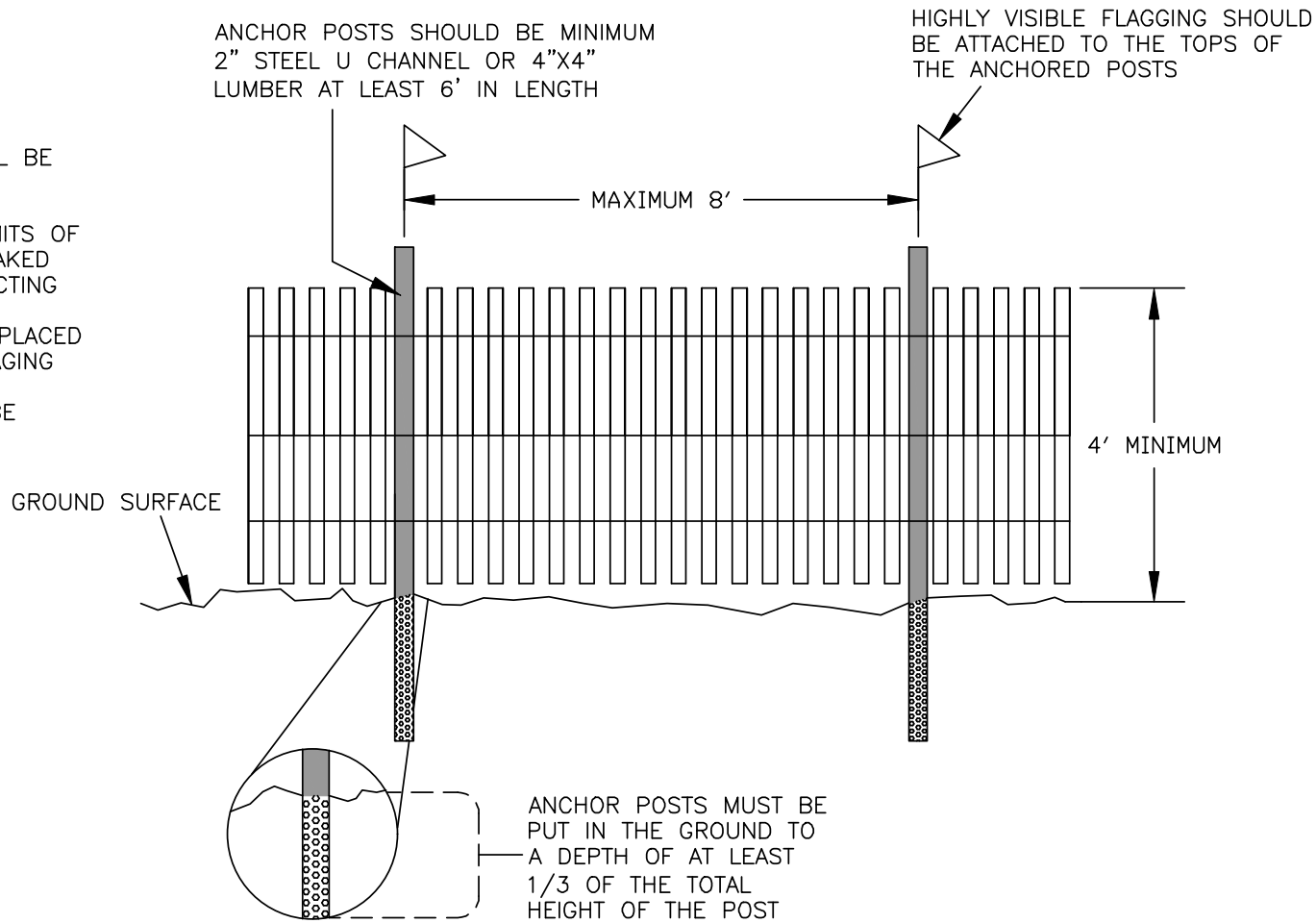
1. LIMITS OF DISTURBANCES WILL BE SET AS PART OF THE REVIEW PROCESS.
2. THE BOUNDARIES OF THE LIMITS OF DISTURBANCE SHOULD BE STAKED AND FLAGGED PRIOR TO ERECTING THE PROTECTIVE DEVICE.
3. ANCHOR POSTS SHOULD BE PLACED TO AVOID SEVERING OR DAMAGING LARGE TREE ROOTS.
4. FENCING MATERIAL SHOULD BE FASTENED SECURELY TO THE ANCHOR POSTS.



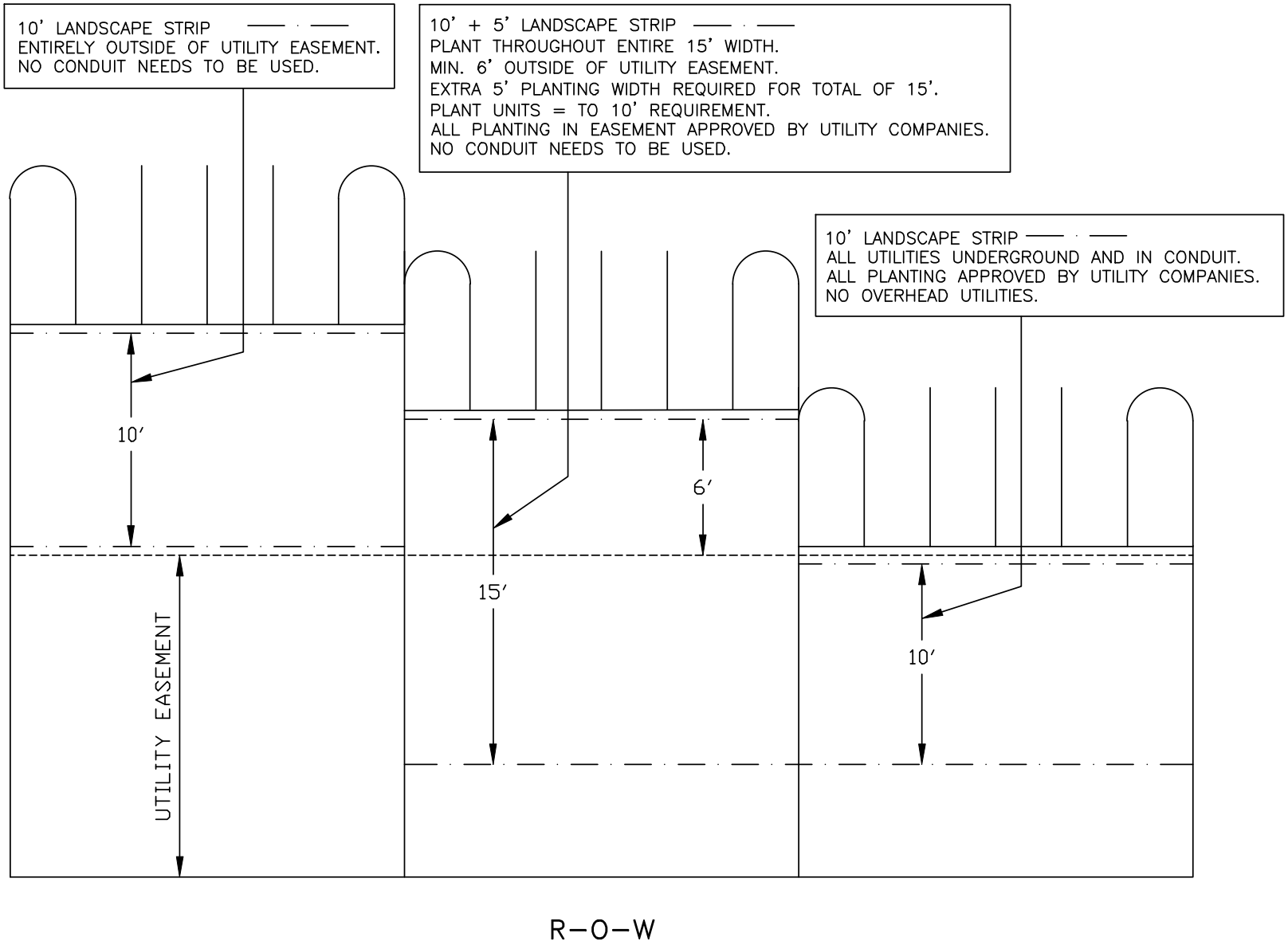
Detail No.	TEMPORARY TREE PROTECTION DEVICE		COUNTY OF PRINCE WILLIAM VIRGINIA	THREE STRAND BARBED WIRE FENCE	
810.13					Date 7/15/14

NOTES:

1. LIMITS OF DISTURBANCES WILL BE SET AS PART OF THE REVIEW PROCESS.
2. THE BOUNDARIES OF THE LIMITS OF DISTURBANCE SHOULD BE STAKED AND FLAGGED PRIOR TO ERECTING THE PROTECTIVE DEVICE.
3. ANCHOR POSTS SHOULD BE PLACED TO AVOID SEVERING OR DAMAGING LARGE TREE ROOTS.
4. FENCING MATERIAL SHOULD BE FASTENED SECURELY TO THE ANCHOR POSTS.



Detail No.	TEMPORARY TREE PROTECTION DEVICE		COUNTY OF PRINCE WILLIAM VIRGINIA	SNOW FENCE	Date 7/15/14
810.14					



Detail No.			COUNTY OF PRINCE WILLIAM VIRGINIA	10' LANDSCAPE STRIP & UTILITY EASEMENTS	
810.15					Date 7/15/14

LANDSCAPING - PLANT SELECTION AND COVER GUIDES

I. Plant Selection and Cover Guides for Buffer Areas, Basic Landscaping, Street Planting, and Reforestation Areas:

The plant selection guides to be utilized by persons preparing landscape plans for buffer areas, basic landscaping, street planting, and reforestation areas are found in Tables I-2-T (trees), I-2-S (shrubs), I-2-P (perennials), and I-2-G (grasses). The following is an explanation of the columns and codes contained therein:

A. Tree Categories/Tree Canopy Coverage -- Table I-2-T is divided into categories of trees (i.e., large, medium, small, and compact) for purposes of calculating tree canopy coverage. The category each tree is placed in is determined by the projected size of the tree's canopy spread.

B. Botanical Name, Common Name -- The first column contains the Latin name and the common name for the plant.

C. Projected 10-Year Tree Cover -- These three columns in Table I-2-T list the area of tree canopy coverage in square feet for each species. The canopy area is determined by the size of a tree at planting related to the projected size of the tree's canopy after 10 years of growth in an urban environment. Also note that the tree cover credit is based on the area of the projected canopy for the species. If cultivars or varieties, which vary significantly from the species, are used then applying canopy credit consistent with the characteristics of the cultivar or variety may be required. For example, if a narrow columnar cultivar of red maple is proposed, then the canopy credit for that selection would be chosen from the compact deciduous category.

D. Uses -- This column is used to select a species which will thrive and exhibit desirable characteristics suitable to the demands of a particular environment. Five situations are considered in Table I-1 as follows:

1. Interior Parking Lot Planting Areas -- Trees indicated as (P) tolerate poor soils, drought, reflected heat, and restricted root zones. They are, therefore, acceptable for use as interior parking lot landscaping. Desirable branching habit is also considered. Trees and shrubs indicated as (CP) have the same tolerances but are not shade trees. They are suitable as complimentary to parking lot landscaping.

2. Native –Plants indicated as (N) are native to Virginia. They are intended for use in basic landscaping but particularly for use in buffers. Buffers are open spaces which are intended to provide screening of undesirable views, which usually will become naturalized over time. Both deciduous and evergreen species are listed; a combination of both is needed for an effective buffer.

3. Street Planting Areas -- Trees indicated as (SS, MS or LS) are appropriate for planting within a streetscape and have been selected based on their form, potential spread, overall size, and tolerance of urban conditions.

4. Reforestation Areas -- Trees indicated as (RF) are appropriate for planting in areas which are to be reforested.

5. Areas near or under overhead utilities -- Trees indicated as (U) are appropriate for planting near or under overhead utilities and have been selected based on their ultimate height and spread. Use of the selected species can prevent disfigurement and associated structural and health problems caused by periodic topping or pruning of trees near power lines. Virginia Power and NOVEC have available lists of trees suitable for planting under or near overhead utility lines.

6. Rain Gardens – Plants indicated as (RG) are suitable for planting in rain gardens (aka bio-retention facilities). They may also be suitable for other low impact development features. Consideration of water retention/detention rates needs to be made before selecting a particular species.

E. Environmental Tolerances -- This column is used to select species that are tolerant of specific environmental factors, both natural and man-made. Nine factors are considered, as follows:

1. Restricted Root Zone –Plants indicated as (RZ) are recommended for areas which are relatively limited in soil volume and surrounded by impervious barriers typical of parking lot islands and planting strips provided between parking bays and between sidewalks and curbs. A larger planting space will result in a more healthy and vigorous tree.

2. Poor Soil –Plants indicated as (SL) are recommended for soil conditions which are poor. These trees are noted for their tolerance to a wide range of soils found in an urban environment. Most trees, however, do not tolerate poor soils. Better soils will result in a more healthy and vigorous tree. Subsoils used to provide a stable base for sidewalks, parking lots, buildings, etc. and general grading purposes are often found to be inadequate for plant growth. Soil amendments are generally needed.

3. Partial Shade –Plants indicated as (PS) are recommended for areas receiving partial amounts of direct sunlight such as on the eastern or western boundary of a structure.

4. Shade -- Trees indicated as (SH) are recommended for a shaded environment.

5. Air Pollution -- Plants indicated as (AP) are recommended for areas subject to exhaust emissions, as found along a highway or in a parking lot with excessive stop and go traffic. Deciduous trees are more tolerant of air pollution than evergreen trees.

6. Deicing Salts –Plants indicated as (IS) are recommended for areas near streets and parking lots where deicing salts containing sodium chloride and/or calcium chloride are used.

7. Wet Soil –Plants indicated as (WS) are recommended for areas near waterways, ponds, lakes, and storm water management facilities.

8. Drought – Plants indicated as (DR) are recommended for hot, dry conditions, such as along streets, near or in parking lots, and near buildings.

F. Associated Problems -- This column is used to identify general problems associated with specific tree species. Five problem codes are provided: disease, insect damage, storm and structural damage, due to weak wood, production of objectionable fruit, and production of objectionable root systems.

1. Disease -- Trees indicated as (D) are susceptible to severe stress, disfigurement, or death brought about by disease-causing agents which produce symptoms not curable or controllable by known or practical methods. Some of these species are susceptible to one or more pathogens.

2. Insect Damage -- Trees indicated as (I) are susceptible to damage by insects. Considerable damage, such as defoliation and sometimes death, can result. Pests causing such damage cannot be effectively controlled without considerable maintenance with pesticides.

3. Storm and Structural Damage Due to Weak Wood -- Trees indicated as (W) are susceptible to structural failure, such as branches breaking and falling or major portions of the main trunk snapping off during storms. These species should not be planted near buildings.

4. Objectionable Fruit: -- Trees indicated as (F) produce fruit that is capable of causing damage when falling, is slick or sticky on roads and walkways, attracts pests, produces disagreeable odors, and/or produces prolific seedlings.

5. Objectionable Root Systems: -- Trees indicated as (R) produce shallow or surface oriented root systems that may heave sidewalks and asphalt surfaces, clog sewer and drainage pipes, or damage foundations, if planted too close to buildings.

6. Transplanting Difficulty: -- Trees indicated as (T) produce deep root systems which are difficult to retain in transplanting.

Table I-1 provides a listing of the codes found in the plant selection guide.

II. Plant Selection Guide for Storm Water Management Facilities:

Table II contains plants which are suitable for planting in storm water management facilities. Like Table I, genus and species as well as common names are listed, followed by columns of three variables – wildlife value, wetland indicator status, and environmental tolerances/comments adaptation to wetland growing conditions, and tolerance to periodic flooding. The variables are provided to assist persons designing landscapes for storm water management facilities in Prince William County.

A. Table II divides the listing of trees into groups (i.e., large, medium, and small) for purposes of calculating tree canopy coverage. Refer to Table I-2-T for corresponding coverage square footage.

B. Wildlife Values -- This column of Table II provides wildlife values, given as high, moderate, and low and are intended to assist those designing storm water facilities for promoting or managing wildlife.

C. Wetland Status -- This column in Table II provides wetland indicators taken from the National List of Plant Species That Occur in Wetlands: Northeast (Region I). USDI/Fish and Wildlife Service, 1988. These indicators may be used as a guide to the adaptability of various species to various prevailing soil moisture conditions. The categories are defined as follows:

1. Obligate Wetland (OBL) -- Occurs almost always occurs in wetlands (estimated at 99 percent probability) under natural conditions.

2. Facultative Wetland (FACW) -- Usually occurs in wetlands (estimated probability 67 to 99 percent), but occasionally found in non-wetland areas.

3. Facultative Upland (FACU) -- Usually occurs in non-wetlands (estimated probability 67 to 99 percent), but occasionally found in wetlands (estimated probability 1 to 33 percent).

4. Obligate Upland (UPL) -- Occurs in wetlands in another region, but occurs almost always (estimated probability greater than 99 percent) in non-wetlands in this region under natural conditions.

5. A plus or minus sign indicates if the species is usually found in the wetter (+) or drier (-) end of its category.

D. Flood Tolerance -- This column in Table II refers to the ability of a plant to survive periodic flooding. While this is shown as yes or no, these are not absolutes. Actual plant survival will also depend on such variables as the amount of soil loss around roots and the amount of silt deposited over the root zone during the storm event.

III. Tree Preservation Plan Requirements

A tree preservation plan shall be submitted as part of either the preliminary or site/subdivision plan. The tree survey shall be submitted in plan format. The narrative may be submitted in either a plan or booklet format. At a minimum, a tree preservation plan shall include the following elements:

A. A tree survey which describes the location, species, size (dbh), accurate dripline and condition of all existing trees 12" or greater in diameter at breast height, that are located within

20' outside or 10' inside of the limits of clearing and grading. The condition analysis shall be prepared by a certified arborist using the eighth edition of The Guide for Plant Appraisal.

B. A tree preservation narrative, which at a minimum includes the following:

1. Preconstruction treatments including crown pruning and root pruning (may also include protective fencing, etc.).

2. Clearing operation measures (e.g., felling techniques, stump removal).

3. Active project, ongoing measures including tree protection, erosion controls and mulching (may also include watering, etc.).

4. Project completion work including crown pruning, soil inoculation, and aeration (may also include removals, vertical mulching, fertilization, watering, etc.).

5. Any proposed transplanting, including a description of the transplanting operation.

TABLE I-1 PLANT SELECTION GUIDE CODES	
Uses	**Codes**
Interior parking lot planting trees	P
Complimentary Interior Parking Lot Planting	CP
Native	N
Street Tree Categories Large Street Tree Medium Street Tree Small Street Tree	 LS MS SS
Areas near overhead utilities	U
Rain Gardens	RG
Environmental Tolerances	
Restricted root zone	RZ
Poor soils	SL
Partial shade	PS
Shade	SH
Air pollution	AP
Deicing salts	IS
Wet soils	WS
Drought	DR
Associated Problems	
Disease	D
Insect damage	I
Weak wood	W
Objectionable fruit	F
Objectionable root systems	R
Transplanting Difficulty	T
Non-native Invasive	NI

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME **COMMON NAME**	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		1”	**2”**	**3”**			
COMPACT DECIDUOUS TREES							
Acer palmatum **Japanese Maple**		40	50	75	U, RG	SH, PS	
Cornus kousa **Kousa Dogwood**		40	50	75	SS, U, CP, RG	PS	
Cornus mas **Corneliancherry Dogwood**		40	50	75	U, RG	PS	
Cotinus obovatus **American Smoketree**		40	50	75	N, RG		
Ilex vomitoria **Yaupon Holly**		40	50	75	N, RG	PS, DR, WS	
Lagerstromia indica **Crape Myrtle**		40	50	75	RG, CP, SS, U	SL	
Magnolia stellata **Star Magnolia**		40	50	75	U, RG	AP	
Malus spp. **Crabapples**		40	50	75	U	AP, DR	F, D, I
Ostrya virginiana **Hophornbeam**		40	50	75	N, MS, RG		T
Oxydendrum arboreum **Sourwood**		40	50	75	N, RG	PS	T
Prunus cerasifera **Flowering Plum**		40	50	75	RG, U	AP	D, I
Sorbus alnifolia **Korean Mountainash**		40	50	75		AP, WS	
Stewartia koreana **Korean Stewartia**		40	50	75	U		
Stewartia ovata **Mountain Stewartia**		40	50	75	RG, U		

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		1”	**2”**	**3”**			
Stewartia pseudocamellia **Japanese Stewartia**		40	50	75	RG, U		
Styrax japonicus **Japanese Snowbell**		40	50	75	RG, U	PS	
Syringa reticulata **Japanese Tree Lilac**		40	50	75	U, SS	PS	D, I
SMALL DECIDUOUS TREES							
Acer griseum **Paperbark Maple**		75	100	125	SS, CP, RG	PS	
Acer buergeranum **Trident Maple**		75	100	125	SS, CP		
Acer ginnala **Amur Maple**		75	100	125	RG, SS, U, CP	PS	
Amelanchier arborea **Downey Serviceberry**		75	100	125	N,U, RG	PS, WS, SH	I
Amelanchier laevis **Allegheny Serviceberry**		75	100	125	N	PS	
Asimina triloba **Paw Paw**		75	100	125	RG, N	WS	T
Carpinus caroliniana **American Hornbeam**		75	100	125	N, RG	WS, PS, SH	T, D
Cercis canadensis **Redbud**		75	100	125	N,U, RG	SL, DR, SH, PS	D
Chionanthus virginicus **Fringetree**		75	100	125	RG, N,U	PS	
Cornus alternifolia **Pagoda Dogwood**		75	100	125	N		T, D
Cornus florida **Flowering Dogwood**		75	100	125	N,U, RG	PS, SH	D, I
Crataegus crus-gali ‘inermis’ **Thornless Cockspur Hawthorn**		75	100	125	SS, CP		

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		1”	**2”**	**3”**			
Crataegus phaenopyrum **Washington Hawthorn**		75	100	125	N, U	SL, DR	D
Crataegus viridus ‘Winter King’ **‘Winter King Hawthorn**		75	100	125	CP, SS, RG	DR	
Cyrilla racemiflora **Swamp Cyrilla**		75	100	125	N		
Euonymus atropurpureus **Eastern Wahoo**		75	100	125	N, RG		
Franklin alatamaha **Franklinia**		75	100	125	N, RG	PS	T
Halesia carolina (H. tetraptera) **Carolina Silverbell**		75	100	125	N, RG	PS, SH	
Halesia diptera **Two-winged Silverbell**		75	100	125	N		
Japanese Crape Myrtle **Lagerstroemia fauriei**		75	100	125	SS		
Magnolia soulangiana **Saucer Magnolia**		75	100	125	RG, MS	AP	
Magnolia virginiana **Sweetbay Magnolia**		75	100	125	N,U, RG	WS, PS	
Parrotia persica **Persian Parrotia**		75	100	125	SS, CP		
Prunus x incam ‘Okame’ **Okame Cherry**		75	100	125	U,CP		D, I
Prunus sargentii **Sargent Cherry**		75	100	125	CP, MS		
Prunus virginiana **Choke Cherry**		75	100	125	N		D, I

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		1”	**2”**	**3”**			
Quercus marilandica **Blackjack Oak**		75	100	125	N		T
Quercus myrsinifolia **Chinese Evergreen Oak**		75	100	125	CP, SS		
Rhamnus caroliniana **Carolina Buckthorn**		75	100	125	N		
Sassafras albidum **Sassafras**		75	100	125	N, RG	S, PS, W	T
MEDIUM DECIDUOUS TREES							
Acer campestre **Hedge Maple**		125	150	175	RG, MS, U, CP	AP, DR	
Aesculus flava **Yellow Horsechestnut**		125	150	175	N, MS		
Aesculus hippocastanum **Horsechestnut**		125	150	175	RZ, SL, IS	D, I	
Betula lenta **Black Birch**		125	150	175	N, RG	WS	
Betula nigra **River Birch**		125	150	175	M, CP, MS, RG	WS	
Carpinus betulus **European Hornbeam**		125	150	175	MS, CP, S	SL, AP, PS	
Carya cordiformis **Bitternut Hickory**		125	150	175	N		T
Carya glabra **Pignut Hickory**		125	150	175	N		T
Carya laciniosa **Shellbark Hickory**		125	150	175	N		T
Carya ovata **Shagbark Hickory**		25	150	175	N		T
Carya tomentosa **Mockernut Hickory**		125	150	175	N		T

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		1”	**2”**	**3”**			
Castanea mollissima **Chinese Chestnut**		125	150	175			F, D
Celtis occidentalis **Hackberry**		125	150	175	N, MS, P, RG	WS, DR	
Cercidiphyllum japonicum **Katsura Tree**		125	150	175	MS, RG	PS	T
Cladrastis kentuckea **Yellowwood**		125	150	175	N, P, MS, RG		W
Corylus colurna **Turkish Filbert**		125	150	175	P, MS		
Diospyros virginiana **Persimmon**		125	150	175	N, RG	DR, PS	F, T
Ginkgo biloba (MALE ONLY) **Ginkgo, Maidenhair Tree**		125	150	175	P, LS	RZ, AP, DR	T
Gymnocladus diocus **Kentucky Coffeetree**		125	150	175	P	SL, WS, DR, IS	
Juglans cinerea **Butternut**		125	150	175	N		T
Koelreuteria paniculata **Goldenrain Tree**		125	150	175	RG, MS	SL, DR, AP	W
Liquidambar styraciflua **Sweetgum**		125	150	175	N, MS, RG	S, WS, SH	F
Magnolia macrophylla **Bigleaf Magnolia**		125	150	175	N		T
Metasequoia glyptostroboides **Dawn Redwood**		125	150	175	CP, LS, RG	AP, WS	
Nyssa sylvatica **Black Gum, Tupelo**		125	150	175	N, MS, P, RG	PS, WS	T
Pistacia chinensis **Chinese Pistache**		125	150	175	MS, P		
Prunus serrulata ‘Kwanzan” **Kwanzan Cherry**		125	150	175	U, MS	AP	W, D, I

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		1”	**2”**	**3”**			
Prunus subhirtella ‘Pendula’ **Weeping Japanese Cherry**		125	150	175			D, I
Prunus x yedoensis **Yoshino Cherry**		125	150	175	RG, CP		D, I
Quercus acutissima **Sawtooth Oak**		125	150	175	P, MS		
Quercus hemisphaerica **Laurel Oak**		125	150	175	N, MS	WS	T
Quercus lyrata **Overcup Oak**		125	150	175	N, MS		T
Quercus muehlenbergii **Chinkapin Oak**		125	150	175	N, LS, RG		T
Quercus nigra **Water Oak**		125	150	175	N, RG	SH, WS	T, W
Quercus robur **English Oak ‘Fastigiata’**		125	150	175	P, MS	SL	
Quercus stellata **Post Oak**		125	150	175	N, RG, LS	T	
Robinia pseudoacacia **Black Locust**		125	150	175	N	SL, DR	D, I
Salix nigra **Black Willow**		125	150	175	N, RG	WS	D, I
Sophora japonica **Japanese Pagoda Tree**		125	150	175	P, LS	AP, DR	F, D
Taxodium ascendens **Pondcypress**		125	150	175	N, P		
Taxodium distichum **Bald Cypress**		125	150	175	N, LS, RG	WS, PS	R
Tilia americana **American Linden**		125	150	175	N, RG	WS	
Tilia cordata **Littleleaf Linden**		125	150	175	P, LS		I

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		1”	**2”**	**3”**			
Tilia tomentosa **Silver Linden**		125	150	175	P, LS		I
Ulmus parvifolia **Lacebark Elm**		125	150	175	P, MS, RG	SL	I, R, W
LARGE DECIDUOUS TREES							
Acer pseudoplatanus **Sycamore Maple**		150	200	250	P, LS	PS, IS,	I
Acer rubrum **Red Maple**		150	200	250	N, P, LS, RG	PS, IS, WS	R, W
Acer saccharum **Sugar Maple**		150	200	250	LS	PS	
Carya illinoinensis **Pecan**		150	200	250		WS	T, D, I
Celtis laevigata **Sugar Hackberry**		150	200	250	N, LS	WS	
Eucommia ulmoides **Hardy Rubbertree**		150	200	250	P		
Fagus grandifolia **American Beech**		150	200	250	N	PS	T, R
Fagus sylvatica **European Beech**		150	200	250		PS	R
Gleditia triacanthos inermis **Thornless Honeylocust**		150	200	250	N, P, RG, MS	RZ, SL, IS, WS	D, I, W
Juglans nigra **Black Walnut**		150	200	250	N	WS	F, T
Liriodendron tulipfera **Tulip Poplar**		150	200	250	N, RG	AP, WS	W

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME **COMMON NAME**	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		1”	**2”**	**3”**			
Maclura pomifera **Osage-Orange**		150	200	250		DR, WS AP	F, R
Magnolia acuminata **Cucumber Tree**		150	200	250	RG	WS	T
Phellodendron amurense **Amur Corktree**		150	200	250		P	AP
Platanus x. acerfolia **London Planetree**		150	200	250	P, LS	AP	R
Platanus occidentalis **Sycamore**		150	200	250	N, RG	WS	R, D, I
Quercus alba **White Oak**		150	200	250	N	IS	T
Quercus bicolor **Swamp White Oak**		150	200	250	N, P, LS, RG	SL, IS, WS, DR	T
Quercus coccinea **Scarlet Oak**		150	200	250	N, LS RG	SL, DR	
Quercus falcata **Southern Red Oak**		150	200	250	N, P RG,	DR, IS	T
Quercus falcata var. pagodifolia **Cherrybark Oak**		150	200	250	N, RG		T
Quercus imbricaria **Shingle Oak**		150	200	250	N, RG, LS	DR	T
Quercus michauxii **Swamp Chestnut Oak**		150	200	250	N, P, LS, RG		
Quercus palustris **Pin Oak**		150	200	250	N, P, S, RG	WS, DR	
Quercus phellos **Willow Oak**		150	200	250	N, P, S, RG	WS, DR	T
Quercus prinus **Chestnut Oak**		150	200	250	N	DR, SL	T
Quercus rubra **Northern Red Oak**		150	200	250	RG, N,P,LS	SL, DR, IS	

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		1”	**2”**	**3”**			
Quercus velutina **Black Oak**		150	200	250	N		T
Salix babylonica **Weeping Willow**		150	200	250	RG	WS	W, D, I
Salix matsudana 'Tortuosa' **Corkscrew Willow**		150	200	250		WS	W, D, I
Ulmus Americana: 'Princeton', 'Valley Forge', 'New Harmony' **American Elm**		150	200	250	N, LS, P	WS	D. I
Ulmus hollandica 'Groenveldt' **Groenveldt Elm**		150	200	250	LS	DR	I
Zelkova serrata **Japanese Zelkova**		150	200	250	P, LS, RG	AP, DR	

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		6-7'	**7-8'**	**8-10'**			
COMPACT EVERGREEN TREES							
Abies fraseri **Frasier Fir**		75	100	125	N	PS	
Chamaecyparis lawsoniana **Lawson False Cypress**		40	50	75		PS	
Chamaecyparis obtusa **Hinoki False Cypress**		40	50	75	RG		
Chamaecyparis pisifera 'Plumosa' **Plume Sawara False Cypress**		40	50	75			
Chamaecyparis thyoides **Atlantic White Cedar**		40	50	75	N, RG	WS	
Ilex aquifolia **English Holly**		40	50	75	U	PS, SH	T
Ilex X attenuata 'Fosteri' **Foster's Holly**		40	50	75	RG, U	PS, SH	
Ilex vomitoria **Yaupon**		40	50	75	N	WS	
Juniperus chinensis **Chinese Juniper (Columnar varieties)**		40	50	75	U, CP	DR	I
Juniperus scopulorum **Rocky Mountain Juniper**		40	50	75		DR	I
Calocedrus decurrens **Incense Cedar**		40	50	75		WS	
Taxus baccata 'Fastigata' **Upright Irish Yew**		40	50	75			D
Taxus cuspidata 'Capitata' **Pyramidal Japanese Yew**		40	50	75			
Thuja occidentalis **American Arborvitae**		40	50	75	N, CP, RG	PS	I

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		6-7'	**7-8'**	**8-10'**			
Thuja orientalis **Columnar Oriental Arborvitae**		40	50	75	CP	PS, SH	I
SMALL EVERGREEN TREES							
Cryptomeria japonica **Japanese Cryptomeria**		75	100	125	CP, RG	IS	
Cupressocyparis leylandi **Leyland Cypress**		75	100	125	U, RG, CP	IS	
Ilex opaca **American Holly**		75	100	125	N, RG, U	PS, SH, IS, WS	T
Juniperus virginiana **Eastern Red Cedar**		75	100	125	N, CP, RG	DR, AP	
Osmanthus americana **Devilwood**		75	100	125	N, RG	PS, WS	
Picea glauca **White Spruce**		75	100	125		DR	I
Picea omorika **Serbian Spruce**		75	100	125	RG, CP		I
Picea pugens **Colorado Blue Spruce**		75	100	125			D, I
Pseudotsuga menziesii **Douglas Fir**		75	100	125	RG		I
Tsuga caroliniana **Carolina Hemlock**		75	100	125	N	PS, SH	I
MEDIUM EVERGREEN TREES							
Cedrus atlantica **Atlas Cedar**		125	150	175	RG		T
Cedrus deodora **Deodar Cedar**		125	150	175	RG		T
Cunninghamia lanceolata **China Fir**		125	150	175			

TABLE I - 2-T TREE SELECTION AND COVER GUIDE							
BOTANICAL NAME COMMON NAME	**PROJECTED 10 – YR TREE COVER IN ft² BY CALIPER OR HEIGHT AT PLANTING**				**USES**	**ENVIRONMENTAL TOLERANCES**	**ASSOCIATED PROBLEMS**
		6-7'	**7-8'**	**8-10'**			
Picea abies **Norway Spruce**		125	150	175		PS	
Pinus bungeana **Lace-Bark Pine**		125	150	175			
Pinus echinata **Shortleaf Pine**		125	150	175	N, RG	PS	T
Pinus virginiana **Virginia Pine**		125	150	175	N, CP	DR	
Tsuga canadensis **Canadian Hemlock**		125	150	175	N	PS, SH	I
LARGE EVERGREEN TREES							
Magnolia grandiflora **Southern Magnolia**		150	200	250	RG	PS, WS	W
Pinus rigida **Pitch Pine**		150	200	250	N, CP	DR	
Pinus sylvestris **Scotch Pine**		150	200	250			D
Pinus taeda **Loblolly Pine**		150	200	250	N, CP, RG		
NOTE: Size categories based on 10-yr crown spread, not mature height or spread.							

TABLE I – 2 – S SHRUB SELECTION GUIDE					
BOTANICAL NAME COMMON NAME	**MATURE SIZE**		**ENVIRON. TOLERANCES**	**ASSOCIATED PROBLEMS**	**COMMENTS**
	Height	**Width**			
DECIDUOUS SHRUBS					
Aesculus parviflora **Bottlebrush Buckeye**	8-12'		RG, PS		N; Full sun; moist, well drained soils
Alnus serrulata **Tag Alder**	12–20’		WS		RG; large suckering shrub; birds, waterfowl, small mammals
Amelanchier canadensis **Shadblow Serviceberry**	6-20'		RG, WS		N; full sun
Aronia arbutifolia **Red Chokeberry**	6'-10'	3'-5'	RG, PS, SL, WS	D, I	N; suckers to form colony
Aronia melanocarpa **Black Chokeberry**	3'-10'		RG, PS, WS	D, I	N; Forms large colonies
Aucuba japonica 'Variegata' **Gold-Dust Plant**	6'-10'	5'-8'	SH		Requires male for berries
Buxus microphylla **Boxwood**	3'-4'	3'-4'	PS	D, I	
Callicarpa americana **American Beautyberry**	3-8'		PS, RG		N
Calycanthus floridus **Sweetbush / Carolina Allspice**	6'-9'	6'-12'	RG, PS		N
Camellia japonica **Japanese Camellia**	10'-15'	6'-10'	PS	D, I	
Caryopteris x clandonensis **Blue-Mist Shrub**	3'-4'	3'-4'	PS		Almost herbaceous, cut back in winter
Ceanothus americanus **New Jersey Tea**	3’-4’	3’-5’	PS, SH	T	N
Cephalanthus occidentalis **Buttonbush**	3'-6'	5'-10'	RG, PS, WS		N
Clethra alnifolia **Summersweet**	4'-8'	4'-6'	RG, PS, WS	I	N
Cornus amomum **Silky Dogwood**	6'-10'	6'-10'	RG, PS, WS	I	N
Cornus sericea **Redosier Dogwood**	7'-9'	6'-10'	RG, WS	D, I	N; Forms large colonies
Cotinus coggygria **Smokebush**	10'-15'	10'-15'	DR	D	

TABLE I – 2 – S SHRUB SELECTION GUIDE					
BOTANICAL NAME **COMMON NAME**	**MATURE SIZE**		**ENVIRON. TOLERANCES**	**ASSOCIATED PROBLEMS**	**COMMENTS**
	Height	**Width**			
DECIDUOUS SHRUBS					
Corylus americana **American Filbert**	8'-10'	5'-7'	PS		N; Best in Naturalized Settings
Deutzia gracilis **Deutzia**	2'-4'	3'-4'		D, I	
Euonymus americanus **American Strawberry Bush**	4'-6'		SH	D, I	N; Suckers to form colony
Euonymus japonicus **Japanese Euonymus**	10'-15'	5'-8'	PS, IS	D, I	
Fothergilla major **Fothergillia**	6'-10'	5'-8'			Suckers to form colony
Gaylussacia spp. **Huckleberries**	6"-18"		PS		Spreads indefinitely
Hamamelis virginiana **Virginia Witchhazel**	15'-20'	15'-20'	PS, RG		N; Don't use near birch trees
Hibiscus syriacus **Rose of Sharon**	8'-12'	6'-10'	RG, PS	D, I	
Hydrangea macrophylla **Bigleaf Hydrangea**	3'-6'	3'-6'	PS	D, I	
Hydrangea quercifolia **Oakleaf Hydrangea**	4'-6'	4'-6'	RG, PS		N
Hypericum calycinum **St. John's Wort**	1-1 ½'	1½ - 2'	RG, PS		Ground cover
Hypericum prolificum **Shrubby St. John's Wort**	1'-4'	1'-4'	RG, PS	D	N
Illicium parvifolium **Anise**	8-10'		RG, PS		
Ilex decidua **Possumhaw**	9-18'		RG, WS, PS		N; full sun, acidic to alkaline soil
Ilex laevigata **Smooth Winterberry**	6'-10'	6'-10'	PS, WS	D	
Ilex verticillata **Winterberry Holly**	6'-10'	6'-10'	RG, PS, WS	D	N; Bird Food

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BOTANICAL NAME **COMMON NAME**	**MATURE SIZE**		**ENVIRON. TOLERANCES**	**ASSOCIATED PROBLEMS**	**COMMENTS**
	Height	**Width**			
DECIDUOUS SHRUBS					
Itea virginica **Virginia Sweetspire**	3'-5'	6'-10'	RG, PS, SH, SW, DR		N; Summer Flowering, Fragrant
Kerria japonica **Japanese Kerria**	3'-6'	6'-9'	SH	D	Suckers to form colony
Lindera benzoin **Spicebush**	6'-12'	6'-12'	RG, PS	R, T	N
Leucothoe fontanesia **Drooping Leucothoe**	3'-6'	3'-6'	PS, SH	D	Sensitive to site, drought intolerant
Leucothoe racemosa **Fetterbush**	4-6'		RG, PS		N; moist, acid soils
Morella pensylvanica **Northern Bayberry**	6'-9'	6'-9'	PS		N; Suckers to form colony, Bird Food
Osmanthus heterophyllus **Falseholly or Tea-Olive**	8'-10'	6'-9'	PS		
Rhododendron arborescens **Sweet Azalea**	8'-20'	8'-20'	PS		N
Rhododendron viscosum **Swamp Azalea**	1'-8'	3'-8'	RG, SH,WS		N
Rhus typhina **Staghorn Sumac**	15'-25'	15'-25'	DR	D, I	N; Suckers profusely
Rosa palustris **Swamp Rose**	3-6'		RG, PS		N; full sun, moist, acidic soils
Sambucus canadensis **American Elder**	5'-12'	5'-12'	RG, WS	D, I	N; Suckers to form colony
Spiraea japonica **Japanese Spirea**	4'-5'	4'-5'	PS		
Spiraea prunifolia **Bridalwreath Spirea**	4'-9'	6'-8'	PS		
Spiraea tomentosa **Steeple Bush**	2'-4'		RG, WS		Suckers to form colony
Spiraea x vanhouttei **Vanhoutte Spirea**	6'-8'	10'-12'	PS		
Vaccinium corymbosum **Highbush Blueberry**	6'-12'	8'-12'	RG, WS, PS	D, I	N; Food Source
Viburnum opulus **European Cranberry**	8'-12'	10'-15'	RG, PS, WS	I	
Viburnum acerifolium **Mapleleaf Viburnum**	4'-6'	3'-4'	PS, SH, DR		N; Best in Naturalized Settings
Viburnum carlesii **Koreanspice Viburnum**	10'	6'-8'	PS		Fragrant

TABLE I – 2 – S SHRUB SELECTION GUIDE					
BOTANICAL NAME **COMMON NAME**	**MATURE SIZE**		**ENVIRON. TOLERANCES**	**ASSOCIATED PROBLEMS**	**COMMENTS**
	Height	**Width**			
DECIDUOUS SHRUBS					
Viburnum cassinoides **Witherod Viburnum**	5’-10’	5’-6’	RG		N; Excellent Fruit, Naturalizing, Massing
Viburnum dentatum **Arrowwood Viburnum**	15’	6’-8’	RG, S, PS		N; Good in hedges, borders, naturalizing
Viburnum lentago **Nannyberry Viburnum**	15’-25’	8’-10’	RG, PS, SH	D	N; Naturalizing, Wildlife Food
Viburnum plicatum var. tomentosum **Doublefile Viburnum**	8’-10’	9’-12’			Intolerant of heavy clay & poor drainage
Viburnum prunifolium **Blackhaw Viburnum**	12'-15'	8'-12'	PS		N
EVERGREEN SHRUBS					
Aucuba japonica 'Variegata' **Gold-Dust Plant**	6'-10'	5'-8'	SH	D	Requires male for berries
Buxus microphylla 'Green Beauty' **Green Beauty Boxwood**	3'-4'	3'-4'	PS	D, I	
Camellia japonica **Japanese Camellia**	10'-15'	6'-10'	PS	D, I	
Cephalotaxus harringtonia 'Prostrata' **Prostrate Japanese Plum Yew**	5'-10'	5'-10'	PS, DR		
Euonymus kiautschovicus 'Manhattan' **Manhattan Euonymus**	4'-6'	4'-6'	PS	D, I	
Ilex aquipernyi 'Meschick' **Dragon Lady Holly**	12'-15'	6'-8'	PS		
Ilex cornuta 'Burfordii' **Burford Holly**	10'-20'	10'-12'	PS, DR	I	
Ilex crenata **Japanese Holly**	5'-10'	5'-10'	PS	D, I	
Ilex glabra **Inkberry Holly**	6'-8'	8'-10'	RG, PS, WS		Evergreen
Ilex x 'Nelly R. Stevens' **Nelly Stevens Holly**	15'-25'	8'-10'	PS		

TABLE I – 2 – S SHRUB SELECTION GUIDE					
BOTANICAL NAME **COMMON NAME**	**MATURE SIZE**		**ENVIRON. TOLERANCES**	**ASSOCIATED PROBLEMS**	**COMMENTS**
	Height	**Width**			
EVERGREEN SHRUBS					
Kalmia angustifolia **Sheep Laurel**	1'-3'	2'-3'	PS		Poisonous foliage
Kalmia latifolia **Mountain Laurel**	7'-15'	7'-15'	PS	D, I	N
Mahonia aquifolium **Oregon Grapeholly**	3'-6'	3'-5'	SH	D, I	Suckers to form colony
Cephalotaxus harringtonia 'Prostrata' **Prostrate Japanese Plum Yew**	5'-10'	5'-10'	PS, DR		
Osmanthus americana **Devilwood**	15-25'		RG, PS, WS, DR		N
Osmanthus heterophyllus **Falseholly or Tea-Olive**	8'-10'	6'-8'	PS		
Pieris japonica **Japanese Pieris**	9'-12'	6'-8'	PS	D, I	
Rhododendron catawbiense **Catawba Rhododendron**	6'-10'	5'-8'	PS		N; Do not plant in full sun
Rhododendron maximum **Rosebay Rhododendron**	4'-15'	4'-15'	SH		N
Rhododendron spp. **Azalea**	4'-9'	3'-8'	PS	D, I	
Skimma japonica **Japanese Skimma**	3'-4'	3'-4'	SH	I	
Taxus x media **Yew**	3'-20'	3'-8'	SH	D, I	
Viburnum rhytidophyllum **Leatherleaf Viburnum**	10'-15'	10'-15'	SH		

TABLE I – 2 – P PERENNIAL SELECTION GUIDE				
BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Acanthus spinosus **Acanthus/Bear's Breeches**	1'-2'			Full sun; tolerant of most landscape conditions
Achillea filipendula **Yarrow**	2'-3'	DR, SL		Full sun, butterfly, beneficial bugs, fragrant
Achillea millefolium **Yarrow**	2'-3'	DR, SL		Full sun, butterfly, beneficial bugs, fragrant
Aegopodium podagraria 'Variegatum' **Bishopsweed**	1'	PS, SH		Full sun; tolerant of most landscape conditions; butterfly, beneficial insects, ground cover
Agapanthus **Nile Lily**	2'-3'			Full sun, butterfly, hummingbirds
Ajania pacifica **Chrysanthemum**	1'-2'			Full sun, butterfly, beneficial bugs, ground cover
Ajuga reptans **Bugleweed**	3-6"	PS, SH, WS	RG	Ground cover; tolerates a variety of soils; full sun
Allium spp. **Ornamental Onion**	1'-2'			Tolerant of most landscape conditions
Amsonia hubrectii **Willow Blue Star**	2'-3'	PS		Full sun, tolerant of most landscape conditions; butterfly, beneficials
Amsonia tabernaemontana **Bluestar**	2-3'	WS, DR, PS	RG	Full sun; ground cover; butterfly, beneficials
Anacyclus pyrethrum var. deprussus **Anacyclus/Mt. Atlas Daisy**	4-6"			Tolerant of most landscape conditions
Anemone blanda **Windflower**	6-8"	PS	RG	Full sun; tolerant of most landscape conditions; butterfly, beneficials
Anemone coronaria **Israelian Anemone**	1'	PS	RG	Full sun; tolerant of most landscape conditions; butterfly, beneficials
Anemone x hybrida **Japanese anemone**	2'-3'	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Anemone hupehensis **Japanese anemone**	2'-3'	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Anemone mutifida 'Rubra' **Windflower**	1'	PS	RG	Full sun; tolerant of most landscape conditions; butterfly, beneficials
Anemone sylvestris **Snowdrop anemone**	1'-1 ½'	PS	RG	Full sun; tolerant of most landscape conditions; butterfly, beneficials
Anemone tomentosa 'Robustissima' **Japanese anemone**	2'-3'	PS	RG	Full sun; tolerant of most landscape conditions; butterfly, beneficials

TABLE I – 2 – P PERENNIAL SELECTION GUIDE				
BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Anthemis tinctoria **Anthemis/ Marguerite Daisy**				Full sun; tolerant of most landscape conditions
Aquilegia alpina **Alpine columbine**	12-30"	PS, SH		Tolerant of most landscape conditions; Hummingbirds
Aquilegia caerulea **Columbine**	12-30"	PS, SH		Tolerant of most landscape conditions; Hummingbirds
Aquilegia canadensis **Red Columbine**	1-2'	WS, PS	RG	N; tolerates variety of soils; full sun; song birds, pollinators, hummingbirds
Aquilegia chrysantha **Golden Columbine**	12-30"	PS, SH		Tolerant of most landscape conditions; Hummingbirds
Aquilegia flabellata **Fan columbine**	12-30"	PS, SH		Tolerant of most landscape conditions; Hummingbirds
Aquilegia viridiflora **Columbine**	12-30"	PS, SH		Tolerant of most landscape conditions; Hummingbirds
Aquilegia vulgaris **Columbine**	12-30"	PS, SH		Tolerant of most landscape conditions; Hummingbirds
Arabis blepharophylla 'Red Sensation' **Arabis/Rock Cress**	6-10"			Full sun; tolerant of most landscape conditions; beneficial bugs
Arctostaphylos uva-ursi **Kinnikinnick/Bearberry**	4-6"	PS, SH		N; tolerant of most landscape conditions; groundcover
Arenaria montana **Arenaria/Sandwort**	4-5"	PS		Full sun; tolerant of most landscape conditions
Armeria maritima **Armeria/Thrift**	5-18"			Full sun; tolerant of most landscape conditions
Armeria pseudarmeria **Armeria/Thrift**	5-18"			Full sun; tolerant of most landscape conditions
Artemisia lacinata 'Ghizhou' **Artemisia/Wormwood**	5'			Full sun
Artemisia ludoviciana 'Valerie Finnis' **Artemisia/Wormwood**	15-18"			Full sun
Artemisia 'Powis Castle' **Artemisia/Wormwood**	5-18"			Full sun
Artemisia schmidtiana 'Silvermound' **Artemisia/Wormwood**	5-18"			Full sun
Aruncus aethusifolius **Aruncus/Goatsbeard**	8-12"			Prefers moist soil
Aruncus diocus **Aruncus/Goatsbeard**	30-48"			Prefers moist soil

TABLE I – 2 – P PERENNIAL SELECTION GUIDE				
BOTANICAL NAME COMMON NAME	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Asarum canadense **Wild Ginger**	1-2'	PS, SH, WS	RG	N; low ground cover; not full sun
Asclepias incarnata **Swamp Milkweed**	2-6'	WS, PS	RG	N; full sun, fragrant; beneficial insects, pollinators
Asclepias tuberosa **Butterflyweed**	2'-3'		RG	N; full sun; Butterfly
Aster amellus 'Violet Queen' **Italian Aster**	15-20"		RG	Full sun; Butterfly, beneficials
Aster divaricatus **Whitewood Aster**	24"		RG	N; Full sun; Butterfly, beneficials
Aster laterifolius 'Lady in Black' **Calico Aster**	36"		RG	Full sun; Butterfly, beneficials
Aster linosyris	18-20"		RG	Full sun; Butterfly, beneficials
Aster nova-angliae cvs. **New England Aster**	36"			Full sun; Butterfly, beneficials
Aster oblongifolia 'October Skies'	24-36"			Full sun; Butterfly, beneficials
Aster sp. 'Fanny' **Fanny's Aster**	24-36"			Full sun; Butterfly, beneficials
Aster tataricus 'Jindai' **Tatarian Daisy**	3-5'			Full sun; Butterfly, beneficials
Aster tongolensis 'Wartbergstern' **East Indies Aster**	1'-2'			Full sun; Butterfly, beneficials
Aster x dumosus cvs. **Hardy Aster**	12-15"			Full sun; Butterfly, beneficials
Aster x frikartii cvs. **Frikart's Aster**	2'-3'			Full sun; Butterfly, beneficials
Aurinia saxatilis **Aurinia/Basket-of-Gold**	8-12"			Butterfly, beneficials
Baptisia australis **Baptisia/False Indigo**	3'-4'			Full sun; tolerant of most landscape conditions
Baptisia leucophaea **White False indigo**	24-30"			Full sun; tolerant of most landscape conditions
Baptisia pendula **White Wild Indigo**	2'-3'			Full sun; tolerant of most landscape conditions
Begonia grandis **Hardy Begonia**	1-3'	PS, WS	RG	
Belmcanda chinensis **Blackberry Lily**	3'-4'			Full sun; tolerant of most landscape conditions; butterfly, beneficials

TABLE I – 2 – P PERENNIAL SELECTION GUIDE				
BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Boltonia asteroides **Boltonia**	2'-3'			Full sun; tolerant of most landscape conditions
Brunnera macrophylla **Siberian Bugloss**	1-1.5'	WS, PS	RG	Tolerates all but dry conditions; groundcover
Campanula glomerata **Clustered Bellflower**	24-30"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Campanula latifolia **Great Bellflower**	4'-6'	PS		Full sun
Campanula persicifolia **Peachleaf Bellflower**	2'-3'	PS		Full sun
Campanula punctata **Spotted Bellflower**	1 ½-3'	PS		Full sun
Canna spp. **Canna Lily**	3'	WS	RG	Tolerates variety of soils, full sun
Caryopteris x clandonensis **Caryopteris**	2'-3'			Full sun; tolerant of most landscape conditions
Caltha palustris **Marsh Marigold**	½' - 2'	WS, PS	RG	Good for stream banks; full sun; hummingbirds & butterflies; poisonous
Catanache caerulea **Cupid's Dart**	18-30"	DR		Full sun
Centranthus ruber **Red Valerian**	24-36"			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Cerastium tomentosum **Snow-in-Winter**	6-8"	PS		Full sun; butterfly, beneficial bugs; quick spreading
Ceratostigma plumbaginoides **Plumbago**	6-12"	PS, SH	RG	Full sun; well drained soil; ground cover
Chelone lyonii **Pink Turtlehead**	2-3'	WS, PS	RG	Not full sun
Chelone obliqua **Red Turtlehead**	2-3'	WS, PS	RG	N; full sun
Chrysogonum virginianum **Green and Gold**	6-9"	WS, PS	RG	Ground Cover; N; full sun; tolerates a variety of soil conditions
Coreopsis auriculata 'Nana' **Tickseed**	6-12"			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Coreopsis grandiflora cvs. **Tickseed**	18-24"			Full sun; long blooming
Coreopsis lanceolata **Lanceleaf Coreopsis**	12-18"		RG	Full sun; long blooming

TABLE I – 2 – P PERENNIAL SELECTION GUIDE				
BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Coreopsis rosea **Lanceleaf Coreopsis**	18-24"		RG	Full sun; long blooming
Coreopsis verticillata **Lanceleaf Coreopsis**	18-24"		RG	N; full sun; long blooming
Delosperma cooperi **Ice Plant**	2-6"			Full sun; tolerant of most landscape conditions
Delosperma floribumdum 'Starburst' **Ice Plant**	2-6"			Full sun; tolerant of most landscape conditions
Delosperma nubigenum **Ice Plant**	2-6"			Full sun; tolerant of most landscape conditions
Delphinium grandiflorum **Larkspur**	14-24"			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Dendranthema sp. **Chrysanthemum**	2'-3'			Full sun; late blooming
Dianthus barbatus **Sweet William**	8-10"			Full sun; Butterfly, beneficials, hummingbirds
Dianthus alpinus **Rockery Pinks**	3-6"			Full sun; Butterfly, beneficials, hummingbirds
Dianthus deltoides **Garden Pinks**	8-12"			Full sun; Butterfly, beneficials, hummingbirds
Dianthus gratianopolitanus **Cheddar Pinks**	6-10"			Full sun; Butterfly, beneficials, hummingbirds
Dianthus plumaris **Cottage Pinks**	14-16"			Full sun; Butterfly, beneficials, hummingbirds
Dianthus x alwoodii **Garden Pinks**	12"			Full sun; Butterfly, beneficials, hummingbirds
Echinacea purpurea **Echinacea/Coneflower**	18-36"		RG	N; full sun; tolerant of most landscape conditions; butterfly, beneficials
Echinops bannaticus 'Blue Glow' **Globe Thistle**	18-36"			Full sun; butterfly; clumping
Echinops ritro **Globe Thistle**	18-36"			Full sun; butterfly; clumping
Erigeron sp. **Fleabane**	18-30"			Full sun
Eryngeum planum 'Blaukappe' **Eryngium/Sea Holly**	24-30"			Full sun; tolerant of most landscape conditions; butterfly
Eupatorium fistulosum **Hollow-stem Joe Pye Weed**	5-8'	PS	RG	N; full sun; butterfly; late season bloom

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BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Eupatorium maculatum **Joe Pye Weed**	5-6'	PS	RG	N; full sun; butterfly; late season bloom
Eupatorium rugosum 'Chocolate' **Chocolate leaf snakeroot**	4-5'	PS	RG	Full sun; butterfly; late season bloom
Euphorbia amygdaloides 'Purpurea' **Wood Spurge**	10-12"	PS	RG	Full sun; tolerant of most landscape conditions; butterfly, beneficials
Euphorbia cyparissus 'Fen's Ruby' **Cushion Spurge**	6-10"	PS	RG	Full sun; tolerant of most landscape conditions; butterfly, beneficials
Euphorbia dulcis 'Chameleon' **Purple Spurge**	12"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Euphorbia griffithii 'Fireglow' **Griffith's Spurge**	2'-3'	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Euphorbia myrsinites **Myrtle Euphorbia**	6-9"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Euphorbia polychroma **Cushion spurge**	12-18"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Euphorbia robbiae **Robb's Spurge**	24"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Gaillardia aristata 'Tokajer' **Blanket Flower**	8-30"			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Gaillardia x grandiflora **Blanket Flower**	8-30"			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Gaura linheimeri **Gaura**	18-24"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Gazania linearis 'Colorado Gold' **Gazania**	8-12"			Full sun; tolerant of most landscape conditions
Geranium 'Brookside' **Cranesbill/Hardy Geranium**	10-18"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Geranium macrorrhizum **Cranesbill/Hardy Geranium**	15"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Geranium phaeum var. purpureum **Cranesbill/Hardy Geranium**	18-24"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Geranium 'Philippe Vapelle' **Cranesbill/Hardy Geranium**	10-12"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds

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BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Geranium praetense **Cranesbill/Hardy Geranium**	2'-3'			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Geranium sanguineum **Bloody Cranesbill/Geranium**	6-18"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Geranium soboliferum 'Stanhoe' **Cranesbill/Hardy Geranium**	5-6"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Geranium x cantabrigense 'Biokovo' **Cranesbill/Hardy Geranium**	8-12"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Geranium x magnificum **Cranesbill/Hardy Geranium**	18-24"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Geranium x oxonianum 'Claridge Druce' **Cranesbill/Hardy Geranium**	18"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Goniolimon tataricum **Goniolimon/German Statice**	10-15"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Gypsophila cerastoides **Baby's Breath**	2-3"			Full sun; well drained slightly alkaline soil
Gypsophila paniculata **Baby's Breath**	18-24"			Full sun; well drained slightly alkaline soil
Gypsophila repens **Creeping Baby's Breath**	4-8"			Full sun; well drained slightly alkaline soil
Goniolimon tataricum **Goniolimon/German Statice**	10-15"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Helanthus maximiliani **Perennial Sunflower**	3-10"			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Helenium autumnale **Common Sneezeweed**	3'-4'			Full sun; tolerant of most landscape conditions
Helianthemum cvs. **Rock Rose**	4-24"			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Heliopsis helianthoides **Heliopsis/False Sunflower**	2'-3'			Full sun; tolerant of most landscape conditions; butterfly

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BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Hemerocallis spp. **Daylilies**	1'	PS WS	RG	Tolerates variety of soils, full sun; see unacceptable species list.
Hedychium spp. **Gingers**	4-6'	WS	RG	Tolerates variety of soils, full sun; bees, birds, butterflies
Helianthus angustifolius **Swamp Sunflower**	6-8'	WS	RG	Full sun; bees, butterflies, birds
Hibiscus coccineus **Scarlet Rose Mallow**	4-6'	WS	RG	N; full sun; nectar feeders and birds
Hibiscus moscheutos **Marsh Mallow**	4-6'	WS	RG	N; full sun; nectar feeders and birds
Iberis sempervirens **Candytuft**	6-12"			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Iris x **Louisiana Iris**	2-3'	WS, PS, SH	RG	Hybrids of native sp; full sun; Tolerates variety of soils
Iris pseudacorus **Pale Yellow Iris**	2-3'	WS	RG	N; Tolerates variety of soils, full sun
Iris versicolor **Slender Blue Flag Iris**	2-3'	WS	RG	N; Tolerates variety of soils except dry, full sun;
Iris virginica **Virginia Iris**	2-3'	WS	RG	N; Tolerates variety of soils except dry, full sun
Kalimeris pinnatafia 'Hortensis' **Japanese Aster**	2'-3'			Tolerant of most landscape conditions; long blooming
Kalimeris yomena 'Aurea' **Japanese Aster**	2'-3'			Tolerant of most landscape conditions; long blooming
Knautia macedonica **Knautia**	24"			Full sun; butterfly, beneficial bugs
Kniphofia uvaria **Red Hot Poker**	2'-3'			Full sun; hummingbird
Lamiastrum galeobdolon **Yellow Archangel**	12-18"	PS		Full sun; tolerant of most landscape conditions
Lavandula angustifolia **Lavender**	12-36"			Full sun; prefers alkaline soil; butterfly, beneficial bugs
Lavandula x intermedia **Lavender**	12-36"			Full sun; prefers alkaline soil; butterfly, beneficial bugs
Liatris spicata **Liatris/Blazing Star**	2-4'	RG, WS		N; tolerates variety of soils- not wet soils in winter, full sun
Liatris squarrosa **Gayfeather/Blazing Star**	12-36"			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs

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BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Liriope muscari **Lilyturf**	1-1.5'	WS, PS, SH	RG	Groundcover; tolerates variety of soils, full sun, evergreen
Lirope spicata **Liriope/Monkey Grass**	12-16"		RG	Full sun; tolerant of most landscape conditions; butterfly, beneficials; ground cover
Ligularia tussilaginea **Leopard Plant**	1-3'	WS, PS	RG	Tolerates variety of soils
Lithodora diffusa **Lithodora**	6-12"			Full sun; tolerant of most landscape conditions
Lobelia cardinalis **Cardinal Flower**	2-4'	PS, WS	RG	N; tolerates variety of soils, full sun; hummingbirds, butterflies
Lobelia siphilitica **Blue Lobelia**	2-3'	PS, WS	RG	N; tolerates variety of soils, full sun
Lychnis chalcedonica **Lychnis /Campion**	24-36"			Full sun; tolerant of most landscape conditions
Mazus reptans **Mazus**	< ½'	PS, WS	RG	Ground cover; full sun
Mertensia virginica **Virginia Bluebells**	1-2'	WS, PS, SH	RG	N; not full sun; prefers seeps & floodplains
Mimulus ringens **Monkey Flower**	1-3'	WS, PS	RG	Rich soil, full sun
Monarda didyma **Beebalm**	2-3'	WS, PS	RG	Full sun; bees, hummingbirds, butterflies
Nepeta x faassenii **Nepeta/Catnip**	12-24"			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Nipponanthemum nipponicum **Nippon Daisy**	18-30"			Full sun; late blooming
Oenothera bierlanderi **Mexican Evening Primrose**	8-12"			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Oenothera fruticosa **Sundrops**	18-24"			N
Ophiopogon japonicus **Ophiopogon/Mondo Grass**	6-12"	PS, SH		Full sun; tolerant of most landscape conditions; ground cover
Paeonia lactiflora **Paeonia / Peony**	36"			Powdery mildew
Pardancanda norrisii **Pardancanda/Candylily**	15-36"			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Patrinia scabiosifolia **Patrinia/Golden Lace**	3-7"			Full sun; tolerant of most landscape conditions; ground cover

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BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Penstemon barbatus **Beardtongue**	15-24"	PS, WS	RG	Full sun; needs well drained soil; butterfly, beneficials, hummingbirds
Penstemon coccineus **Beardtongue**	15-18"	PS, WS	RG	Full sun; needs well drained soil; butterfly, beneficials, hummingbirds
Penstemon digitalis **Beardtongue**	30-36"	PS, WS	RG	Full sun; needs well drained soil; butterfly, beneficials, hummingbirds
Penstemon x mexicali **Beardtongue**	15-18"	PS, WS	RG	Full sun; needs well drained soil; butterfly, beneficials, hummingbirds
Penstemon strictus **Beardtongue**	15-18"	PS, WS	RG	Full sun; needs well drained soil; butterfly, beneficials, hummingbirds
Penstemon hybrids **Beardtongue**	24-36"	PS, WS	RG	Full sun; needs well drained soil; butterfly, beneficials, hummingbirds
Perovskia atriplicifolia **Russian Sage**	36"	DR		Full sun; butterfly,beneficial bugs, hummingbirds
Persicaria filiformis **Mountain Fleece Flower**	24-36"	PS		Full sun; tolerant of most landscape conditions
Persicaria microcephala 'Red Dragon' **Mountain Fleece Flower**	24-36"	PS		Full sun; tolerant of most landscape conditions
Phlomis tuberosa **Jerusalem Sage**	4-5'	DR		Full sun; tolerant of most landscape conditions
Phlox maculata **Wild Sweet William**	2'-3'	WS		N; full sun; tolerant of most landscape conditions; Powdery mildew
Phlox stolonifera **Creeping Phlox**	12-15"	PS, SH	RG	N; Full sun
Phlox subulata **Moss Phlox**	6-10"	PS	RG	N; Full sun; tolerant of most landscape conditions; butterfly, beneficials; evergreen; ground cover
Phlox paniculata **Garden Phlox**	24-36"		RG	N; full sun; tolerant of most landscape conditions; Powdery mildew
Physotegia virginiana **Obedient Plant**	up to 4'	WS, PS	RG	N; tolerates variety of soils, full sun; pollinators, hummingbirds
Platycodon grandiflorus **Balloon Flower**	8"-24"			
Prunella grandiflora 'Rubra' **Prunella**	8-12"	PS		Full sun; tolerant of most landscape conditions; can be invasive
Pontederia cordata **Pickerelweed**	1-3'	WS, PS	RG	N; full sun ; emergent

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BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Primula spp. **Primroses**	4-6"	WS, PS	RG	Tolerates variety of soils; full sun
Pulmonaria spp. **Lungwort**	1-1.5'	WS, SH	RG	Tolerates dry sites
Rubus pentalobus (calycinoides) **Creeping Bramble**	6-12"			Full sun; tolerant of most landscape conditions; ground cover
Rudbeckia fulgida **Black-eyed Susan**	20-24"			N; Full sun; tolerant of most landscape conditions; butterfly, beneficials
Rudbeckia hirta **Blackeyed Susan**	2-3'	WS	RG	N; Tolerates variety of soils, full sun; bees, butterflies, insects, birds
Rudbeckia lacinata 'Goldquelle' **Cutleaf Coneflower**	36"			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Rudbeckia maxima **Giant coneflower**	6'			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Rudbeckia nitida 'Herbstonne' **Autumn Sun Rudbeckia**	4-5'			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Rudbeckia triloba **Three lobed coneflower**	2'-3'			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Salvia greggii **Texas sage**	30-36"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Salvia koyame **Japanese Yellow Sage**	24-36"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Salvia lyrata **Sage**	12-18"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Salvia nemorosa **Meadow Sage**	18-24"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Santolina virens **Santolina**	12-18"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Santolina chamaecyparissus **Lavender cotton**	12-18"	PS		Full sun; tolerant of most landscape conditions; butterfly, beneficials
Saururus cernuus **Lizard Tail**	1.5-3'	RG, WS, PS		N; wet soils only; food for ducks
Scabiosa caucasica **Pincushion Flower**	18-24"			Full sun; prefers slightly alkaline soil; butterfly, beneficial bugs
Scabiosa columbaria **Pincushion Flower**	12-15"			Full sun; prefers slightly alkaline soil; butterfly, beneficial bugs
Sedum acre **Sedum**	6"-24"	DR		Full sun

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BOTANICAL NAME **COMMON NAME**	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Sedum album **Biting stonecrop**	2-4"	DR		Full sun
Sedum floriferum **Trailing stonecrop**	6-8"	DR		Full sun
Sedum 'John Creech' **Stonecrop**	6-8"	DR		Full sun
Sedum kamtschaticum **Kamtschatka stonecrop**	6-8"	DR		Full sun
Sedum rupestre **Sedum**	6-8"	DR		Full sun
Sedum sarmentosum **Stonecrop**	6-8"	DR		Full sun
Sedum sieboldii **October Daphne**	6-8"	DR		Full sun
Sedum spurium **Stonecrop**	6-8"	DR		Full sun
Sedum spectabile cvs. **Stonecrop**	18-24"	DR		Full sun
Silene schafta **Silene/Campion**	2-10"			Full sun; tolerant of most landscape conditions
Sisyrinchium angustifolium **Blue-Eyed Grass**	6-20"			N; full sun; tolerant of most landscape conditions
Solidago flexicaulis **Goldenrod**	1-3'	RG, PS, WS		Tolerates variety of soils, full sun; Wildlife: butterflies
Solidago 'Golden Baby' **Goldenrod**	20"			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Solidago 'Golden Fleece' **Goldenrod**	18"			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Solidago 'Laurin' **Goldenrod**	1’			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Solidago ohiensis **Goldenrod**	2’			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Solidago rugosa 'Fireworks' **Rough-stemmed Goldenrod**	3’-4’			Full sun; tolerant of most landscape conditions; butterfly, beneficial bugs
Stachys byzantina **Lamb's ear**	12-18"			Full sun; tolerant of most landscape conditions
Stachys officinalis **Wood betony**	24"			Full sun; tolerant of most landscape conditions

TABLE I – 2 – P PERENNIAL SELECTION GUIDE				
BOTANICAL NAME COMMON NAME	**MATURE HEIGHT**	**ENVIRON. TOLERANCES**	**USES**	**COMMENTS**
Stokesia laevis **Stokes' Aster**	14-48"	DR		Full sun
Tanacetum coccineum **Tanacetum/Painted Daisy**	24-32"			Full sun; tolerant of most landscape conditions; butterfly, beneficials
Tiarella cordifolia **Foamflower**	½'-1'	WS, PS, SH	RG	N; ground cover; tolerates a variety of soil conditions
Tradescantia x andersonia **Spiderwort**	15-30"	PS, WS	RG	Full sun; tolerant of most landscape conditions; butterfly, beneficials
Verbena canadensis 'Homestead Purple' **Verbena**	6-10"			Full sun; tolerant of most landscape conditions; butterfly, beneficials, hummingbirds
Verbena bonariensis **Brazilian verbena**	18-36"			Full sun; tolerant of most landscape conditions; butterfly, hummingbirds
Veronica alpina 'Alba' **Alpine Speedwell**	10"			Full sun; tolerant of most landscape conditions; ground cover
Veronica austriaca 'Crater Lake Blue' **Speedwell**	15"			Full sun; tolerant of most landscape conditions
Veronica gentianoides **Gentian Speedwell**	8-18"			Full sun; tolerant of most landscape conditions; ground cover
Veronica 'Goodness Grows' **Spike Speedwell**	12"			Full sun; tolerant of most landscape conditions; ground cover
Veronica longifolia 'Icicle' **Spike Speedwell**	18-24"			Full sun; tolerant of most landscape conditions
Veronica peduncularis **Speedwell**	3"			Full sun; tolerant of most landscape conditions; ground cover
Veronica prostrata 'Rosea' **Harebell Speedwell**	6-8"			Full sun; tolerant of most landscape conditions; ground cover
Veronica repens **Creeping Speedwell**	1-4"			Full sun; tolerant of most landscape conditions; ground cover
Veronica spicata **Spike Speedwell**	8-10"			Full sun; tolerant of most landscape conditions; ground cover
Veronica 'Sunny Border Blue' **Speedwell**	18-20"			Full sun; tolerant of most landscape conditions
Veronica 'Waterperry' **Speedwell**	4-6"			Full sun; tolerant of most landscape conditions; ground cover
Vernonia noveboracensis **Ironweed**	3-7'	WS	RG	N; tolerates variety of soils, full sun; bees, butterflies, beneficial insects
Zephyranthes spp. **Rain Lilies**	.5-1'	WS, DR, PS	RG	Tolerates variety of soils; full sun

TABLE I – 2 – G ORNAMENTAL GRASSES SELECTION GUIDE				
BOTANICAL NAME COMMON NAME	**MATURE HEIGHT**	**ENVIRON. TOLERANCES & USES**	**GROWING CONDITIONS**	**COMMENTS**
Achnatherum calamagrostis **Silver Spike Grass**	2'-2.5'		Full sun	Needs well drained soil, Panicles June-Fall
Alopecurus pratensis **Foxtail Grass**	1'	RG, WS, PS		Full sun
Andropogon gerardii **Big Bluestem**	2'-6'	DR; PS	Full sun	Erosion control; May become invasive if not property managed
Andropogon glomeratus **Bushy Beardgrass**	2'-4'	WS	Full sun to light shade	Native; Upright, Retains fall color into winter
Andropogon virginicus **Broomsedge**	1'-3'	RG, DR, WS	Full sun	Native; Grows in tufts, reddish fall color; wildlife food/cover
Arrhenatherum elatius **Tall Oats Grass**	1'-2'	DR, PS	Full sun	Best in spring & fall, cut back in summer
Bouteloua gracilis **Mosquito Grass**	1.5-2'	DR	Full sun	Blooms mid-late summer; early fall
Calamagrostis x acutiflora **Feather Reed Grass**	3'-4'	RG, DR, SL, PS	Full sun	Won't self seed
Carex morrowii 'Aurea Variegata'	1'-1.5'	PS	Full sun	Acidic rich soil, Evergreen; Cluster grass
Deschampsia caespitosa **Tufted Hair Grass**	1.5-2'	PS	Full sun	Four seasons of interest; evergreen
Elymus hystrix **Bottlebrush Grass**	2'-5'	PS; SH		Native
Festuca amethystina **Large Blue Fescue**	1-1.5'	DR, PS	Full sun	Heat tolerant, narrow green foliage
Festuca mairei **Atlas Fescue**	3-3.5'	DR	Full sun	Heat tolerant once established, evergreen
Festuca ovina **Blue Fescue**	0.5-1'		Full sun	Well drained soil, silvery blue foliage
Helictotrichon sempervirens	1.5-2'	PS, SL	Full sun	Powder blue foliage, spiky
Imperata cylindrica **Japanese Blood Grass**	1-1.5'	PS		Well drained soil; red color during whole growing season
Koeleria macrantha **Prairie June Grass**	1'	SL	Full sun	Green flattened flower heads
Molinia litorialis **Tall Purple Moor Grass**	2'-3'	SL	Full sun	Summer flowers; variegated foliage

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BOTANICAL NAME COMMON NAME	**MATURE HEIGHT**	**ENVIRON. TOLERANCES & USES**	**GROWING CONDITIONS**	**COMMENTS**
Ophiopogon planiscarpus 'Ebkinzam' **Black Mondo Grass**	1'	PS	Full sun	Prefers rich soils, summer pink bloom color
Panicum virgatum **'Dallas Blue', 'Heavy Metal', 'Hanse Herms' 'Prairie Sky' 'Rehbraun'**	3'-6'	SL	Full sun	Native, Red/purple flowers
Pennisetum alopecuroides **Chinese Fountain Grass**	3'-4'		Full sun	Flowers August - October fertile soil; adequate moisture
Pennisetum japonicum	3'-4'	DR, SL	Full sun	Bottle brush type flowers; summer to fall
Pennisetum villosum **Feather Top**	1'-3'	PS	Full sun	Needs fertile soil, adequate moisture; spikes light green to tawny with age
Phalaris arundinacea **Ribbon Grass**	2'-3'	DR, PS	Full sun	Moderate drought tolerance, interest whole growing season
Saccharum ravennae **Ravannae Grass**	.5-1.5'		Full sun	Blooms fall; bronze color in winter, well drained soils
Schizachyrium scoparium **Little Bluestem**	1.5-4'	SL	Full sun	Winter interest; wildlife cover
Sorghastrum nutans 'Sioux Blue'	3'-5'	SL	Full sun	Blooms August with good winter color
Spartina cynosuroides **Big Cordgrass**	To 8'	WS	Full sun	Wetland obligate; Saltwater tolerant
Spodiopogon sibericus	3'-4'	PS		Not drought tolerant, Red/burgundy fall color,
Themeda triandra japonica **Japanese Themeda**	2'-3'	DR, SL, PS	Full sun	Summer flowers; maroon colored flowers
Tripsacum dactyloides **Eastern Gama Grass**	To 8'	WS	Full sun	Requires careful site selection, cultivation and management

TABLE I-3 Plants Not Acceptable for General Use		
SCIENTIFIC NAME	**COMMON NAME**	**CODE**
TREES		
Acer negundo	Boxelder	D, L, W, R
Acer platanoides	Norway Maple	R
Acer saccharinum	Silver Maple	D, I, W, R
Ailanthus altissima	Tree of Heaven	W, NI
Albizzia julibrissin	Mimosa	D, W, NI
Betula papyrifera	Paper Birch	D, I
Betula pendula	European White Birch	D, I, W
Betula populifolia	Gray Birch	D, I
Broussonetia papyrifera	Paper Mulberry	NI
Gingko biloba	Female Ginkgo	F
Gledistsia triacanthos	Thorny Honeylocust	I, Thorns
Maclura pomifera	Osage Orange	F, Thorns
Melia azedarach	Chinaberry tree	NI
Morus spp.	Mulberry	W, F, NI
Pauwlonia tomentosa	Empress Tree	W, F
Pinus strobus	White Pine	D, W
Populus deltoids	Eastern Cottonwood	W
Populus spp.	Poplar	D, W, R
Prunus serotina	Black Cherry	D, I
Pyrus calleryana	Callery Pear	W, NI
Quercus acutissima	Sawtooth Oak	NI
Salix spp.	Willows	W, R
Sorbus spp. (except S. alnifolia)	Mountain Ash	D, I
Triadica sebifera	Tallowtree, Popcorntree	NI
Ulmus pumila	Siberian Elm	W
SHRUBS		
Azalea - Japanese cultivars	Japanese Azalea	D, I
Berberis thunbergii	Japanese barberrry	NI
Elaeagnus angustifolia	Russian Olive	NI
Eleagnus umbellatus	Autumn Olive	NI
Euonymus alata	Burning Bush	NI
Ligustrum (all species)	Privet	NI

Lonicera maackii; L. x bella; L. xylosteum; L. fragrantissima; L. tatarica	Bush honeysuckles	NI
Nanadina domestica	Sacred bamboo; Nandina	NI
Pieris japonica	Andromeda	I
Pyracantha- coccinea	Scarlet Firethorn	NI, I
Pyracantha angustifolia	Narrow-leaf Firethorn	NI
Rosa multiflora	Multiflora Rose	NI
Rosa rugosa	Rugosa Rose	NI
Spiraea japonica	Japanese Spiraea	NI
GRASSES		
Bambusa, Phyllostachys and Pseudosasa sp	Bamboo	NI
Microstegium vimineum	Japanese Stiltgrass	NI
Miscanthus sinensis	Chinese Silver grass	NI
Phragmites australis	Comon Reed	NI
Phalaris arundinacea	Ribbon Grass	NI
Polygonum cuspidatum	Japanese Knotweed	NI
PERENNIALS		
Alliaria petiolata	Garlic Mustard	NI
Hemerocallis fulva	Common Daylily	NI
Iris pseudoacorus	Water Iris	NI
Lespedeza bicolor	Shrubby Lespedeza	NI
Lespedeza cuneata	Chinese Lespedeza	NI
Lythrum salicaria	Purple Loosestrife	NI
Rannunculus ficaria	Lesser Celadine	NI
Rubus phoenicolasius	Wineberry	NI
VINES		
Akebia quinata	Five-leaved Akebia	NI
Ampelopsis brevipedunculata	Porcelainberry	NI
Celastrus orbiculatus	Oriental Bittersweet	NI
Euonymus fortunei	Creeping Euonymus	NI
Hedera helix	English Ivy	NI
Pueraria montana	Kudzu	NI
Wisteria floribunda	Japanese Wisteria	NI
Wisteria sinensis	Chinese Wisteria	NI

Table I-4 Minimum Spacing Requirements for Landscaping *	
Plant Category	**Minimum Spacing Between Trees of the Same Category**
Compact Deciduous	10 ft
Small Deciduous	10 ft
Medium Deciduous	20 ft
Large Deciduous	30 ft.
Compact Evergreen	10 ft.
Small Evergreen	10 ft.
Medium Evergreen	15 ft
Large Evergreen	20 ft
* Minor variation in spacing may be allowed with approval of the Director of Public Works, or designee.	

TABLE I-5 Minimum Planting Area		
Tree Category	**Minimum Width**	**Minimum Planting surface area**
Large deciduous or evergreen tree	8 ft	150 sf
Medium deciduous or evergreen tree	8 ft	150 sf
Small deciduous or evergreen tree	6 ft	60 sf
Compact deciduous or evergreen tree	6ft	40 sf
Shrub	4 ft	20 sf

TABLE II PLANT SELECTION GUIDE FOR STORM WATER MANAGEMENT FACILITIES				
Botanical Name Common Name	**Wildlife**	**Wetland Status**	**Flood Tol.**	**Comment**
LARGE DECIDUOUS TREES				
Acer rubarum **Red maple**	High	FAC	Yes	Rapid Growth
Celtis laevigata **Sugar Hackberry**		FACW		
Fagus grandiflora **American Beech**	High	FACU	No	Prefers shade; well drained
Juglans nigra **Black Walnut**	High	FACU		
Liquidambar styraciflua **Sweetgum**	Moderate	FAC	Yes	Tolerates acid or clay soils
Liriodendron tulipifera **Tulip Tree**	Moderate		No	Rapid growth
Platanus occidentalis **Sycamore**	Low	FACW	Yes	Rapid growth
Populus deltoides **Eastern Cottonwood**		FACW		Rapid growth
Quercus bicolor **Swamp White Oak**	High	OBL	Yes	
Quercus falcatae **Southern Red Oak**	High	FACW	Yes	
Quercus michauxii **Swamp Chestnut Oak**	High	FACW		
Quercus palustris **Pin Oak**	High	FACW	No	
Quercus phellos **Willow Oak**				
MEDIUM DECIDUOUS TREES				
Asimina triloba **Paw Paw**	Moderate	FACU+		
Betula nigra **River Birch**	Low	FACW	Yes	Stream bank stabilizer
Carpinus carolinian **American Hornbeam**	FACU			
Carya cordiformis **Bitternut hickory**	High	FACU+		

TABLE II PLANT SELECTION GUIDE FOR STORM WATER MANAGEMENT FACILITIES				
Botanical Name Common Name	**Wildlife**	**Wetland Status**	**Flood Tol.**	**Comment**
MEDIUM DECIDUOUS TREES				
Carya ovata **Shagbark Hickory**	High	FACU-		
Diospyros virginiana **Persimmon**	Moderate	FAC-	No	Needs full sun
Metasequoia glyptostroboidies **Dawn Redwood**				
Nyssa sylvatica **Black Gum**	High	FAC	Yes	
Salix alba **White Willow**		FACW	Yes	
Salix babylonica **Weeping Willow**		FACW-	Yes	
Salix nigra **Black Willow**	Low	FACW+	Yes	Streambanks
Taxodium distichum **Bald Cypress**	Moderate	FACW+	Yes	Prefers sun
Alnus glutinosa **Black Alder**		FACW	Yes	Rapid growth; Streambanks
Alnus serrulata **Common Alder**		OBL		
Amelanchier canadensis **Serviceberry**	High	FAC	Yes	Prefers shade; Understory
Chionanthus virginicus **Fringe Tree**		FAC+		
Crataegus spp. **Hawthorns**	High	FACU		
Magnolia virginiana **Sweetbay Magnolia**	Low	FACW+	Yes	Semi-evergreen Prefers some shade
Morus alba **White Mulberry**	Moderate	FACU		
Prunus serotina **Black Cherry**	High	FACU		
Prunus virginiana **Purple Chokecherry**	High	FACU	No	

TABLE II PLANT SELECTION GUIDE FOR STORM WATER MANAGEMENT FACILITIES				
Botanical Name Common Name	**Wildlife**	**Wetland Status**	**Flood Tol.**	**Comment**
MEDIUM DECIDUOUS TREES				
Sorbus aucuparia **European Mountain Ash**		FACU		
EVERGREEN TREES				
Chaemaecyparis spp.	Cover	OBL	No	
Cryptomeria japonica **Japanese Cryptomeria**				
Ilex opaca **American Holly**	Food	FAC	Infre-quent	Plant 1 male, 10 females
Juniperus virginia **Eastern Red Cedar**	Food	FACU	No	
Magnolia virginiana **Sweetbay Magnolia**	Low	FACW+	Yes	Semi-evergreen, Prefers some shade
Pinus virginiana **Virginia Pine**	High	FAC-	Some	
Thuja occidentalis **Eastern Arborvitae**	Cover	FACW	No	
DECIDUOUS SHRUBS				
Aronia arbutifolia **Red Chokeberry**	Moderate	FACW	Yes	
Aronia melanocarpa **Black Chokeberry**		FAC		
Calycanthus floridas **Sweet Shrub**				
Cephalanthus occidentalis **Buttonbush**	High	OBL	Yes	
Clethra alnifolia **Sweet Pepperbush**		FAC+	Yes	
Cornus amomum **Silky Dogwood**	Moderate	FACW	Yes	Shade; drought tolerant
Eunonymous americanus **American Strawberrybush**	Moderate	FACU	No	

TABLE II PLANT SELECTION GUIDE FOR STORM WATER MANAGEMENT FACILITIES				
Botanical Name Common Name	**Wildlife**	**Wetland Status**	**Flood Tol.**	**Comment**
DECIDUOUS SHRUBS				
Gaylussacia spp. **Huckleberries**	High	FAC		
Hammamelis virginiana **Witch Hazel**	Low	FAC-	No	
Ilex laevigata **Smooth Winterberry**	Moderate	OBL	No	
Ilex verticillata **Common Winterberry**	High	FACW		
Lindera benzoin **Spice Bush**	Moderate	FACW	No	
Morella pennsylvanica **Northern Bayberry**	High	FAC		
Prunus virginiana **Purple Chokecherry**	High	FACU	No	
Rhododendron arborescens **Smooth Azalea**		FAC		
Rhododendron maximum **Rosebay Rhododendron**		FAC		
Rhododendron viscosum **Swamp Azalea**	Low	OBL	Yes	
Rhus typhina **Staghorn Sumac**	Moderate			
Rosa palustris **Swamp Rose**		OBL		
Rubus hispida **Bristly Hispoides Blackberry - BOG**	High	FACW		
Sambucus canadensis **American Elder**	High	FACW-	Yes	
Spirea tomentosa **Steeple Bush**		FACW		
Vaccinium corymbosum **Highbush Blueberry**	High	FACW-		
Viburnum spp.	Moderate	FACW / FAC		Natives only

TABLE II PLANT SELECTION GUIDE FOR STORM WATER MANAGEMENT FACILITIES				
Botanical Name Common Name	**Wildlife**	**Wetland Status**	**Flood Tol.**	**Comment**
DECIDUOUS SHRUBS				
Viburnum prunifolium **Black Haw Viburnum**		FACU		
BROADLEAF EVERGREEN SHRUBS				
Ilex glabra **Inkberry**		FACW-	Yes	
Kalmia augustifolia **Sheep-laurel**		FAC	No	
Kalmia latifolia **Mountain Laurel**	Low	FACU	No	Tolerates acid soils
WOODY VINES				
Campsis radicans **Trumpet Vine**		FAC	No	Rampant
Celastris scandens **American Bittersweet**	Low	FACU-	No	Rampant
Clematis virginiana **Virginsbower**	Low		No	
Parthenocissus quinquefolia **Virginia Creeper**		FACU		
Rubus hispidus **Swamp Dewberry**	High	FACW	No	
Vitis riparia **Riverbank Grape**	High	FACW	No	
Vitis vulpina **Winter Grape**	High	FAC	No	
EMERGENT AND AQUATIC PLANTS				
Acorus calamus **Sweet Flag**	Low	OBL	Yes	Emergent
Cephalanthus occidentalis **Buttonbush**	High	OBL	Yes	Emergent
Ceratophyllum demersum **Coontail**	Low	OBL	Yes	Emergent

TABLE II PLANT SELECTION GUIDE FOR STORM WATER MANAGEMENT FACILITIES				
Botanical Name Common Name	**Wildlife**	**Wetland Status**	**Flood Tol.**	**Comment**
EMERGENT AND AQUATIC PLANTS				
Cyperus spp. **Sedges**	Moderate	Varies	Yes	Emergent
Hibiscus moscheutos **Marsh Hibiscus**	Low	OBL	Yes	Emergent
Leersia oryzoides **Rice Cutgrass**	Moderate	OBL	Yes	Emergent
Nasturtium officinale **Water Cress**	Moderate	OBL	Yes	Emergent
Nuphar luteum **Spatterdock**	Moderate	OBL	Yes	Emergent
Peltandra virginica **Arrow Arum/Duck Corn**	Wood ducks	OBL	Yes	Emergent
Pontederia cordata **Pickerelweed**	Low	OBL	Yes	Emergent
Potamegaton spp. **Pond Weed**	High	OBL	Yes	Submergent
Sagittaria latifolia **Arrowhead/Duck Potato**	Moderate	OBL	Yes	Emergent
Saururus cernuus **Lizard's Tail**	Low	OBL	Yes	Emergent
Scirpus americanus **Common Three-Square**	High	OBL	Yes	Emergent
Scirpus validus **Soft-stem Bulrush**	Moderate	OBL	Yes	Emergent
Viburnum recognitum **Smooth Arrowood**		FACW-		
Viburnum trilobum **Highbush Cranberry**	Moderate	FACW	Yes	