

TOWN OF DURHAM, NEW HAMPSHIRE



****DRAFT****

SITE PLAN REGULATIONS PART III – DEVELOPMENT STANDARDS

Original version - September 17, 2014

Articles 1 through 6 presented to the Planning Board on April 8, 2015

Adopted by the Durham Planning Board: *DATE
Most Recently Amended:

Proposed additions are shown like this

Proposed deletions are shown like this

[Comments from various parties, including those who propose the specific change, are shown below the pertinent item like this. Where no name is given the comment is from the Town Planner]

PART III. DEVELOPMENT STANDARDS

- Article 1 General Standards
- Article 2 Architectural Design Standards (The standards are contained in the Appendix)
- Article 3 Construction Practices Standards
- Article 4 Cultural Resources Standards
- Article 5 Landscaping and Screening Standards
- Article 6 Lighting Standards

****Articles 1 through 6 included herein****

- Article 7 Miscellaneous Design Standards
 - Building Configuration
 - Erosion and Sedimentation Control
 - Fences and Walls
 - Flood Zones
 - Recreation and Open Space
 - Signage
- Article 8 Natural Resources Standards
- Article 9 Operational Issues Standards
 - Hours of Operation
 - Maintenance of the Site
 - Snow Storage and Removal
 - Solid Waste
 - Flammable and Combustible Liquids
 - Street Addressing
- Article 10 Parking and Circulation Standards
- Article 11 Pedestrian, Bicycle, and Transit Facility Standards
- Article 12 Personal Wireless Service Facilities
- Article 13 Public Health and Safety Standards
- Article 14 Standards for Particular Uses/Activities
 - Contractor's Storage Yards
 - Recreational Playing Fields, Outdoor
- Article 15 Stormwater Management Standards
- Article 16 Traffic and Access Management Standards
- Article 17 Utilities Standards

[From April Talon. I prefer Times New Roman Font throughout and bulleting of A),I),a) for ease of reading and simplicity (mostly preference), with the exception of a different font at the footer as we have it now. See the following link for Hanover’s Site Plan Regs for illustration of what I mean here. http://www.hanovernh.org/Pages/HanoverNH_BComm/planning/Site.pdf]

[Comments from Bubar and Mower: We urge the Board to consider carefully the portions of this document that include words such as “should” and “encourage.” While the goal is laudable, and recommendations may lead to better results, these standards are legally binding and should be written with that intent.]

Article 1. General Standards

- Section 1.1 Overview
- Section 1.2 Other Regulations

Section 1.1 Overview

- 1.1.1 The standards contained in these regulations apply to all site plans. These standards shall be construed as minimum standards. The Planning Board, at its discretion, may require higher standards in individual cases or may waive certain requirements for good cause in accordance with the procedures outlined in these regulations.
- 1.1.2 In addition to these standards, the Planning Board may stipulate any appropriate special measures to eliminate or mitigate potential adverse impacts upon abutters, neighbors, or the general public that might result from a proposed project.
- 1.1.3 A site plan application may be denied by the Planning Board if the proposal fails to meet one or more of the requirements herein.
- 1.1.4 Legally established nonconforming site conditions are considered “grandfathered” until such time as site plan review is required due to proposed changes to a property. The Planning Board shall use the nonconforming provisions in the Town of Durham Zoning Ordinance as a guide in reviewing such situations, to the extent appropriate.

As part of any site plan review, the Planning Board may require that:

- (a) nonconforming site conditions be brought into compliance; or
- (b) the extent of nonconforming site conditions be reduced; or

- (c) nonconforming site conditions be mitigated, giving due consideration both to the extent of the nonconformities and their adverse impacts and to the costs for addressing the nonconformities relative to the costs for the overall project.

Section 1.2 Other Regulations

1.2.1 The site plan shall conform to all applicable ordinances, regulations, standards, and statutes of the Town of Durham, State of New Hampshire, and United States Government, as appropriate, including, but not limited to:

- (a) The Town of Durham Zoning Ordinance;
- (b) Other ordinances within the Durham Town Code;
- (c) The Town of Durham Subdivision Regulations;
- (d) Specifications and/or regulations promulgated by the Town of Durham Public Works Department; and
- (e) The building and life safety codes, as adopted by the Town of Durham.

1.2.2 The Town of Durham Master Plan and Capital Improvement Program (CIP) are policy rather than regulatory documents, but the Planning Board may consult these documents as guides in reviewing proposed development or redevelopment.

Article 2. Architectural Design Standards

Due to its size, Article 2, containing the Architectural Design Standards, is placed in an Appendix to these Site Plan Regulations. The Architectural Design Standards are part of the Site Plan Regulations and fully apply in like manner as other standards contained in the main body of these regulations.

[The Planning Board approved placing the Architectural Standards into an appendix in this manner in the course of its earlier, separate review of the Architectural Standards on December 10, 2014.]

Article 3. Construction Practices

- Section 3.1 Commencement
- Section 3.2 Construction Equipment
- Section 3.3 Fire Access
- Section 3.4 Hours of Activity
- Section 3.5 Topsoil

Section 3.6 Waste Materials
Section 3.7 Blasting

Section 3.1 Commencement

No site work, grading, nor removal of vegetation (except that necessary to establish erosion and sedimentation control devices and construction fencing) shall commence until all erosion and sedimentation control devices and, when appropriate, construction fencing are installed and stabilized.

Section 3.2 Construction Equipment

3.2.1 Construction equipment and materials shall be stored at least 25 feet away from drainage channels.

[April Talon. Item 3.2.1 and 3.6.2 could be combined in some way and clarified further given concerns we have heard. We could add a requirement that the developer/contractor acknowledge the tight space for construction and equipment, etc, and have a plan to mitigate impacts? I think in particular projects there are conditions where - if the site is thoroughly contained with erosion control measures – and there is no clear observation of equipment of material stockpiles have a detrimental impact on a stream, wetland etc. – then is this requirement really necessary? Especially when in the final construction, ie. Brick pavers, walkways, curbing, extend to the brook. In order to get to the finish product, there has to be construction activity taking place within this 25 or 50ft buffer zone.]

3.3.2 If there will be any refueling or servicing of construction vehicles or equipment on site, provisions shall be made for this activity, including, as appropriate, fuel storage, secondary containment, spill clean up, and management procedures. If not otherwise addressed as part of the Site Plan Review, when applicable, a plan addressing these procedures shall be provided to the Public Works Department when site work or building construction is commenced.

Section 3.3 Fire Access

Access into the site for fire apparatus shall be maintained at all times during the construction process.

Section 3.4 Hours of activity

3.4.1 For any site where development activity would occur within 300 feet of any residential dwelling unit, outside construction is restricted to the following hours:

- between 7:00 a.m. and 6:00 p.m., Monday through Friday, and
- between 8:00 a.m. to 6:00 p.m., Saturday.

- 3.4.2 The Planning Board may modify these hours, and when they apply, as appropriate.

[Comments from Bubar and Mower: This section should be amended to include a restriction on hours for “noisy” activities that would affect the quality of life of abutters, such as was included for Orion’s construction management plan: Drilling / Hammering: 9:00 a.m. 4:00 p.m.]

Section 3.5 Topsoil

Unless otherwise approved by the Town, all stripped topsoil from the site shall be retained, stabilized in accordance with NHDES standards, and stockpiled on site for later reuse on site, unless otherwise approved by the Planning Board.

- 3.5.1 For any sites one (1) acre or larger, during the development and construction process, wooded natural and non-wooded natural areas shall be manipulated to maintain a healthy vegetative cover to maintain the soil structure, minimize soil erosion and enhance the quality of the proposed community. In wooded natural areas, the healthy forest cover shall be retained to reduce the amount of stormwater running across the ground surface.

I am not familiar with item 3.5.1, (have we ever required topsoil be retained for reapplying after the completion of a project?), I will look more into this.

- 3.5.2 Limits of clearing shall be established in the field with construction fencing, wherever natural limits are not otherwise clearly identified. Trees to be protected during clearing operations and construction shall be clearly marked to caution operators. The developer shall notify the Tree Warden *in advance* to ensure this occurs. Impacts outside of clearing limits shall be reestablished with native species at applicant’s expense.

[From April Talon. I think item 3.5.2 about establishing limits of clearing and protecting trees should be included as part of 3.1.]

[Added per Bubar and Mower]

[Comment from Bubar and Mower: See minutes of the November 28, 2012 Planning Board meeting regarding the Peak Campus development multi-use path that begins: ...Concerning item e) Natural features, on page 3, Mr. Kelley noted the issue of how to establish the tree clearing lines, in order to avoid clearing more trees than was needed. He said it was easy enough for those lines to be laid out and established in the field by a surveyor. He suggested that there should perhaps be a note on this on the site plan. (see pages 3-4)]

Section 3.6 Waste Materials

- 3.6.1 Construction site operators shall control and properly dispose of all on-site waste, including but not limited to cut trees, stumps, debris, junk, rubbish, discarded building materials, concrete truck washout, chemicals, litter, sanitary waste and other materials. These materials may not be buried or left on the site unless specifically approved by the Durham Department of Public Works, and where appropriate, by NHDES.
- 3.6.2 If the development site is in close proximity to a waterbody, all stockpiles, concrete washout areas, chemicals, fertilizers, hazardous materials, etc., shall be located as far from the waterbody as possible and at a minimum of 50 feet away.
- 3.6.3 Applicants shall make reasonable attempts to store recyclable materials during construction either for reuse by the applicant or collection by third parties.

Section 3.7 Blasting

A Town of Durham Blasting Permit shall be obtained from the Durham Fire Department prior to conducting any blasting. A Blasting Permit shall be issued only after a Pre-Blast Structural Condition Survey and Blasting Plan has been performed. All blasting activities shall be conducted following the General Procedures and Best Management Practices, below.

- 3.7.1 Pre-Blast Structural Condition Survey and Blasting Plan. A minimum of 30 days prior to conducting any blasting, the applicant shall prepare a Pre-Blast Structural Condition Survey (“Survey”) and Blasting Plan and submit them to the Durham Fire Department for review and approval. The approved Blasting Plan shall be implemented accordingly. The Survey shall include pre-blast structural condition inspections of all existing structures and conditions on the site, adjacent to the site or in the vicinity of the site. The Survey shall extend to such structures or conditions as may be affected by the applicant's construction operations and the inspections shall be performed on all structures (including homes, foundations, driveways, roadbeds, swimming pools, wells and mobile homes) within a radius of 250 feet (or as otherwise specified by the Planning Board) of the anticipated blasting areas. The blasting contractor and the owner of the property being inspected shall sign all such inspections once completed. If an owner refuses to allow for the conducting of a pre-blast conditions inspection or sign a pre-blast conditions inspection form for whatever reasons the applicant shall note this on the form. The blasting contractor shall make at least three attempts to notify the owner of the need for such inspections; the last such attempt shall include a written notification by certified mail and appropriate contact information.
- 3.7.2 The applicant shall conduct a Survey for any property located within 1,000 feet of the anticipated blasting areas, if so requested in writing by the property owner at

least 7 days prior to the planned start of blasting. The property owner shall pay all expenses for preparing the survey.

- 3.7.3 The pre-blast structural condition inspection shall be performed in the presence of the property owner or an owner's representative and shall consist of photographs and a written description of the interior and exterior condition of each of the structures examined. Descriptions shall locate any existing cracks, damage, or other defects and shall include such information in order to make it possible to determine the effect, if any, of the construction operations on the defect. A good-quality videotape survey with appropriate audio description of locations, conditions, and defects may be used in lieu of a written form. Copies of all inspection forms and photographs shall be submitted to the Durham Fire Department and kept for a minimum of seven (7) years on file with the Durham Fire Department (unless the documentation cannot be provided to the Fire Department for some reason).
- 3.7.4 The individual conducting the inspections shall give written notice, not less than 10 days in advance, to the owner of the property concerned and tenants of the property. The notice shall state the dates on which inspections are to be made. Copies of all notices shall be provided to the Durham Fire Chief.
- 3.7.5 General Procedure. Blasting and on-site chipping or hammering (of stone) is restricted to the hours of 9:00 a.m. to 4:00 p.m. Monday through Friday. There shall be no processing of stone on site. A notice of intent to blast shall be provided at least 24 hours in advance via signage placed in places easily accessible to the public and via other media provided by the Town (such as the Town's website and Friday Updates). The applicant is encouraged (but not required) to do all blasting during the summer when the University of New Hampshire is out of session.
- 3.7.6 The applicant shall hold a meeting with members of the neighborhood prior to starting any blasting, at an appropriate time and place determined by the applicant. The applicant shall give a minimum of three days' advance notice of said meeting. The applicant shall notify:
- a) all abutting property owners who were notified of the development at the outset;
 - b) all parties whose property is located within 250 feet of any area where blasting will occur; and
 - c) the Planning Department.

3.7.7 Best Management Practices for Blasting. All activities related to blasting shall be performed in accordance with the following New Hampshire Department of Environmental Services (NHDES) Blasting Best Management Practices (BMPs) to prevent contamination of groundwater. These include preparing, reviewing and following an approved blasting plan; proper drilling, explosive handling and loading procedures; observing the entire blasting procedures; evaluating blasting performance; and handling and storage of blasted rock.

If the NHDES BMPs are updated subsequent to the adoption of these Site Plan Regulations, those subsequent BMPs shall become the standards.

1. Loading practices. The following blasthole loading practices to minimize environmental effects shall be followed:
 - a) Drilling logs shall be maintained by the driller and communicated directly to the blaster. The logs shall indicate depths and lengths of voids, cavities, and fault zones or other weak zones encountered as well as groundwater conditions.
 - b) Explosive products shall be managed on site so that they are used in the borehole, returned to the delivery vehicle or placed in secure containers for off-site disposal.
 - c) Spillage around the borehole shall either be placed in the borehole or cleaned up and returned to an appropriate vehicle for handling or placement in secured containers for offsite disposal.
 - d) Loaded explosives shall be detonated as soon as possible and shall not be left in the blastholes overnight, unless weather or other safety concerns reasonably dictate that detonation should be postponed.
 - e) Loading equipment shall be cleaned in an area where wastewater can be properly contained and handled in a manner that prevents release of contaminants to the environment.
 - f) Explosives shall be loaded to maintain good continuity in the column load to promote complete detonation. Industry accepted loading practices for priming, stemming, decking and column rise must be attended to.
2. Explosive Selection. The following BMPs shall be followed to reduce the potential for groundwater contamination when explosives are used:

- a) Explosive products shall be selected that are appropriate for site conditions and safe blast execution.
 - b) Explosive products shall be selected that have the appropriate water resistance for the site conditions present to minimize the potential for hazardous effect of the product upon groundwater.
3. Prevention of Misfires. Appropriate practices shall be developed and implemented to prevent misfires.
4. Muck Pile Management. Muck piles (the blasted pieces of rock) and rock piles shall be managed in a manner to reduce the potential for contamination by implementing the following measures:
- a) Remove the muck pile from the blast area as soon as reasonably possible.
 - b) Manage the interaction of blasted rock piles and stormwater to prevent contamination of water supply wells or surface water.
5. Spill Prevention Measures and Spill Mitigation. Spill prevention and spill mitigation measures shall be implemented to prevent the release of fuel and other related regulated substances to the environment. The measures shall include at a minimum:
- a) Storage of fuel and other regulated substances requirements shall include at a minimum:
 - i. Storage on an impervious surface;
 - ii. Secure storage areas against unauthorized entry;
 - iii. Label regulated containers clearly and visibly;
 - iv. Inspect storage areas weekly;
 - v. Cover regulated containers in outside storage areas;
 - vi. Wherever possible, keep regulated containers that are stored outside more than 50 feet from surface water and storm drains, 75 feet from private wells, and 400 feet from public wells; and
 - vii. Secondary containment is required for containers containing regulated substances stored outside, except for on premise use heating fuel tanks, or aboveground or underground storage tanks otherwise regulated.
 - b) The handling of fuel and other regulated substances requirements shall include at a minimum:

- i. Except when in use, keep containers containing regulated substances closed and sealed;
 - ii. Place drip pans under spigots, valves, and pumps;
 - iii. Have spill control and containment equipment readily available in all work areas;
 - iv. Use funnels and drip pans when transferring regulated substances; and
 - v. Perform transfers of regulated substances over an impervious surface.
- c) Training of on-site employees and the on-site posting of release response information describing what to do in the event of a spill of regulated substances.
- (d) Fueling and maintenance of excavation, earthmoving and other construction-related equipment will comply with the regulations of NHDES. [Note that these requirements are summarized in NHDES’s publication WD-DWGB-22-6 “Best Management Practices for Fueling and Maintenance of Excavation and Earthmoving Equipment” or its successor document.]

3.7.8 Upon completion of all earth/rock excavation and blasting work, the applicant shall conduct a post-blast condition inspection of any properties, structures, and conditions for which complaints of damage have been received or damage claims have been filed. Notice shall be given to all interested parties so they may be present during the final inspection. Records of the final inspection shall be distributed in the same manner as the original pre-blast structural condition inspection.

Article 4. Cultural Resources

Section 4.1	General Guidelines
Section 4.2	Archaeological Resources
Section 4.3	Cemeteries
Section 4.4	Stone walls

Section 4.1 General guidelines

[Comments from Bubar and Mower: The Planning Board should not be the arbiter of significance. IF resources are identified, they should be reviewed by the Historic District/Heritage Commission.]

- 4.1.1 The applicant is encouraged to retain architecturally or historically significant buildings, structures, and resources. This includes the following resources:
- a) Those that are listed or determined eligible to be on the National or State Registers of Historic Places;
 - b) Those that were constructed prior to 1930 and that in the reasonable opinion of the Planning Board possess significant architectural value due to quality and integrity of condition, overall design, detailing, materials, craftsmanship, style, or form; and
 - c) Those that were constructed prior to 1930 and that in the reasonable opinion of the Planning Board are closely associated with the lives of persons or events important in the history of the Town of Durham.
- 4.1.2 The Planning Board may refer items to the Historic District/Heritage Commission for its recommendation at the next regularly scheduled meeting, but applications shall not be unduly delayed when such a recommendation is sought.

[Comments from Bubar and Mower: The HDC might be willing to meet at an earlier date. Thus, we suggest: If such resources are identified, the applicant shall immediately notify the Town Planner and the Chair of the Historic District/Heritage Commission.]

Section 4.2 Archaeological Resources

Where significant archaeological resources exist or are believed to exist on a site, the applicant shall mitigate the impact upon those resources, by renovating, excavating, or providing a buffer around the resource, or by other appropriate means.

Section 4.3 Cemeteries

- 4.3.1 Applicants shall comply with RSA 289:3 III, as amended. As of the date of the adoption of these Regulations, the RSA reads as follows:

“...[N]o new construction, excavation, or building shall be conducted within 25 feet of a known burial site or within 25 feet of the boundaries of an established burial ground or cemetery, whether or not such burial site or burial ground was properly recorded in the deed to the property, except when such construction, excavation, or building is necessary for the construction of an essential service, as approved by the governing body of a municipality in concurrence with the cemetery trustees, or in the case of a state highway, by the commissioner of the department of transportation in concurrence with the cemetery trustees.”

4.3.2 The applicant shall restore or renovate existing cemeteries on the subject site situated in proximity to the proposed site work, if reasonably deemed appropriate by the Planning Board. At its reasonable discretion, the Planning Board may require buffering between the development and an existing cemetery, beyond that stipulated in the RSA, above, in order to mitigate the visual impact of the development on visitors to the cemetery.

Section 4.4 Stone Walls

4.4.1 RSA 472:6 Removing or Altering Boundary Markers shall apply to stone walls situated along property boundaries.

4.4.2 In addition, when it is necessary to remove portions of a stone wall that is not situated along property boundaries to accommodate development, the applicant shall preserve remaining portions to the extent feasible. Applicants are encouraged to:

[From Bubar/Mower]

- a) relocate stone walls that must be removed to another location on site;
- b) renovate and rebuild older stone walls; and
- c) build new stone walls as and where appropriate. Appropriate locations for relocated or rebuilt stone walls may include the front property line, the edge of travel ways (provided they would not interfere with sight distance or maintenance requirements), side lot lines, the edge of the development, and open space areas.

Article 5 Landscaping and Screening Standards

Section 5.1	Purpose
Section 5.2	General Objectives
Section 5.3	General Requirements
Section 5.4	Plant Selection
Section 5.5	Planting Requirements
Section 5.6	Landscaped Areas, in General
Section 5.7	Landscaping Along Public Rights of Way
Section 5.8	<u>Perimeter Landscaping Parking Lots</u>
Section 5.9	Screening
Section 5.10	Protection of Trees and Other Vegetation During Construction
Section 5.11	Monitoring, Maintenance, and Replacement of Landscaping and Screening
Section 5.12	Irrigation
Section 5.13	Innovative Landscaping Practices
Section 5.14	Definitions

Section 5.1 Purpose

The purpose of landscaping and screening standards is to:

*[Bubar and Mower comments: The current ZO Article is extremely outdated. Karen Edwards wrote in an email to Mower that “When the Zoning Ordinance was completely re-done in Feb. of 1990 the Landscaping Chapter was added taking the place of what use to be a chapter on Earth Removal Regulations.” It would be good to incorporate an overall purpose such as the following from the Georgia Urban Forest Council’s “Urban Forestry Five-Year Plan”:
Promote tree canopy and longevity at the landscape scale through the green infrastructure approach. <http://www.gufc.org/about/urban-forestry-five-year-plan/>]*

1. help integrate the built environment with the natural environment;
2. enhance the quality and appearance of development;
3. preserve open space and natural habitats;
4. control excessive stormwater runoff;
5. prevent soil erosion and pollution of water bodies;
6. reduce noise, wind, glare and dust;
7. provide shade *and windbreaks to increase energy conservation in buildings;*

[John Parry]

8. establish an attractive streetscape adjacent to roadways;
9. screen vehicular headlights in parking areas;
10. promote public safety by guiding vehicles and pedestrians within a site;
11. provide areas for snow storage;
12. enhance privacy;
13. enhance the health and survivability of selected landscaping materials
14. protect the value of surrounding property; and
15. protect and enhance the natural beauty, environment, and green space within the Town of Durham.

16. increase property values

[John Parry]

Section 5.2 General Objectives

Landscaping shall be provided that:

1. Defines areas for pedestrian and vehicular circulation;
2. Breaks up the mass of buildings and impervious areas;
3. Incorporates existing native vegetation and other natural features into the site design;
4. Manages and controls stormwater at its source to minimize off-site impacts;
5. Conserves water and reduces outside water use on the site;
6. Provides buffers between incompatible land uses or sites;
7. Softens the visual impact of architectural and structural materials;
8. Minimizes the introduction of pollutants to the environment.

Section 5.3 General Requirements

- 5.3.1 Areas not occupied by buildings or other structures, parking, loading, access ways landscaping materials, natural vegetation or other natural features shall be landscaped to provide visual relief from expanses of paving and buildings while providing shade and stormwater management benefits.

[Comments from Bubar and Mower: 5.3.1 and 5.3.7 should be identical in their first parts.]

- 5.3.1 Areas not occupied by buildings or other structures, parking, loading, access ways or natural vegetation or other natural features shall be left in their natural vegetated state where desirable or landscaped to provide visual relief from expanses of paving and buildings while providing benefits such as shade and stormwater management benefits.

*[*John Parry. Same section]*

- 5.3.2 At a minimum, all yards, setbacks, and areas of open space as required by the Zoning Ordinance shall retain existing natural features or be landscaped as required herein.

- 5.3.3 Landscaped areas shall consist of a combination of grass, flowers, vines, groundcovers, shrubs, and/or trees, as appropriate. All planting areas shall be landscaped with a combination of climate tolerant plant material and protective groundcover and bark mulch. No area shall be left to remain as bare soil.

[John Parry]

- 5.3.4 Sites shall be designed to retain and enhance the existing natural features as reasonably determined by the Planning Board.
- 5.3.5 Existing invasive plant species on the subject property shall be removed and destroyed. The Planning Board may reduce or disregard this requirement, where appropriate, based upon the location and area of invasive species relative to the area to be developed. Applicants shall refer to the current *Prohibited Invasive Plant Species List* maintained by the NH Department of Agriculture.

Dead trees that pose a high risk to people or property should be removed prior to construction. Existing live trees with severe defects that appear to be at high risk for failure should be inspected by a certified arborist. If confirmed to be an extreme risk they should be removed as soon as practical.

[John Parry]

- 5.3.6 Existing topography shall be maintained unless otherwise approved by the Planning Board.
- 5.3.7 Any areas disturbed during construction that will not be occupied by buildings or other structures, parking, loading, access ways, or landscaping materials natural vegetation, or other natural features shall be replaced with a minimum of 6 inches of suitable topsoil and shall be replanted according to the requirements herein.

[Comments from Bubar and Mower: 5.3.1 and 5.3.7 should be identical in their first parts.]

- 5.3.8 Plant material and landscape maintenance procedures ~~that shall~~ incorporate water conservation techniques (i.e., xeriscaping) are preferred.

[Comments from Bubar and Mower: Low Impact Design and water conservation support the Council goal of sustainability and the Town's efforts to manage stormwater and our drinking water supply. (Water used for landscaping comes from that drinking water supply, which, as the Board knows, can be challenged.)]

- 5.3.9 All local and state requirements for yards and sight distance shall take precedence for selection and placement of landscaping features, as appropriate.
- 5.3.10 No plantings shall be placed where they may interfere with existing or proposed sewer, water, natural gas lines, or power/utility lines, or where they will inappropriately block signs or lighting.

[John Parry]

- 5.3.11 The front yard landscaping area may contain any of the following:
- a) Public utility easements and open surface drainage easements that do not occupy more than thirty (30) percent of the required landscaped area. Such areas should be planted with perennials or groundcover in order to not interfere with utility connections;
 - b) Underground utility connections and transformers, provided that they do not encroach more than five (5) feet into the required landscaped area. Such equipment shall be landscaped to soften the visual impact.

[John Parry. Ideally encourage locating underground utilities in the same trench to reduce disturbance to site]

- 5.3.12 Applicants shall incorporate Low Impact Development (LID) design practices and technologies in all aspects of the site's landscaping.
- 5.3.13 Zoning Ordinance. Until such time that Article XXII – Landscaping, in the Durham Zoning Ordinance, is removed from the Zoning Ordinance, wherever any provision in these regulations is inconsistent with a provision in the Zoning Ordinance, the stricter provision shall apply. A landscape plan, developed by a landscape architect or other qualified professional, shall be completed and approved by the planning board prior to installation.

[John Parry]

Section 5.4 Plant Selection

The following standards shall apply.

- 5.4.1 Trees shall be selected for growing habits that are appropriate for the location. Consideration shall be given to rooting space, crown height and canopy spread at maturity in order not to interfere with structures, sidewalks, utility lines (above- and below-ground), signs, lights, and other elements.

5.4.2 Soil tests shall be performed and serve as reference for plant species selection.

[Comments by Bubar and Mower: John Parry noted in correspondence regarding the Peak Lodges plantings near the retaining wall that “I would suggest 2.5 to 3.5 inch caliper trees (hardwoods) or 7 – 9’ tall (for conifers). As you get much bigger than that a larger % of the root system is left behind in the nursery, and we find that smaller trees do better and catch up with the big trees.”]

- 5.4.1 Deciduous trees, at the time of planting, shall be fully branched and have a minimum caliper of 2 inches.

[Comments by Bubar and Mower: John Parry noted in correspondence regarding the Peak Lodges plantings near the retaining wall that “Ideally, someone should check the soil types where trees will be planted - A soil test might help.. The species selected should be based in part on the soil and drainage. If the species is not well suited to the soil, than it will not grow well, and will make a poor buffer. Used to get soil tests from Cooperative Extension. Not sure if they still do it, but we could start there.”]

- 5.4.2 Evergreen trees, at the time of planting, shall be fully branched and have a minimum height of 5 feet.

[Comments by Bubar and Mower: John Parry noted in correspondence regarding the Peak Lodges plantings near the retaining wall that “I would suggest 2.5 to 3.5 inch caliper trees (hardwoods) or 7 – 9’ tall (for conifers). As you get much bigger than that a larger % of the root system is left behind in the nursery, and we find that smaller trees do better and catch up with the big trees.”]

- 5.4.3 Shrubs, at the time of planting, shall be fully branched and have a minimum height of 2½ feet.

[John Parry. May be limiting. Some shrubs are intended to be shorter or even ground covers. Some shrubs may start out smaller.]

- 5.4.4 All proposed plantings shall be appropriate for the soils, drainage, hardiness zone, climate and other conditions of the site. Particular attention shall be paid to tolerance to potential road salt and other deicing treatments.

[renumber correctly]

- 5.4.2 Plant materials shall be of specimen quality conforming to the most recent version of the American Standards for Nursery Stock (ANSI) ~~Standard for Nursery Stock~~ and be pest free. Plant materials shall be guaranteed for at least two growing seasons.

[John Parry]

- 5.4.3 Unless otherwise approved, trees shall be selected from the approved list of tree species, included in Appendix #

[John Parry. A list would need to be developed.]

- 5.4.4 Species on the current Prohibited or Restricted Invasive Plant Species Lists maintained by the NH Department of Agriculture shall not be planted.
- 5.4.5 Species shall not be planted that are a known host for an insect or disease pest of concern for the region.

[John Parry]

~~5.4.6 — Trees shall be selected for growing habits that are appropriate for the location. Consideration shall be given to rooting space, crown height and canopy spread at maturity in order not to interfere with structures, sidewalks, utility lines (above- and below-ground), signs, lights, and other elements.~~

[Bubar and Mower]

5.4.6 Trees shall be selected for growing habits that are appropriate for the location, and for the intended function (privacy buffer, shade, etc.). Consideration shall be given to rooting space, crown height and canopy spread at maturity in order not to interfere with structures, sidewalks, utility lines (above- and below-ground), signs, lights, and other elements.

*[*John Parry for same provision]*

Section 5.5 Planting Requirements

The following standards shall apply:

- 5.5.1 Planting holes for trees shall be at least two times the width of the root ball and shall be no deeper than the root ball.

[John Parry. Provide a general reference for tree planting specs such as “trees and shrubs should be planted using the commonly accepted industry standards, as described in the most recent edition of Tree Planting Best Management Practices – International Society of Arboriculture”. Some of these basic practices include]

- 5.5.2 Shrubs shall have a planting hole at least three times the width of the root ball and shall not be deeper than the root ball itself. Plant material shall be watered and mulched with 2” – 4” of bark mulch at time of planting.

Plant material shall be installed during appropriate planting seasons unless otherwise approved (March – Mid June or Mid September – December).

[John Parry]

- 5.5.3 Trees planted in dense urban development within sidewalks, parking lots, pavement or other hard scape require special design techniques to insure they will be healthy. Adequate drainage, irrigation, rooting space, soil volume and protection from human activity must all be considered. Planning for these Tree spaces or “boxes” should be included in the conceptual design phase so that adequate space is allocated, and it is incorporated into the infrastructure. This is especially true when there is a desire to establish trees that will have a medium to large mature size (over 30 feet in height). Where appropriate, existing standards for infrastructure design (such as the Architectural Design Standards for Tree Planting in Urban Areas”) shall be consulted and appropriate specifications determined by the Planning Board.

[John Parry]

When appropriate for trees placed within sidewalks, porous pavers, tree box filters grates, or other appropriate devices, shall be used to prevent excessive soil compaction enhance stormwater management and to add interest to the pavement. If Tree grates are used they shall be fabricated of a strong, durable material, installed flush with grade, and provide an expandable center opening to allow for continued tree growth.

[Bubar and Mower]

- 5.5.4 Where appropriate, tree guards shall be installed to protect the base of the tree from street activity.
- 5.5.5 Tree wells over 6 inches deep or other landscape features that have the potential to present a tripping/falling hazard to the public shall have grates, fences or other protective measures installed.

[John Parry]

Section 5.6 Landscaped Areas, in General

- 5.6.1 Side slopes for all landscaped areas shall not exceed thirty-three and one third (33-1/3) percent (3:1 slope) and shall be appropriately stabilized with vegetation.
- 5.6.2 Within parking areas, landscaped islands shall be provided between adjacent rows of parking and between groups of parking spaces in such a way as to break up large contiguously paved areas and thus provide shade and interest for pedestrians.

[John Parry. Include a ratio here? Such as 1 planting island per 20 parking spaces.]

- 5.6.3 Landscaped areas shall be a minimum of 6 feet wide or as determined appropriate by the Planning Board in order to provide adequate room for vegetative root growth and to not interfere with access to vehicles, lines of sight, and pedestrian travel. *For trees with a mature height of under 30 feet, a minimum width of 4 feet is adequate.*

[John Parry]

- 5.6.4 Landscaped areas shall consist of a combination of large and small trees, shrubs, perennial and/or annual flowers, and/or groundcover, as appropriate.
- 5.6.5 Landscaped areas shall be designed with a variety of plant species that provide seasonal variety and biodiversity, such as:
- a) no more than 10% of any species shall be planted;
 - b) no more than 20 % of any genus shall be planted; and
 - c) no more than 30 % of any family shall be planted.

[Comments from Bubar and Mower: The above specifications were provided by John Parry, urban forester with the U.S. Forest Service, and reflect his professional experience of working with towns across the Northeast. The rationale for this variety is to protect plants from blight or disease and thus promote longevity. In addition, John notes that the over-use of some species may become problematic, e.g., the pear trees planted at many sites in 2014 are considered by some to be invasive. We would also remind the Board of the 1960s Dutch elm disease decimation of elm trees that had lined Main Street and Graced Mill Road.]

*[***From Town Planner. I encourage the board to look seriously at this proposal, and whether the costs would outweigh the benefits. It would be rather burdensome to require landscape plans to meet this requirement and be time consuming for the staff to review this. It would seem more effective to require a reasonable mix of species and rely on the applicant, staff, and boards to consider the proposed mix.]*

- 5.6.6 Landscaping around building entrances, near parking spaces, and along pedestrian and bicycle ways shall not interfere or block lines of sight, restrict travel, or present a hazard to personal property.
- 5.6.7 Any landscaping located within the safe site distance of a driveway entryway, as defined by AASHTO standards, shall be no more than 3 feet at mature height.
- 5.6.8 Low Impact Development (LID) techniques such as raingardens, bioretention systems, tree box filters, and similar stormwater management landscaping techniques shall be incorporated into landscaped areas and may replace required landscaping components as approved by the Planning Board with the goal of conserving water and achieving at minimum the following:

- 1) Avoidance of extensive grading
- 2) Retention of as much of the original vegetation as possible and incorporation into site design
- 3) Control of airborne particulates such as soot and dirt
- 4) Enhancement the public or private streetscape
- 5) Screening of service structures (dumpsters, etc.)
- 6) Visual, impervious cover, and climatic relief from broad expanses of pavement and define areas for pedestrian and vehicular circulation
- 7) A pedestrian-friendly environment

[From Jamie Houle]

Section 5.7 Landscaping Along Public Rights of Way

- 5.7.1. Where feasible ~~or~~ and as required by the Planning Board, street trees may be planted along public rights-of-way with the goal of providing a tree-lined street.

[Bubar and Mower]

- 5.7.2 Trees shall be spaced at a minimum of 1 tree per 30 lineal feet (50 feet for trees with a large mature height) or as specified by the Planning Board to accommodate the mature crown spread of the tree. In most cases, deciduous trees – larger shade trees where space permits or smaller ornamental/fruit trees where space does not permit – should be used. Trees shall not interfere with buildings, overhead utilities, pedestrian travel, or access to on-street parking spaces.
- 5.7.3 Landscaping strip. Along Route 4, Route 108, Route 155A/Mast Road, and the Old Concord Turnpike, but not including any property located in the five core commercial zoning districts (C, CB, CC, CH, and PO), there shall be established a front landscaping strip 25 feet wide, extending onto the property from the front right of way/property line. In addition to the trees specified immediately above,

the landscaping strip shall be laid out with an appropriate combination of those trees, shrubs, hedges, planted berms, fences, brick or stone walls, and other landscaping elements, as determined by the Planning Board.

[Joe Moore. As I reviewed the proposed Durham Site Plan Regulations, I note that Route 155 (a.k.a, Lee Road) was not included in Section 5.7.3 pertaining to Landscaping Strip buffers. Since other major highways within Durham are included in this section, I assume the omission of Rte 155 was an oversight and request that it be added to the Regulations.]

[Comments from Bubar and Mower: The delineation of “front right of way/property line” is a tricky measure. It is our understanding that this may result in a variation of widths of the landscaping strip. Is there a better way to define this starting point—or the width of the strip? Note that Portsmouth’s standards for this section read: Along [street] the front yard shall include a landscaped buffer strip with a depth of at least one-third of the distance between the street right-of-way and any building and extending across the width of the lot except for driveways, sidewalks and bicycle paths. The buffer strip shall be in addition to the street trees required herein and shall include a combination of trees and lower-level elements such as shrubs, hedges, fences, planted berms, or brick or stone walls.]

Section 5.8 Parking Lots Landscaping and Screening

[Jamie Houle. These guidelines are fine however only address visual aesthetics. Management of stormwater runoff as close to the source as possible should be an equal objective. This engenders multiple benefits from landscaping features. These requirements should be reviewed with requirements in article 15 Stormwater Management Standards for consistency.]

[Comments from Bubar and Mower: Taken together, these subsections should provide for safe pedestrian walkways that break up traditional “seas of asphalt” and include sufficient visual interest to encourage walking. In addition, these measures mitigate against the heat island effect often created by extensive parking lots and abutting buildings. Trees protect a site from incoming solar radiation and increase evapotranspiration, which decreases the air temperature.]

- 5.8.1 The requirements of this subsection, do not apply to parking areas situated to the rear of the main building, *if it is not visible from a public way*, or beyond the line running even with the rear wall of the building. For smaller parking lots/areas, such as those with fewer than 6 vehicle spaces, the Planning Board may adjust these requirements as appropriate.

[Comments from Bubar and Mower: Both rear elevations and rear yards are often visible in the commercial core. To the extent that we wish to encourage a pedestrian-friendly downtown, interest and aesthetically pleasing views should be required.]

- 5.8.2 All off-street parking areas shall be screened from the public right-of-way to provide substantial visual screening up to a height of 3-1/2 feet above grade, excluding sight triangles at vehicular entrances and exits. A moderately dense hedge composed predominantly [John Parry] of evergreen small trees or shrubs shall be planted that is reasonably expected to provide this screening within one year. Alternatively, a combination of plantings, mounds, berms, walls, and fences may be used to provide this screening. This screening will often in conjunction with the front landscaping strip.

[Bubar and Mower.<<NEEDS CLARIFICATION. ADD: However, when Comments from Bubar and Mower: r]

[John Parry. I would not limit species to ever green shrubbery. Maybe say and appropriate mix of species as determined by the PB?]

- 5.8.3 Landscaping should be used to delineate vehicular and pedestrian circulation patterns within parking lots and throughout the site and to provide visual interest.

[Comments from Bubar and Mower: To the extent that we wish to encourage a pedestrian-friendly downtown, the requirement should extend beyond delineation to interest and an aesthetically pleasing experience..]

- 5.8.4 Trees should be distributed throughout the parking lot as evenly as practical, in order to provide optimal canopy coverage and shading.
- 5.8.5 A landscaping peninsula shall be placed at the end of each parking row (such a peninsula is also referred to as an “end cap”), in line with the adjoining parking spaces, measuring at least the same dimensions as the adjoining parking spaces, wherever the row of parking spaces is adjacent to a perpendicular travel way. Each peninsula shall be planted with one shade tree, or one ornamental tree if use of a shade tree is not practical, for lack of space for roots. Where two peninsulas back up to one another, there may be space for only one ornamental tree (rather than a shade tree) near the tip of each peninsula.

[Jamie Houle. This may be at odds with other sections of this regulation and should be updated or eliminated.]

- 5.8.6 There shall be no more than four continuous parallel parking rows on the interior of the parking lot (i.e. parking rows along the perimeter of the parking lot are not situated on the interior) without installation of a landscaped median separating those parking rows from any additional parking rows. The landscaped median shall be at least 6 feet wide and shall be parallel to and run the same length as the adjacent parking rows. See the diagram.
- 5.8.7 The landscaped median, referred to in Subsection 5.8.6 7), above, when included, shall be planted with evergreen shrubbery and at least one ornamental or shade tree for every 30 linear feet of the median. The landscape median shall be planted with sufficient trees and shrubs in order that, at maturity (defined herein to be 5 years from installation), at least 25% of the area of the median, as looked down upon from above, would be covered by the canopies/crowns of the trees and shrubs.

[Jamie Houle. This may be at odds with other sections of this regulation. It is unclear what “7)” refers to as numbers may have changed. This section should be updated or eliminated as it is redundant or conflicting to other sections.]

- 5.8.8 Trees and shrubs used in parking lots ~~should~~ shall be selected to avoid “messy” species that may drop significant fruit, flowers, sap, and other materials onto vehicles, and to be as salt-tolerant as necessary for the particular location.

[Bubar and Mower]

Species selected may need to tolerate hotter drier conditions in expansive pavement areas and tolerate salt spray and drainage.

[John Parry]

- 5.8.9 Foundation Planting Strip. There shall be a minimum 4 foot wide foundation planting strip between the building and any parking lot or driveway situated on the front or side of the building. The foundation bed shall be planted with appropriate landscaping materials, including grass, shrubbery, flowers, and mulch, as determined by the applicant. Use of ornamental trees is encouraged where practical. Where there is a sidewalk alongside the building, the foundation planting strip may be situated on either side of the sidewalk. A continuous foundation planting strip is preferred but it need not be continuous where there are projecting building elements, such as entrances, bays, and utilities.
- 5.8.10 A minimum of five percent (5%) of the total parking and driveway area, in addition to a buffer strip of at least ten-feet in width abutting a public right-of-way, shall be landscaped.

- 5.8.11 Parking lots shall be broken up into smaller parking areas with landscaping features and bioretention systems. The total parking area required shall be broken into sections not to exceed forty (40) spaces unless otherwise approved by the Planning Board.
- 5.8.12 All islands, peninsulas, and medians required in the parking areas shall be more or less evenly distributed throughout such parking areas. The distribution and location of landscaped areas may be adjusted to accommodate existing trees or other natural features so long as the total area requirement for landscaped islands, peninsulas, and medians for the respective parking area is satisfied. All landscaped islands, peninsulas, and medians shall be a minimum of ~~six~~ nine feet in width or as necessary to provide adequate room for vegetative root growth and in order to not to interfere with access to vehicles, lines of sight, pedestrian travel, or the long-term health of the vegetation. Islands and shall be separated from the parking area by adequate curbing or tire stops. The design and use of islands for bioretention systems shall meet Low Impact Development (LID) best management practices (BMPs). Some islands shall be used to provide pedestrian walkways.

[Comments from Bubar and Mower: Durham has allowed the planting of trees on commercial properties with inadequate room for root growth, and decades later those trees remain stunted or have died. For example, the medians in the parking lot of the Mill Plaza are approximately 9 feet wide; trees planted decades ago have either died or are stunted.]

- 5.8.12 All islands, peninsulas, and medians required in the parking areas shall be more or less evenly distributed throughout such parking areas. The distribution and location of landscaped areas may be adjusted to accommodate existing trees or other natural features so long as the total area requirement for landscaped islands, peninsulas, and medians for the respective parking area is satisfied. All landscaped islands, peninsulas, and medians shall be a minimum of eight feet in width. All islands, peninsulas, and medians shall be depressed and may be associated with curb cuts allowing sheet flow to pond to a maximum depth of 8" in the median. Water quality swales or rain garden beds (if sheet flow is allowed) will be designed to promote detention time and infiltration. Soils must be designed for infiltration and evaluated for need of amendments. Overflow contingencies shall be provided and plumbed to adjacent drainage network if necessary. and shall be separated from the parking area by adequate curbing or tire stops. The design and use of islands for bioretention systems shall meet Low Impact Development (LID) best management practices (BMPs). Some islands shall be used to provide pedestrian walkways.

*[*Jamie Houle. An alternative approach to this same provision – 5.8.12]*

~~5.8.13 — There shall be a six-foot-high solid screen composed of evergreens or fencing when bordering or adjacent to a residential zone.~~

[Bubar and Mower]

5.8.13 — There shall be a six-foot-high solid screen composed of evergreens or fencing when bordering or adjacent to a residential zone, unless the topography or other features of the abutting properties require greater screening.

[Comments from Bubar and Mower: These two subsections (5.9.1 and 5.8.13) perhaps should be combined. Note: If a commercial property sits significantly higher or lower than an abutting residential property, six feet is unlikely to provide adequate screening.]

[John Parry. (Comment on original language.) “I would be a little more flexible on this to allow for species diversity and aesthetic, such as “a screen of appropriate height, density and species composition approved by the PB. 5.9.3 below sounds good.”]

5.8.14 Corner clearance, as defined in Section 175-7 of the Durham zoning ordinance, shall be observed regarding all landscaping or screens.

Section 5.9 Screening

5.9.1 Where nonresidential uses and/or off-street parking facilities abut a vacant lot in a residential zone or an existing residential use, the perimeter shall be screened to provide physical and visual separation from the residential zone or use.

5.9.2 Screening ~~devices~~ measures consisting composed of trees, shrubs, berms, walls, and/or fences shall be installed to a height of 6 feet, or as specified by the Planning Board. A wall or fence shall be placed on the exterior side of any landscaping unless otherwise approved by the Planning Board with the more attractive/”better” side facing abutters, if requested by the abutter.

[Bubar and Mower.]

[Town Planner: The better side should face the abutters as default unless requested otherwise by the abutter.]

5.9.3 Natural screening shall consist of evergreen shrubs and/or trees planted in a line to form a continuous screen ~~and growing that will grow to a minimum~~ height of 6 feet within 3 years. Additional evergreen shrubs/trees may be planted in a second, staggered line to form a screen together with the first line.

[Bubar/Mower]

- 5.9.4 All sites shall incorporate screening measures to prevent the headlights of vehicles from shining on adjoining residential areas.
- 5.9.5 All mechanical installations and equipment, solid waste collection equipment, pump stations, outdoor storage, and similar items shall be screened or softened with landscaping that is appropriate for the location.
- 5.9.6 The Planning Board may stipulate additional buffers due to unusual impacts generated, including odor, noise, glare, dirt, dust, vibration, etc.

5.9.7 Where appropriate, natural wooded or vegetated areas existing on property boundaries should be preserved as a visual buffer to adjacent areas. To be an adequate buffer and maintain the area as a viable natural ecosystem, the buffer should be at least 50 feet wide, preferably wider. Larger trees on the edge of this buffer, should have root systems protected from damage

[John Parry. Too narrow and a wooded strip is more exposed to sun, wind, invasive invade, etc.]

Section 5.10 Protection of Trees and Other Vegetation During Construction

~~*5.10.1 Existing landscaping, trees, and planting materials to be retained shall be protected with a snow fence or other durable method as necessary during construction to avoid damage to root zones as well as above ground vegetation. The fencing shall remain in place until the construction activity in the vicinity of the plant materials is completed.*~~

~~*5.10.2 Pedestrian, vehicular, and other traffic shall be kept away from trees to avoid soil compaction. Vehicles and equipment may not be parked, and materials may not be stockpiled under the canopy nor in close proximity to trees during construction.*~~

*5.10.1. Assess and Map Existing Forested Areas**

Identify general areas on the ground where proposed construction will occur. Make sure that the developer also identifies areas where disturbance will occur, such as travel lanes, storage areas, etc. In those proposed construction and disturbance areas, do a general assessment to identify tree and vegetation types, size, age, and general condition. Note sensitive areas, scenic vistas, wildlife habitat, natural or cultural features, topography, water features, etc. This information should be used in developing a conceptual plan for development, so that important features can be avoided and innovative techniques can be incorporated to avoid damage.

*2. Tree Inventory **

Inventory and assess significant trees or stands of trees, such as trees with larger diameter (over 16 “ DBH), desirable species, good aesthetics, good condition, wildlife value, etc. Saving trees in groups is more effective than saving individual trees scattered over a construction site.

a. Flag trees or groups of trees which will be kept and need protection during construction. Identify those trees, and the critical rooting area needed on construction documents.

b. Alternatively, undesirable trees should also be identified, such as declining high risk trees (as identified by a certified arborist) , poor species, species intolerant of disturbance, invasives, etc. With PB approval these could be removed prior to construction to avoid conflicts.

c. Make adjustment in the site plan to leave adequate room around the desirable trees. Plan construction of footings, pavement, underground utilities, etc. to avoid critical root areas.

3. Protection Techniques for Trees*

Most of the tree root system is in the top 20 inches of the soil, and can extend out well past the branches of the tree. Construction can damage the root system by severing roots. If too much of the tree root system is removed or damaged by construction, the tree may decline or die, resulting in the loss of benefits, and possibly creating a public hazard with larger trees that could later fail.

Soil compaction caused by equipment can also be a serious problem. This is especially true on wet soils. Compacted soils have less open pore space, and hence less space for moisture and oxygen needed to sustain tree health. Even one pass with heavy equipment can cause soil compaction.

A general rule of thumb in the protection of open grown trees is to protect a circle called the critical root zone (CRZ) around the tree. The circle radius is equal to 1 foot per 1 inch of trunk diameter for tree species that are tolerant of construction impacts and 1.5 feet per 1 inch of trunk diameter for tree species that are in-tolerant. This is more critical with older trees, than young trees that recover more easily.

Create a tree protection plan to specify how trees will be protected during construction. Techniques should include; refer to “Best Management Practices for Protecting Trees During Construction – International Society of Arboriculture. Some techniques to consider include:

a. Install highly visible and sturdy fencing to keep equipment off of the critical rooting zone of trees identified to protect. Fencing should be installed around all wooded areas and individual trees where equipment may be present.

b. Where development must come close to large trees, use other techniques to protect the roots, trunk and branches such as;

i. Wrap the trunk in wooden snow fencing or other similar material to protect it from wounding from equipment.

- ii. Place a heavy layer of wood chips (6") over the root zone where equipment will pass.
- iii Use heavy timbers, vehicle mats, or steel plates over the root zone where equipment will pass.
- c. Establish and identify travel lanes, parking areas, unloading, washout and storage areas to keep vehicles, equipment and chemicals away from tree root zones.
- d. Where grading or excavation will damage roots, severing roots cleanly by hand or with power equipment (concrete saw) causes less tree damage than tearing through the root system with heavy equipment.
- e. Filling and grading should be planned so as not to change the drainage or soil moisture level in the root zone area. In changing grade, do not add more than 4 – 6 inches of fill soil over the critical root zone. This fill will affect the amount of moisture and oxygen reaching the root system.
- f. Prune any low hanging branches that are likely to be broken off by equipment.
- g. Conduct construction during the winter or dormant season, when stress to trees will be less, and there is less soil compaction and disturbance on frozen ground.
- h. Mulch and irrigate impacted trees as needed if construction occurs during the growing season.

4) Transplanting and Reforestation*

Where appropriate, the developer should provide an appropriate level of reforestation to replace desirable trees that are damaged or removed. The Town should develop a list of recommended trees for planting in urban/suburban areas. Consider transplanting smaller specimen trees on the site, that may be severely damaged by construction - it may be reasonable to move trees up to 8 inches in diameter with the right methods.

5) Communication

Communicate with all staff, sub-contractors and Town staff about the details of the tree protection plan. Erect signage at key sites and trees protection areas to raise awareness of sub-contractors.

6) Mitigation and Maintenance after Construction*

Where damage has occurred, a qualified professional (Certified Arborist) should be brought in to assess and mitigate the damage. This may include, pruning, watering, mulching, aerating or amending the soil, wound repair, etc.

7) Monitor and Evaluate*

Town staff should monitor tree protection during construction and evaluate tree health after construction. Mitigation, tree care and replacement should be required as needed.

[John Parry. Could refer to reference “Best Management Practices for Protecting Trees During Construction – International Society of Arboriculture. Note – steps above should be done by a qualified professional such as a Landscape Architect, Urban Forester, Forester or Certified Arborist]

Section 5.11 Maintenance and Replacement of Landscaping and Screening

- 5.11.2 The developer or property owner shall be responsible for the maintenance, repair, and replacement of all required landscaping and screening materials for two years from the date of planting. A written, 2-year tree maintenance plan shall be submitted that includes specifications for watering, mulching, removal of guy wires/stakes (if used), pruning, and tree protection.
- 5.11.2 All required plant materials (including mulched beds) shall be tended and maintained in a healthy growing condition reasonably free of weeds, replaced when necessary, and kept free of refuse and debris. All required fences and walls shall be maintained in good repair.
- 5.11.3 The property owner shall remove dead or diseased plant materials immediately once their condition is recognized and replace them with the same type, size, and quantity of plant materials as originally installed, unless alternative plantings are approved by the Durham Tree Warden or Planning Board.
- 10.1.9 A performance bond or letter of credit is required to insure compliance with this section and to cover maintenance for a period of two (2) years after the time of planting.

Section 5.12 Irrigation

- 5.12.1 The need for irrigation shall be minimized to the extent possible practicable through use of native drought-tolerant species and the use of landscaping that does not require permanent irrigation systems, such as xeriscaping. See Subsection 5.3.8.

[Bubar/Mower]

- 5.12.2 When irrigation is necessary to support the establishment and/or maintenance of landscaped areas, smart controllers shall be used to limit irrigation during the day and during rain events.
- 5.12.3 Where appropriate, additional water conservation features including trickle and drip lines, rain barrels, cisterns, or other water harvesting elements shall be used.

~~5.12.4 — Applicants are encouraged to use recycled water for irrigation provided the harvesting and circulation systems and water quality meet any applicable Town and State requirements.~~

[Comments from Bubar and Mower: Deleted 5.12.4 because it is not a regulation.]

5.12.5 Irrigation systems shall be installed and operated in accordance with any applicable Town standards.

Section 5.13 Innovative Landscaping Practices

5.13.1 Green Roofs. Applicants are encouraged to use roofing materials that have a Solar Reflective Index (SRI) of at least 29 (greater for roofs with a slope of 2:12 or more) or to install vegetated roofs.

[Comments from Bubar and Mower: See comment under Part I, Article 10 Definitions.]

5.13.2 Solar Orientation. Passive heating and cooling. Applicants are encouraged to incorporate landscaping techniques that help reduce energy consumption for heating and cooling of buildings on the site. Trees should be planted to provide shade on buildings and parking lots in the warm seasons and to allow solar heat during the cool seasons.

[Comments from Bubar and Mower: Solar orientation involves components other than landscaping/trees. See comment under Part I, Article 10 Definitions.]

5.13.2 Stormwater Management. When planting in urban street or sidewalk areas, incorporate techniques to use landscaping to reduce stormwater, such as stormwater tree boxes, and rain gardens.

Section 5.14 Definitions

Note that there are special definitions sections in several sections in the Site Plan Regulations, specifically: Part I, Article 10 - Definitions and Part III, Article 2 – Architectural Design Standards, Article 5 – Landscaping and Screening Standards, Article 6 – Lighting Standards, and Article 16 – Stormwater Management Standards.

The following words and terms are oriented specifically toward landscaping. However, these words and terms may be found elsewhere in the Site Plan Regulations, and may appear in more than one place (in which case, the same definition is given in both places). Wherever these words and terms are found, they shall have the meanings given below.

~~Biodiversity. Contraction of the term “biological diversity,” as defined by the Convention on Biological Diversity, meaning the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological~~

~~complexes of which they are part; this includes diversity within species, between species and of ecosystems.~~

Biodiversity. Contraction of the term “biological diversity,” as defined by the Convention on Biological Diversity, which includes diversity within species, between species, and of ecosystems. With respect to these Regulations, see General Landscaping Subsection 5.6.5 for requirements to increase plant materials’ resilience to pests and diseases and, thus, their longevity.

[Comments from Bubar and Mower: It may be appropriate to eliminate the section of the definition that is not relevant here.]

Caliper. A measurement of the tree stem diameter used for nursery stock, measured at a point 6 inches above the ground, if the resulting measurement is no more than 4 inches. If that measurement is larger than 4 inches, the desired measurement is made 12 inches above the ground.

Critical root zone (Or root save area) is the area surrounding a tree that is essential to that tree's health and survival. For a free-standing tree with no apparent root restriction, the root save area consists of a circle having a radius of one foot for each one inch of diameter at breast height of the tree.

[Comments from Bubar and Mower: See Part II, Subsection 2.2. Formal Application Content, requirement to delineate a critical root zone on site plans to protect trees during construction..]

~~*Diameter at Breast Height (DBH). A measurement of the tree stem diameter measured at a point 4 ½ feet above ground, generally used for existing trees.*~~

Diameter at Breast Height (DBH). The diameter of the main stem of a tree, or the combined diameters of a multi-stemmed tree, as measured 4.5 feet above the natural grade at the base. [SOURCE: The Atlanta Tree Commission <<http://www.atlantatreecommission.com/tree-ordinance/glossary-of-key-terms>>]

[Comments from Bubar and Mower: Replaced definition to encompass multi-stemmed trees.]

~~*Green roof. Also known as rooftop gardens, green roofs are planted over existing roof structures, and consist of a waterproof, root-safe membrane that is covered by a drainage-system, lightweight growing medium, and plants. Green roofs reduce rooftop and building temperatures, filter pollution, lessen pressure on sewer systems, and reduce the heat island effect.*~~

[Comments from Bubar and Mower: Not relevant to Landscaping, so moved to Part I, Article 10. Definitions.]

Growing season. The period of time from the last frost date in spring to the first frost date in the fall.

~~*Solar orientation. 1. Orientation of a structure in a way that encourages energy efficiency by creating optimum conditions for the use of passive and active solar strategies. 2. Orientation of a structure for controlled solar gain. 3. The relation of a building and its associated fenestration and interior surfaces to compass direction and, therefore, to the location of the sun. It is usually given in terms of angular degrees away from south, i.e. a wall facing due southeast has an orientation of 45 degrees east of south.*~~

[Comments from Bubar and Mower: Not relevant to Landscaping, so moved to Part I, Article 10. Definitions.]

Tree, ornamental. Broadleaved deciduous tree, often bearing recognizable fruit, that generally reaches a height of 15 to 30 feet at maturity.

Tree, shade. Broad-leaved deciduous tree that generally reaches a height of at least 30 feet at maturity.

Tree Size. Small: mature height under 30 feet, Medium: mature height 31 – 45 feet, Large: mature height over 45 feet.

[John Parry]

Xeriscaping. The practice of designing landscapes to reduce or eliminate the need for irrigation. Xeriscaped landscapes need little or no water beyond what the natural climate provides.

Article 6. Lighting Standards

Section 6.1	Purpose
Section 6.2	Definitions
Section 6.3	Standards

[Comments from Bubar and Mower: Could we consider including lighting curfews? Rationale: “Areas without street lights or with very low ambient light levels should consider turning off all non-emergency lighting at curfew while commercial areas or urban areas may prefer a reduction in lighting levels. A reduction of at least 30% is recommended for most uses.” See the joint International Dark Sky Association + Illuminating Engineering Society’s Model Lighting Ordinance (“MLO” User’s Guide, page 10

http://www.darksky.org/assets/documents/MLO/MLO_FINAL_June2011.pdf]

Section 6.1 Purpose

The purpose of these regulations is to promote high-quality, effective lighting designs and to avoid negative impacts. Inappropriate, poorly designed, and excessive outdoor lighting causes glare and unsafe driving conditions; adversely impacts effectiveness of lighting on adjacent properties; depresses quiet enjoyment of neighboring residential property; hampers citizens' enjoyment of the nighttime sky (causing "sky glow"); and results in unnecessary use of energy.

[Comments from Bubar and Mower: The Purpose of the Model Lighting Ordinance from the International Dark Sky Association website may be preferable <<http://www.darksky.org>>. It reads:

The purpose of this Ordinance is to provide regulations for outdoor lighting that will:

- a. Permit the use of outdoor lighting that does not exceed the minimum levels specified in IES recommended practices for night-time safety, utility, security, productivity, enjoyment, and commerce.*
- b. Minimize adverse offsite impacts of lighting such as light trespass, and obtrusive light.*
- c. Curtail light pollution, reduce skyglow and improve the nighttime environment for astronomy.*
- d. Help protect the natural environment from the adverse effects of night lighting from gas or electric sources.*
- e. Conserve energy and resources to the greatest extent possible.]*

Section 6.2 Definitions

~~Note that there are special definitions sections in several sections in the Site Plan Regulations, specifically: Part I, Article 10 – Definitions and Part III, Article 2 – Architectural Design Standards, Article 5 – Landscaping and Screening Standards, Article 6 – Lighting Standards, and Article 16 – Stormwater Management Standards.~~

[Comments from Bubar and Mower: Already in Part I, Article 10 Definitions]

The following words and terms are oriented specifically toward lighting. However, these words and terms may be found elsewhere in the Site Plan Regulations, and may appear in more than one place (in which case, the same definition is given in both places). Wherever these words and terms are found, they shall have the meanings given below.

Cone of illumination. A regular conical shaped volume situated directly below, and centered upon, a light fixture. The sides of the cone radiate out from the fixture at an angle of 80 degrees from the vertical. For wall-mounted fixtures, the cone of illumination is a half cone.

Floodlight. A light fixture that is positioned or designed to concentrate substantial light, often in a single beam, in a direction other than directly downward.

Footcandle. The measure of light falling on a surface, usually the ground. One footcandle equals the amount of light generated by one candle shining on a one square foot surface one foot away.

Full cut-off fixture. A type of fixture as defined by the Illuminating Engineering Society of North America (IESNA). The standards are incorporated under Shielding, below.

Glare. Light emitted from a fixture, where the light source is not shielded, with sufficient intensity and in a direction such that it impairs a viewer's ability to see. In extreme cases it causes momentary blindness.

Light trespass. The shining of light beyond the subject property boundary.

Section 6.3 Standards

- 6.3.1 **Design.** Lighting plans shall be designed to enhance the attractiveness, usability, comfort, and security of a site. Plans, including the design of mounting structures and fixtures, shall be designed with due consideration of setting, use, architecture, landscaping, existing trees, neighboring properties, and the character of the adjacent roadway.
- 6.3.2 **Glare.** All exterior lights shall be designed, located, installed, and directed in such a manner as to not cause glare and objectionable light trespass onto neighboring roads and properties.
- 6.3.3 **Shielding.** All lights, including those placed on building walls (e.g., wall-packs), shall be fully shielded such that the light source cannot be seen directly from any point on the same horizontal plane as the light source (i.e., a "full cut-off" fixtures). No more than 10% of the total light output (as measured in lumens) from any fixture may be directed above the cone of illumination and none of the total output may be directed above the horizontal plane that is at the same height as the fixture. At its reasonable discretion, the Planning Board may require additional shielding for lights, beyond what is described herein, to protect neighboring residential properties.
- 6.3.4 **Maximum illuminance.** Horizontal illuminance on the ground shall not exceed the following: 4 footcandles in the Residential zoning districts (RA, RB, RC and Rural), 8 footcandles in the Core Commercial Districts, (C, CB, CH, CC, and PO) and 12 footcandles in the Office Districts (DBP, OR, ORLI, and MUDOR), (except for gasoline station canopies, below).
- 6.3.5 **Property line.** Horizontal illuminance at the property line may not exceed one half (½) footcandle adjacent to a residential property nor 1 footcandle adjacent to a nonresidential property. This limitation does not apply in the vicinity of driveway entrances and exits.

- 6.3.6 Mounting heights. Light fixtures mounted on buildings shall not be placed higher than 20 feet above the ground. Light poles shall not exceed the following heights, measured from the ground to the bottom of the light fixture:
- (a) 15 feet in the Residential Zoning districts;
 - (b) 20 feet in the Core Commercial Zoning Districts;
 - (c) 25 feet in the Office Zoning Districts

[Query by Mower: Please confirm that these are reasonable heights for commercial sites abutting residential sites.]

- 6.3.7 Gas station canopies. Light levels directly under a gas station canopy shall not exceed 20 footcandles. Light fixtures mounted under canopies shall be recessed so that the lens cover is recessed or flush with the bottom surface (ceiling) of the canopy. There shall be no lighting attached to the sides or top of the canopy, nor may the sides or top of the canopy be illuminated.

~~6.3.10 Vertical lighting. Exterior lighting of buildings is discouraged except for highlighting of exceptional architecture. Illumination of any vertical surface, including building walls, shall not exceed 3 footcandles.~~

6.3.10 Vertical lighting. Exterior lighting of buildings is allowed only with express consent of the Planning Board. Illumination of any vertical surface, including building walls, shall not exceed 3 footcandles.

[Comments from Bubar and Mower: Written consent shall be required.]

- 6.3.11 Floodlighting. Floodlighting is prohibited, unless a) lights are directed toward the rear of a lot and away from the road and neighboring properties, and b) the Planning Board determines that there will be no negative impact upon motorists and neighboring properties.
- 6.3.12 Flashing lights. Flashing, blinking, and moving lights are prohibited.
- 6.3.13 Timing of lights. The Planning Board may stipulate that all unnecessary lighting (i.e., lighting not used for security) be turned off outside of business hours. Use of timers, sensors, and other energy saving devices is strongly encouraged.
- 6.3.14 Wiring. Wiring for all lighting fixtures must be placed underground.

6.3.15 Natural areas. Lighting shall be directed away from stands of trees and habitat areas in order to not to disrupt animal behavior.

6.3.16 *Abutting residential districts. Lighting on properties that abut residential zoning districts shall XXXX*

[Comments from Bubar and Mower: Language should be inserted to protect specifically abutting residences from the completely different type of lighting required by nonresidential uses, whether commercial or playing field, for example. Multi-unit dwellings may also qualify as both commercial and as residential (light producer and light receiver) in this section. For example, mounting heights, cones of illumination, shielding, and curfews (reduced lighting after a specified time of day/night) should be addressed in this language.]

6.3.16 Lamp specifications

- (a) Lamp types shall be selected for optimum color rendering as measured by their color rendering index (CRI), as listed by the lamp manufacturer.
- (b) Lamps with a color-rendering index lower than 50 are not permitted. This requirement shall not apply to decorative lighting, which may include colored lamps, such as holiday lighting.
- (c) Commercial lighting shall meet minimum IESNA illumination levels while not exceeding IESNA uniformity ratios and average illuminance recommendations.