







To unify green-industry and municipal professionals in the effort to develop functional environments that contribute to healthy, livable communities.



To advance the adoption of research-based green infrastructure policies and technologies across multiple green-industry and municipal disciplines.



Single Family Residence Zoning: RS-8 and RS-M, Urban Tier

BEST GREEN INFRASTRUCTURE PRACTICES FOR URBAN LANDSCAPES: SITE PLAN REVIEW

Looking Beyond the Landscape Plan to See the Forest for the Trees



Developing functional landscape environments that contribute to healthy, livable communities is a multi-disciplinary process, involving professionals from planning, design, regulatory, nursery, installation, and maintenance disciplines. One important element of this process is the review of development site plans. All participants in this process have a role in establishing ordinances that are the rules which govern the creation of functional green infrastructure. This brochure, as part of an overall series, seeks to describe the site plan review process as it relates to the contribution of trees and other woody plants in the landscape.

Ordinance Standards

Standards for the preservation of existing trees, installation and maintenance of new trees, need to be developed and made available to all partners in the site plan review process. These standards are typically provided in a book of ordinances. Ordinance standards are the minimum requirements to be

met in order for a project to be approved and granted occupancy. Ordinances use language such as 'you must' or 'you shall'. Allowable options or alternatives may be provided for within the ordinance. Due to the large amount of detail and variety of plant options available to serve specific ordinance

UNIFIED DEVELOPMENT ORDINANCE



requirements, a separate landscape manual is often provided, and would therefore be referenced as part of the ordinance.

When reviewing site plans, the reviewer makes correction comments to ensure that ordinance-based requirements are met, referencing applicable ordinance sections. Recommendation comments may be made but should be noted as such. Recommendations can include information regarding best management practices and plant cultural requirements, and may reference a separate landscape manual for further details.

- Other applicable details may include:
 - Pruning
 - Street tree planting location options
 - Trees and overhead utilities

The preservation and protection of qualifying existing trees, and the installation and maintenance of new trees, are important elements in the development of sustainable green infrastructure. The site plan is an important part of the overall instruction manual created and used to communicate how green infrastructure features will be established. The site plan describes how ordinance-required standards for development will be met. Review of the site plan verifies compliance with ordinance standards. Interpretation and implementation of the site plan falls on the landscape professional. While the production and review of site plans is typically associated with design and regulatory staff, it takes a multi-disciplinary approach, from plan inception to implementation, to ensure healthy, functional landscapes that meet ordinance standards.

References

Best Green Infrastructure Practices for Urban Landscapes: Plant Specifications; Green Infrastructure Alliance

Protecting and Retaining Trees: A Guide for Municipalities and Counties in North Carolina; NC Co-operative Extension

American Standards for Nursery Stock: http://americanhort.org/

City of Durham Unified Development Ordinance http://durhamnc.gov/414 and Landscape Manual http://durhamnc.gov/DocumentCenter/View/1034

City of Raleigh Unified Development Ordinance https://www.raleighnc.gov/content/extra/Books/PlanDev/UnifiedDevelopmentOrdinance/ and City Tree Manual http://www.raleighnc.gov/environment/content/ParksRec/Articles/Programs/UrbanForestry/UFDivision.html

City of Greensboro Landscaping Ordinance and Landscaping and Tree Conservation Manual http://www.greensboro-nc.gov/index.aspx?page=1779

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Details and Specifications

Details and specifications are critical components of site plans.

Installation and maintenance contractors do not typically have an ordinance on a job site for reference in determining how to implement

site plan components. It is therefore crucial that the details and specifications accurately reflect ordinance requirements. Details and specifications should also be vetted through industry professionals – do they reflect current industry standards, product availability, allow flexibility to incorporate or adapt new technologies? Providing a separate manual of details and specifications that incorporates a

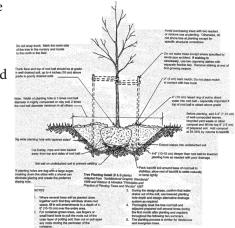


Fig. 4: Planting & staking detail

variety of acceptable details allows green infrastructure professionals the flexibility to use the detail best suited to their site while still meeting ordinance requirements. Specifications for tree planting, staking and mulching should be research-based and reflect current industry best practices. The long-term health and vitality of trees is dependent upon proper installation techniques.

Some critical details to include on any site plan are:

- Tree protection fence detail
- Critical root zone(s) of existing trees and tree protection fence detail
- Tree planting detail
- Shrub planting detail (if appropriate)
- Tree staking detail (may be incorporated into planting detail)
- Excavation for utilities (trenching/tunneling) detail

Required elements such as lists of acceptable plants, size, quality, quantity, spacing, and conflict resolution with other existing or planned elements should all be addressed in the ordinance. For additional information, refer to the NC Co-operative Extension's *Protecting and Retaining Trees: A Guide for Municipalities and Counties in North Carolina*.

Existing Conditions and Demolition Plan Sheets

The first elements of a site plan are the existing conditions and demolition plan sheets. The designer provides these to communicate which features are to remain, be relocated, or removed. A plan review checklist, used by both the designer and reviewer, provides a quick reference of ordinance-required elements. The locations, sizes and species of trees to be retained are shown on the existing conditions sheet. For small numbers of trees, a point or symbol with a species code and diameter number (with appropriate legend) should be shown. For large numbers of trees, a table showing the results of

a tree survey should be included, noting species, diameter, and tree ID number in a legend. For required landscape buffers, the existing trees and shrubs being utilized in buffer calculations should be shown, indicating whether or not supplemental planting is needed. Any tree removals should

Any tree removals should be clearly noted on the

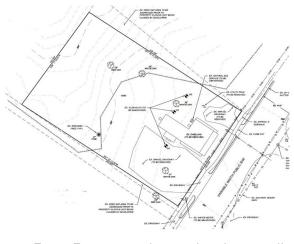


Fig. 1: Existing conditions plan showing all elements on the site

demolition sheet. Trees retained for ordinance credit should be shown with required root protection zone. Site visits and recent aerial images of the site may aide the plan reviewer with verification of existing features or note features that are not shown on the plan.

Grading & Drainage/Erosion Control & Sedimentation Plan Sheets

While addressing separate phases and requirements, the grading/drainage and erosion control/sedimentation sheets show information regarding the protection of remaining trees. Providing specific locations of remaining trees in relationship to site management structures, helps the designer and

reviewer identify and address conflicts with the grading/ drainage plan, erosion control/sedimentation plan, utility plan, and landscape plan. The reviewer should evaluate construction impact to the root protection zones, determining if the tree meets ordinance requirements for credit. Location of tree protection elements (signage, fencing, and dimensions) shown on grading/drainage, erosion control/sedimentation and utility plan sheets allow

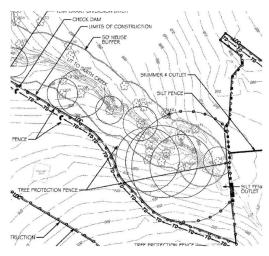


Fig. 2: Tree protection fence shown on grading & drainage plan

the reviewer to determine if ordinance requirements are being met. The reviewer will want to verify if the ordinance has the appropriate dimensional requirements for tree protection fencing.

Landscape Plan Sheet

The landscape plan contains many similar features as on previous plan sheets, such as existing trees that will remain on site, location of overhead and underground utilities, hardscape features, and street lighting. The plan should show sight distance triangles and sign locations to ensure plantings will not conflict with visibility of signs or vehicles. To ensure minimum planting conditions (e.g., width of planting strip, square footage, soil volume, etc.) are provided some ordinance standards are needed. All ordinance required landscaping should be shown. All other landscaping, including

existing vegetation, can be shown but must be distinguished from the required planting. The plan should include minimum spacing allowed between trees and between trees and constructed features such as street lights, signs, fire hydrants,

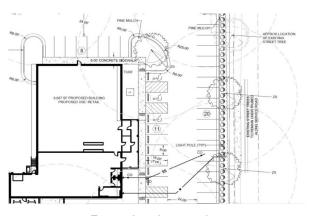


Fig. 3: Landscape plan

driveways, buildings, etc. Failure to allow for future tree growth will create chronic maintenance issues and poor performance of both the tree and built elements.

Ensure proposed species are in compliance with your landscape manual or approved planting list. The referenced planting list should include common and botanical names, including any cultivar or variety name as appropriate. Tree or shrub species should be clearly labeled with a symbol and letter code denoting the species referenced in the planting list. Verify that the plant count on the plan matches the planting list. Check for potential conflicts between trees and overhead utilities on the site. Landscaping proposed within the utility easement must be species approved by the easement holder. Check that specified plants meet the minimum installation size standards. Base plant size standards on caliper for single stem trees or height for multistem or evergreen trees. Specify shrub sizes by height or spread as related to intended function. For ordinance required planting, do not allow trees and shrubs to be specified by container size. Refer to Best Green Infrastructure Practices for Urban Landscapes: Plant Specifications brochure for more information.

It is recommended that landscape plans be sealed by a North Carolina licensed landscape professional.

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