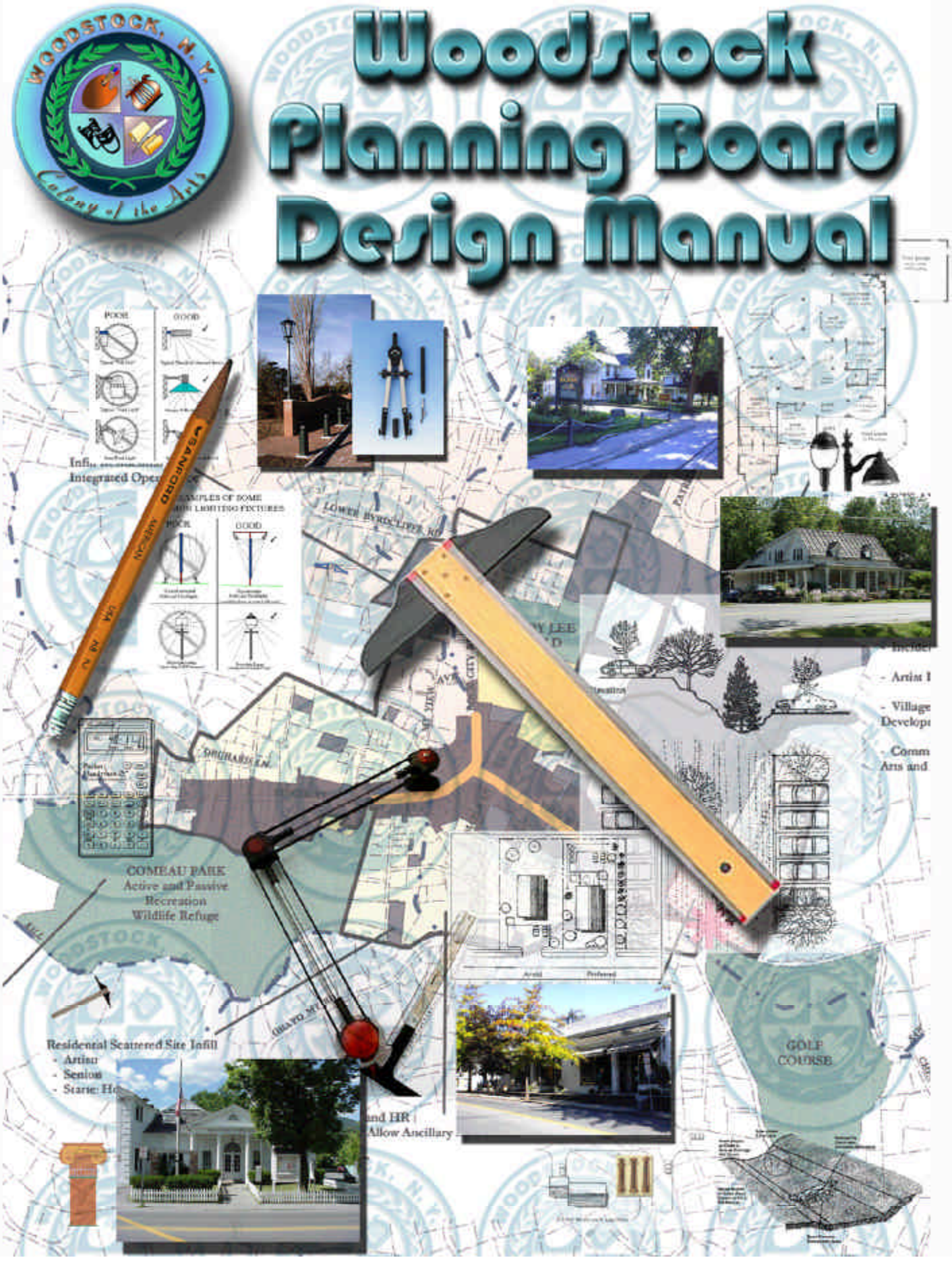
Woodstock Planning Board Design Manual



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INTRODUCTION

BACKGROUND

The Zoning Law of the Town of Woodstock requires site plan review in most cases before the issuance of a building permit. The Zoning Law states that the Woodstock Planning Board (PB) has site plan review and approval authority. The PB has developed policies based on its interpretation of these Zoning Law requirements. The following design guidelines reflect these interpretations and, as policies, should be viewed as supplemental to the Law. The guidelines should be used in conjunction with sections of the Law pertaining to the duties and responsibilities of the Planning Board as outlined in Section V, the Supplemental Regulations, and Section VII, "Site Plan Review and Approval" of this manual. The guidelines are intended to help applicants better understand the regulations relating to general site design, building design, landscaping and lighting and to clarify, simplify and expedite the site plan approval process.

This manual is the result of work done by the Planning Board, the Planning Specialist and a Design Manual Committee, as a way of explaining the Planning Board (PB) and Commission for Civic Design (CCD) review processes. The illustrations selected, along with the text, are not meant to show every possible approach to a given site or condition, but rather serve as guidelines in achieving design solutions acceptable to the PB.

HISTORY

Woodstock, in northern Ulster County, is a semi- rural, semi-exurban town. The community's center is the hamlet of Woodstock. Other hamlets of significance are Bearsville, Lake Hill, Zena, and Willow. While a significant portion of the Town consists of state-protected forestland, agricultural uses are now practically non-existent, meaning much of the outlying, privately owned land, is currently subject to aggressive demand for development.

The Zoning Law, as updated in 1989, mandates site plan review by the Planning Board (PB) of all uses requiring a Building Permit, with the exception one and two family residences. The Zoning Law's language, however, does not provide sufficient guidance for the PB in many situations. Therefore, the PB has developed Board Policies which interpret and thus supplement the Zoning Law.

In 1999, during one of the PB's regular Planning Sessions, the Board decided to invite the Woodstock Commission for Civic Design (CCD) and members of the local professional community (Architects, Engineers, Draftspersons, etc.) to form a working committee to address the need for Guidelines to supplement and clarify the sometimes seemingly ambiguous Zoning Law.

The newly formed Design Guidelines Committee met over the course of 1999 to discuss current laws and policies, the intended scope of the Guidelines and, of course, the proposed manual's content. The Planning Board Specialist then worked with the resulting preferences and policies, incorporating them into this manual, which was completed in November, 2001.

The illustrations selected here, along with the text, are not meant to show every possible approach to a given site or condition, but serve to as suggestions for design solutions acceptable to the PB.

PURPOSE

The Town of Woodstock, as most towns, uses zoning to regulate the development of private property. Unfortunately, zoning alone, with it's quantitative approach to development (e.g. height, setbacks, number of parking spaces, etc.), is often inadequate in ensuring quality site and building design. This manual has vbeen created:

- To convey the Planning Board's policies and to offer examples of preferred development approaches for design professionals, such as engineers, architects and builders;
- To use drawings and photographs to indicate what is expected of applicants, in order to speed up the approval process for commercial, industrial, institutional, certain accessory uses and multi-family residential projects;
- To clarify possibly vague Zoning Law language referring to design issues;
- To improve lighting, landscaping and stormwater treatment design;
- To protect natural resources, preserve the rural feeling of the Town, preserve existing architectural forms and styles and foster the community values as identified by the Woodstock Comprehensive Plan;
- To help maintain the Hamlet of Woodstock as a pedestrian-friendly district;
- To educate new Planning Board Members on site design review techniques and policies, thereby, fostering consistency in all Planning Board decisions;
- To provide specific examples of preferred site plan details and architectural treatments in order to preserve the Town's historic cultural and scenic character.

The Manual is divided into three sections:

- Site Design Criteria
- Landscaping, Lighting and Signage Criteria
- Building Design Criteria (under construction)

Acknowledgments: The Town of Woodstock Planning Board would like to thank the Town of Rhinebeck for producing their design standards handbook, the APA for its design review guide by Mark Hinshaw, the Fort Drum Land Use Teams for its Community Design Guidelines Manual and Michele Slung for her wonderful editing job. Thanks also to former Planning Board Chairman Jon Lewis for initiating this project.

PART I: SITE DESIGN CRITERIA

Land Development must address the opportunities and limitations of a site and its surroundings. Favorable existing conditions — existing stands of trees, flat areas, sufficient drainage, convenient access, etc. — should be maximized to enhance the site's potential and to avoid negative visual or environmental impacts. Unfavorable conditions — steep slopes, wet areas, adjacent buildings, setbacks, incompatible surrounding uses, etc. — also need to be taken into account. An analysis incorporating site conditions is necessary, and a land use/site plan must be prepared prior to land clearing, grading or demolition of any existing structures.

The plan should consider drainage and erosion potential, placement of planned or existing buildings, access (vehicular and pedestrian), parking, and contiguous land uses.

For a checklist of the Planning Board's site plan requirements, consult Section VII.B.1 & 2 of the Zoning Law. We have made the site plan checklist available in Appendix A of this manual.

Existing Site Conditions

It is helpful for the Planning Board (PB) to have an existing conditions map submitted along with the plan for proposed development. The Existing Conditions Site Map should contain the following:

- Title of drawing, with name and address of applicant/representative
- Tabular Summary of Zoning Requirements
- North arrow, scale and date
- Metes and bounds with minimum scale of 1inch = 100 feet
- Natural features, including streams, wetlands, rock outcrops, major stands of trees (groups of six or more trees 6 inches or up in diameter) and plantings
- Manmade features, including buildings, roads, utilities, drainage facilities, walls, fences, sidewalks and easements.

Figure 1 When this undeveloped lot was cleared, standing trees were left along Rte. 212 for future screening purposes.

On undeveloped lots, the greatest efforts should be made to preserve existing vegetation and topography. Doing so will help provide for screening of proposed structures from adjacent properties. It will also preserve current hydrological patterns, limit erosion potential, shade future parking areas and generally increase the visual attractiveness of the site. Applicants must attempt to leave undisturbed large trees, rock outcroppings, and natural drainage patterns. Earthmoving and grading activities must work with the natural contours of the land. Lessening the impact of the proposed development on adjacent properties is a high priority. Vegetated buffers should be left between uses and should be *at least* ten feet in width.

Applicants proposing modifications to developed sites, are urged to rehabilitate and reuse to the largest extent practicable existing structures. The Zoning Law, under Section V.K, strongly encourages the protection of the Town's existing character by prohibiting construction of buildings with "Auto-oriented Strip Commercial", "Highway Commercial" or "Franchise Modern" architectural styles. Section V.I of the Law — "Standards for Development in the Hamlet Preservation Overlay District" — dictate that existing architectural styles and character be preserved and favors the continuation of residential uses within the Woodstock Hamlet.

Figure 2 The owners of this bookstore made minimal exterior changes to the building when converting to a commercial use.

Site Drainage and Erosion Control

Section VII.B.1 and C.1 of the Zoning Law of the Town of Woodstock calls for PB review of grading, drainage, and soil data. The Board must approve stormwater, drainage and erosion control facilities. Soil conditions, natural drainage patterns and appropriate erosion control measures are to be carefully considered and incorporated into the land use plan submitted to the PB.

Drainage-Stormwater Management Plan:

When it is apparent drainage will be an issue, a comprehensive drainage-stormwater management plan should be prepared as part of the overall site plan. The plan should include: 1) proposed grading elevation/changes 2) existing and proposed ground cover 3) detention/retention ponds 4) catch basins (w/rim & invert elevations) 5) surface runoff swales 6) any other stormwater-management technique utilized and 7) any flood plains, federal or state designated wetlands and/or standing water bodies.

Generally, development will increase the quantity of runoff because of the increase in impermeable surfaces such as parking areas and rooftops. If runoff is likely to increase, the Planning Board may require a stormwater-management system. The design of the stormwater-management system should be based on the estimated runoff volume, peak discharge rates and estimated pollutant loading. Applicants may be required to present pre- and post- discharge and volume estimates for a number of design storms. Hydrographs may also be requested.

Natural drainage patterns of a site should be considered in the development of any new drainage systems. An attempt should be made to design larger drainage features to mimic the characteristics of naturally occurring ponds and streams. Use of native plant material suited to pond and stream bank environments is encouraged to help control erosion.

The goal of the stormwater-management plan should be twofold: 1) drainage facilities should be designed to capture and retain *at least* a 1-year 24-hour storm event (for "first flush" control), and 2) there should be no net increase in runoff from pre-development conditions.

Examples of Commonly Used Stormwater-Management Designs:

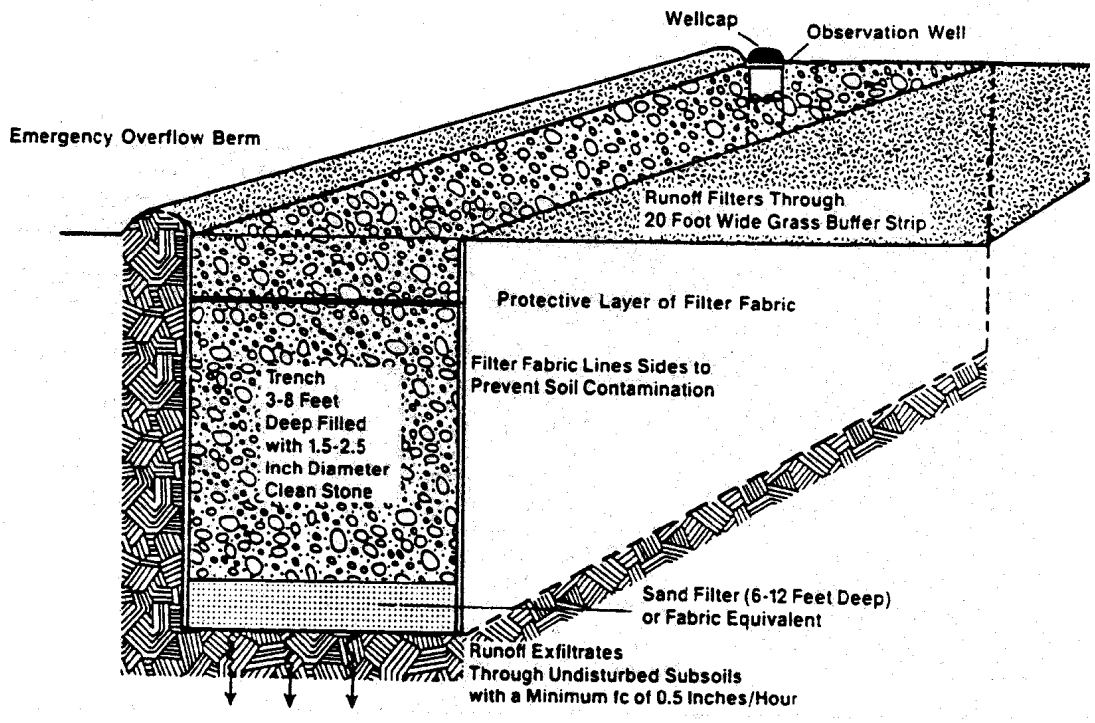


Figure 3. Basic design for a basin infiltration trench. (Source: 1993 ed., NYSDEC,"Reducing the Impacts of Stormwater Runoff From New Development")

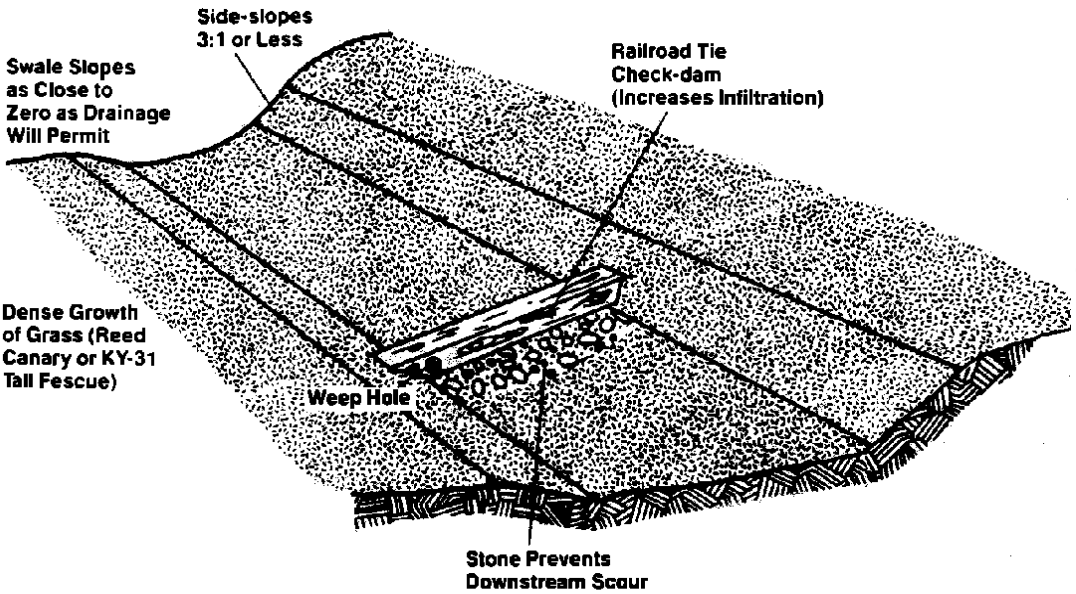


Figure 4 Schematic of a Grassed Swale (source: MWCG, 1987)

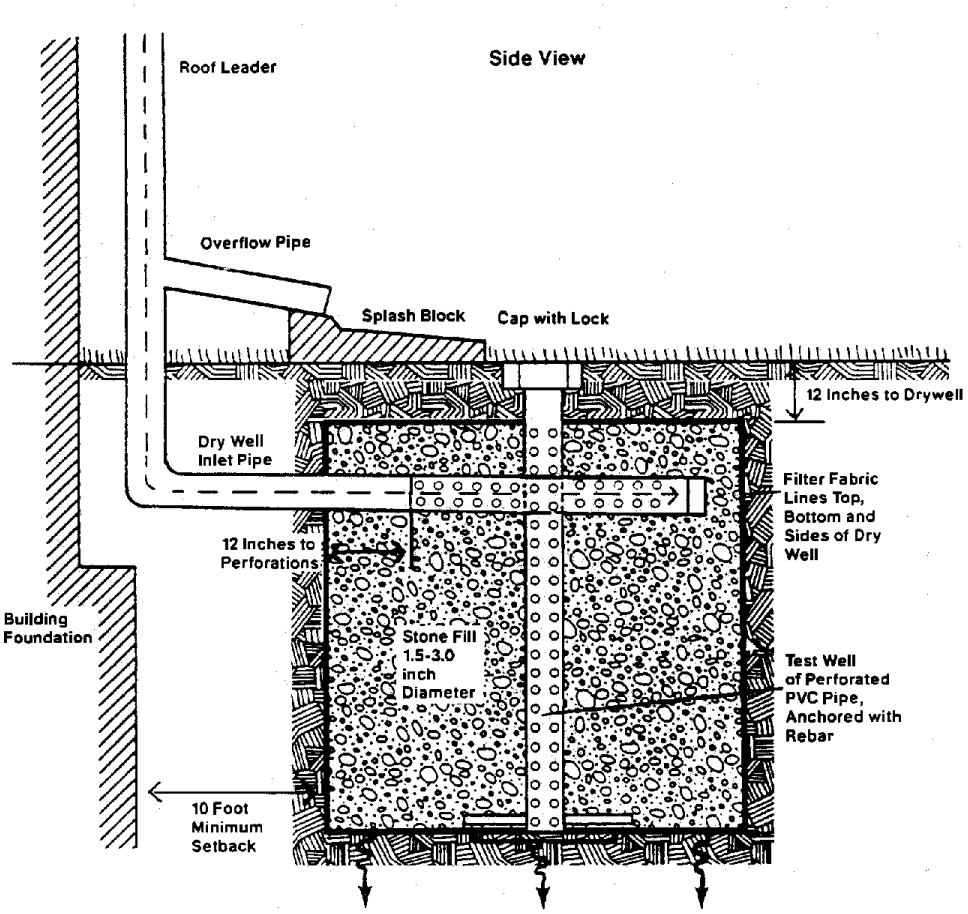


Figure 5 - Dry Well (source: MWCG, 1987)

Figure 6 Example of a rain garden. Source: NRDC "Stormwater Strategies" CD/Low Impact Development Center

Low Impact Development

Use of the techniques illustrated above assume that the proposed action or use is occurring on a "green field." Or that adequate open space exists to establish modern stormwater treatment and retention structures. Often, though, the PB is faced with additions or modifications to a developed lot. Frequently, these lots do not have adequate stormwater facilities or enough open space to install facilities. In these instances, applicants should incorporate Low Impact Development (LID) techniques into their site plan. LID techniques emphasize cost-effective, lot-level strategies to reduce the impact of development. LID techniques use microscale design to manage precipitation as close to where it hits the ground as possible. Developed areas can be retrofitted using the LID designs on the following page.

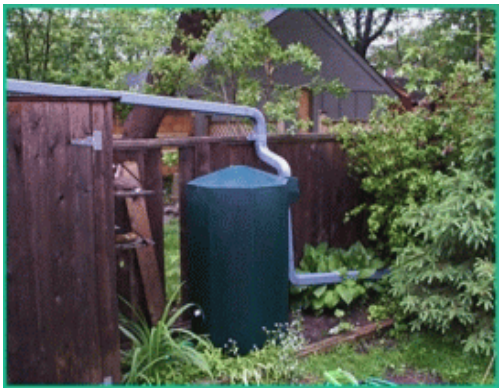


Figure 8 This aboveground cistern provides water for landscaped areas during drought conditions. Source: NRDC

Common LID Practices

- Rain Gardens and Bioretention
- Sidewalk Storage
- Vegetated Swales, Buffers, and Strips; Tree Preservation
- Roof Leader Disconnection
- Rain Barrels and Cisterns
- Permeable Pavers
- Soil Amendments
- Impervious Surface Reduction and Disconnection
- Pollution Prevention and Good Housekeeping

Figure 7 Permeable pavers can be installed in any low traffic flow area without reducing parking spots. Source: NRDC

Figure 10 Example of tree-box filter. Source: Low Impact Development Center

Bioretention, a core LID practice, uses landscaped areas to trap and treat petroleum products, metals, nutrients and sediments. Runoff is directed to low- tech treatment systems, such as rain garden depressions or tree-box filters, instead of conventional stormwater treatment facilities. Bioretention is particularly effective on small or cramped lots as the technique does not require much room.

Figure 9 These disconnected roof leaders drop water into a bioreten-tion/treatment area. Source: NRDC

Sidewalk storage and permeable pavers involve using materials that allow for rainwater infiltration. Infiltration is important for recharging groundwater and avoiding downstream degradation due to increased runoff from impervious surfaces.

The use of rain barrels and aboveground cisterns are historic methods that have been given new life. Both store water collected from rooftops for later irrigation of landscaped areas.

Soil amendments involve removing soil from a site that has low permeability, such as those with a high clay content, and replacing it with well drained soil, such as sandy loam. [For more information on LID practices visit the NRDC website at http://www.main.nc.us/riverlink/frameset.htm]

Erosion control:

Appropriate erosion control measures must be incorporated into the drainage-stormwater-management plan. This includes measures to be utilized both during and after construction. Among acceptable techniques are interceptor drains, silt dams, temporary ditching, erosion control fencing and revegetation. Erosion can be further minimized by limiting the gradient on cut and fill slopes (3:1 max.; 4:1 or less preferred), by eliminating points of concentrated runoff, and by grading only those areas going into immediate construction.

Figure 11 Silt fence

A reseeding-landscaping plan, to be implemented immediately after construction activities cease, may be required. [See Landscaping section of this document for more details. For additional grading, erosion control and drainage facility information, the PB recommends the most recent versions of the New York State Department of Environmental Protection's "Reducing the Impacts of Stormwater Runoff from New Development", the USDA Soil Conservation Service's "New York Guidelines for Urban Erosion and Sediment Control" and the National Resources Defense Council's CD, "Stormwater Strategies"]

Watercourses:

The drainage control plan should include provisions to protect watercourses or waterbodies. Contact with the New York State Department of Environmental Conservation, New York City Department of Environmental Protection or Army Corp of Engineers may be required if construction activities will have direct impact on stream banks or beds or their associated buffers. Town of Woodstock's local laws on watercourses and wetlands should also be considered in the planning process. Whenever possible, the drainage control plan should include provisions to retain runoff from impervious surfaces on the site instead of increasing the flow to existing watercourses. Drainage control plans should maintain adequate vegetative buffers around streams and attempt to incorporate water features into open space and recreation opportunities.

Grades:

The PB discourages development on slopes of 10% or greater. However, if such development is unavoidable, the finished grades should remain as high as possible to reduce excavation activities. Positive drainage away from all structures can be achieved by providing a minimum slope of 2%. [The Town of Woodstock construction standards for driveways and roads, which include limitations on allowable grades, can be found in the Town's Subdivision Regulations and in the Zoning Law of the Town of Woodstock. Both are available at the Town Clerk's Office]

Soils:

Soils types, which can be reviewed in the latest version of the U.S. Department of Agriculture's "Soil Survey for Ulster County, NY", should be shown on the plan. Development in areas with thin soils too close to the bedrock is discouraged. Thin soils present severe limitations for the installation of septic and drainage systems, and also limit landscaping opportunities.

Development on highly permeable soils should address the potential problems of soil erosion and groundwater pollution. With all soil types, only those areas going into immediate construction should be cleared and graded. Erosion control methods should be planned for use during construction while reseeding or landscaping activity is desirable immediately after the conclusion of construction activities.

Placement of Buildings

All buildings and structures must be placed on a site in accordance with the setbacks and other area and bulk regulations listed in Section IV of the Zoning Law.

In less developed areas, such as Woodstock's outlying residential districts, the Planning Board (PB) recommends building placement be designed to provide a functional relationship to the site's topography, existing vegetation and other pertinent natural features. Minimization of cut and fill activities, as well as preservation of large trees, rock outcroppings and natural drainage patterns are desirable. Buffers are to be maintained around streams and wetland areas.

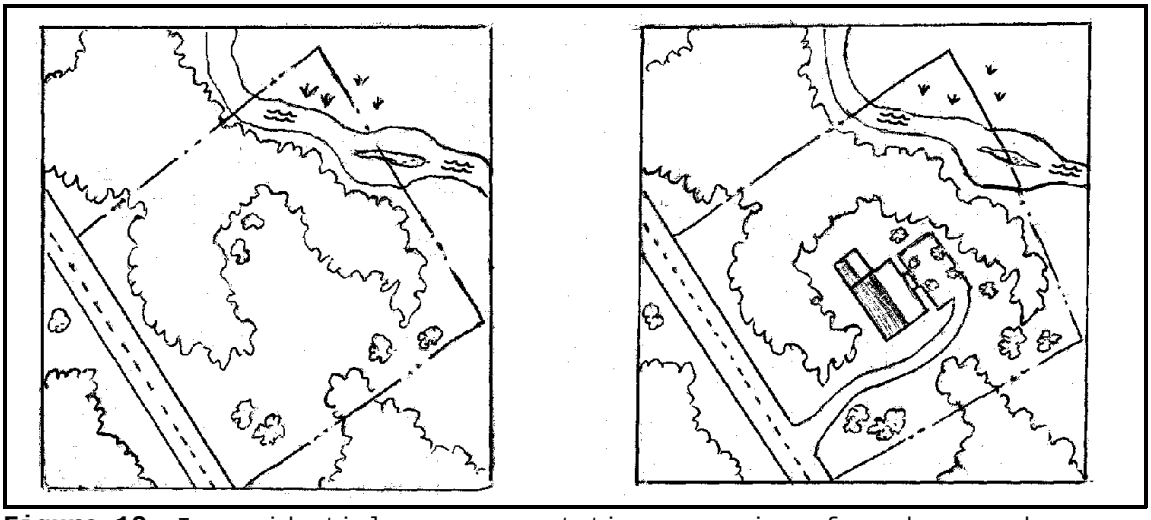


Figure 12. In residential areas, vegetative screening of roadways and neighboring uses is desirable. As much screening as possible should be left intact from pre-development conditions. Treed buffers should be maintained along stream banks and wetlands.

The preservation of existing trees will reduce final development costs. Screening of commercial or industrial uses from adjacent residences is, in fact, required in certain sections of the Zoning Law. [Refer to Sections

V.B.2.b, V.Q, VI.A.3, VII.C.1.g of the Zoning Law for appropriate regulations. Consult the landscaping section of this document for landscaping recommendations].

The placement of buildings should attempt to maximize open space. Well-designed open space can positively affect perception of development density. At the same time, well-designed open space serves as an effective and desirable buffer from adjacent properties. In addition, this open space creates opportunities for recreation, pedestrian access, and amenities such as benches or tables. [For a definition of open space, see the Zoning Law.]

In the hamlet of Woodstock and in neighborhood commercial areas, the PB recommends that building placement take into account pedestrian access and vehicle parking needs, as well as the setbacks of adjacent buildings. Matching the setback of neighboring structures is desirable. At the same time, building placement should be as close to the street as possible, while still leaving room for sidewalks, street trees and landscaping. Where once large setbacks in commercial districts were encouraged, to provide open space and reduce density, now the importance of allowing buildings to be placed close to the street and to neighboring structures has become apparent for the following reasons:

- a "walkable", pedestrian-friendly town is created;
- parking on the rear and sides of buildings – where it can be screened from pedestrians and the road – is facilitated;
- building placement then matches the setback of older, existing buildings;
- a visually interesting street front – where the architectural features of buildings are not diminished behind a sea of blacktop and people are encouraged to "window shop"– is created;

- the building's architectural treatment and design can be maintained at a "human" scale, in contrast to the scale created for "big box" retailers, where visibility from an often distant roadway is the main concern;
- proper building placement, combined with small front-yard setbacks, can increase the buffer between the commercial use and contiguous residential uses.

Additions

Additions or expansions are to be placed to the rear of the existing building when possible. The addition should be of an equal or lesser size and height than the existing structure. Window size and building materials should be consistent with the parent structure [See building design criteria for more information.] The exception to rear placement of additions would be when the existing building's setback is not in keeping with the setback of contiguous structures in a commercial area. In these instances a front addition would be desirable in order to have the addition match neighboring front setbacks.

Figure 16 The gray wood addition to the rear of this building blends well with original brick structure

Figure 17 [Same building] From the front no changes are visible due to expansion.

Vehicular Access

Unrestricted or multiple accesses to a site along a main thoroughfare can lead to traffic tie-ups, excessive turning movements (a common cause of accidents), and the eventual need for expensive highway improvements. The following standards are designed to aid traffic flow, improve safety and enhance the appearance of a site.

Minimizing of Site Ingress and Egress

Access drives should be limited to one per parcel unless a traffic impact analysis or the site's unique circumstances justify additional curb cuts. The more curb cuts, the more frequent traffic flow delays and the higher number of accidents along main thoroughfares. Pedestrian safety is also compromised. Excess entrances should be closed and overly wide openings narrowed whenever site plan review is triggered. The New York State Department of Transportation allows a maximum width of 30 feet for curb cuts.

Figure 18 This site has three, broad entrances, where two would suffice.

Placement of Site Ingress and Egress

Entrances and exits should be located at a safe distance from intersections. For example, the distance between a proposed access drive and an unsignalized side road should be twice the width of the proposed drive, plus 15 feet. Adequate sight distances, determined by highway traffic speed, must be established at all curb cuts [See Figure 19.]

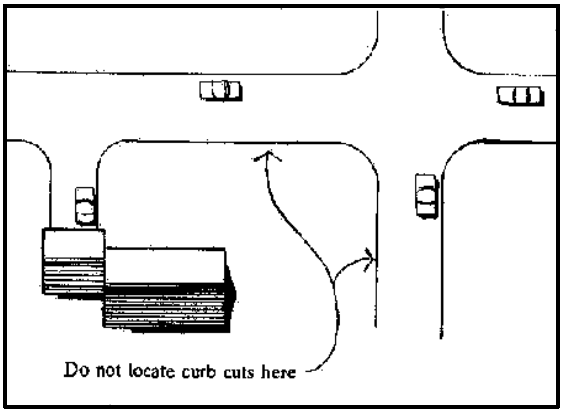


Figure 19 Source: The Fort Drum Land Use Team, "Community Design Guidelines Manual"

Narrowing of Site Ingress and Egress

Narrower entrance drives (i.e. a maximum of 24 feet) are recommended. They slow traffic entering the site, provide more predictable turning movements and allow space for landscaping along the frontage. Sites with wide open frontages allow uncontrolled access, often at dangerous speeds, and decrease landscaping opportunities.

Sharing Access with Neighbors

A single driveway should serve adjacent parcels when feasible. New access drives should be placed at the edge of the property thereby allowing entrances to be shared with future adjacent uses.

Figure 20 Several parking areas owned by separate businesses successfully share this single entrance.

New nonresidential uses should be clustered and developed in depth around a shared access point, rather than strung out along the road with multiple drives. Grouping these uses in clusters slows commercial-strip development, increases open space and lessens vehicular traffic on main roads. Pedestrian walkways should be provided both within and between multiple-use developments.

Providing Internal Circulation Between Sites

Interconnected parking lots between adjacent parcels are encouraged. When possible, a continuous service road (preferably to the rear) should be created between lots. During development or renovations to a site, temporary stub roads should be provided to connect commercial projects to adjacent properties.

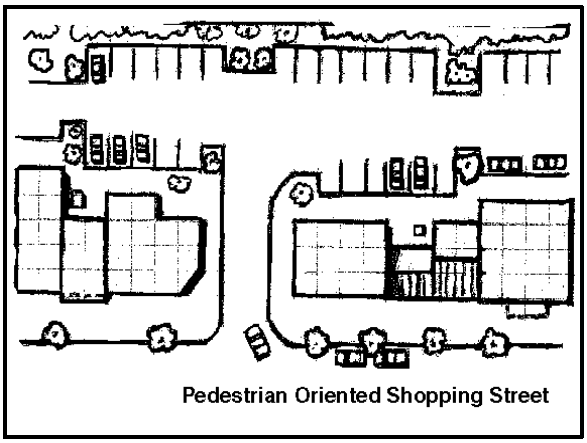


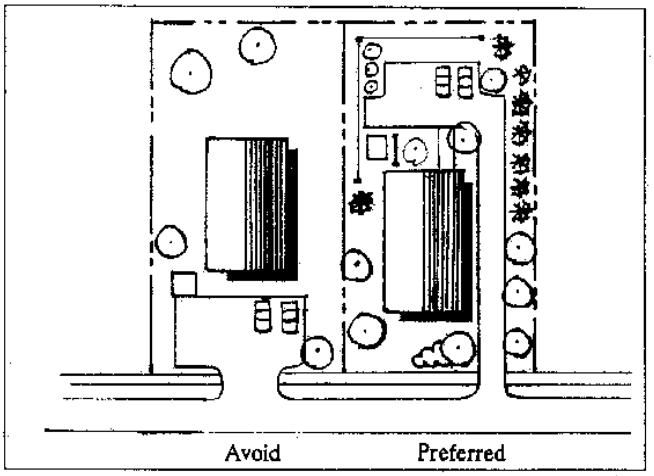
Figure 21 Example of parking area behind commercial buildings, with interconnected, well-screened lots.

Parking

The Planning Board (PB) is charged with reviewing the location,

arrangement, appearance and sufficiency of off-street parking spaces under the Site Plan Review section of the Zoning Law (Section VII.C.1.c). [Regulations governing the number of spaces, along with the design standards for parking areas, can be found in Section V.B of the Zoning Law. *Note:* It is PB Policy that if less than a whole number of parking spaces are required, the applicant must round up the number to the next greatest whole number. For example, 7.25 spaces must be rounded up to 8 parking spaces.] The PB recommends the following standards when designing or re-designing parking areas:

Screening of Parking Lots



(Source: Fort Drum Land Use Team, "Community Design Guidelines Manual")

Parking should be located to the side or, preferably, to the rear of buildings, so that the building's architecture – not expanses of asphalt – is featured. The Zoning Law states explicitly that parking areas cannot be created in front yard setbacks (Section V.B.2.b). It also states that parking spaces be confined to the rear and side yards in residential neighborhoods (SectionV.B.2.c). Locating parking to the rear of a building has the added benefit of allowing dumpsters, air conditioning units and loading areas also to be placed in back – where they are more easily screened from view. Although drive-up windows are discouraged by the PB, their placement should follow this rule. When a large parking area is required, the designer should divide the necessary spaces into separate, smaller lots, by utilizing landscaping and varied building forms.

The screening of parking areas is mandated by the Zoning Law. Section V.B.2.b states that parking areas for three (3) or more cars which abut residential districts or properties be screened. Section V.Q of the Zoning Law allows the PB to require screening in some circumstances – for example, parking lots – from residential areas and public Right-Of-Ways. The PB is required to have applicants screen parking areas when a Special Use Permit is needed [see Section VI.A.5 of the Law].


Figure 23 Evergreens screen this parking area from neighboring residences.

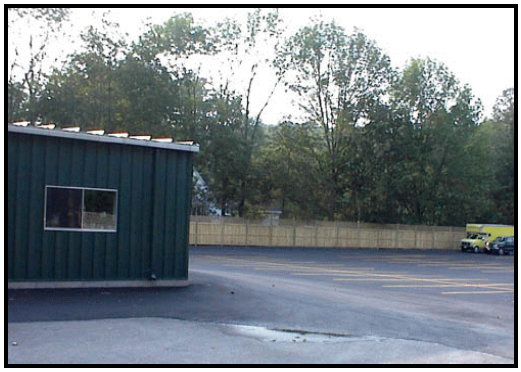


Figure 24 A mixture of trees and fencing screen this building and its parking area from adjacent residential uses.

To screen parking areas, the PB recommends the use of evergreens, fencing or a combination of the two. Evergreens, such as white pine, spruce or American holly, should be at least five (5) feet in height at planting and placed a maximum of four (4) feet on center. Staggered

plantings are preferred. A continuous hedge, such as privet, hemlock or yew, also may be used.

Minimizing Scale and Eliminating Unnecessary Asphalt

Internal roads, entrance drives, access aisles, and parking areas must be the minimum width necessary to provide safe access. Short-corner radii and narrow drives are beneficial because they slow traffic speeds, reduce development costs, reduce impervious surfaces, and allow more room for landscaping. Minimum parking standards should be considered maximum standards unless larger numbers are fully justified.

Figure 26 Woodstock Playhouse parking.

On sites where large amounts of parking are required on a seasonal or intermittent basis, alternatives to blacktop surfacing – for example, gravel, grass or modular pavement – may be considered [Figure 25 illustrates seasonal parking at the Woodstock Playhouse. The modular pavement shown in Figure 26 allows stormwater infiltration where blacktop would not].

Figure 25 Modular pavement (Source: NYSDEC, "Reducing the Impacts of Stormwater Runoff From New Development", 1993).

Designing Parking Areas

Parking should do more than meet the standards and dimensions listed in the zoning law. Its design should contribute positively to the site. Methods for incorporating parking into a site include: 1) minimizing earthmoving by working around existing knolls or rock outcroppings 2) breaking up larger lots into several smaller ones 3) carefully designing site lighting and 4) leaving mature existing trees. The PB encourages the creation of tree isles and pits, in order to provide shading and screening for parked cars and break up the monotony of blacktopped areas. Tree isles and pits must be wide enough to ensure trees do not die of dehydration or become damaged by car bumpers. To insure adequate hydration for the trees an unpaved or porous area of *at least* six (6) feet in width is needed with areas up to fifteen (15) feet in width preferred. Curbing or bumper blocks can be used to protect tree trunks and be placed *at least* thirty (30) inches away from full grown trees. Greater distances are recommended when the trees are immature. Decorative walls, trellises and separated pedestrian areas may also be part of the design. [Fig. 28 illustrates ways to incorporate trees into parking areas]. Overall, the PB recommends one large tree or ten (10) sq ft of planting area for every ten (10) parking spaces.

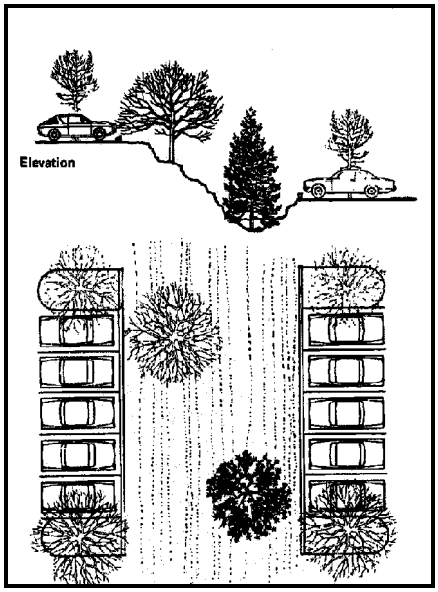


Figure 27 This parking design accommodates the existing change of grade between parking rows.(source: Parking Lot Landscape Development, 2nd ed., Robinette, 1993)

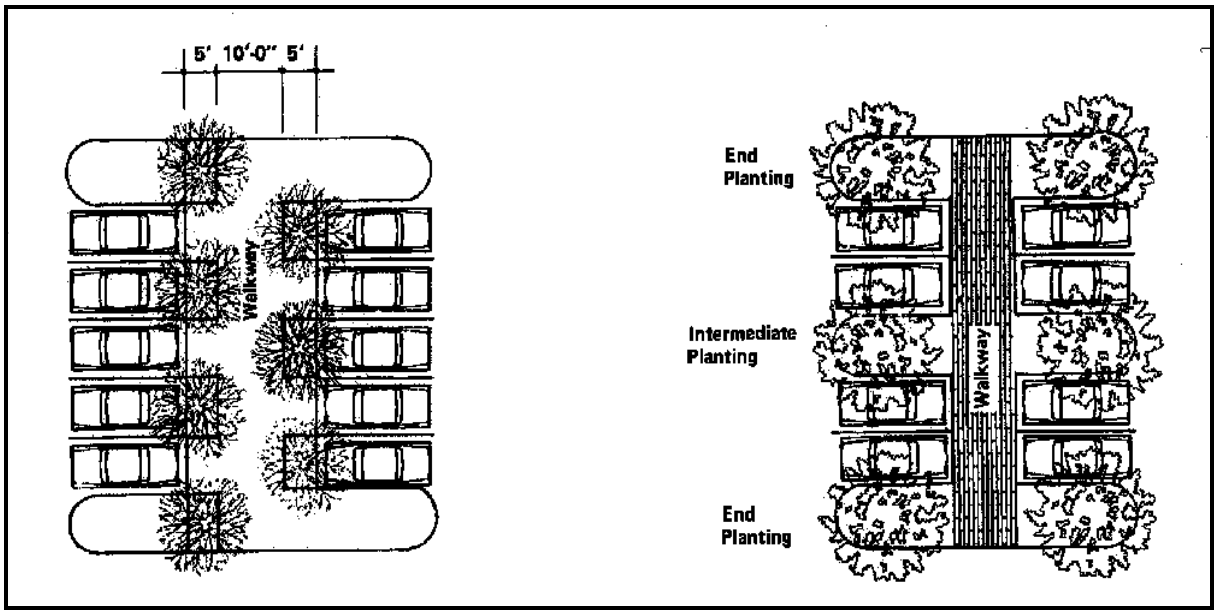


Figure 28 These parking configurations illustrate the creative use of walkways and trees (source: Parking Lot Landscape Development, 2nd ed., Robinette, 1993).

The Woodstock Zoning Law sets specific standards for the design of parking areas. For example, Section V.B.2.e states that all parking areas must be suitably drained. Methods to accomplish this include using tree isles, tree pits and vegetative areas for stormwater retention, and are described in the drainage section beginning on Page 5 of this Manual. Drainage facilities associated with parking areas should be designed not only to direct rainwater offsite but to retain and treat it.

Light from parking areas should be contained within the site's boundaries and not interfere with the vision of passing motorists. But it should be adequate to light the site. [Standards for the lighting of parking areas can be found in Section V.A.3 of the Zoning Law and in Part II of this Manual.]

Pedestrian Access

Separate vehicular and pedestrian access is desirable. Pedestrian access may be separated from parking areas and roadways by the use of raised sidewalks, bollards, landscaped partitions, etc.. Lighting pedestrian pathways is encouraged. Any methods employed must be depicted on the site plan.

In Woodstock's commercial areas, site plans should indicate pedestrian access from the building to existing sidewalks or to roads where sidewalks do not exist. The PB has a general policy of requiring concrete, paving brick, bluestone – or an economically comparable material – for sidewalks in the Hamlet Commercial Area. Blacktop, gravel or similar materials are not acceptable.

Figure 29 Bollards and a raised sidewalk separate this pedestrian area from the roadway.

Storage, dumpsters, air conditioning units, etc.

The PB encourages the placement of these accessory structures behind buildings when possible.

Figure 30 Here, the use of wood and stone makes for an attractive dumpster enclosure.

Storage sheds should match the architectural features of the main buildings. “Baby barns” and similar structures are discouraged.

Dumpsters, garbage cans or air conditioning/mechanical units may be screened using a combination of fence and landscaping. If dumpsters are located in neighborhood commercial zones or on sites adjacent to residences, the use of plastic lids will reduce noise.

Part II: LIGHTING, LANDSCAPE & SIGNAGE DESIGN CRITERIA

Lighting Standards

The Zoning Law of the Town of Woodstock states that all outdoor lighting fixtures (with the exception of incandescent fixtures up to (150) Watt intensity per light source) must be shielded in such a manner that:
1) The edge of the shield is below the light source.
2) Direct rays from the light source are confined within the property boundaries.
3) Direct rays are prevented from escaping toward the sky [See Section V.A.3 for the exact language].

All light sources must be shielded in the Scenic Overlay District as per Section V.C of the Zoning Law [Examples of acceptable shielded lighting can be found on page 20 & 21 of this manual].

In addition to shielding, the Law calls for outdoor lighting to be of the minimum intensity needed for a particular purpose. The Planning Board (PB) has developed policies regarding lighting levels, to help clarify the Law.

Brightness is defined as the amount of light striking a surface and is measured in units of *footcandles*. One footcandle (fc) is defined as one lumen of light falling on one square foot. [Lumens are a measure of light flux]. For example, a standard 60 watt incandescent light bulb placed six feet above a worktable will produce about 20 fc of light at the table surface.

The PB's lighting policies are as follows:

Average lighting levels must never exceed 4 fc on any particular site, unless the lighting requirements for a specific use are superceded by state or federal law. Average levels of 0.6 to 2 fc are preferred. No light's intensity should exceed 25 fc as registered directly below the light source. Lights used for commercial purposed are not to be mounted at a height greater than 25 feet above ground level. Shorter lighting poles and bollards are preferred. Footcandle (fc) levels along the periphery of a site should drop down as close to zero as possible, the exception being pedestrian or vehicular accesses where the average illumination level is to be kept within 0.1 to 1 fc. [The PB suggests that design professionals consult the Illuminating Engineering Society's (IESNA) illuminance levels recommendations for low- and medium- activity areas. A link to these standards is available in Appendix B].

If High Intensity Discharge (HID) lighting is planned for a site, metal halide lamps are preferred to sodium lamps. Mercury vapor lighting is strictly prohibited due to its poor color rendition and energy inefficiency. All HID lighting must be shielded.

The following standards for light trespass and glare avoidance apply to sites having five or more parking spaces:

(1) Lighting levels shall be designed to meet but not exceed the latest recommended levels from IESNA for the type of activity/area being illuminated. An exception is made for ATM machines at which light levels shall be in accordance with the New York State ATM Safety Act. Where no standard is available from IESNA, the applicable standard shall be determined by taking into account the levels for the closest IESNA activity.

(2) Uniform light levels must be achieved on site. The uniformity ratio (average to minimum) shall not exceed 3:1 for parking and traffic areas nor 4:1 for pedestrian areas. Lighting design should

establish a hierarchy of lighting that will insure a smooth transition from bright areas to areas of subdued lighting. Maximum-to-average lighting levels shall be kept within a 6 to 1 ratio.

(3) Lighting levels must be maintained at design levels, with lamp or luminaire replacement as needed.

(4) For the best color rendition, the use of metal halide lighting is encouraged. Once a lamp type is chosen, it should be used consistently throughout the site.

[These standards were incorporated in the Zoning Law in May of 2001 as SectionV.A.3.h.]

Lighting Design

All existing and proposed lighting must be indicated on the site plan. Information regarding the type of lamp, its wattage and the luminaire (fixture) are to be listed. A lighting plan indicating footcandle (fc) values is desirable for all commercial sites where new lighting is planned. An iso-footcandle template, such as the one shown on the right, is a convenient way to depict lighting design. The template must be generated using the same scale as the site plan, then superimposed on the plan. An acceptable alternative to this template is a photometric plan which utilizes fc values plotted as points on a grid.

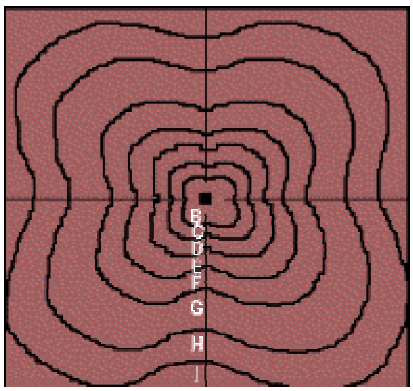


Figure 32 Every point on line B equals 1 footcandle. Where iso-footcandle lines from two luminaires overlap, the effect is cumulative.

Average site lighting along pedestrian and parking areas is to be kept between .6 to 2 fc and should not exceed 4 fc. Efforts are to be made to minimize light pole heights, which must not exceed 25 feet in height. Poles between 8 and 18 feet or bollard lighting is preferred. Outdoor light fixtures used to illuminate an outdoor sign are to be mounted on the top of the sign structure. [See illustration on page 23.] The use of decorative lighting fixtures and path lighting is encouraged, but only when the lamp is a shielded, incandescent bulb the wattage of which does not exceed 150 watts.

Proper lighting design adds not only to the overall attractiveness and safety of a site but can ensure that site lighting does not become a nuisance to neighbors or passers-by. When reviewing lighting design, the Woodstock Planning Board is concerned with the following possible problems:

Glare ~ Lighting that is poorly designed or installed can create excessive glare which interferes with the vision of pedestrians, cyclists and drivers.

Light Trespass ~ Poorly designed outdoor lighting can shine directly onto neighboring properties and into bedroom windows, thereby reducing privacy and interfering with sleep.

Energy Waste ~ Much outdoor lighting wastes energy because of poor design, resulting in high operating costs for property owners and increased pollution from increased power production.

Skyglow ~ A large percentage of poorly designed lighting casts its light upwards, creating "skyglow," an undesirable effect that renders the night sky invisible. In the United States, over a billion dollars a year in energy costs is wasted by misdirected lighting design.

Examples

These illustrations of acceptable and unacceptable lighting will help applicants comply with the outdoor lighting requirements of the Woodstock Zoning Law. [For information on where to get shielded lighting fixtures go to

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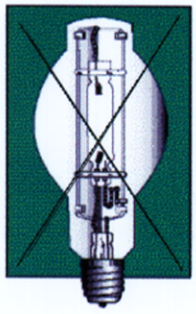
These illustrations of acceptable and unacceptable lighting will help applicants comply with the outdoor lighting requirements of the Woodstock Zoning Law. [For information on where to get shielded lighting fixtures go to www.darksky.org and select the "Resources" link on the sidebar. This will take you to Dark Skies "Information and Resource Library".]

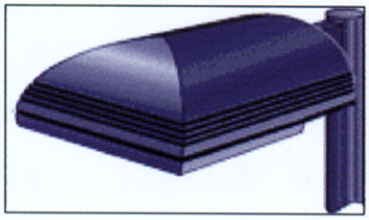
Lamps:

Mercury lamps (left) are prohibited. Compact flourescent (center) or metal halide (right) lamps are preferred.



Luminaires: All lighting, except incandescent lamps equal to or less than 150 watts, must be shielded. The following are examples of acceptable shielded luminaires:

Acceptable pole lighting:



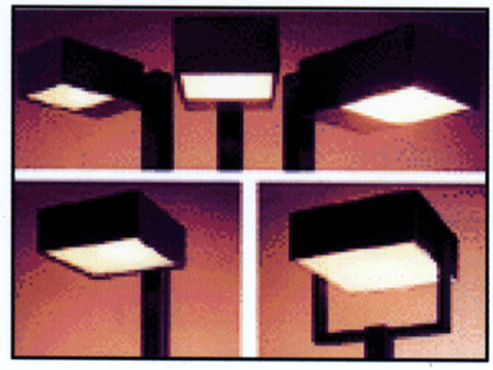
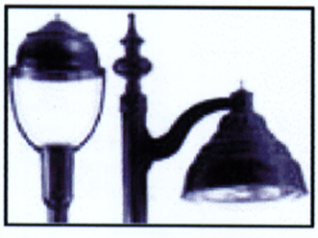


Figure 36 Note that the lamp is recessed under the top of this decorative fixture.



Shielded pole lighting, continued:

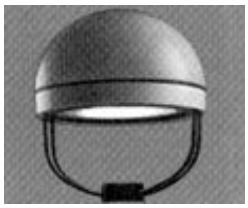
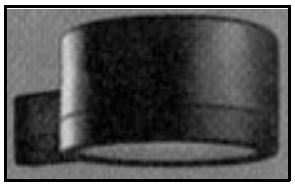
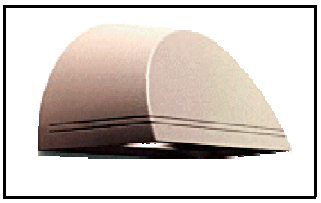
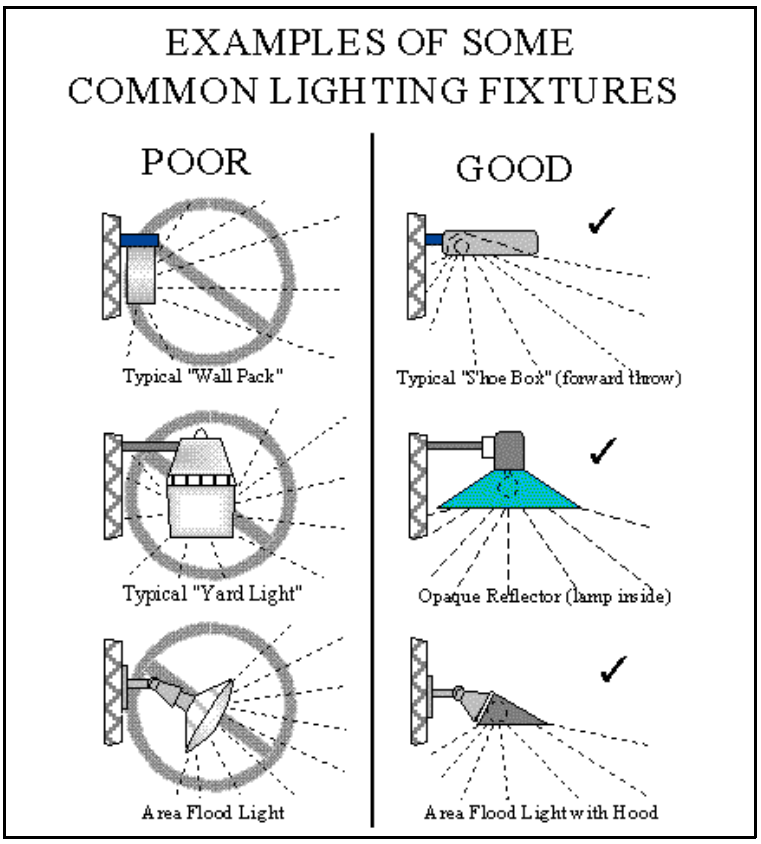


Figure 40 Note the true 90" cut-off in this street light.

Acceptable wall mounted luminaires:







Landscaping, Buffering, and Site Treatment

As explained in the Site Design section, the natural features of a site, including existing topography, watercourses, mature trees, etc., must be considered in the site design. During its site visit the Planning Board (PB) will assess the existing landscape. Design parameters, suggested by the site's natural features, will be identified.

Different criteria for landscaping will apply to projects depending on their location. Surrounding environs should influence any design plan. The plan must be in harmony with or an improvement upon prevailing landscape conditions.

For new projects within existing retail areas – where commercial development already exists and where setbacks are often limited – intensive landscape design that utilizes a mixture of annual and perennial plants, shrubs and trees is encouraged. Garden areas, plant species types and names must be shown on the site plan. These parts of a site should also serve as bioretention areas when possible. [See the drainage section for more on this.] Tree-lined commercial corridors are encouraged. The planting of trees at 20 to 30 foot intervals, and as near to the highway right-of-way as possible, accomplishes this. Indigenous species of trees are preferred. Woodstock's Tree Law mandates that existing trees over eight (8) inches in diameter and within 80 feet of Rt. 212, be preserved.

In areas beyond the defined retail districts, the design for new projects should, 1) incorporate setbacks large enough to ensure that existing woodlands will effectively screen the project from the adjacent highways, or 2) incorporate setbacks sufficient to preserve existing roadside meadows and fields. [If this latter option is most appropriate for the site in question, the project's buildings are to be screened from view by evergreen and hardwood trees set close to the structures.]

Where buffers are designed with berms, the berms must imitate the local terrain's natural land forms and be as wide as the mature branch spread of the tree species planted on them.

If trails are planned, the design must follow the natural terrain of the site and link up with trails on adjoining properties. Trails should be designed to leave existing trees in place.

The landscaping of a site must blend in with the prevailing scale, appearance and use of the neighboring landscape design. It must also effectively screen the site's use from neighboring uses. The result of

Figure 45 Commercial development on both sides has narrowed this stream's natural bed. The stream now floods the sites regularly. To prevent such situations, buffers must be maintained around streams.

Figure 46 This well-landscaped site is in the center of the hamlet of Woodstock.

Figure 47 This site owner has placed a conservation easement on this meadow. The meadow provides a view of the mountains from Rt. 212 and also serves to store and treat runoff from the impervious surfaces on the site's west side.

the landscaping, ideally, should complement and enhance, not merely remedy or screen, buildings deemed unappealing. Examples of effective buffers are plant material, naturally occurring or natural - seeming topographical features, fencing, or a combination of all of these.

Figure 48 This business created a slight berm and used intensive plantings to partially screen its side-yard parking area.

The use of native plant material is strongly recommended. Indigenous plants require less maintenance than transplanted species and blend well with the natural landscape of the Town's open spaces. Where street trees are used, native and salt-tolerant species should be selected. [For plant lists see Appendix C of this manual.]

To reduce the likelihood of damage, plant material should be placed beyond the reach of highway hazards. Setbacks, naturally scaled berms, architecturally compatible fencing, and appropriate species selection can all be used to achieve adequate protection.

Signage

The regulation of signs is extensively covered in Section V.C of the Zoning Law of the Town of Woodstock. For information regarding allowable size, materials and sign placement design professionals should consult the Zoning Law. In addition to the requirements listed there, design professionals should note that outdoor light fixtures illuminating signs must be mounted on the top of the sign structure. The ground area around free-standing signs should be well landscaped. The following pictures illustrate signage elements encouraged or discouraged by the Planning Board:

Figure 49 This sign is both attractive, and appropriately lit by down-lighting.

Figure 50 This attractive sign is well designed, but its lighting should be repositioned above it.

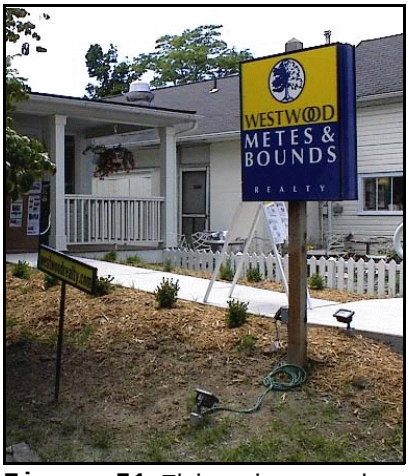
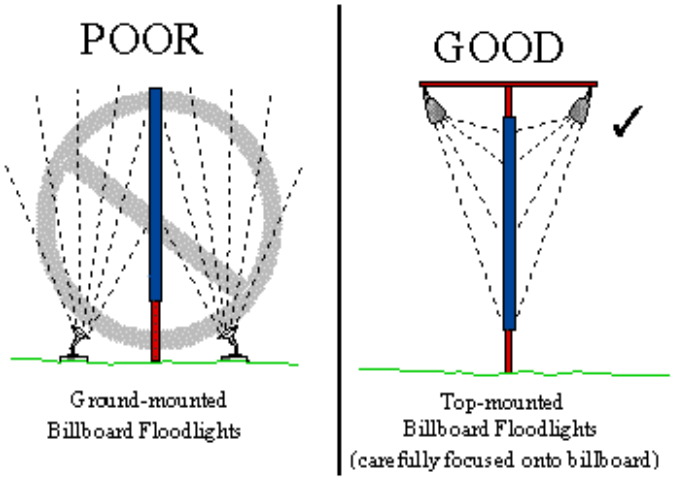


Figure 51 This sign needs more plantings at its base. The lighting is also poorly designed, allowing rays to escape up.

Signage Lighting



Source: Dark Skies organization

Part III: BUILDING DESIGN CRITERIA
[Interim Recommendations]

[The Commission for Civic Design (CCD) is in the process of developing extensive guidelines for building design. These guidelines will be based on the sections of the Zoning Law pertaining to the CCD's duties, namely, Sections V.I, V.K and XII. Until the CCD has completed this process, this section applies.]

Applicants who are building, renovating or expanding a commercial structure in the Town of Woodstock, or any structure within the Hamlet Preservation Overlay District, will be sent to the Commission for Civic Design (CCD) for review of a building's form and facade. The CCD will issue building design recommendations to the Planning Board. The applicant must then modify the site plan to be in conformance with the CCD recommendations or must ask the Planning Board (PB) to override the CCD. The PB can override CCD recommendations with a majority plus one vote, but will not do so without good reason. Adherence to the general guidelines outlined below can count in an applicant's favor when requesting the CCD's recommendations be overridden.

With regard to building form and massing, the Planning Board (PB) is primarily concerned with the proposed use's relationship to neighboring uses, other structures existing on the site, streets, sidewalks and public spaces. The standards listed below are intended to establish an appropriate context for all commercial and industrial uses, and pertain also to certain regulated residential development within the Town of Woodstock. Since not every applicant is equally versed in the local architectural vernacular, these standards are intended to illustrate some of the basic architectural characteristics of the community.

During the site plan review process, applicants are expected to demonstrate a specific design's appropriateness, within the context of these design guidelines.

Building Form and Massing:

The preservation of Woodstock's rural, small-town character is important and must be taken into account when designing a structure and determining its placement on a site. Architectural styles compatible with the area include cottage-style or artist bungalow-style buildings and New England clapboard structures. Buildings with Dutch or Victorian influences also are part of the mix.

Structures must not exceed thirty-five feet in height. Building length along street facades should not exceed 60 feet without a change in plane of the facade and roof. To satisfy this requirement, the facade may be interrupted by other elements, such as projecting porches, recessed wings, etc. Facade modulation and pitched roofs help reduce the apparent bulk of buildings and additions. Blank walls are discouraged.

With regard to building mass, it is desirable to maintain a proportional relationship between the proposed building and neighboring ones – that is, the height and bulk of structures along a street need to remain relatively equal. It is equally important to maintain consistent open spaces and setbacks. Efforts should be made to select

color and materials that harmonize with the predominant style of neighboring buildings.

Entry:

Entry articulation is encouraged. This can be accomplished by the use of recessed or projecting entries, canopies, planters, porches, etc.

Facade Materials:

Acceptable materials include wood clapboard or vertical board and batten, brick and fieldstone. Using these materials in designs that employ different textures and contrasting shapes is encouraged. Metal siding may be considered if the result will closely resemble a traditional board and batten appearance. No vinyl or aluminum siding shall be used unless in combination with wood trim or if it will not come in contact with regular pedestrian traffic. Actual samples of all proposed materials must be presented to the Planning Board for final approval.

Materials for any proposed addition need to match or be of a higher quality than those used for the existing structure.

Roof Shape:

Principal (main) roofs shall have a pitch dependent on the type of roof used, as appropriate for the local climate. Appropriate principal roof types include:

- Gable: min. 6:12
- Hip: min. 5:12
- Gambrel: 3:12- 8:12 upper slope; 18:12-20:12 lower slope

Larger, more complex buildings may require a combination of primary and secondary roofs. Roof-mounted skylights are acceptable if not visible from the public right-of-way. Flat roofs are discouraged, but they are acceptable when they are not visible from any public right of way or when they are completely screened by other building forms which are in accordance with the provisions above.

Roof features:

Features such as ventilators, towers, cupolas (windowed or louvered), belfries or similar structures can occupy a maximum of eighty (80) square feet or ten (10)% of the roof area. These structural elements are only to be used where such features are historically accurate.

When dormers are used, windows should be their primary component. The dormers, cumulatively, must not

exceed 50% of the overall roof length. Cornices, brackets, and overhanging eaves are encouraged if appropriate to the style of the proposed design.

Rooftop mechanical equipment or satellite dishes must be screened from public view.

Roof Materials:

Materials chosen must be appropriate to the design and character of the building. Such materials include shingle (slate, wood, asphalt/fiberglass) or metal (standing seam).

Windows:

Window shape, size, and details shall be appropriate to the building design, and window length should be greater that the width – that is, the effect should be more vertical than horizontal. Multiple panes divided by muntins are encouraged, in accordance with the style of the building. When existing commercial building facades are renovated or residences converted to commercial use, the use of large panes of glass for display areas is strongly discouraged. Clear glass is preferred; smoked or reflective glass is discouraged.

When additions to existing buildings are proposed, window size and style should match those of the existing building.

Doors:

Door style should be in keeping with a building's existing style and with existing windows. Use of typical highway commercial-style doors – comprised almost entirely of glass and metal – is discouraged, with the use of traditional wooden doors preferred.

Handicap rails:

Material used for handicap rails should blend with the existing or proposed architecture of the structure. (For instance, if a residential structure is being converted to commercial use, or a traditional style of architecture is chosen, wooden rails or metal rails masked with a wood surface should be considered.)

[For more information on appropriate building design criteria applicants should consult with the Commission for Civic Design]

Appendix A
(zoning law excerpts)

~ Section V.A.3, Glare and Heat (lighting standards):

3. Glare and Heat.
   a. Any outdoor lighting fixture, with the exception of incandescent fixtures up to and including one hundred fifty watt (150w) intensity per light source, and string, rope or similar low-voltage lighting as provided in Section V.Z of this Local Law, shall be shielded from above in such a manner that:
      (1) the edge of the shield is below the light source;

      (2) direct rays from the light source are confined to the property boundaries, except when lighting accesses to commercial and/or industrial uses where footcandle values shall be permitted up to one footcandle (1 fc) at the point where the site access meets the pavement of adjoining public roads. In no instance shall site access lighting spill into the carriageways of said public roads; and

      (3) direct rays are prevented from escaping toward the sky.
   b. In the Scenic Overlay (S-O) District and for all home occupations, the above shield-ing requirements shall apply to all outdoor lighting, including incandescent fixtures of one hundred fifty watt (150w) intensity or less.
   c. For the purpose of these provisions, light source includes any refractor, reflector or globe.
   d. Outdoor lighting shall be of substantially minimum intensity needed for the particular purpose.
   e. Mercury vapor lighting is prohibited.
   f. No heat shall be produced that is perceptible beyond the boundaries of the lot on which such source is located.
   g. No light shall be mounted higher than twenty-five (25) feet above grade, except landscape lighting for a property used exclusively for residential purposes, providing said parcel is not in the Scenic Overlay District and the lamp is one hundred fifty watts (150w) or less.
   h. For parking lots having five (5) or more parking spaces, the following standards for glare avoidance shall also apply:
      (1) Lighting levels shall be designed to meet but not exceed the latest recommended levels from the Illuminating Engineering Society of North America (IESNA) for the type of activity/area being illuminated, except light levels for automated teller machines (ATMs) shall be in accordance with the New York State ATM Safety Act. Where no standard is available from IESNA, the appli-cable standard shall be determined taking into account the levels for the closest IESNA activity.
      (2) Uniform light levels shall be achieved on site. The uniformity ratio (average-to-minimum) shall not exceed three to one (3:1) for parking and traffic areas nor four to one (4:1) for pedestrian areas. The lighting design shall establish a hierarchy to ensure a smooth transition from bright areas to those with subdued lighting.

Maximum-to-average lighting levels shall be kept within a six to one (6:1) ratio.

(3) Lighting levels shall be maintained at design levels with lamp or luminaire replacement as needed.

(4) Color Rendition: Metal halide lighting is encouraged. Similar lamp types should be used throughout the site.

i. Any outdoor lighting fixture already installed on the effective date of this Local Law shall be brought into compliance with these provisions within twenty-four (24) months of said effective date.

~ Section V.B.2, Parking Design Standards:

2. Design Standards for Off-Street Parking Spaces.

a. Areas which may be considered as meeting off-street parking space requirements may include a garage, carport or other properly developed area available for parking. All permitted or required parking areas shall be on the same lot as the use for which the parking is required.

b. No parking area shall encroach on any portion of a required front yard or within fifteen (15) feet of any public right-of-way. Open parking and related driveways may, however, encroach on a required side or rear yard to within five (5) feet of a property line, except that if abutting a residential district a minimum of ten (10) feet separation shall be maintained. For parking areas of three (3) or more spaces which abut a residential district or property of residential use, there shall be provided and maintained a dense natural screen or other barrier so designed as to form an effective visual screen from the adjoining property. This provision is not, however, to be construed as prohibiting a common driveway which may, by agreement between adjacent property owners, encroach wholly to the lot line.

c. In any residential district, required parking spaces shall be fully provided in the side or rear yard of the same lot so long as they shall not encroach on any required front yard or within five (5) feet of any side or rear property line.

d. In all districts, each parking space provided shall be at least nine (9) feet wide and twenty (20) feet long. Each space shall have direct and usable driveway access to a street and adequate maneuvering area between spaces as follows:

(1) Parallel curb parking:	End to end measurement of 12-foot aisle width for one-directional flow and 24-foot aisle width for two-directional flow.
(2) 30-degree parking:	13-foot aisle width for one-directional flow and 26-foot aisle width for two-directional flow.
(3) 45-degree parking:	16-foot aisle width for one-directional flow and 26-foot aisle width for two-directional flow.

(4) 60-degree parking:	21-foot aisle width for one-directional flow and 26-foot aisle width for two-directional flow.
(5) Perpendicular parking:	26-foot aisle width for one-directional and two-directional flow.

The average parking lot area per automobile parking space shall not be less than three hundred (300) square feet, including adjacent circulation areas.

e. All parking areas shall be suitably drained. Except for one-family or two-family dwellings and as required by the Americans with Disabilities Act (ADA) and Article 13 of the New York State Uniform Fire Prevention and Building Code, parking lot surfacing requirements shall be established by the Planning Board under site plan re-view, as provided for in Section VII of this Local Law, with particular consideration given to the number of vehicles accommodated and the proposed intensity and season(s) of use.

f. All off-street parking areas shall be designed to eliminate the need to back out onto any public street, road or highway.

g. All gravel parking areas shall be constructed to a minimum standard of twelve (12) inches of compacted pervious sub-base (quarry rubble, run-of-bank gravel, creek gravel) topped with three (3) to four (4) inches of Item 4 or 400 fines and shall be maintained to these standards. Sub-base standards may be modified by the Planning Board or the Building Inspector based on existing soil and subsoil conditions.

~ Section V.CC, Driveway Standards

1. For existing lots which were not approved by the local Planning Board, or for lots approved by the Planning Board on which substantial improvements, such as the construction of a structure requiring a building permit or the installation of a driveway and septic system, have not been undertaken within sixty (60) months of Planning Board approval, the following standards shall be met in the construction of driveways.

   a. Curb cut approval shall be obtained from the Town of Woodstock Highway Department and, where appropriate, the County of Ulster Department of Highways and Bridges, or the New York State Department of Transportation (DOT).

   b. On private and Town roads, the following AASHTO standards for minimum sight distances from the center of the driveway in each direction shall be met:
   30 mph: 200’-250’; 40 mph: 275’-325’; 50 mph: 400’-475’; 55 mph: 450’-550’

   If AASHTO standards cannot be met, then there shall be a minimum clearance of not less than one hundred fifty (150) feet of sight distance from the center of the drive-way in each direction.

c. There shall be a minimum of one percent (1%) negative grade from the edge of pavement into the first ten (10) feet of driveway unless modified by the applicable county or state agency.

d. The average grade on the driveway shall be maintained at ten percent (10%) with the exception that there shall be allowed, on a driveway serving a single- or two-family dwelling, a maximum of fourteen percent (14%) grade for not more than five hundred (500) linear feet. The drive-way grades shall not exceed twelve and one-half percent (12.5%) for the first fifty (50) feet from the edge of the street pavement.

e. The minimum radius on turns shall be fifty (50) feet.

f. All required drainage shall be included with the building permit application on the plot plan, as submitted, and subject to approval of the Town of Woodstock Building Inspector and the Town of Woodstock Highway Superintendent unless modified by the applicable county or state agency.

g. If the driveway is twelve hundred (1200) feet or longer, there shall be twelve (12) foot by thirty (30) foot vehicle turnouts provided at eight hundred (800) foot intervals or as site conditions may allow.

h. Driveways shall consist of gravel, crushed stone, brick, asphalt, concrete or other acceptable stabilized ground surface.

i. The driveway's angle with the street shall be as close to ninety degrees (90˚) as possible, but in no case shall a driveway's angle with the street be less than sixty degrees (60˚) unless modified by the applicable county or state agency.

j. Driveways shall be twelve (12) feet wide and have a depth of up to twelve (12) inches of shale or run-of-bank gravel, as to be determined by the Town of Woodstock Building Inspector. On top of the twelve (12) inches there shall be a coat of 400 fines, or the equivalent, three (3) to four (4) inches deep.

k. Where permitted by county and state requirements, any waiver from these standards shall be at the discretion of the Town of Woodstock Building and Highway Departments.

2. For driveways constructed within sixty (60) months of Planning Board approval of a subdivision, the driveway standards listed in Article VI, Section 3, of the Land Subdivision Regulations for the Town of Woodstock shall apply, unless modified by the Planning Board during subdivision review and approval.

~ Section VII.B.1 & 2, Site Plan Review Checklist:

1. Preliminary Site Plan Checklist.
   a. title of drawing, including name and address of applicant and person(s) responsible for preparation of such drawing;
   b. key map or area map oriented to the nearest street or road intersection showing the parcel under consideration for site plan review, its zoning district classification, and all properties, subdivisions, streets and easements within two hundred (200) feet of the boundaries thereof;
   c. north arrow, map scale and date;
   d. boundaries of the property plotted to scale based upon actual survey or similarly accurate data;
   e. existing watercourses;
   f. grading and drainage plan showing existing and proposed contours at an appropriate interval, as specified by the Planning Board at the sketch plan conference, with two (2) foot contours and soils data required on that portion of any site proposed for development where general site grades exceed five percent (5%) or where there may be susceptibility to erosion, flooding or ponding;
   g. location, proposed use and height of all buildings;
   h. location, design and construction materials of all parking and loading areas, with access and egress drives thereto;
   i. provision for pedestrian access;
   j. location of outdoor storage, if any;
   k. location, design and construction materials of all existing and proposed site improvements, including drains, culverts, retaining walls and fences;
   l. description of the method of sewage disposal and the location, design, and construction materials of such facilities;
   m. description of the method of securing water supply and the location, design and construction materials of such facilities;
   n. location of fire and other emergency zones, including the location of fire hydrants;
   o. location, design and construction materials of all energy distribution facilities, including electrical, gas and solar energy;
   p. location, size, design and construction materials of all proposed signage;
   q. location and proposed development of all buffer areas, including indication of existing trees and other vegetative cover;
   r. location and design of all outdoor lighting fixtures and facilities, including data regarding lighting levels both within the site and at the site's boundaries, fixture mounting heights and glare control options for each lighting source. Illuminance may be platted using manufacturer’s photometric charts or the Planning Board may require iso-footcandle specifications. The lighting plan must be in conformance with Section V.A.3 of this Local Law.
   s. designation of the amount of building area proposed for retail sales, office use or similar commercial activity, including, where applicable, the type and number of seats provided, so that the adequacy of parking and other factors may be reviewed;
   t. general landscaping plan and detailed planting schedule;

u. building elevations describing the design and construction materials of both the prin-cipal structure and all accessory structures and related site elements;
v. each site plan submitted to the Planning Board for signature shall contain a state-ment in form and substance satisfactory to the Planning Board that has been signed by all the applicants stating that they will comply with all conditions shown on the site plan;
w. all revisions that are made to a preliminary site plan shall be listed and dated on the site plan; and
x. any other element integral to the proposed development, as considered necessary by the Planning Board, including the identification of any state or county permits required for the project's execution.

2. Tabular Summary Required. In addition to the data specified above, all preliminary site plans shall include a tabular summary relating the site plan to the specific dimensional requirements of this Local Law, including the following:
a. lot area in square feet;
b. building area in square feet;
c. calculation of structure coverage and open space in square feet and as a percentage of lot area;
d. indication of all front, rear and side yard setbacks to the principal structure and to all accessory structures and other site elements; and
e. compliance with parking requirements.

~ Section VII.C.1, Planning Considerations:

1. General Considerations:

a. adequacy and arrangement of vehicular traffic access and circulation, including inter-sections, road widths, pavement surfaces, channelization structures and traffic controls;

b. adequacy and arrangement of pedestrian and bicycle traffic access and circulation, including separation of pedestrian from vehicular traffic, and overall pedestrian con-venience and safety;

c. location, arrangement, appearance and sufficiency of off-street parking and loading;

d. location, arrangement, size, design and general site compatibility of principal and accessory buildings, lighting and signage;

e. adequacy of stormwater and drainage facilities;

f. adequacy of water supply and sewage disposal facilities;

g. adequacy, type and arrangement of trees, shrubs and other landscaping which constitute a visual and/or noise-deterring buffer between the applicant's and adjoining lands, including

the maximum retention of existing vegetation;

h. creation or preservation of open spaces;

i. protection of adjacent properties from noise, glare, unsightly conditions, or other objectionable features, as described in Section V.A of this Local Law;

j. adequacy of fire lanes and other emergency zones and the overall sufficiency of the site to be protected by police, fire and other emergency services; and

k. special attention to the adequacy of structures, roadways and landscaping in areas with susceptibility to ponding, flooding and/or erosion.

Appendix B
(list of resources)

"New York Stormwater Design Manual", October 2001, New York State Department of Environmental Conservation, http://www.dec.state.ny.us/website/dow/swmanual/swmanual.html

"Reducing the Impacts of Stormwater Runoff From New Development", 2nd ed., 1993, New York State Department of Environmental Conservation

"Community Design Guidelines Manual", The Fort Drum Land Use Team, Dulles State Office Building, 317 Washington Street, Watertown, NY 13601

"Saving Face: How Corporate Franchise Design Can Respect Community Identity", 1994, Ronald Lee Fleming, AICP, American Planning Association, Planning Advisory Report Number 452

"Parking Lot Landscape Development", 2nd ed., 1993, Gary O. Robinette, ASLA, Agora Communications

International Dark Skies Association, http://www.darksky.org/ida/ - see their "resources" section for lists of shielded lighting products and manufacturers

International Dark Skies Association Information Sheet 77 – http://www.darksky.org/ida/infoshts/iso77.html – lists IESNA outdoor lighting level recommendations

"Stormwater Strategies: Community Responses to Runoff Pollution", 2001, National Resources Defense Council (NRDC) website: http://www.main.nc.us/riverlink/frameset/frameset.htm - see this site for Low Impact Development (LID) strategies, such as bio-retention techniques.

"Design Review", 1995, Mark L. Hinshaw, AICP, American Planning Association, Planing Advisory Service Report Number 454

"Soil Survey of Ulster County, New York", June 1979, US Dept of Agriculture

"Better Models for Superstores – Alternatives to Big-Box Sprawl", 1997, Constance E. Beaumont, Preservation Information Series, National Trust for Historic Preservation

"New York Guidelines for Urban Erosion & Sediment Control", 4th ed., 1997, Printed by Empire State Chapter of the Soil and Water Conservation Society

"Planning for the Future: A Handbook on Community Visioning", The Center for Rural Pennsylvania, 212 Locust Street, Suite 604, Harrisburg, PA, 17101

Other Design Manuals: "Town of Rhinebeck Design Standards", Rhinebeck, NY; "Hamlet Design Guidelines" October 1994, Dutchess County Department of Planning and Development, Poughkeepsie, NY; "Town of Eastchester Commercial Area Design Guidelines", Eastchester, NY

H.1 Ponds and Wetlands

For areas that are to be planted within a stormwater pond, it is necessary to determine what type of hydrologic zones will be created within the pond. The following six zones describe the different conditions encountered in stormwater management facilities. Every facility does not necessarily reflect all of these zones. The hydrologic zones designate the degree of tolerance the plant exhibits to differing degrees of inundation by water.

Table H.5 at the end of this appendix designates appropriate zones for each plant. There may be other zones listed outside of these brackets. The plant materials may occur within these zones, but are not typically found in them. Plants suited for specific hydrologic conditions may perish when those conditions change, exposing the soil, and therefore, increasing the chance for erosion.

Each zone has its own set of plant selection criteria based on the hydrology of the zone, the stormwater functions required of the plant and the desired landscape effect. The hydrologic zones are as follows:

Table H.1 Hydrologic Zones

Zone #	Zone Description	Hydrologic Conditions
Zone 1	Deep Water Pool	1-6 feet deep Permanent Pool
Zone 2	Shallow Water Bench	6 inches to 1 foot deep
Zone 3	Shoreline Fringe	Regularly inundated
Zone 4	Riparian Fringe	Periodically inundated
Zone 5	Floodplain Terrace	Infrequently inundated
Zone 6	Upland Slopes	Seldom or never inundated

Zone 1: Deep Water Area ***(1- 6 Feet)***

Ponds and wetlands both have deep pool areas that comprise Zone 1. These pools range from one to six feet in depth, and are best colonized by submergent plants, if at all.

This pondscaping zone has not been routinely planted for several reasons. First, the availability of plant materials that can survive and grow in this zone is limited, and it is also feared that plants could clog the stormwater facility outlet structure. In many cases, these plants will gradually become established through natural recolonization (e.g., transport of plant fragments from other ponds via the feet and legs of waterfowl). If submerged plant material becomes more commercially available and clogging concerns are addressed, this area can be planted. The function of the planting is to reduce resedimentation and improve oxidation while creating a greater aquatic habitat.

- Plant material must be able to withstand constant inundation of water of one foot or greater in depth.
- Plants may be submerged partially or entirely.
- Plants should be able to enhance pollutant uptake.
- Plants may provide food and cover for waterfowl, desirable insects, and other aquatic life.

Zone 2: Shallow Water Bench ***(Normal Pool To 1 Foot)***

Zone 2 includes all areas that are inundated below the normal pool to a depth of one foot, and is the primary area where emergent plants will grow in a stormwater wetlands. Zone 2 also coincides with the aquatic bench found in stormwater ponds. This zone offers ideal conditions for the growth of many emergent wetland species. These areas may be located at the edge of the pond or on low mounds of earth located below the surface of the water within the pond. When planted, Zone 2 can be an important habitat for many aquatic and nonaquatic animals, creating a diverse food chain. This food chain includes predators, allowing a natural regulation of mosquito populations, thereby reducing the need for insecticidal applications.

- Plant material must be able to withstand constant inundation of water to depths between six inches and one foot deep.
- Plants will be partially submerged.
- Plants should be able to enhance pollutant uptake.
- Plants may provide food and cover for waterfowl, desirable insects and other aquatic life.

Plants will stabilize the bottom of the pond, as well as the edge of the pond, absorbing wave impacts and reducing erosion, when water level fluctuates. Plant also slow water velocities and increase sediment deposition rates. Plants can reduce resuspension of sediments caused by the wind. Plants can also soften the engineered contours of the pond, and can conceal drawdowns during dry weather.

Zone 3: Shoreline Fringe ***(Regularly Inundated)***

Zone 3 encompasses the shoreline of a pond or wetland, and extends vertically about one foot in elevation from the normal pool. This zone includes the safety bench of a pond, and may also be periodically inundated if storm events are subject to extended detention. This zone occurs in a wet pond or shallow marsh and can be the most difficult to establish since plants must be able to withstand inundation of water during storms, when wind might blow water into the area, or the occasional drought during the summer. In order to stabilize the soil in this zone, Zone 3 must have a vigorous cover.

- Plants should stabilize the shoreline to minimize erosion caused by wave and wind action or water fluctuation.
- Plant material must be able to withstand occasional inundation of water. Plants will be partially submerged at this time.
- Plant material should, whenever possible, shade the shoreline, especially the southern exposure. This will help to reduce the water temperature.

- Plants should be able to enhance pollutant uptake.
- Plants may provide food and cover for waterfowl, songbirds, and wildlife. Plants could also be selected and located to control overpopulation of waterfowl.
- Plants should be located to reduce human access, where there are potential hazards, but should not block the maintenance access.
- Plants should have very low maintenance requirements, since they may be difficult or impossible to reach.
- Plants should be resistant to disease and other problems which require chemical applications (since chemical application is not advised in stormwater ponds).

Zone 4: Riparian Fringe ***(Periodically Inundated)***

Zone 4 extends from one to four feet in elevation above the normal pool. Plants in this zone are subject to periodic inundation after storms, and may experience saturated or partly saturated soil conditions. Nearly all of the temporary ED area is included within this zone.

- Plants must be able to withstand periodic inundation of water after storms, as well as occasional drought during the warm summer months.
- Plants should stabilize the ground from erosion caused by run-off.
- Plants should shade the low flow channel to reduce the pool warming whenever possible.
- Plants should be able to enhance pollutant uptake.
- Plant material should have very low maintenance, since they may be difficult or impossible to access.
- Plants may provide food and cover for waterfowl, songbirds and wildlife. Plants may also be selected and located to control overpopulation of waterfowl.
- Plants should be located to reduce pedestrian access to the deeper pools.

Zone 5: Floodplain Terrace ***(Infrequently Inundated)***

Zone 5 is periodically inundated by flood waters that quickly recedes in a day or less. Operationally, Zone 5 extends from the maximum two year or Cpv water surface elevation up to the 10 or 100 year maximum water surface elevation. Key landscaping objectives for Zone 5 are to stabilize the steep slopes characteristic of this zone, and establish a low maintenance, natural vegetation.

- Plant material should be able to withstand occasional but brief inundation during storms, although typical moisture conditions may be moist, slightly wet, or even swing entirely to drought conditions during the dry weather periods.
- Plants should stabilize the basin slopes from erosion.
- Ground cover should be very low maintenance, since they may be difficult to access on steep slopes or if frequency of mowing is limited. A dense tree cover may help reduce maintenance and discourage resident geese.
- Plants may provide food and cover for waterfowl, songbirds, and wildlife.

- Placement of plant material in Zone 5 is often critical, as it often creates a visual focal point and provides structure and shade for a greater variety of plants.

Zone 6: Upland Slopes *(Seldom or Never Inundated)*

The last zone extends above the maximum 100 year water surface elevation, and often includes the outer buffer of a pond or wetland. Unlike other zones, this upland area may have sidewalks, bike paths, retaining walls, and maintenance access roads. Care should be taken to locate plants so they will not overgrow these routes or create hiding places that might make the area unsafe.

- Plant material is capable of surviving the particular conditions of the site. Thus, it is not necessary to select plant material that will tolerate any inundation. Rather, plant selections should be made based on soil condition, light, and function within the landscape.
- Ground covers should emphasize infrequent mowing to reduce the cost of maintaining this landscape.
- Placement of plants in Zone 6 is important since they are often used to create a visual focal point, frame a desirable view, screen undesirable views, serve as a buffer, or provide shade to allow a greater variety of plant materials. Particular attention should be paid to seasonal color and texture of these plantings.

H.2 Bioretention

Planting Soil Bed Characteristics

The characteristics of the soil for the bioretention facility are perhaps as important as the facility location, size, and treatment volume. The soil must be permeable enough to allow runoff to filter through the media, while having characteristics suitable to promote and sustain a robust vegetative cover crop. In addition, much of the nutrient pollutant uptake (nitrogen and phosphorus) is accomplished through adsorption and microbial activity within the soil profile. Therefore, the soils must balance soil chemistry and physical properties to support biotic communities above and below ground.

The planting soil should be a sandy loam, loamy sand, loam (USDA), or a loam/sand mix (should contain a minimum 35 to 60% sand, by volume). The clay content for these soils should by less than 25% by volume. Soils should fall within the SM, or ML classifications of the Unified Soil Classification System (USCS). A permeability of at least 1.0 feet per day (0.5"/hr) is required (a conservative value of 0.5 feet per day is used for design). The soil should be free of stones, stumps, roots, or other woody material over 1" in diameter. Brush or seeds from noxious weeds. Placement of the planting soil should be in lifts of 12 to 18", loosely compacted (tamped lightly with a dozer or backhoe bucket). The specific characteristics are presented in Table H.2.

Table H.2 Planting Soil Characteristics

Parameter	Value
PH range	5.2 to 7.00
Organic matter	1.5 to 4.0%
Magnesium	35 lbs. per acre, minimum
Phosphorus (P_2O_5)	75 lbs. per acre, minimum
Potassium (K_2O)	85 lbs. per acre, minimum
Soluble salts	≤ 500 ppm
Clay	10 to 25%
Silt	30 to 55%
Sand	35 to 60%

Mulch Layer

The mulch layer plays an important role in the performance of the bioretention system. The mulch layer helps maintain soil moisture and avoid surface sealing which reduces permeability. Mulch helps prevent erosion, and provides a micro-environment suitable for soil biota at the mulch/soil interface. It also serves as a pretreatment layer, trapping the finer sediments which remain suspended after the primary pretreatment.

The mulch layer should be standard landscape style, single or double, shredded hardwood mulch or chips. The mulch layer should be well aged (stockpiled or stored for at least 12 months), uniform in color, and free of other materials, such as weed seeds, soil, roots, etc. The mulch should be applied to a maximum depth of three inches. Grass clippings should not be used as a mulch material.

Planting Plan Guidance

Plant material selection should be based on the goal of simulating a terrestrial forested community of native species. Bioretention simulates an ecosystem consisting of an upland-oriented community dominated by trees, but having a distinct community, or sub-canopy, of understory trees, shrubs and herbaceous materials. The intent is to establish a diverse, dense plant cover to treat stormwater runoff and withstand urban stresses from insect and disease infestations, drought, temperature, wind, and exposure.

The proper selection and installation of plant materials is key to a successful system. There are essentially three zones within a bioretention facility (Figure H.1). The lowest elevation supports plant species adapted to standing and fluctuating water levels. The middle elevation supports a slightly drier group of plants, but still tolerates fluctuating water levels. The outer edge is the highest elevation and generally supports plants adapted to dryer conditions. When using Table A.5 to identify species, use the following guideline:

Lowest Zone: Zones 2-3

Middle Zone: Zones 3-4

Outer Zone: Zones 5-6

The layout of plant material should be flexible, but should follow the general principals described in Table H.3. The objective is to have a system which resembles a random and natural plant layout, while maintaining optimal conditions for plant establishment and growth.

Figure H.1 Planting Zones for Bioretention Facilities

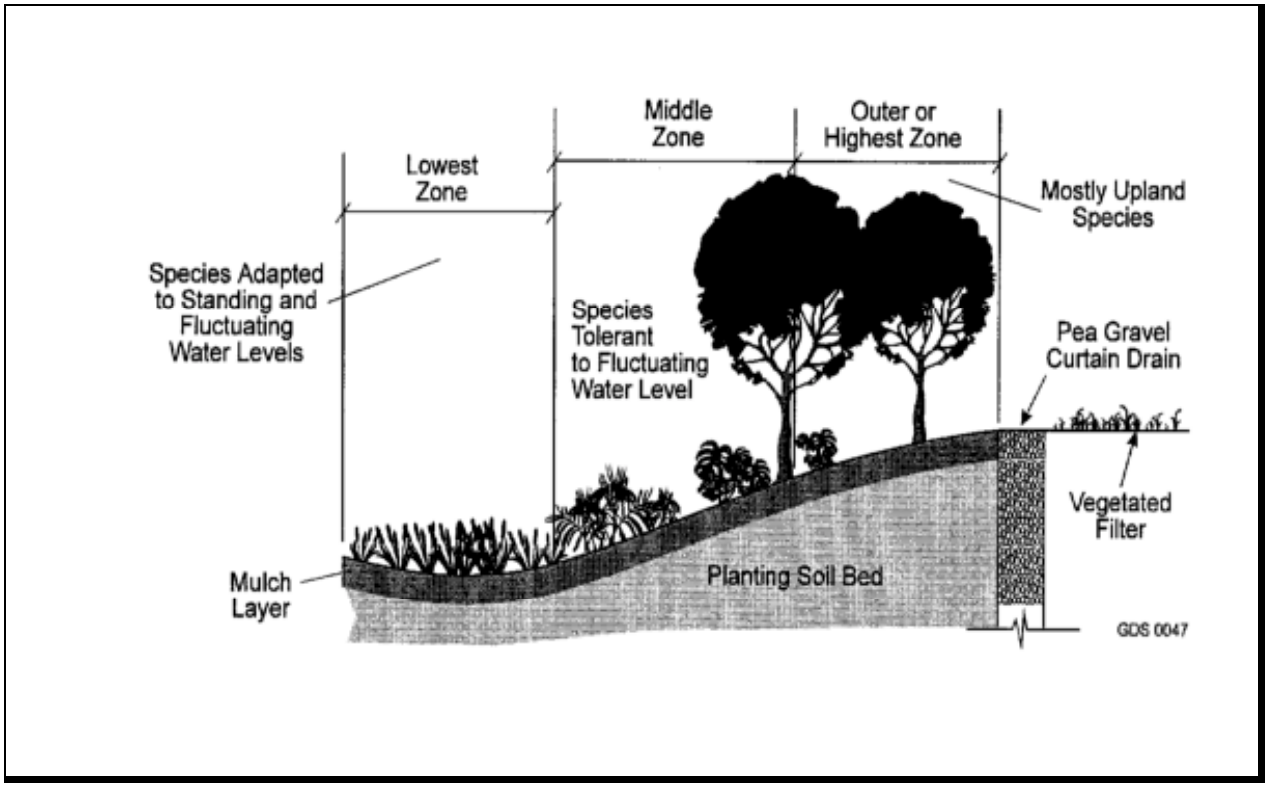


Table H.3 Planting Plan Design Considerations
Native plant species should be specified over exotic or foreign species.
Appropriate vegetation should be selected based on the zone of hydric tolerance (see Figure H.1).
Species layout should generally be random and natural.
A canopy should be established with an understory of shrubs and herbaceous materials.
Woody vegetation should not be specified in the vicinity of inflow locations.
Trees should be planted primarily along the perimeter of the bioretention area.
Urban stressors (e.g., wind, sun, exposure, insect and disease infestation, drought) should be considered when laying out the planting plan.
Noxious weeds should not be specified.
Aesthetics and visual characteristics should be a prime consideration.
Traffic and safety issues must be considered.
Existing and proposed utilities must be identified and considered.

Plant Material Guidance

Plant materials should conform to the American Standard Nursery Stock, published by the American Association of Nurserymen, and should be selected from certified, reputable nurseries. Planting specifications should be prepared by the designer and should include a sequence of construction, a description of the contractor's responsibilities, a planting schedule and installation specifications, initial maintenance, and a warranty period and expectations of plant survival. Table H.4 presents some typical issues for planting specifications.

Table H.4 Planting Specification Issues for Bioretention Areas	
Specification Element	**Elements**
Sequence of Construction	Describe site preparation activities, soil amendments, etc.; address erosion and sediment control procedures; specify step-by-step procedure for plant installation through site clean-up.
Contractor's Responsibilities	Specify the contractors responsibilities, such as watering, care of plant material during transport, timeliness of installation, repairs due to vandalism, etc.
Planting Schedule and Specifications	Specify the materials to be installed, the type of materials (e.g., B&B, bare root, containerized); time of year of installations, sequence of installation of types of plants; fertilization, stabilization seeding, if required; watering and general care.
Maintenance	Specify inspection periods; mulching frequency (annual mulching is most common); removal and replacement of dead and diseased vegetation; treatment of diseased trees; watering schedule after initial installation (once per day for 14 days is common); repair and replacement of staking and wires.
Warranty	Specify the warranty period, the required survival rate, and expected condition of plant species at the end of the warranty period.

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)						
Plant Name	**Zone**	**Form**	**Available**	**Inundation Tolerance**	**Wildlife Value**	**Notes**
Trees and Shrubs						
American Elm *(Ulmus americana)*	4,5,6	Dec. Tree	yes	Irregular-seasonal saturation	High. Food (seeds,browsing), cover, nesting for birds & mammals	Susceptible to diesease (short-lived). Sun to full shade, tolerates drought and wind/ice damage.
Arrowwood Viburrium *(Viburrium dentatum)*	3,4	Dec. Shrub	yes	yes	High. Songbirds and mammals	Grows best in sun to partial shade
Bald Cypress *(Taxodium distichum)*	3,4	Dec. Tree	yes	yes	Little food value, but good perching site for waterfowl	Forested Coastal Plain. North of normal range. Tolerates drought.
Bayberry *(Myrica pensylvanica)*	4,5,6	Dec. Shrub	yes	yes	High. Nesting, food, cover. Berries last into winter	Coastal Plain only. Roots fix N_2 Tolerates slightly acidic soils.
Black Ash *(Fraxinus nigra)*	3,4,5	Dec. Tree	yes	Irregular-seasonal saturation	High. Food (seeds, sap), cover, nesting for birds & mammals. Fruit persists in winter	Rapid growth. Requires full sun. Susceptible to wind/ice damage & disease. Tolerates drought and infrequent flooding by salt water.
Black Cherry *(Prunus serotina)*	5,6	Dec. Tree	yes	no	High. Food	Moist soils or wet bottomland areas
Blackgum or Sourgum *(Nyssa sylvatica)*	4,5,6	Dec. Tree	yes	yes	High. Songbirds, egrets, herons, raccoons, owls	Can be difficult to transplant. Prefers sun to partial shade
Black Willow *(Salix nigra)*	3,4,5	Dec. Tree	yes	yes	High. Browsing and cavity nesters.	Rapid growth, stabilizes stream-banks. Full sun
Buttonbush *(Cepahlanthus occidentalis)*	2,3,4,5	Dec. Shrub	yes	yes	High. Ducks and shorebirds. Seeds, nectar and nesting.	Full sun to partial shade. Will grow in dry areas.
Common Spice Bush *(Lindera benzoin)*	3,4,5	Dec. Shrub	yes	yes	Very high. Songbirds	Shade and rich soils. Tolerates acidic soils. Good understory species

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)						
Plant Name	**Zone**	**Form**	**Available**	**Inundation Tolerance**	**Wildlife Value**	**Notes**
Eastern Cottonwood *(Populus deltoides)*	4,5	Dec. Tree	yes	yes	Moderate. Cover, food.	Shallow rooted, subject to windthrow. Invasive roots. Rapid growth.
Eastern Hemlock *(Tsuga canadensis)*	5,6	Conif. Tree	yes	yes	Moderate. Mostly cover and some food	Tolerates all sun/shade conditions. Tolerates acidic soil.
Eastern Red Cedar *(Juniperus virginiana)*	4,5,6	Conif. Tree	yes	no	High. Fruit for birds. Some cover.	Full sun to partial shade. Common in wetlands, shrub bogs and edge of stream
Elderberry *(Sambucus canadensis)*	3,4,5,6	Dec. Shrub	yes	yes	Extremely high. Food and cover, birds and mammals.	Full sun to partial shade.
Green Ash, Red Ash *(Fraxinus pennsylvania)*	4,5	Dec. Tree	yes	yes	Moderate. Songbirds.	Rapid growing streambank stabilizer. Full sun to partial shade.
Hackenberry *(Celtis occidentalis)*	5,6	Dec. Tree	yes	some	High. Food and cover	Full sun to partial shade.
Larch, Tamarack *(Larix latricina)*	3,4	Conif. Tree	no	yes	Low. Nest tree and seeds.	Rapid initial growth. Full sun, acidic boggy soil.
Pin Oak *(Quercus palustris)*	3,4,5,6	Dec. Tree	yes	yes	High. Tolerates acidic soil	Gypsy moth target. Prefers well drained, sandy soils.
Red Choke Berry *(Pyrus arbutifolia)*	3,4,5	Dec. Shrub	no	yes	Moderate. Songbirds.	Bank stabilizer. Partial sun.
Red Maple *(Acer rubrum)*	3,4,5,6	Dec. Tree	yes	yes	High seeds and browse. Tolerates acidic soil.	Rapid growth.
River Birch *(Betula nigra)*	3,4,5	Dec. Tree	yes	yes	Low. Good for cavity nesters.	Bank erosion control. Full sun.
Shadowbush, Serviceberry *(Amelanchier*	4,5,6	Dec. Shrub	yes	yes	High. Nesting, cover, food. Birds and	Prefers partial shade. Common in forested

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)						
Plant Name	**Zone**	**Form**	**Available**	**Inundation Tolerance**	**Wildlife Value**	**Notes**
canadensis)					mammals.	wetlands and upland woods.
Silky Dogwood *(Cornus amomium)*	3,4,5	Dec. Shrub	yes	yes	High. Songbirds, mammals.	Shade and drought tolerant. Good bank stabilizer.
Slippery Elm *(Ulnus rubra)*	3,4,5	Dec. Tree	rare	yes	High. Food (seeds, buds) for birds & mammals (browse). Nesting	Rapid growth, no salinity tolerance. Tolerant to shade and drought.
Smooth Alder *(Alnus serrulata)*	3,4,5	Dec. Tree	no	yes	High. Food, cover.	Rapid growth. Stabilizes streambanks.
Speckled Alder *(Alnus rugosa)*	3,4	Dec. Shrub	yes	yes	High. Cover, browse for deer, seeds for bird.	
Swamp White Oak *(Quercus bicolor)*	3,4,5	Dec. Tree	yes	yes	High. Mast	Full sun to partial shade. Good bottomland tree.
Swamp Rose *(Rosa Palustrus)*	3,4	Dec. Shrub		Irregular, seasonal, or regularly saturated	High. Food (hips) for birds including turkey, ruffed grouse and mammals. Fox cover.	Prefers full sun. Easy to establish. Low salt tolerance.
Sweetgum *(Liquidambar styraciflua)*	4,5,6	Dec. Tree	yes	yes	Moderate. Songbirds	Tolerates acid or clay soils. Sun to partial shade.
Sycamore *(Platanus occidentalis)*	4,5,6,	Dec. Tree	yes	yes	Low. Food, cavities for nesting.	Rapid growth. Common in floodplains and alluvial woodlands.
Tulip Tree *(Liriodendron tulipifera)*	5,6	Dec. Tree	yes	no	Moderate. Seeds and nest sites	Full sun to partial shade. Well drained soils. Rapid growth.
Tupelo *(Nyssa sylvatica vari biflora)*	3,4,5	Dec. Tree	yes	yes	High. Seeds and nest sites	Ornamental

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)						
Plant Name	**Zone**	**Form**	**Available**	**Inundation Tolerance**	**Wildlife Value**	**Notes**
White Ash *(Fraxinus americana)*	5,6	Dec. Tree	yes	no	High. Food	All sunlight conditions. Well drained soils.
Winterberry *(Ilex verticillata)*	3,4,5	Dec. Shrub	yes	yes	High. Cover and fruit for birds. Holds berries into winter.	Full sun to partial shade. Seasonally flooded areas.
Witch Hazel *(Hamamelis virginiana)*	4,5	Dec. Shrub	yes	no	Low. Food for squirrels, deer, and ruffed grouse.	Prefers shade. Ornamental.
Herbaceous Plants						
Arrow arum *(Peltandra virginica)*	2,3	Emergent	yes	up to 1 ft.	High. Berries are eaten by wood ducks.	Full sun to partial shade.
Arrowhead, Duck Potato *(Saggitaria latifolia)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Tubers and seeds eaten by ducks.	Aggressive colonizer.
Big Bluestem (*Andropogon gerardi*)	4,5	Perimeter	yes	Irregular or seasonal inundation.	High. Seeds for songbirds. Food for deer	Requires full sun.
Birdfoot deervetch (*Lotus Corniculatus*)	4,5,6	Perimeter	yes	Infrequent inundation	High. Food for birds.	Full sun. Nitrogen fixer.
Blue Flag Iris *(Iris versicolor)*	2,3	Emergent	yes	Regular or permanently, up to ½ ft or saturated	Moderate. Food muskrat and wildfowl. Cover, marshbirds	Slow growth. Full sun to partial shade. Tolerates clay. Fresh to moderately brackish water.
Blue Joint (*Calamagrotis canadensis*)	2,3,4	Emergent	yes	Regular or permanent inundation up to 0.5 ft.	Moderate. Food for game birds and moose.	Tolerates partial shade
Broomsedge *(Andropogon virginicus)*	2,3	Perimeter	yes	up to 3 in.	High. Songbirds and browsers. Winter food and cover.	Tolerant of fluctuation water levels & partial shade.
Bushy Beardgrass *(Andropogon glomeratus)*	2,3	Emergent	yes	up to 1 ft.		Requires full sun.
Cardinal flower (*Lobelia cardinalis*)	4,5,6	Perimeter	yes	Some. Tolerates saturation up to 100% of season.	High. Nectar for hummingbird, oriole, butterflies.	Tolerates partial shade

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)						
Plant Name	**Zone**	**Form**	**Available**	**Inundation Tolerance**	**Wildlife Value**	**Notes**
Cattail *(Typha sp.)*	2,3	Emergent	yes	up to 1 ft.	Low. Except as cover	Aggressive. May eliminate other species. Volunteer. High pollutant treatment
Coontail *(Ceratophyllum demersum)*	1	Submergent	no	yes	Low food value. Good habitat and shelter for fish and invertebrates.	Free floating SAV. Shade tolerant. Rapid growth.
Common Three-Square *(Scirpus pungens)*	2	Emergent	yes	up to 6 in.	High. Seeds, cover. Waterfowl and fish.	High metal removal.
Duckweed *(Lemma sp.)*	1,2	Submergent/ Emergent	yes	yes	High. Food for waterfowl and fish.	High metal removal.
Fowl mannagrass (*Glyceria striata*)	4,5	Perimeter	yes	Irregular or seasonal inundation	High. Food for waterfowl, muskrat, and deer.	Partial to full shade.
Hardstem Bulrush *(Scirpus acutus)*	2	Emergent	yes	up to 3 ft.	High. Cover, food (achenes, rhizomes) ducks, geese, muskrat, fish. Nesting for bluegill and bass.	Quick to establish, fresh to brackish. Good for sediment stabilization and erosion control.
Giant Burreed *(Sparganium eurycarpum)*	2,3	Emergent	rare	Regular to permanently inundated. up to 1 ft.	High. Food (seeds, plant) waterfowl, beaver & other mammals. Cover for marshbirds, waterfowl.	Rapid spreading . Tolerates partial sun. Good for shoreline stabilization.. Salinity <0.5 ppt
Lizard's Tail *(Saururus cernuus)*	2	Emergent	yes	up to 1 ft.	Low, except wood ducks.	Rapid growth. Shade tolerant
Long-leaved Pond Weed *(Potamogeton nodosus)*	1,2	Rooted submerged aquatic	yes	up to 1-6 ft. depending on turbidity	High. Food (seeds, roots) waterfowl, aquatic fur-bearers, deer, moose. Habitat for fish	Rapid spread. Salinity <0.5 ppt. Flowers float on surface, Aug.-Sept.

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)						
Plant Name	**Zone**	**Form**	**Available**	**Inundation Tolerance**	**Wildlife Value**	**Notes**
Marsh Hibiscus *(Hibiscus moscheutos)*	2,3	Emergent	yes	up to 3 in.	Low. Nectar.	Full sun. Can tolerate periodic dryness.
Pickerelweed *(Pontederia cordata)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Ducks. Nectar for butterflies.	Full sun to partial shade.
Pond Weed, Sago *(Potamogeton pectinatus*	1	Submergent	yes	yes	Extremely high. Waterfowl, marsh and shorebirds.	Removes heavy metals.
Redtop (*Agrostis alba*)	3,4,5	Perimeter	yes	Up to 25% of season	Moderate. Rabbits and some birds.	Quickly established but not highly competitive.
Rice Cutgrass *(Leersia oryzoides)*	2,3	Emergent	yes	up to 3 in.	High. Food and cover.	Full sun although tolerant of shade. Shoreline stabilization.
Sedges *(Carex spp.)*	2,3	Emergent	yes	up to 3 in.	High waterfowl, songbirds.	Many wetland and upland species.
Tufted Hairgrass (*Deschampsia caespitosa*)	3,4,5	Perimeter	yes	Regular to irregular inundation.	High.	Full sun. May become invasive.
Soft-stem Bulrush *(Scirpus validus)*	2,3	Emergent	yes	up to 1 ft.	Moderate. Good cover and food.	Full sun. Aggressive colonizer. High pollutant removal.
Smartweed *(Polygonum spp.)*	2,3,4	Emergent	yes	up to 1 ft.	High. Waterfowl, songbirds. Seeds and cover.	Fast colonizer. Avoid weedy aliens such as *P. perfoliatum.*
Soft Rush *(Juncus effusus)*	2,3,4	Emergent	yes	up to 3 in.	Moderate.	Tolerates wet or dry conditions.
Spatterdock *(Nuphar luteum)*	2	Emergent	yes	up to 3 ft.	Moderate for food but high for cover.	Fast colonizer. Tolerant of fluctuating water levels.
Switchgrass *(Panicum virgatum)*	2,3,4,5,6	Perimeter	yes	up to 3 in.	High. Seeds, cover for waterfowl, songbirds.	Tolerates wet/dry conditions.

Table H.5 Native Plant Guide for Stormwater Management Areas (NY)						
Plant Name	**Zone**	**Form**	**Available**	**Inundation Tolerance**	**Wildlife Value**	**Notes**
Sweet Flag *(Acorus calamus)*	2,3	Herbaceous	yes	up to 3 in.	Low.	Tolerant of dry periods. Not a rapid colonizer. Tolerates acidic conditions.
Waterweed *(Elodea canadensis)*	1	Submergent	yes	yes	Low.	Good water oxygenator. High nutrient, copper, manganese and chromium removal.
Wild Celery *(Valisneria americana)*	1	Submergent	yes	yes	High. Food for waterfowl. Habitat for fish and invertebrates.	Tolerant of murkey water and high nutrient loads.
Wild Rice *(Zizania aquatica)*	2	Emergent	yes	up to 1 ft.	High. Food for birds.	Prefers full sun
Wool Grass *(Scirpus cyperinus)*	2,3	Emergent	yes	Irregularly to seasonally indundated	Moderate. Cover, Food.	Requires full sun. Can tolerate acidic soils, drought. Colonizes disturbed areas, moderate growth.