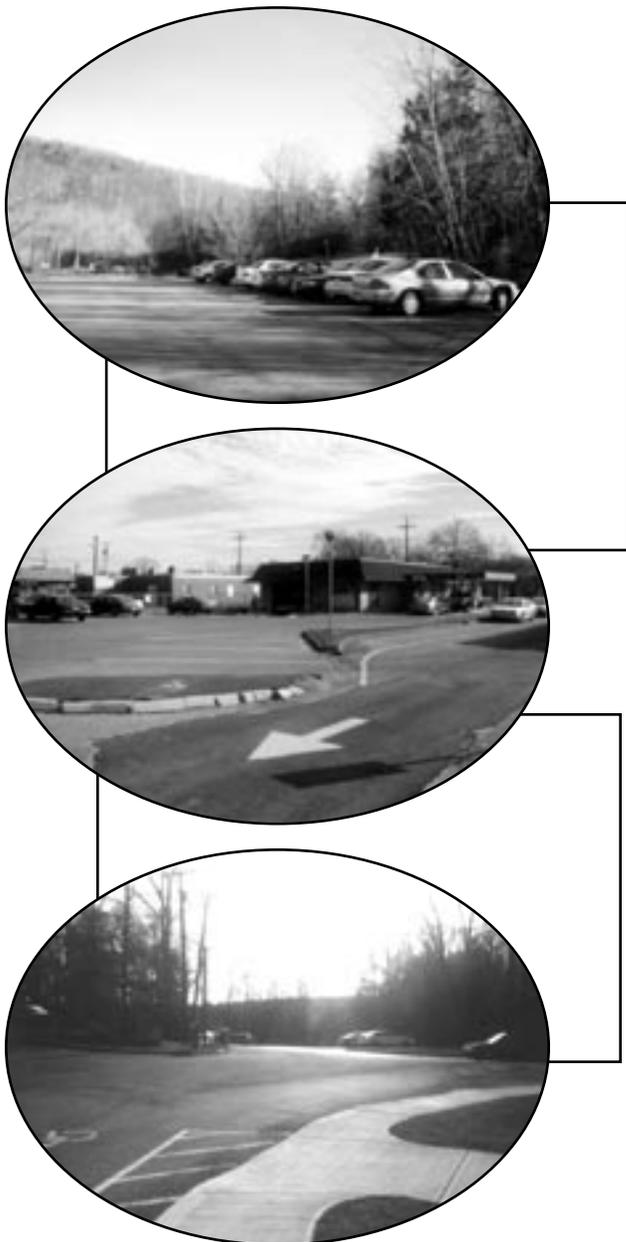


Model Zoning Regulations for Parking for Northwestern Connecticut



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**Northwestern Connecticut Parking Study – Phase II
Model Zoning Regulations for Parking
for Northwestern Connecticut**

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INTRODUCTION

This report presents the findings of Phase II of the Northwestern Connecticut Parking Study, which has been jointly sponsored by the Northwestern Connecticut Council of Governments (NWCCOG) and the Litchfield Hills Council of Elected Officials (LHCEO). This study was funded in part by the Connecticut Department of Environmental Protection (CTDEP) through a US Environmental Protection Agency (USEPA) Clean Water Act Section 604(b) grant. This Phase II report builds upon the information and findings of the Phase I effort. The overall aim of the project has been to identify strategies to reduce the area of impervious surface dedicated to parking. The related goals of the study include:

- To reduce adverse water quality effects of contaminated runoff originating from paved parking surfaces
- To better match actual demand for parking with supply
- To minimize land consumption for paved parking
- To achieve improved overall parking lot design

Phase I, completed in 2002, compared actual parking usage with available parking supply for 10 different land uses at 42 locations in the towns that are part of the NWCCOG and LHCEO regions. The area covered by the Phase I study is shown in Figure 1. Phase I revealed that the majority of the parking lots surveyed were underutilized, indicating that parking lots are, in general, larger than needed. Phase I concluded that this excess of impervious parking area unnecessarily contributes to adverse water quality impacts. To address this issue, Phase I identified strategies to decrease the cumulative land area covered by impervious parking.

As a brief background on the parking lot-water quality relationship, when rainwater runs off parking lots and other impervious (paved/pavement-like) surfaces, it collects pollutants such as salt and petroleum products that can get carried into adjacent streams, rivers, lakes, and oceans, adversely affecting their ecological health and water quality (Otto et al 2002). Impervious surfaces seal the ground, preventing rainfall from naturally infiltrating into the soil and recharging groundwater supply. The resulting increases in surface flows contribute to increases in flooding, peak stream flows, and stream channel erosion (NEMO 2002). Scientific studies have observed that stream health noticeably decreases when impervious surfaces cover only 10 percent of a watershed, with severe water quality degradation almost certain at 30 percent impervious coverage (Arnold and Gibbons 1996).

Phase II of this study translates the findings from Phase I into practical model zoning regulations (the model) encompassing provision of parking and parking lot design for water quality management. In recognition that there is more than one possible strategy for achieving water quality improvements, the model addresses surface area (number of parking spaces), location, and the physical design/landscaping of parking lots.

Providing adequate parking to meet realistic demands and needs is important, but it is equally important to manage parking to reduce its potential adverse water quality impacts within a

community and/or a watershed, and ensure that land is not covered excessively with impervious surfaces. Not only do expansive parking areas impact water quality, but they can discourage walking by creating barriers to safe, convenient walking from sidewalks, streets, or adjacent uses to a destination, thus making land use even more auto dependent. Large, poorly designed parking areas also pose safety hazards for pedestrians and bicyclists, and create undesirable and unnecessary separation of land uses and between land uses and the transportation system, undermining local vision for community character. These concerns also brought about this study.

PARKING STANDARDS: CONSIDERATIONS FOR ZONING AND DESIGN

Where Do Today's Parking Standards Come From?

One of the first questions investigated for Phase II of this study was where the current parking space requirements found in most zoning regulations come from. Available professional publications on parking were researched and queries made of several Connecticut municipalities' planning departments. Today's parking standards appear to have evolved in two ways. First, there have been some technical analyses of parking demand by institutions and organizations such as the Institute of Traffic Engineers (ITE) and the Urban Land Institute (ULI). The ULI approach is representative and it recommends that the size of parking lots for commercial uses (shopping centers) should serve the parking demand during the 20th highest (busiest) hour of all of the hours the commercial center will be open for an entire year (ULI 1999). The 20th highest hour of demand for the entire year generally falls between Thanksgiving and Christmas. This approach effectively provides adequate parking for patrons and employees for the more than 3,000 hours per year that shopping centers are commonly open. However, it results in far more parking spaces than are actually needed for most of the year or off peak times, such as the off-holiday season. In fact, the ULI estimates that using this methodology, about 40 percent of the year more than half of the parking spaces provided will be empty.

Interviews and research for this study indicate that the second manner in which parking standards have evolved is by word-of-mouth. A local government will research how many parking spaces other communities require for a variety of land uses and then, finding those most commonly used and effective, adopt requirements for its jurisdiction. Therefore, parking requirements found in most zoning regulations are not based on an empirical analysis of what any one land use will require to meet patrons' needs, but appear to have been handed down from one community to another. The historical emphasis for most parking requirements has been on guaranteeing that there is enough parking, with little or no recognition that there may be *too much* parking provided in the form of impervious surfaces. None of the 25 existing Connecticut parking regulations reviewed for this study required a developer to perform a parking demand analysis to demonstrate the anticipated parking need generated at a proposed site.

The Psychology of Parking

Although parking supply is dictated primarily by zoning, parking supply is also based in part on the psychology associated with parking availability and location. Beyond designing a parking lot to meet local regulations, a developer will design a lot based on how it will be perceived by drivers entering the site. A discussion with a development company for this study revealed that large commercial property owners want patrons not only to find easy parking in front of their businesses, but want them to perceive that there is an abundance of parking as they consider entering the site. The level of occupancy at which a parking lot is perceived to be full is referred to as the “effective supply” (*The Parking Handbook for Small Communities*, ITE, 1994). Consequently, there may be an inclination to provide excess parking in an effort to demonstrate the availability of parking to potential patrons. In village and downtown areas, there may be a desire to construct strip-type developments to provide patrons with the convenience of parking right outside their destinations.

To better support the community’s quality of life, the desire to provide excess parking should be balanced against the need to develop land responsibly with respect to the natural environment and surrounding land uses. A comprehensive parking plan, such as is described in Appendix A, can help address issues related to the psychology of parking in village and downtown areas.

FLEXIBLE PARKING GUIDELINES

The amount of parking needed at a particular development depends in part on the type of geographic area where it is located. Phase I of this study evaluated isolated or free-standing parking lots in rural and suburban areas as well as parking lots in more densely developed village or downtown commercial areas. While it was found that there was an excess of parking for both types of lots, the clustering of uses downtown or in a village district suggests that developments in those areas may require the least on-site parking and afford the greatest opportunities for alternative parking arrangements such as shared parking and municipal parking. Consequently, parking regulations may be most flexible for new development in a village district or central business district where parking is available nearby.

The parking requirements in the local zoning regulations for a village district or downtown district should be written to allow maximum creativity and flexibility of design and provide an opportunity for a developer to work with the community to arrive at innovative parking solutions. It is notable that many downtown areas in the northwestern Connecticut communities that were studied (see Figure 1) struggle with a lack of sufficient or well-placed parking to complement the desired village character of the community and support economic development. In these instances, a parking plan would be particularly useful for providing future parking.

Creative parking options for downtowns and village districts can include:

- Provisions for shared parking (between private uses or public-private spaces)
- Provisions for payment of a fee in-lieu of parking

- Provisions for a reduction in the number of off-street parking spaces where there is a municipally sponsored carpooling program, shuttle bus service to parking located off-site, or availability of transit stops with amenities at the proposed development.
- Provisions for a reduction in the number of off-street parking spaces where access via bicycle lanes or off-road paths and well designed pedestrian access is emphasized in design
- Provisions for parking off-site where walking to the site is safe and convenient
- Provisions for green parking lot design (design that minimizes impervious pavement and maximizes natural surfaces and landscaping)
- Requiring all parking to be behind buildings
- Encouraging the use of common driveways to access parking areas
- Encouraging the use of pedestrian alleyways to access parking located behind buildings with frontage on the street

ALTERNATE TRAVEL MODES

Though there is a need to provide ample parking for vehicles at businesses, there is also a need to consider alternate modes of travel during site planning. Not only does excessive impervious pavement have a detrimental effect on the environment, it can also deter patrons from accessing a business when using a mode of travel other than the automobile. Typically, site plans place parking in front of a proposed building, which is visible from the street. A consequence of this type of design is that people accessing the building on foot or bike need to travel further off the street through a parking lot and compete with automobiles moving around the site before reaching the building. In addition, expanses of paved parking located in front of businesses in a village district or downtown detracts from the pedestrian-scale character of the area. The model zoning regulations developed for this study discuss site layout and parking lot design that are more pedestrian and bicycle friendly.

MODEL ZONING REGULATIONS FOR PARKING

The following model language for parking requirements is intended to offer alternatives to the typical parking section used in most northwestern Connecticut zoning regulations. A typical parking section lists each use allowed by the regulations and specifies the minimum number of parking spaces required for that use based on the physical size of the associated buildings. Some zoning regulations also include a set of design standards for parking lots that call for some landscaping, set a minimum size for parking spaces, and require some stormwater drainage features. This common approach may not address the issue of too much impervious surface and a general excess of parking relative to the actual demand.

The following model regulations are intended, and have been tailored to meet the needs and issues of the more rural northwestern region of Connecticut with many sparsely populated communities and geographically separated small towns. The language this model includes was designed to be straightforward to the greatest degree, for ease of administration, while still serving the purposes at hand. It was also developed in recognition of the fact that parking situations and the complexity of associated regulatory mechanisms can and should vary widely. While the fundamental concepts represented by the language used in this model would be applicable to any community, the more quantitative components of the model, such as recommended maximum and minimum number of spaces per use would need to be reassessed and modified if they would be applied in an urban or suburban setting; whether the community involved would be a city or metropolitan suburb, as opposed to a small town. An added consideration for any community adapting this model to its specific needs would be the type or form of future development it expects to face.

These model zoning requirements are based on the results of the Phase I survey as well as alternative regulations in use around the United States. A list of the regulations reviewed and additional sources of information about parking are provided in Appendix A. The model language for parking is presented in seven (7) sections (Parking Definitions, Parking Spaces, Impervious Surfaces, Fees-in-Lieu of Parking, Shared Parking, Alternate Modes, and Stormwater Management). Each section includes two columns. The right hand column provides model language that could be used to achieve the desired parking configuration. The left hand column provides an explanation of the intent of the model language and guidelines for using that regulatory approach.

Appendix B provides guidelines on how to develop a parking plan. The best way for smaller communities to manage parking is to develop an understanding of existing parking supply and demand and then develop a parking plan with a focus on the village center or central business district. A parking plan can increase the efficiency of existing parking supply, establish a system for effective enforcement of parking regulations, provide guidance to local governments in providing new parking, and aid in educating the public of parking locations or options.

The following regulations are in the form of a model. That is, the language provided is comprehensive, offering a broad range of regulatory options that can be used either

individually or in concert to meet the needs of individual communities to manage parking. Necessarily, as any community incorporates all or part of this language into its zoning regulations, it will need to modify the section numbering system, cross reference the language with other parts of its regulations, and delete or modify elements that may be redundant or to best reflect local conditions and needs.

PARKING DEFINITIONS

Overview and Guidelines

Any time new language is added to a set of zoning regulations, it is useful to review the definitions section to ensure that new terms used in the body of the regulations are clear and not subject to wide interpretation.

The definitions offered here are the parking related terminology that appears throughout the rest of this model.

Parking Definitions:

Aisle: The driving portion of the parking area. The aisle provides access to each space.

Angled: Any parking space that is not parallel to the curb or aisle.

Bikeway: Any road, street, path, or way, which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designed for the exclusive use of bicycles or are to be shared with other transportation modes.

Big Box Retail: Single retail sales facility that has greater than 20,000 square feet of gross floor area and is contained in a single building.

BMPs (Best Management Practices): structural, vegetative, or managerial practices designed to treat, prevent, or reduce degradation of water quality due to stormwater runoff and snow-melt.

Downtown Zone: the major business district in a community or area of highest concentration of commercial activity and often including the local government center; often referred to as the 'downtown'.

Free Standing Retail: Single retail sales facility of up to 20,000 square feet in size that is situated independently on a building lot and for which associated parking serves exclusively that facility

Gross Floor Area: The total floor area of a building.

Impervious Surface: A ground cover such as cement, asphalt, or packed clay or rock through which water cannot penetrate.

Indoor Recreation Facilities: Uses such as bowling alleys, billiard parlors, and skating rinks

Industrial Plant: Structure or complex of structures used for manufacturing, assembling, fabricating, warehousing, and related activities.

Mixed Use: A development that provides multiple compatible uses in close proximity to one another. And/or a land use pattern that seeks to increase concentrations of population and employment in well-defined areas with a mix of diverse and compatible land uses

Off-Street Parking: Parking spaces provided outside of the right-of-way of a street or highway.

On-Street Parking: Parking spaces provided within the right-of-way of a street or highway

Outdoor Recreation Facilities: Uses such as golf courses, amusement parks, miniature golf courses, and water slide parks

Parking Area: That portion of a Lot set aside, marked, posted, or intended for parking, including total of circulation areas, loading and unloading areas, parking spaces and aisles, landscaped areas, bikeways, and walkways.

Parking Stall or Space: A space in which a single car is parked.

Parking Supply: The actual number of spaces provided and legally available at a land use.

Personal Services: Establishments primarily engaged in providing services involving the care of a person or a person's personal goods or apparel. It includes uses such as barber shops, beauty salons, shoe repair shops, and dry cleaners

Pervious Surface: Ground cover through which water can penetrate at a rate comparable to that of water through undisturbed soils.

Shared Parking: When parking spaces are shared among different structures or uses, or among mixed uses, and can include properties with different owners.

Many of the towns in northwestern Connecticut are characterized by a cohesive village center and/or a single concentrated commercial district on a state road. These areas can present unique challenges for parking that do not occur elsewhere in a predominantly rural community. Consequently, these more densely developed community areas are defined here and parking provisions specific to them are offered in subsequent sections of this model.

Shopping Center: An area that is comprised of three or more commercial establishments, the purpose of which is primarily retail sales, that has a combined gross floor area of 20,000 square feet or more, that is owned or managed as a unit.

Sight Distance: The distance visible to a driver from his/her position to other objects or vehicles, when at a point of turning or when stopping a vehicle.

Walkway: Any path or way, which in some manner is specifically designated exclusively for pedestrian travel.

Village Center Zone: The traditional center of the community, typically comprised of a cohesive core of residential, civic, religious, and commercial buildings, arranged along a main street and intersecting streets.

PARKING SPACES

Overview and Guidelines

The survey conducted for Phase I of this study revealed that the majority of the parking lots surveyed were underutilized, indicating that many of the lots were larger than needed. The primary factor in the design of most parking lots today is zoning that specifies the number of spaces required in relation to building size and usage. These are typically based on the peak potential usage of a lot, representing peak demand for a very small time window in a year.

The model language offered here attempts to more closely correlate zoning requirements to the actual daily demand for parking based on the observations of the Phase I survey. (See Appendix C for more detail.) The model recognizes that many business owners also want to provide parking in excess of zoning. Therefore, it specifies a maximum number of spaces a land use can have as well as a minimum. This will enable a Planning and Zoning Commission to limit the excess impervious parking surface a developer provides as well as to ensure that adequate parking is available.

The requirements for parking spaces for the first 10 items in the list to the right were derived directly from the results of the Phase I parking study. That assessment of parking space requirements is supplemented with an additional list for other uses commonly found in northwestern Connecticut. These supplemental uses were not addressed in the Phase I survey. The number of spaces required for these supplemental uses are based on professional publications, common requirements, professional judgment, and extrapolation from the Phase I survey results.

Section PG General Parking Requirements

Section PG.1 Number of Parking Spaces

Off-street parking shall be provided and maintained in connection with the use, substantial change in use, construction, conversion, or increase in intensity of use of buildings or structures, such spaces to be provided in the following amounts per 1000 square foot (sf) of Gross Floor Area (GFA):

Land Use	Maximum	Minimum
Bank	3	2
Big Box Retail	3	2
Drive-Thru Restaurant	9	2
Free Standing Retail	3	1
General Office Building	5	2
Industrial Plant	2	1
Medical Office Building	9	2
Nursing Home	3	2
Restaurants	11	6
Small Shopping Centers	6	3
Bed and Breakfast	1.2 spaces per guest room or suite	1 space per guest room or suite
Personal Services	3	2
Day Care Centers	1 space per 4 children at max. capacity	1 space per 8 children at max. capacity
Churches and Places of Worship	1 space per 3 seats in portion of the building used for services	1 space per 5 seats in the portion of the building used for services
Museums and Libraries	2	1
Social, Fraternal Clubs and Organizations	4	3
Elementary, Middle and	1 space per 3 seats in the	1 space per 5 seats in the

This model recognizes that the Phase I survey was limited in scope in that it considered 42 parking lots across 21 towns. The language offered here is based on those survey results, which reasonably reflect general conditions in northwestern Connecticut, and best professional judgment.

High Schools	auditorium	auditorium
Hotels and Motels	1.2 space per guest room or suite	1 spaces per guest room or suite
Warehouse	1	1
Self Service Warehouse	1 space per 10 compartments	1 space per 20 compartments
Home Occupation	4 per dwelling unit plus 1.5 per non-resident employee	2 per dwelling unit plus 1 per non-resident employee
Multi-Family Residences	2.5 per dwelling unit	1 per dwelling unit
Commercial Kennel	3	1
Automotive Sales and/or Rental	3	1
Automotive Repair and/or Service	4	2
Gymnasiums, Physical Fitness Centers, Health Spas, Martial Arts Centers and Dance Studios	4	2
Indoor Recreation Facilities	5	5
Outdoor Recreation Facilities	As determined by the Commission based on a parking demand study	As determined by the Commission based on a parking demand study

For uses not listed in this section, the minimum and maximum number of parking spaces required shall be comparable to the closest other similar use as determined by the Commission.

Section PG.2 Handicapped Parking Space Requirements

All off-street parking areas shall include paved handicapped accessible parking spaces. Accessible parking spaces shall be at least 15 feet wide including 3 feet of cross hatch. Handicap accessible parking spaces and access aisles shall be level, not exceeding 2% slope in all directions. Handicap accessible parking

The requirements for number of handicap spaces shown here are based on requirements found section 14-253a, CGS and Table 1105.1 of the State Building Code. These state requirements are also

the same as those provided in guidelines of The Access Board, an independent federal agency charged with developing and maintaining accessibility requirements.

While the goal of zoning regulations is to control the location and character of development, they are not intended to create a regulatory burden that will prevent property owners from all reasonable use of their land. In order to strike this balance, the regulations should include a degree of flexibility that provides for the unique characteristics of each parcel. Parking regulations are no exception. This model therefore includes mechanisms to allow the Planning and Zoning Commission to consider exceptions to the general parking requirements as long as the overall intent and purposes of the parking regulations are met.

spaces shall be provided in the following amounts relative to the total number of spaces provided in the parking area:

TOTAL PARKING SPACES IN LOT	REQUIRED ACCESSIBLE SPACES
1-25	1
26-50	2
51-75	3
76-100	4
101 –150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1000	2% of total
1001 and over	20 plus 1 for each 100 over 1000

Section PG.3 Waivers and Exceptions

Section PG.3.a Intent

It is the intent of these regulations that all structures and land uses be provided with a sufficient amount of off-street motor vehicle parking, while allowing for some flexibility of site design to accommodate the unique characteristics of individual properties. This section of the regulations is intended to set standards for conditions under which a waiver or exception from the general parking requirements may be allowed.

The Commission may require the submission of a parking demand analysis as part of any request for a waiver or exception from the general parking requirements.

Section PG.3.b Waivers

Except for buildings or parts of buildings used or occupied for residential use, all or part of the off-street parking requirements may be waived by the Commission where the proposed site planning, design, and construction includes the following:

1. Sufficient publicly owned parking spaces within 500 feet of the proposed development site.

2. Access to a regularly scheduled transit stop within 500 feet of the proposed development, with service available during commuting hours
3. Direct access from a bikeway used exclusively by bicycles and pedestrians to the proposed development
4. Provision of a regularly scheduled, municipally supported shuttle bus service from the development to an alternate safe, secure, and convenient parking facility

Section PG.3.c Parking Reduction Requests

If the applicant believes that the required parking amounts are in excess of what is needed for the proposed use, the applicant may submit a request with justification to the Commission for a reduction in parking space requirements. The Commission will consider and act on this request concurrent with and as part of the full development application process.

Section PG.3.d Parking in the Central Business Zone or Village Center Zone

All requirements for number of off-street parking spaces as listed in Section PG.1 above shall be reduced by 25% where the use and associated required parking would be located within the Central Business Zone or Village Center Zone.

Section PG.3.e Parking for Mixed-Use Developments

In Mixed-Use developments, or developments where parking is affected by cooperative agreements between different land uses, for any proposed use, substantial change in use, construction, conversion, or increase in intensity of use of any buildings or structures, the applicant shall submit a parking demand analysis that demonstrates parking demand patterns. The parking demand analysis must be approved by the Commission and will serve as the basis for determination of required parking at the mixed-use site.

The central business zone or village center in most communities presents unique issues for provision of parking. In these locations, the establishment of minimum and maximum number of spaces may not be sufficient to fully guide the amount, location, and design of parking. Therefore, it is appropriate to provide for an automatic reduction in parking requirements for these zones where municipal and on-street parking options exist and where innovative parking solutions should be encouraged. The allowance for an automatic reduction in parking spaces for the Central Business Zone and/or Village Center Zone has the added benefit of providing an incentive to businesses to locate in the downtown, thus contributing to the sustainability of community character.

For information on situations where pervious parking may not be appropriate, refer to Section PP – the Overview and Guidelines for pervious parking

The requirements for parking lot design included here are drawn from professional publications and common requirements found in a wide range of existing zoning regulations. The zoning regulations used as resources for this model are listed in Appendix A.

The fundamental goals for efficient, safe, and effective parking lot design include a layout that:

- X Is easy to understand and convenient for the user*
- X Makes efficient use of land in terms*

Section PG.3.f Parking In Excess of the Maximum

The Commission may approve parking lots with more spaces than the allowed maximum provided all of the spaces above the maximum number are composed of a pervious surface, and where adequate stormwater management is provided as specified in Section SWM of these regulations.

The Commission may also approve parking lots with additional impervious parking spaces above the allowed maximum where the use of pervious spaces would not be environmentally sound and where an aggressive stormwater management plan is included with the application and implemented, employing, at a minimum, the stormwater management measures specified in Section SWM of these regulations.

Section PG.3.g Parking Space Held on Reserve

For phased developments, the Commission may provide that up to 50 percent of the parking spaces required by this section will not be immediately constructed and may be kept in reserve. Such reserve parking areas must be kept planted and maintained rather than surfaced for parking until such time the additional parking space is necessary to serve completed phases of the associated development. No above ground improvements shall be placed or constructed upon such reserve parking area. The area designated as reserve parking must be clearly depicted on the phased development site plan and the terms and conditions of phasing of the parking area completion as determined by the Commission, must be clearly set forth in notations on the approved site plan.

Section PG.4 Parking Lot Design

Parking lots shall be designed to achieve the greatest efficiency of use of space practicable. In general, the preferred layout should have:

1. 90 degree parking
2. Parking provided around the periphery of the site with no parking located between the building and the principal street
3. Parking provided with one of the site

X *Minimizes potential conflict points between vehicles and among pedestrians, bicyclists, and vehicles*

X *Is compatible with the character of surrounding development*

The ratio of parking space angles to aisle widths and flow are drawn from The Parking Handbook for Small Communities (J. Edwards, National Trust for Historic Preservation, 1994)

The specifications in the zoning regulations for parking lot design should be accompanied by language under the section on Site Plan requirements requiring the applicant to show all proposed parking lot design features on the site plan including surface types, all parking space and aisle dimensions and slope, access drives, landscaping, stormwater management system, sidewalks, bicycle access and parking, handicap parking, loading areas, and transit stop areas.

PG.4.a Minimum Design Requirements

At a minimum, all parking lots shall:

1. Have a minimum stall size of 9' x 18'
2. Have rectangular parking stalls
3. Have aisle widths and parking angles in a minimum ratio as shown as follows

Parking Angle	Minimum Aisle Width	Direction of Flow
45°	12'3"	One way
50°	12'9"	One way
55°	13'3"	One way
60°	14'3"	One way
65°	15'2"	One way
70°	16'	One way
75°	24'	Two way
90°	24'	Two Way

4. Have no greater than 5% slope
5. Have a number and location of access drives compatible with traffic circulation patterns both within the site and on the abutting street system
6. Provide sufficient stacking area (area where cars may need to wait in line to exit onto the street or to enter to circulate in the parking lot) for 2 vehicles at the outbound access drives from the site
7. No parking space shall be designed to allow a vehicle to protrude or overhang a sidewalk or any landscaped area.
8. Minimize potential conflict points between pedestrians, bicycles, and motor vehicles.
9. Required off-street parking facilities shall be maintained as long as the use or structure exists for which the facilities are designed to serve.

Figure 2: Alternative Parking Lot Space Arrangements

PERVIOUS SURFACES

Overview and Guidelines

In a natural system (i.e. undeveloped land) approximately 10% of rainwater flows over the land surface directly to lakes and streams while 50% of rainwater filters into the ground. The remaining 40% is lost to evapotranspiration. For areas that are comprised of 75% to 100% impervious surfaces, 65% of rainwater flows off the land as runoff, 20% is lost to evapotranspiration, and only 15% infiltrates the ground. (Center for Land Use Education, 2002). The goal for reducing impervious surfaces dedicated to parking is to preserve the natural water drainage and infiltration ratio of undeveloped land to the extent practicable.

In addition to specifying the number of spaces required in zoning, it is useful to specify what total area of the parking lot can be composed of impervious surfaces. This allows for some flexibility in the number of spaces provided, if the amount of impervious surface dedicated to parking is minimized.

Most zoning regulations include requirements for “allowable lot coverage” in the section on bulk and height requirements. Allowable lot coverage is often defined as the area of a lot that may be covered by the footprint of all structures. If the area of allowable lot coverage is defined to include all impervious surfaces, whether for buildings or parking or other surfaces such as tennis courts, then the total area of a development maintained as natural, pervious surfaces could be more effectively encouraged and controlled.

The model language provided here is intended to strongly encourage the use of pervious parking lot surfaces. Consequently it is phrased to allow the majority of the pervious parking surfaces provided to be excluded when calculating allowable lot coverage. This, in effect, allows a developer to increase a proposed building footprint. This is because when less of the

Section PP: Pervious Parking Area

In all districts, off-street parking provided and maintained as paved/impervious surface shall be counted as part of the allowable lot coverage as defined and specified in Section ____ of these regulations.

Parking areas composed of pervious surfaces are encouraged for all land uses and lots without environmental limitations, and may be provided to meet all or part of any required parking spaces on a lot. 20% of such pervious surfaces shall be counted as part of the overall allowable lot coverage.

Measures that shall be considered to reduce the amount of impervious surfaces in all proposed parking lots include:

1. Provide pervious parking stall surfaces
2. Provide pervious overflow parking
3. Provide pervious snow-storage space
4. Conserve existing natural areas, including trees on-site
5. Minimize clearing to the extent practicable while retaining access, sight distances, and safe vehicle flows

parking area is counted towards allowable lot coverage, more of that coverage becomes available for building space. For example, where:

*Parcel size is 20,000 square feet (sf) and
Allowable Lot Coverage is 30% = 6,000 sf and
Required parking uses 3,000 sf and
All of the parking is pavement **THEN**
Building can have a 3,000 sf footprint*

Pervious Surface Benefit Where

*Parcel size is 20,000 square feet (sf) and
Allowable Lot Coverage is 30% = 6,000 sf and
Required parking uses 3,000 sf and
1,000 sf is pavement
2,000 sf is pervious parking surface **THEN**
Building can have a 4,600 sf footprint*

Limitations: *It should be noted that pervious parking materials have some limitations. Alternative pavers and semi-permeable surfaces are not recommended for high traffic volume areas (e.g. generally more than 500 average daily trips or ADT), or for parking that is located near public or private drinking water wells. They are also not suitable for handicap parking spaces, as they do not provide a smooth flat surface for wheelchairs and those with limited mobility. Finally, pervious parking surfaces can be more challenging for snow removal and use of sand (which has a clogging effect) and salt (that can contaminate groundwater) should be minimized on these surfaces.*

FEES-IN-LIEU OF PARKING

Overview and Guidelines

The General Statutes of Connecticut (CGS) (Section 8-2c) authorize municipalities to allow, through their zoning regulations, an applicant to pay a fee to the municipality in-lieu of any requirement to provide parking. Any such payment to the municipality must be set aside in a fund established solely for the purposes of “acquisition, expansion, development, or capital repair of municipal parking facilities.” When such lots are constructed, they are intended to be accessible to customers and employees of those businesses that have contributed funds.

This technique for providing fees-in-lieu of parking is generally best suited to a downtown or village center. This approach offers an alternative for developers to providing parking on-site and thus facilitates the in-fill development of odd shaped or constrained lots. The funds accumulated through fees-in-lieu of parking can be used for construction of strategically located parking lots that best meet the overall downtown or village center needs as opposed to meeting parking needs for one business at a time.

The primary benefit of this system is the ability of the community to incorporate parking into the downtown or village center in a manner that is consistent with desired goals for the character of the area. In addition, there is a greater level of municipal control over the cumulative area of impervious parking surface in the community. The drawbacks include the need for a coordinated parking plan for the community to make use of the accumulated fee, and uncertainty about when a municipal parking facility can be constructed. It may be that the development providing a fee-in-lieu of parking will have an immediate need that cannot be met by existing parking available or planned for near term construction elsewhere.

Section PF: Fees- In-Lieu of Parking

Within the Central Business Zone and/or Village Center Zone off-street parking requirements may be satisfied by payment of an in-lieu parking fee at a rate as established by the Commission. The payment shall be equivalent to the estimated cost to the Town of providing the required parking spaces to serve the proposed use and shall be in a total amount as acceptable to the Commission. Such payment shall be made before issuance of a Certificate of Occupancy. Fee revenue shall be deposited in the Parking Fund designated solely for the purpose of constructing, expanding, repairing, and enhancing municipal parking facilities to provide public parking.

When an applicant wishes to offer a fee-in-lieu of parking, the applicant must coordinate with the Zoning Administrator and/or Town Engineer to determine how parking for the proposed use will be made available. A statement of the agreed upon plan for a fee-in-lieu of parking and manner of parking provision must be included with the application to the Commission.

Any off-street parking supplied in this manner shall run with the land (not be invalidated by change in ownership), and any subsequent change in use that requires more parking shall require subsequent action by the property owner to satisfy any additional parking requirements. No refund of any fee-in-lieu of parking shall be made when there is a change in use requiring less parking.

SHARED PARKING

Overview and Guidelines

Shared parking can reduce the total area of impervious surfaces dedicated to parking by allowing a reduction in the amount of parking required for a single use where parking is shared with another adjacent use. This not only reduces impervious surface area but also increases efficiency in land use and encourages mixed-use development.

An example of an agreement for shared parking is provided in Appendix D.

Generally, shared parking is most effective when there is a distinction between day and night uses and/or weekday and weekend use. For example, an office building that shares a parking lot with a movie theater, restaurant, or hotel.

In order for shared parking to be effective, the parking requirements for individual land uses must reflect day-to-day peak demand such that the reduction for shared parking does not result in undersupply.

It must be noted that local governments cannot legally require a private property owner to provide access or use of his property to another property owner. Therefore, all shared parking arrangements must be an option rather than a requirement. Similarly, a town government cannot enforce a legal agreement between two or more private parties for shared parking. However, if an applicant violates the conditions under which his application was approved by failing to provide adequate parking, then this becomes an enforceable zoning violation.

Section PS: Shared Parking

PS.1: Shared Parking

The Commission encourages parking lots for different structures or uses, or for mixed uses, to be shared in any zoning district. At the applicant's request, shared parking may be provided, subject to the following provisions:

1. A reciprocal written agreement has been executed by all the parties concerned that assures the perpetual joint use of such common parking, a copy of which has been submitted to and is acceptable to the Commission. The Commission may forward such agreements to the town legal counsel for review.
2. The Commission may require the applicant to provide a parking study with all information deemed necessary to its decision-making on a shared parking arrangement. This information includes but is not limited to a) the type and hours of operation and parking demand, for each use, b) a site plan displaying shared use spaces in the lot and walking distance to the uses sharing the lot, c) a description of the character of land use and parking patterns of adjacent land uses, and d) an estimate of anticipated turnover in parking space use over the course of 12 to 24 hours at the site.
3. Parking spaces to be shared must not be reserved for individuals or groups on a 24-hour basis.
4. Uses sharing a parking facility do not need to be contained on the same lot, but each use shall be a maximum of 500 feet from the closest parking space in the lot providing the shared spaces. A waiver of the maximum allowable distance between the use and associated shared parking may be approved by the Commission with written justification and supporting information provided by the applicant.

An example of the hypothetical reduction in parking spaces that could be achieved with shared parking is shown below:

A Movie Theater with 100 spaces required is adjacent to a medical office building and a bank with 15 and 10 spaces required respectively = Total of 125 parking spaces provided

Reduction for Shared Parking:

75% of the movie theater spaces may be shared with predominantly daytime uses. Consequently, 75 movie theater spaces can be shared with the bank and medical offices, meeting all of their combined required parking = Total of 100 spaces provided, a savings of 25 less parking spaces. Alternatively, the 100 spaces required for the movie theater may be reduced to 75 by sharing the spaces available at the office and bank.

5. Uses sharing a parking facility shall provide for safe, convenient walking between uses and parking, including safe, well marked pedestrian crossings, signage, and adequate lighting.
6. If the conditions for shared parking become null and void and the shared parking arrangement is discontinued, this will constitute a violation of zoning regulations for any use approved expressly with shared parking. The applicant must then provide written notification of the change to the Zoning Enforcement Official and, within 60 days of that notice, provide a remedy satisfactory to the Commission to provide adequate parking.

PS.2: Reduction in Parking Space Requirements for Shared Parking:

Where shared parking is provided among a mix of land uses, the Commission may allow the following, at the applicant's request:

1. Up to 30% of the parking spaces required for the predominant use on a site may be shared with other uses operating during the same time of day and days of the week. The predominant use is considered to be that which requires the most parking of those sharing the parking facilities.
2. Up to 75% of the parking spaces required for uses such as theaters, public auditoriums, bowling alleys, nightclubs, movie theaters, and similar predominantly evening uses may be shared with uses such as banks, offices, and similar predominantly daytime uses.
3. Up to 75% of the parking spaces required for uses such as churches and other uses exclusively in operation during the weekend may be shared with uses such as medical offices, banks, and other similar uses predominantly in operation on weekdays.

ACCOMMODATION OF ALTERNATE MODES

Overview and Guidelines

One additional approach to reducing the number of parking spaces necessary for a development is to encourage and facilitate the use of alternate modes of transportation including bicycle, on-foot, and transit. This not only can reduce the amount of impervious surface dedicated to parking, but also can foster a sense of neighborhood in the development vicinity by encouraging human scale activities and interaction.

Consequently, this set of model regulations includes provisions to ensure the accommodation of alternate modes of travel within any parking lot. While this may be most effective for village centers and downtowns, it can also benefit the general environment of shopping districts or development concentrations along arterial road.

Examples of well-designed sidewalks and bicycle parking facilities are shown in Figures 3 and 4 on the following pages

Section PAM: Bicycle and Pedestrian Accommodations

Section PAM.1 Intent

It is the intent of these regulations to promote and support access by bicycle and walking throughout the community. To this end, all parking lots must be designed to provide safe and convenient pedestrian and bicycle access as a part of any parking lot design including safe and convenient movement to and from public walkways and/or bikeways, streets, or transit stops.

Section PAM.2 Bicycle Access Design Standards

A minimum of one bicycle parking space shall be provided for each 20 off-street automobile parking spaces within the Central Business Zone or Village Center Zone.

At a minimum, all bicycle parking spaces shall be provided in the form of bicycle racks with locking capability. Bicycle parking facilities shall be designed and installed to include

1. Spaces that are a minimum of 2 feet by 6 feet per bicycle
2. The minimum number possible of potential conflict points between bicycles and motor vehicles
3. Lighting
4. Provision for locking of bicycles to the rack or bicycle locker
5. Adequate spacing for access to the bicycle and locking device when the spaces are occupied.
6. Where possible, bicycle parking shall be located within view of building entrances or in view of windows, and/or security personnel stations.

Section PAM.3 Pedestrian Access Design Standards

Provision for safe and convenient pedestrian access shall be incorporated into landscaping plans for any parking area. This shall be clearly shown on all site plans.

Any parking lot designed, constructed, and maintained as part of a development must be designed such that the flow of pedestrians can be directed through a system of convenient routes that bring them to central walkways leading to main entrances. All walkways shall be constructed to provide for:

1. Safe separation of all walkways from motor vehicle traffic through the use of raised sidewalks and/or landscaping between sidewalks and parking spaces and/or driving aisles
2. Safe, well-articulated pedestrian crossings demarcated with pavement markings, pedestrian warning signs, and lighting
3. A minimum of 4 feet in width
4. Inclusion of plantings, benches, and lighting along walkways and at all pedestrian crossings
5. Design, construction and maintenance to accommodate disabled individuals per Americans with Disabilities Act (ADA) requirements.

Figure 3: Sample Layout for Pedestrian Access In A Parking Lot

Figure 4: Examples of Bicycle Parking

PARKING LOT DESIGN TO OPTIMIZE STORMWATER MANAGEMENT

The goals of zoning requirements for parking lot design are threefold.

- To ensure that there will be efficient, convenient, and safe flow of traffic in the lot.
- To ensure safe, convenient travel of pedestrians, bicyclists, transit vehicles, delivery vehicles, and emergency services vehicles, as well as automobiles.
- To minimize rainwater and snowmelt runoff and preserve water quality in runoff to the extent practical.

This section of the model regulations focuses on the third of these objectives. When land is paved for parking, the stormwater that once seeped into the ground and nourished vegetation is deflected as runoff. This change in water flow patterns can create water quality and flooding problems due to erosion and sedimentation, pollutants contained in the runoff, and alteration of flows to nearby wetlands, streams, rivers, and lakes.

Zoning regulations can guide the design of parking lots to better support water quality objectives. A prime focus is to maintain as much pervious or unpaved surface as possible, followed by managing the runoff that does occur. Maintaining pervious surfaces can be accomplished primarily by reducing the overall size of parking lots (addressed in the model Parking Spaces, Shared Parking, and Fees-In-Lieu of Parking regulations) and by replacing impervious materials with appropriate pervious materials (addressed in the model Pervious Surfaces regulations). Pervious materials can be used in the construction of overflow as well as primary parking areas. For primary parking areas, pervious materials can be used in the entire parking lot or in selected areas. For example, the driveway and lanes may be asphalt paved, but the parking stalls may be constructed of a pervious material. Examples of pervious materials include grid pavers, block pavers, and porous pavement. Photos of these materials are shown in Figure 5.

As was noted earlier in this model, pervious parking materials have some limitations. Alternative pavers and semi-permeable surfaces are not recommended for high traffic volume areas (e.g. generally more than 500 average daily trips or ADT), or for parking that is located near public or private drinking water wells. They are also not suitable for handicap parking spaces, as they do not provide a smooth flat surface for wheelchairs and those with limited mobility. Finally, wintertime use of sand (which has a clogging effect) and salt (that can contaminate groundwater) should be minimized on pervious surfaces.

Figure 5
Examples of Permeable Pavement Applications



Modular Concrete Pavers



Parking Lot with Porous Surface



Overflow Parking Area



Concrete Paver Driveway



Low Use Parking Area



Plastic Lattice Turf Pavement

Source: Nonpoint Education for Municipal Officials (NEMO) web site

Once the amount of impervious surface has been minimized, Best Management Practices (BMPs) are the best tools for controlling stormwater runoff. BMPs for protecting water quality are a collection of techniques that have become widely recognized as effective in mitigating the adverse effects of development on water resources. BMPs for stormwater management appropriate to parking lot design can be divided into two categories. The first category includes techniques to facilitate stormwater infiltration into the ground and ultimately to groundwater reserves. In parking lot design, this can be achieved not only with pervious parking materials, but also with the use of the following design features:

- X Flat curbing to encourage stormwater flows to drainage facilities
- X Vegetative islands and perimeter buffers, planted with native plant species tolerant of and adapted to the amount of moisture anticipated in the island or buffer
- X Vegetated islands and medians located below grade so water will flow to them
- X Vegetated, natural drainage swales
- X Creation of wetland cells planted with appropriate plant species and strategically located to capture runoff
- X Grading across the lot to encourage runoff flows to drainage areas
- X Pervious snow storage surface areas

The second category of BMPs for stormwater management appropriate to parking lot design is detention, meaning capturing and treating stormwater and controlling the rate of flow into receiving water bodies. BMPs for stormwater detention in parking lots focus on detaining runoff for short periods of time, treating or filtering it to remove pollutants such as grease and oil from motor vehicles, and directing stormwater flows to appropriate receiving water bodies or wetlands. The same parking lot design features that can facilitate infiltration can also manage runoff. These techniques include slowing and filtering runoff through vegetation in swales or created wetland cells, as well as many of the practices noted to enhance infiltration. The more “natural” the parking lot drainage system, the more value it will provide for downstream fish and wildlife habitat and general water quality. The following model regulatory language provides standards that can be used to require developers to provide suitable stormwater detention in association with parking lot design.

Overview and Guidelines

The design features of any parking facility will determine the degree to which it achieves the general objective of minimizing stormwater runoff and maximizing water infiltration.

Once the number of parking spaces has been determined and the amount of impervious parking area has been minimized, the design of stormwater management features and landscaping that contributes to infiltration becomes key. The stormwater management features used for a parking lot must be sized and designed as an integral part of an overall stormwater management plan for the entire site, where stormwater flows from the parking area will be in addition to runoff from the building roofs and other structures on the site.

Examples of design treatments for stormwater management are included at the end of this section in Figures 6 through 10.

However, rather than incorporate specific stormwater design or maintenance standards into the zoning regulations, it is most effective to reference the most recent version of the state recognized stormwater manual. This way, technical information can remain up-to-date without making legal changes to the ordinance necessary. A copy of this manual should be kept available for public use in the office of the town engineer, town planner, or town clerk and local library.

The most recent version of the Connecticut Stormwater Quality manual is currently being completed. Draft copies of this manual have been distributed to each regional planning agency or council of governments in Connecticut and are also available from the CTDEP Bureau of Water Management.

In general, this manual recommends sizing and design of stormwater management features be tailored to the site based on physical site features, soil types present, downstream water resources, system maintenance factors, and winter operational concerns. The sizing and design criteria for stormwater management

Section SWM: Design Standards for Stormwater Management and Landscaping in Parking Lots

Section SWM.1 Intent:

It is the intent of these regulations to require the use of Best Management Practices (BMPs) to minimize, treat, prevent and/or reduce degradation of water quality and flooding potential due to stormwater runoff from parking. In all districts, all developments shall be designed to the extent practicable with the goal of **no-net runoff** from the site. That is, the volume of runoff from the site after development shall not, to the extent practicable, exceed the volume of site runoff prior to the proposed development. In addition, the stormwater management system shall be designed, constructed, and maintained with BMPs to minimize run-off volumes, prevent flooding, reduce soil erosion, protect water quality, maintain or improve wildlife habitat, and contribute to the aesthetic values of the project.

Section SWM.2 General Standards

Stormwater management systems in parking lots shall be designed in accordance with BMPs as described in the most recent version of the *Connecticut Stormwater Quality Manual* (CTDEP), and in accordance with the erosion and sedimentation control requirements and flood protection zone requirements specified in Sections ___ and ___ of these regulations respectively, and to meet the following general standards:

1. Infiltration of stormwater shall be accommodated to the extent possible through limitation of land disturbance and grade changes, retention of existing natural drainage areas and wetlands, and use or creation of vegetated islands, vegetated medians, and vegetated perimeter buffer strips.
2. All stormwater detention and conveyance structures shall be constructed to control the post-development peak discharge rates from 10, 25, and 100-year storms to the corresponding pre-development peak discharge rates.

facilities should also relate to water quality goals including pollutant reduction, groundwater recharge, runoff volume reduction, peak flow control, and stream channel and conveyance protection. Criteria relative to each of these goals vary.

Guidelines from the Draft Connecticut Stormwater Quality Manual for sizing of facilities for stormwater treatment for peak flows can be summarized, as follows:

Stream Channel Protection

Control the 2-yr, 24-hour post-development peak flow rate to 50 percent of the 2-yr, 24-hr pre-development level or to the 1-yr, 24-hr pre-development level. Design for post-development storm magnitude: 2-year, 24-hour rainfall

Conveyance Protection

Design the conveyance system leading to, from, and through stormwater management facilities based on the 10-year, 24-hour storm.

Peak Runoff Attenuation

Control the post-development peak discharge rates from the 10-, 25-, and 100-year storms to the corresponding pre-development peak discharge rates.

Emergency Outlet Sizing

Size the emergency outlet to safely pass the post-development peak runoff from, at a minimum, the 100-year storm in a controlled manner without eroding the outlet works and downstream drainages.

3. Site plans must include information regarding all existing and proposed landscaping and stormwater management structures and features.
4. Natural drainage patterns shall be maintained to the extent practicable. The applicant must demonstrate through information provided on and in association with the proposed site plan, the existing and proposed drainage patterns and calculated flows.
5. Parking lot drainage shall be designed such that all surface runoff (both piped and overland flow) is conveyed through a vegetated swale, vegetated filter strip, created wetlands, rain gardens, or detention basins with bio-filtration prior to discharge into existing wetlands, streams, ponds, or other waterbodies.
6. The use of native grasses and small-diameter wood-stemmed shrubs is encouraged as plantings for all vegetated swales, vegetated filter strips, created wetlands, rain gardens, or detention basins with bio-filtration
7. Direct discharge of untreated stormwater to any natural wetland or waterbody is prohibited.
8. Stormwater runoff discharged to wetlands must be diffused to non-erosive velocities prior to reaching any natural wetland based on calculations submitted with the application package.
9. The applicant must demonstrate that any receiving wetlands or waterbodies have sufficient holding capacity, based on calculations submitted with the application package.
10. The Commission may send any or all information provided on anticipated stormwater flow patterns and volumes and proposed stormwater management system to the Town Engineer and/or other consulting professional or agency for review and advisory comment.

Landscaping standards included here are intended to maximize the natural areas retained in any parking lot in order to optimize natural infiltration of rainwater beyond what is accomplished by the reduction in paved surfaces. Again, the design of landscaping treatments will be unique to the physical layout of the site, the associated soil types, and relative to the number and type of parking and loading spaces required. While specific landscaping requirements are offered here, they are representative of standards in use for parking lots in a New England environment. They are intended to provide for trees and shrubs of a size and maturity that will be durable over time, withstand Connecticut's winter, and provide shade for parking areas.

11. All stormwater BMPs shall be designed in a manner to minimize the need for maintenance and reduce the chances of failure. Design and maintenance guidelines to be followed shall be in accordance with the most recent version of *The Connecticut Stormwater Quality Manual* (CTDEP).

Section SWM.3: Landscaping Standards for Parking Lot Stormwater Management:

The landscaping requirements in this section are intended to maximize the natural areas retained in any parking lot in order to optimize natural infiltration of rainwater, intercept and manage stormwater runoff, and provide an aesthetic setting for development. In order to accomplish these goals the following standards shall apply:

1. Developments with proposed parking areas of 15 spaces or more shall provide a minimum of 10% of the total parking area as landscaped open space. The parking area shall be as defined in Section ___ of these regulations. Such landscaped open space may be provided in the form of islands, aesthetic landscape treatments, pedestrian refuge/oasis areas, and may include the perimeter buffer between the parking lot and adjacent streets.
2. Developments with proposed parking areas of 25 or more spaces shall also provide landscaped islands of a minimum width of 9 feet and 18 feet in length throughout the parking area planted with a mix of shrubs and trees. Such islands shall be located:
 - a. At each parking lot entrance
 - b. At the ends of each parking aisle
 - c. As intermediate islands in long rows of spaces, located every 15 spaces
 - d. As separation between long rows of parking spaces where they abut other rows
 - e. As separation between pedestrian walkways and parking spaces and/or driving aisles

3. All landscaped islands shall be situated below the grade of the parking spaces and driving aisles such that stormwater runoff flow is directed to and trapped by such islands
4. A minimum of one deciduous or evergreen tree and two shrubs shall be planted on the parking lot islands for every 10 parking spaces. Trees and shrubs shall conform to the following standards:
 - a. Deciduous trees shall be planted at 3 inches in caliper with a mature height of at least 35 feet
 - b. Evergreen trees shall be coniferous species planted at 6 feet in height
 - c. Shrubs shall be either deciduous species planted at 2 ½ feet in height or evergreen species planted at 2 ½ feet in spread.
 - d. Trees and shrubs shall be situated such that they do not obstruct vehicle sight lines when at full growth
 - e. All landscaped islands shall be protected where they meet the driving aisles with bollards

Figure 6: Alternative Green Parking Lot Site Design

Figure 7: Vegetated Filter Strip design

Figure 8: Grassed Swale Design

Figure 9: Runoff Detention System: Constructed Wetlands design

Figure 10: Bio-retention System Design

APPENDIX A
INFORMATION RESOURCES AND REFERENCES

INFORMATION RESOURCES AND REFERENCES

NORTHWESTERN CONNECTICUT PARKING STUDY – PHASE II

Publications and Websites

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Zoning Ordinances

Arapahoe County, Colorado
Austin, Texas
Darien, Connecticut
Dennis, Massachusetts
Farmington, Connecticut
Greenwood, Colorado
Groton, Connecticut
Hackensack, New Jersey
King County, Washington
Kingston, North Carolina
Marquette County, Michigan
Sacramento, California
San Diego, California
Seattle, Washington
SeaTac, Washington
Torrington, Connecticut
Westbrook, Connecticut

APPENDIX B
DEVELOPING A COMPREHENSIVE PARKING PLAN

DEVELOPING A COMPREHENSIVE PARKING PLAN

The best way for smaller communities to manage parking is to develop an understanding of existing parking supply and demand and then develop a parking plan with a focus on the village center or central business district. A parking plan can increase the efficiency of existing parking supply, increase compliance with parking regulations, provide guidance to local governments in providing new parking, and aid in educating the public of parking locations or options. This study does not examine how to create a parking plan in detail, but provides an overview of such a planning effort as the most sound approach for communities to address parking needs, and lay a foundation for parking requirements specified in the zoning regulations. Therefore, this section is primarily informational and intended to be a starting point for communities interested in developing a parking plan. The following is based on, *The Parking Handbook for Small Communities* (Edwards 1994). The general steps for developing a parking plan for a village district or downtown area include:

Step One: Get Organized – Understand the relationship between downtown commerce and parking.

Step Two: Gather Data and Analyze Demand – Inventory parking, tabulate data, perform a parking survey, analyze the data, and project future parking demands.

Step Three: Increase the Effectiveness of Existing Parking – Assess and maintain existing parking management systems to improve the effectiveness of on-street parking by increasing turnover and encouraging long-term parkers to use off-street parking spaces.

Step Four: Plan and Develop New Parking Facilities – If maximizing existing parking management systems do not yield enough additional parking, then plan for and develop new parking facilities.

Step Five: Promote the Parking Program – Educate the public about the value of on-street parking, the need for consistent enforcement procedures, the plans for additional parking, and the way the parking system operates.

Step Six: Manage the Parking System – Provide on-going management strategies for the parking plan's success.

Step Seven: Put it Together...and Keep it Together – Put all of the previous steps together to create a successful parking plan.

APPENDIX C

PARKING SUPPLY PARAMETERS FOR NORTHWESTERN CONNECTICUT



PARKING SUPPLY PARAMETERS FOR NORTHWESTERN CONNECTICUT

Background

This memo provides guidance for the Northwestern Connecticut Council of Governments (NWCCOG) and the Litchfield Hills Council of Elected Officials (LHCEO) in establishing parameters for appropriately sized parking facilities. This memo was prepared as a component of the Northwestern Connecticut Parking Study. The Phase I report for this study, published in August 2002, discusses strategies to reduce impervious surfaces in parking lots. A primary strategy explored was to more accurately correlate the number of parking spaces required for differing land uses to actual demand. This memo has been developed to supplement that Phase I report by evaluating and recommending a proposed range for number of parking spaces to be used as a guidepost for planning and zoning commissions in determining appropriate parking for various land use types.

The parameters for appropriately sized parking facilities were developed based on the findings of the parking lot usage survey conducted as part of the Phase I study. The resulting parameters were also considered in the context of a variety of published sources that report national parking lot standards. A more detailed assessment of the northwestern Connecticut survey is included in the *Northwestern Connecticut Parking Study* (August 2002, Fitzgerald and Halliday Inc.).

Parking Survey Overview

A survey of local sites within the NWCOG/LHCEO study area was conducted in November and December of 2001. The times associated with the survey were selected in an attempt to capture parking usage at its highest levels. In total, 42 locations were surveyed within the NWCCOG and LHCEO regions. Each location was surveyed on two occasions. In addition, multiple locations for each type of land use were surveyed to ensure that observations would account for variations between parking at individual facilities. The list of land uses surveyed included:

- Bank
- Big Box Retail
- Drive Through Restaurant
- Free Standing Retail
- General Office Building

- Industrial Plant
- Medical Office Building
- Nursing Home
- Restaurants
- Small Shopping Centers

The analysis of the survey observations indicated that in general there is an oversupply of parking in northwestern Connecticut. Table 1 indicates the observed occupancy rates at the uses surveyed.

Table 1
Percent of Occupied Parking Spaces

Land Use	Average	High	Low
Bank	36.1%	59.1%	14.3%
Big Box Retail	24.3%	35.7%	13.3%
Drive Through Restaurant	55.1%	100%	25.0%
Free Standing Retail	47.1%	100%	19.0%
General Office Building	54.0%	94.7%	13.3%
Industrial Plant	42.3%	92.1%	17.1%
Medical Office Building	46.6%	68.8%	28.1%
Nursing Home	58.1%	96.1%	31.1%
Restaurants	54.4%	100%	31.3%
Small Shopping Centers	56.1%	78.6%	40.0%

It is important to note that three observations reflected 100% utilization of parking facilities. This high utilization rate was generally related to unique site features and/or temporary conditions affecting the site. The majority of observations, however, reflected underutilization and indicated the existence of excess impermeable surfaces.

Parking Parameter Methodology

Based on the results of the parking survey paired with industry research on parking lot utilization, it was determined that the level of parking that a land use requires can vary significantly even when comparing two businesses of a similar nature. For this reason parking space standards for zoning should be developed as ranges to ensure enough parking is provided to serve the land use while minimizing the potential area of unused paved parking area. Consequently, the parking space standards developed for inclusion in the model zoning requirements (Phase II of the Northwestern Connecticut Parking Study) for parking include both a maximum allowable and minimum required number of spaces relative to the size of the buildings on a lot. The parameters developed correlate expressly to the land uses observed for the survey. The general methodology for determining the maximum allowed and minimum required number of parking spaces through zoning included the following steps:

- 1) The minimum required number of parking spaces 1000 square feet (SF) of building was calculated as an average of the observed lowest number of occupied spaces per 1000 SF of building and average number of occupied spaces per 1000 SF of building for each land use, with the result rounded up to the next largest number.
- 2) The maximum allowable number of parking spaces was calculated as equal to the highest observed occupancy rate for each land use, but tempered in some cases by the relative percent average occupancy and observations made during the survey

The results from this approach are shown on the following page.

Proposed Standards for Number of Parking Spaces

Northwest Connecticut Parking Study

June, 2003

Occupied Parking Spaces per 1000 sf of Building Space

	Average Lot Occupancy by Percent	Observed Average	Observed High	Observed Low	Proposed Regulatory Maximum	Proposed Regulatory Minimum	Additional Considerations/Observations
Bank	36.1%	1.9	2.6	1.3	3	2	Banks with the most parking per 1000 sf building space clearly had the lowest proportional utilization of parking.
Big Box Retail	24.3%	1.4	2.1	0.7	3	2	The low occupancy rate at big-box outlets is exacerbated by the overall large size of parking lots for these uses
Drive Through Restaurant	55.1%	5.1	12.1	0.5	9	2	The results of the survey for this use was skewed somewhat by 100% occupancy at a newly opened drive-through that was a novelty at the time it opened. The high occupancy without this drive-through was 6.1 spaces per 1000 sf and the average was 2.8
Free Standing Retail	47.1%	1.5	2.8	0.7	3	1	One of these uses had 100% occupancy of delineated spaces and a number of additional parkers randomly using a dirt area next to the business
General Office Building	54.0%	2.2	4.5	0.7	5	2	
Industrial Plant	42.3%	0.9	1.8	0.3	2	1	Due to the typically large size of these buildings, the number of parkers, and therefore occupied parking spaces, is relatively low in relation to the building size
Medical Office Building	46.6%	3.1	8.6	0.6	9	2	
Nursing Home	58.1%	1.2	2.9	0.5	3	2	The amount of parking provided at nursing homes most closely matched occupancy rates of all the land uses studied. These uses provided the least parking in relation to building size.
Restaurants	54.4%	7.2	11.1	5.4	11	6	
Small Shopping Centers	56.1%	3.1	5.4	1.5	6	3	

APPENDIX D
SAMPLE SHARED PARKING AGREEMENT

APPENDIX E
MODEL ZONING REGULATIONS FOR PARKING
WITHOUT COMMENTARY

Model Zoning Regulations for Parking

Parking Definitions:

Aisle: The driving portion of the parking area. The aisle provides access to each space.

Angled: Any parking space that is not parallel to the curb or aisle.

Bikeway: Any road, street, path, or way, which in some manner is specifically designated for bicycle travel, regardless of whether such facilities are designed for the exclusive use of bicycles or are to be shared with other transportation modes.

Big Box Retail: Single retail sales facility that has greater than 20,000 square feet of gross floor area and is contained in a single building.

BMPs (Best Management Practices): structural, vegetative, or managerial practices designed to treat, prevent, or reduce degradation of water quality due to stormwater runoff and snow-melt.

Downtown Zone: the major business district in a community or area of highest concentration of commercial activity and often including the local government center; often referred to as the 'downtown'.

Free Standing Retail: Single retail sales facility of up to 20,000 square feet in size that is situated independently on a building lot and for which associated parking serves exclusively that facility

Gross Floor Area: The total floor area of a building.

Impervious Surface: A ground cover such as cement, asphalt, or packed clay or rock through which water cannot penetrate.

Indoor Recreation Facilities: Uses such as bowling alleys, billiard parlors, and skating rinks

Industrial Plant: Structure or complex of structures used for manufacturing, assembling, fabricating, warehousing, and related activities.

Mixed Use: A development that provides multiple compatible uses in close proximity to one another. And/or a land use pattern that seeks to increase concentrations of population and employment in well-defined areas with a mix of diverse and compatible land uses

Off-Street Parking: Parking spaces provided outside of the right-of-way of a street or highway.

On-Street Parking: Parking spaces provided within the right-of-way of a street or highway

Outdoor Recreation Facilities: Uses such as golf courses, amusement parks, miniature golf courses, and water slide parks

Parking Area: That portion of a Lot set aside, marked, posted, or intended for parking, including total of circulation areas, loading and unloading areas, parking spaces and aisles, landscaped areas, bikeways, and walkways.

Parking Stall or Space: A space in which a single car is parked.

Parking Supply: The actual number of spaces provided and legally available at a land use.

Personal Services: Establishments primarily engaged in providing services involving the care of a person or a person's personal goods or apparel. It includes uses such as barber shops, beauty salons, shoe repair shops, and dry cleaners

Pervious Surface: Ground cover through which water can penetrate at a rate comparable to that of water through undisturbed soils.

Shared Parking: When parking spaces are shared among different structures or uses, or among mixed uses, and can include properties with different owners.

Shopping Center: An area that is comprised of three or more commercial establishments, the purpose of which is primarily retail sales, that has a combined

gross floor area of 20,000 square feet or more, that is owned or managed as a unit.

Sight Distance: The distance visible to a driver from his/her position to other objects or vehicles, when at a point of turning or when stopping a vehicle.

Walkway: Any path or way, which in some manner is specifically designated exclusively for pedestrian travel.

Village Center Zone: The traditional center of the community, typically comprised of a cohesive core of residential, civic, religious, and commercial buildings, arranged along a main street and intersecting streets.

Section PG General Parking Requirements

Section PG.1 Number of Parking Spaces

Off-street parking shall be provided and maintained in connection with the use, substantial change in use, construction, conversion, or increase in intensity of use of buildings or structures, such spaces to be provided in the following amounts per 1000 square foot (sf) of Gross Floor Area (GFA):

Land Use	Maximum	Minimum
Bank	5	3
Big Box Retail	5	3
Drive-Thru Restaurant	12	2
Free Standing Retail	5	2
General Office Building	5	2
Industrial Plant	8	2
Medical Office Building	10	2
Nursing Home	4	1
Restaurants	12	6
Small Shopping Centers	6	3
Bed and Breakfast	1.2 space per guest room or suite	1 spaces per guest room or suite
Personal Services	3	2
Day Care Centers	1 space per 4 children at max. capacity	1 space per 8 children at max. capacity
Churches and Places of Worship	1 space per 3 seats in portion of the building used for services	1 space per 5 seats in the portion of the building used for services
Museums and Libraries	2	1
Social, Fraternal Clubs and Organizations	4	3
Elementary, Middle and High Schools	1 space per 3 seats in the auditorium	1 space per 5 seats in the auditorium
Hotels and Motels	1.2 space per guest room or suite	1 spaces per guest room or suite
Warehouse	1	1
Self Service Warehouse	1 space per 10 compartments	1 space per 20 compartments
Home Occupation	4 per dwelling unit plus 1.5 per non-resident employee	2 per dwelling unit plus 1 per non-resident employee

Multi-Family Residences	2.5 per dwelling unit	1 per dwelling unit
Commercial Kennel	3	1
Automotive Sales and/or Rental	3	1
Automotive Repair and/or Service	4	2
Gymnasiums, Physical Fitness Centers, Health Spas, Martial Arts Centers and Dance Studios	4	2
Indoor Recreation Facilities	5	5
Outdoor Recreation Facilities	As determined by the Commission based on a parking demand study	As determined by the Commission based on a parking demand study

For uses not listed in this section, the minimum and maximum number of parking spaces required shall be comparable to the closest other similar use as determined by the Commission.

Section PG.2 Handicapped Parking Space Requirements

All off-street parking areas shall include paved handicapped accessible parking spaces. Accessible parking spaces shall be at least 15 feet wide including 3 feet of cross hatch. Handicap accessible parking spaces and access aisles shall be level, not exceeding 2% slope in all directions. Handicap accessible parking spaces shall be provided in the following amounts relative to the total number of spaces provided in the parking area:

TOTAL PARKING SPACES IN LOT	REQUIRED ACCESSIBLE SPACES
1-25	1
26-50	2
51-75	3
76-100	4
101 -150	5
151-200	6
201-300	7
301-400	8
401-500	9
501-1000	2% of total
1001 and over	20 plus 1 for each 100 over 1000

Section PG.3 Waivers and Exceptions

Section PG.3.a Intent

It is the intent of these regulations that all structures and land uses be provided with a sufficient amount of off-street motor vehicle parking, while allowing for some flexibility of site design to accommodate the unique characteristics of individual properties. This section of the regulations is intended to set standards for conditions under which a waiver or exception from the general parking requirements may be allowed.

The Commission may require the submission of a parking demand analysis as part of any request for a waiver or exception from the general parking requirements.

Section PG.3.b Waivers

Except for buildings or parts of buildings used or occupied for residential use, all or part of the off-street parking requirements may be waived by the Commission where the proposed site planning, design, and construction includes the following:

1. Sufficient publicly owned parking spaces within 500 feet of the proposed development site.
2. Access to a regularly scheduled transit stop within 500 feet of the proposed development, with service available during commuting hours
3. Direct access from a bikeway to the proposed development
4. Provision of a regularly scheduled, municipally supported shuttle bus service from the development to an alternate safe, secure, and convenient parking facility

Section PG.3.c Parking Reduction Requests

In the case that an applicant believes that the required parking amounts are in excess of what is needed for the proposed use, the applicant may submit a request with justification to the Commission for a reduction in parking space requirements. The Commission will consider and act on this request concurrent with and as part of the full development application process.

Section PG.3.d Parking in the Central Business Zone or Village Center Zone

All requirements for number of off-street parking spaces as listed in Section PG.1 above shall be reduced by 25% where the use and associated required parking would be located within the Central Business Zone and/or Village Center Zone.

Section PG.3.e Parking for Mixed-Use Developments

In Mixed-Use developments, or developments where parking is affected by cooperative agreements between different land uses, for any proposed use, substantial change in use, construction, conversion, or increase in intensity of use of any buildings or structures, the applicant shall submit a parking demand analysis that demonstrates parking demand patterns. The parking demand analysis must be approved by the Commission and will serve as the basis for determination of required parking at the mixed-use site.

Section PG.3.f Parking In Excess of the Maximum

The Commission may approve parking lots with more spaces than the allowed maximum provided all of the spaces above the maximum number are composed of a pervious surface, and where adequate stormwater management is provided as specified in Section SWM of these regulations.

The Commission may also approve parking lots with additional impervious parking spaces above the allowed maximum where the use of pervious spaces would not be environmentally sound and where an aggressive stormwater management plan is included with the application and implemented, employing, at a minimum, the stormwater management measures specified in Section SWM of these regulations.

Section PG.3.g Parking Space Held on Reserve

For phased developments, the Commission may provide that up to 50 percent of the parking spaces required by this section will not be immediately constructed and may be kept in reserve. Such reserve parking areas must be kept planted and maintained rather than surfaced for parking until such time the additional parking space is necessary to serve completed phases of the associated development. No above ground improvements shall be placed or constructed upon such reserve parking area. The area designated as reserve parking must be clearly depicted on the phased development site plan and the terms and conditions of phasing of the parking area completion as determined by the Commission, must be clearly set forth in notations on the approved site plan.

Section PG.4 Parking Lot Design

Parking lots shall be designed to achieve the greatest efficiency of use of space practicable. In general, the preferred layout should have:

- 1. 90 degree parking
- 2. Parking provided around the periphery of the site with no parking located between the building and the street
- 3. Parking provided with one of the site layout options as shown in Figure 1 on Page ___ of these regulations.

PG.4.a Minimum Design Requirements

At a minimum, all parking lots shall:

- 1. Have a minimum stall size of 9' x 18'
- 2. Have rectangular parking stalls
- 3. Have aisle widths and parking angles in a minimum ratio as shown as follows:

Parking Angle	Minimum Aisle Width	Direction of Flow
45°	12'3"	One way
50°	12'9"	One way
55°	13'3"	One way
60°	14'3"	One way
65°	15'2"	One way
70°	16'	One way
75°	24'	Two way
90°	24'	Two Way

- 4. Have no greater than 5% slope
- 5. Have a number and location of access drives compatible with traffic circulation patterns both within the site and on the abutting street system

6. Provide sufficient stacking area (area where cars may need to wait in line to exit onto the street or to enter to circulate in the parking lot) for 2 vehicles at the inbound access drives to the site
7. No parking space shall be designed to allow a vehicle to protrude or overhang a sidewalk or any landscaped area.
8. Minimize potential conflict points between pedestrians, bicycles, and motor vehicles. Required off-street parking facilities shall be maintained as long as the use or structure exists for which the facilities are designed to serve.

Section PP: Pervious Parking Area

In all districts, off-street parking provided and maintained as paved/impervious surface shall be counted as part of the allowable lot coverage as defined and specified in Section ____ of these regulations.

Parking areas composed of pervious surfaces are encouraged for all land uses and lots without environmental limitations, and may be provided to meet all or part of any required parking spaces on a lot. 20% of such pervious surfaces shall be counted as part of the overall allowable lot coverage.

Measures that shall be considered to reduce the amount of impervious surfaces in all proposed parking lots include:

1. Provide pervious parking stall surfaces
2. Provide pervious overflow parking
3. Provide pervious snow-storage space
4. Conserve existing natural areas, including trees on-site
5. Minimize clearing to the extent practicable while retaining access, sight distances, and safe vehicle flows

Section PF: Fees- In-Lieu of Parking

Within the Central Business Zone and/or Village Center Zone off-street parking requirements may be satisfied by payment of an in-lieu parking fee at a rate as established by the Commission. The payment shall be equivalent to the estimated cost to the Town of providing the required parking spaces to serve the proposed use and shall be in a total amount as acceptable to the Commission. Such payment shall be made before issuance of a Certificate of Occupancy. Fee revenue shall be deposited in the Parking Fund designated solely for the purpose of constructing, expanding, repairing, and enhancing municipal parking facilities to provide public parking.

When an applicant wishes to offer a fee-in-lieu of parking, the applicant must coordinate with the Zoning Administrator and/or Town Engineer to determine how parking for the proposed use will be made available. A statement of the agreed upon plan for a fee-in-lieu of parking and manner of parking provision must be included with the application to the Commission.

Any off-street parking supplied in this manner shall run with the land (not be invalidated by change in ownership), and any subsequent change in use that requires more parking shall require subsequent action by the property owner to satisfy any additional parking requirements. No refund of any fee-in-lieu of parking shall be made when there is a change in use requiring less parking.

Section PS: Shared Parking

PS.1: Shared Parking

The Commission encourages parking lots for different structures or uses, or for mixed uses, to be shared in any zoning district. At the applicant's request, shared parking may be provided, subject to the following provisions:

1. A reciprocal written agreement has been executed by all the parties concerned that assures the perpetual joint use of such common parking, a copy of which has been submitted to and is acceptable to the Commission. The Commission may forward such agreements to the town legal counsel for review.
2. The Commission may require the applicant to provide a parking study with all information deemed necessary to its decision-making on a shared parking arrangement. This information includes but is not limited to a) the type and hours of operation and parking demand, for each use, b) a site plan displaying shared use spaces in the lot and walking distance to the uses sharing the lot, c) a description of the character of land use and parking patterns of adjacent land uses, and d) an estimate of anticipated turnover in parking space use over the course of 12 to 24 hours at the site.
3. Parking spaces to be shared must not be reserved for individuals or groups on a 24-hour basis.
4. Uses sharing the parking facility do not need to be contained on the same lot, but shall be a maximum of 500 feet from the closest parking space in the parking lot which is to be used and allow for safe, convenient walking for most parkers, including safe pedestrian crossings, signage, and adequate lighting. A waiver of the maximum allowable distance from the use to the parking may be approved by the Commission with written justification and supporting information provided by the applicant.
5. If the conditions for shared parking become null and void and the shared parking arrangement is discontinued, this will constitute a violation of zoning regulations for any use approved expressly with shared parking. The applicant must then provide written notification of the change to the Zoning Enforcement Official and, within 60 days of that notice, provide a remedy satisfactory to the Commission to provide adequate parking.

PS.2: Reduction in Parking Space Requirements for Shared Parking:

Where shared parking is provided among a mix of land uses, the Commission may allow the following, at the applicant's request:

1. Up to 30% of the parking spaces required for the predominant use on a site may be shared with other uses operating during the same time of day and days of the week. The predominant use is considered to be that which requires the most parking of those sharing the parking facilities.

2. Up to 75% of the parking spaces required for uses such as theaters, public auditoriums, bowling alleys, nightclubs, movie theaters, and similar predominantly evening uses may be shared with uses such as banks, offices, and similar predominantly daytime uses.
3. Up to 75% of the parking spaces required for uses such as churches and other uses exclusively in operation during the weekend may be shared with uses such as medical offices, banks, and other similar uses predominantly in operation on weekdays.

Section PAM: Bicycle and Pedestrian Accommodations

Section PAM.1 Intent

It is the intent of these regulations to promote and support access by bicycle and walking throughout the community. To this end, all parking lots must be designed to provide safe and convenient pedestrian and bicycle access as a part of any parking lot design including safe and convenient pedestrian and bicycle movement to and from public walkways and/or bikeways, streets, or transit stops.

Section PAM.2 Bicycle Access Design Standards

A minimum of one bicycle parking space shall be provided for each 20 off-street automobile parking spaces within the Central Business Zone or Village Center Zone.

At a minimum, all bicycle parking spaces shall be provided in the form of bicycle racks with locking capability. Bicycle parking facilities shall be designed and installed to include

1. Spaces that are a minimum of 2 feet by 6 feet per bicycle
2. The minimum number possible of potential conflict points between bicycles and motor vehicles
3. Lighting
4. Provision for locking of bicycles to the rack or bicycle locker
5. Adequate spacing for access to the bicycle and locking device when the spaces are occupied.
6. Where possible, bicycle parking shall be located within view of building entrances or in view of windows, and/or security personnel stations.

Section PAM.3 Pedestrian Access Design Standards

Provision for safe and convenient pedestrian access shall be incorporated into landscaping plans for any parking area. This shall be clearly shown on all site plans.

Any parking lot designed, constructed, and maintained as part of a development must be designed such that the flow of pedestrians can be directed through a system of convenient routes that bring them to central walkways leading to main entrances. All walkways shall be constructed to provide for:

1. Safe separation of all walkways from motor vehicle traffic through the use of raised sidewalks and/or landscaping between sidewalks and parking spaces and/or driving aisles
2. Safe, well-articulated pedestrian crossings demarcated with pavement markings, pedestrian warning signs, and lighting
3. A minimum of 4 feet in width

4. Inclusion of plantings, benches, and lighting along walkways and at all pedestrian crossings
5. Design, construction and maintenance to accommodate disabled individuals per Americans with Disabilities Act (ADA) requirements.

Section SWM: Design Standards for Stormwater Management and Landscaping in Parking Lots

Section SWM.1 Intent:

It is the intent of these regulations to encourage the use of Best Management Practices (BMPs) to minimize, treat, prevent and/or reduce degradation of water quality and flooding potential due to stormwater runoff from parking. In all districts, all developments shall be designed to the extent practicable with the goal of **no-net runoff** from the site. That is, the volume of runoff from the site after development shall not, to the extent practicable, exceed the volume of site run-off prior to the proposed development. In addition, the stormwater management system shall be designed, constructed, and maintained with BMPs to minimize run-off volumes, prevent flooding, reduce soil erosion, protect water quality, maintain or improve wildlife habitat, and contribute to the aesthetic values of the project.

Section SWM.2 General Standards

Stormwater management systems in parking lots shall be designed in accordance with BMPs as described in the most recent version of the *Connecticut Stormwater Quality Manual* (CTDEP), and in accordance with the erosion and sedimentation control requirements and flood protection zone requirements specified in Sections ____ and ____ of these regulations respectively, and to meet the following general standards:

1. Infiltration of stormwater shall be accommodated to the extent possible through limitation of land disturbance and grade changes, retention of existing natural drainage areas and wetlands, and use or creation of vegetated islands, vegetated medians, and vegetated perimeter buffer strips.
2. All stormwater detention and conveyance structures shall be constructed to control the post-development peak discharge rates from 10, 25, and 100-year storms to the corresponding pre-development peak discharge rates.
3. Site plans must include information regarding all existing and proposed landscaping and stormwater management structures and features.
4. Natural drainage patterns shall be maintained to the extent practicable. The applicant must demonstrate through information provided on and in association with the proposed site plan, the existing and proposed drainage patterns and calculated flows.
5. Parking lot drainage shall be designed such that all surface runoff (both piped and overland flow) is conveyed through a vegetated swale, vegetated filter strip, created wetlands, rain gardens, or detention basins with bio-filtration prior to discharge into existing wetlands, streams, ponds, or other waterbodies.
6. The use of native grasses and small-diameter wood-stemmed shrubs is encouraged as plantings for all vegetated swales, vegetated filter strips, created wetlands, rain gardens, or detention basins with bio-filtration
7. Direct discharge of untreated stormwater to any natural wetland or waterbody is prohibited.

8. Stormwater runoff discharged to wetlands must be diffused to non-erosive velocities prior to reaching any natural wetland based on calculations submitted with the application package.
9. The applicant must demonstrate that any receiving wetlands or waterbodies have sufficient holding capacity, based on calculations submitted with the application package.
10. The Commission may send any or all information provided on anticipated stormwater flow patterns and volumes and proposed stormwater management system to the Town Engineer and/or other consulting professional or agency for review and advisory comment.
11. All stormwater BMPs shall be designed in a manner to minimize the need for maintenance and reduce the chances of failure. Design and maintenance guidelines to be followed shall be in accordance with the most recent version of *The Connecticut Stormwater Quality Manual* (CTDEP).

Section SWM.3: Landscaping Standards for Parking Lot Stormwater Management:

The landscaping requirements in this section are intended to maximize the natural areas retained in any parking lot in order to optimize natural infiltration of rainwater, intercept and manage stormwater runoff, and provide an aesthetic setting for development. In order to accomplish these goals the following standards shall apply:

1. Developments with proposed parking areas of 15 spaces or more shall provide a minimum of 10% of the total parking area as landscaped open space. The parking area shall be as defined in Section ___ of these regulations. Such landscaped open space may be provided in the form of islands, aesthetic landscape treatments, pedestrian refuge/oasis areas, and may include the perimeter buffer between the parking lot and adjacent streets.
2. Developments with proposed parking areas of 25 or more spaces shall also provide landscaped islands of a minimum width of 9 feet and 18 feet in length throughout the parking area planted with a mix of shrubs and trees. Such islands shall be located:
 - a. At each parking lot entrance
 - b. At the ends of each parking aisle
 - c. As intermediate islands in long rows of spaces, located every 15 spaces
 - d. As separation between long rows of parking spaces where they abut other rows
 - e. As separation between pedestrian walkways and parking spaces and/or driving aisles
3. All landscaped islands shall be situated below the grade of the parking spaces and driving aisles such that stormwater runoff flow is directed to and trapped by such islands
4. A minimum of one deciduous or evergreen tree and two shrubs shall be planted on the parking lot islands for every 10 parking spaces. Trees and shrubs shall conform to the following standards:
 - a. Deciduous trees shall be planted at 3 inches in caliper with a mature height of at least 35 feet
 - b. Evergreen trees shall be coniferous species planted at 6 feet in height
 - c. Shrubs shall be either deciduous species planted at 2 ½ feet in height or evergreen species planted at 2 ½ feet in spread.
 - d. Trees and shrubs shall be situated such that they do not obstruct vehicle sight lines when at full growth

