Town of Windsor

Stormwater Manual

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TOWN OF WINDSOR

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List of Revisions

Effective Date	Sections(s)	Remarks
8/17/09	4.3	To clarify the acceptable methods to be used for drainage calculations.
8/17/09	4.4	Updated to include reference to Appendix C and Appendix D
8/17/09	Appendix C	Template Inspection & Maintenance Agreement added
8/17/09	Appendix D	Template Certificate of Title added

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1.0 INTENT AND PURPOSE

It is hereby determined that:

- During the construction process, exposed soil is highly vulnerable to erosion by wind and water. Eroded soil endangers water resources by reducing water quality and causing the siltation of aquatic habitat for fish and other desirable species. Eroded soil also necessitates repair of sewers and ditches and the dredging of lakes. In addition, clearing and grading during construction cause the loss of native vegetation necessary for terrestrial and aquatic habitat.

- Land development projects and other land use conversions, and their associated changes to land cover, permanently alter the hydrologic response of local watersheds and increase stormwater runoff rates and volumes, which in turn increase flooding, stream channel erosion, and sediment transport and deposition.

- Land development projects and other land use conversions also contribute to increased non-point source pollution and degradation of receiving water.

- The impacts of post-development stormwater runoff quantity and quality can adversely affect public safety, public and private property, drinking water supplies, recreation, fish and other aquatic life, property values and other uses of lands and waters.

- These adverse impacts can be controlled and minimized through the management of stormwater runoff quantity and quality from new development and redevelopment, by the use of both structural facilities as well as non-structural measures, such as the conservation of open space areas. The preservation and protection of natural area and open space for stormwater management benefits can be encouraged through the use of incentives.

- Municipalities in the State of Connecticut are required to comply with a number of both State and Federal laws, regulations and permits which require a municipality to address the impacts of construction and post-development stormwater runoff quality and non-point source pollution.

Therefore, the Town of Windsor has adopted both the *Erosion and Sediment Control Ordinance* and the *Stormwater Management Ordinance* in addition to this Stormwater Manual to provide reasonable guidance for the management of construction activities, post-development stormwater runoff, and non-point source pollution for the purpose of protecting local water resources from degradation. It has determined that it is in the public interest to regulate land-disturbing activities, post-development stormwater runoff discharges, and non-point source pollution in order to control and minimize increases in stormwater runoff rates and volumes, post-construction soil erosion and sedimentation, stream channel erosion, and non-point source pollution associated with post-development stormwater runoff.

2.0 DEFINITIONS

Applicant	A person who files for a permit.
ASTM	American Society for Testing and Materials
Best Management Practices (BMPs)	Measures, either structural or non-structural, that are determined to be the most effective, practical means of preventing or reducing point source or non-point source pollution inputs to stormwater runoff and water bodies.
Building	Any structure, either temporary or permanent, having walls and a roof, designed for the shelter of any person, animal, or property, and occupying more than 100 square feet of area.
Channel	A natural or artificial watercourse with a definite bed and banks that conveys continuously or periodically flowing water.
Clearing and Grubbing	Cutting, removal, and satisfactory disposal of all vegetation and surface debris.
Conservation Easement	An agreement between a land owner and the Town of Windsor or other government agency or land trust that permanently protects open space on the owner's land by limiting the amount and type of development that can take place, but continues to leave the remainder of the fee interest in private ownership.
Construction Activities	Activities including but not limited to clearing and grubbing, grading, excavation, filling, and dewatering.
CT DEP	Connecticut Department of Environmental Protection
Dedication	The deliberate appropriation of property by its owner for general public use.
Developer	A person who undertakes land-disturbing or land development activities.
Development	See "Land Development".
Disturbance	The execution of any construction activities defined above.
Drainage Way	Any channel that conveys surface runoff throughout the site.
Engineer	A professional engineer, see "Professional Engineer".
Erosion	The detachment and movement of soil or rock fragment by water, wind, ice or gravity.

Erosion Control	A measure that prevents erosion.
Erosion and Sediment Control Permit	A permit issued by the Town of Windsor for the construction or alteration of ground improvements and structures for the control of erosion, runoff, and grading.
Erosion and Sediment Control Plan	A set of plans prepared by or under the direction of a professional engineer licensed by the state of Connecticut, indicating specific measures and sequencing to be used to control erosion and sediment on a development site during and after construction.
Establishment	Establishments as defined in C.G.S. 22a-134.
Extreme Flood Protection	Measures taken to prevent adverse impacts from large low-frequency storm events with a return frequency of 100 years or more.
Flooding	A volume of surface water that is too great to be confined within the banks or walls of a conveyance or stream channel and that overflows onto adjacent lands.
Grading	Any excavating, grubbing, filling (including hydraulic fill) or stockpiling of earth materials or any combination thereof, including the land in its excavated or filled condition.
Impervious Cover	Those surfaces that significantly impede or prevent the natural infiltration of water into soil. Impervious surfaces include, but are not limited to, rooftops, buildings, streets and roads, and any concrete or asphalt surface.
Infiltration	The process of percolating stormwater runoff into the subsoil.
Infiltration Facility	Any structure or device designed to infiltrate retained water to the subsurface. These facilities may be above or below grade.
Inspection	The periodic review of erosion and sediment control measures or of the stormwater management system (either wholly or partially) as approved and shown on the certified plan.
Inspection and Maintenance Agreement	A written agreement providing for the long-term inspection and maintenance of stormwater management facilities and practices on a site or with respect to a land development project, which when properly recorded in the land records of the Town of Windsor constitutes a restriction on the title to a site or other land involved in a land development project.

Land Development	Any land change, including, but not limited to, clearing, digging, grubbing, stripping, removal of vegetation, dredging, grading, excavating, transporting and filling of land, construction, paving, and any other installation of impervious cover.
Land Development Activities	Those actions or activities that comprise, facilitate, or result in land development.
Land Development Project	A discrete land development undertaking.
New Development	A land development activity on a previously undeveloped site.
Non-point Source Pollution	A form of water pollution that does not originate from a discrete point such as a sewage treatment plant or industrial discharge, but involves the transport of pollutants such as sediment, fertilizers, pesticides, heavy metals, oil, grease, bacteria, organic materials and other contaminants from land to surface water and groundwater via mechanisms such as precipitation, stormwater runoff, and leaching. Non-point source pollution is a by-product of land use practices such as agricultural, silvicultural, mining, construction subsurface disposal and urban runoff sources.
Non-Structural Stormwater Management Practice	Any natural or planted vegetation or other non-structural component of the stormwater management plan that provides for or enhances stormwater quantity and/or quality control or other stormwater management benefits, and includes, but is not limited to, riparian buffers, open spaces, overland flow filtration areas, natural depressions, and vegetated channels.
Off-Site Facility	A stormwater management facility located outside the boundaries of the site.
Open Space	Permanently protected areas of the site that are preserved in a natural state.
On-Site Facility	A stormwater management facility located within the boundaries of the site.
Overbank Flood Protection	Measures taken to prevent an increase in the frequency and magnitude of out-of-bank flooding (i.e. flow events that exceed the capacity of the channel and enter the floodplain), and that are intended to protect downstream properties from flooding for the 2-year through 25-year frequency storm events.

Owner	The legal or beneficial owner of a site, including but not limited to, a mortgagee or vendee in possession, receiver, executor, trustee, lessee or other person, firm or corporation in control of the site.
Perimeter Control	A barrier that prevents sediment from leaving a site by filtering sediment-laden runoff or diverting it to a sediment trap or basin.
Permittee	The owner, applicant, and/or agent of the owner of the site who has received an Erosion and Sediment Control Permit or a Stormwater Management Permit.
Person	"Person" means, except to the extent exempted from the Towns' *Erosion and Sediment Control Ordinance* or the Town's *Stormwater Management Ordinance*, any individual, partnership, firm, association, joint venture, public or private corporation, trust, estate, commission, board, public or private institution, utility, cooperative, city, county or other political subdivision of the State, any interstate body or any other legal entity and acting as either the owner or the owner's agent.
Phasing	Limiting site disturbance to a clearly defined area. Stabilization of each phase must be completed before the clearing of the next.
Post-development	The time period, or the conditions that may reasonably be expected or anticipated to exist, after completion of the land development activity on a site as the context may require.
Pre-development	The time period, or the conditions that exist, on a site prior to the commencement of a land development project and at the time that plans for the land development of a site are approved by the plan approving authority. Where phased development or plan approval occurs (preliminary grading, roads and utilities, etc.), the existing conditions at the time prior to the first item being approved or permitted shall establish pre-development conditions.
Professional Engineer	A professional engineer licensed in the State of Connecticut.
Project	A land development project.
Redevelopment	A land development project on a previously developed site, excluding ordinary maintenance activities, remodeling of existing buildings, resurfacing of paved areas, and exterior changes or improvements that do not materially increase or concentrate stormwater runoff, or cause additional non-point source pollution.

Regional Stormwater Management Facility	Stormwater management facilities designed to control stormwater runoff from multiple properties, where the owners or developers of the individual properties may assist in the financing of the facility, and the requirement for on-site controls is either eliminated or reduced.
Runoff	That portion of the precipitation (excess rainfall, snow melt or irrigation) on a drainage area that is discharge from the area in the form of flow across the surface of the ground.
Sediment	Solid material, either mineral or organic, that is in suspension, is transported, or has been moved from its origin by erosion.
Sediment Control	A measure that prevents eroded soil from leaving the site.
Site	A parcel(s) of land where construction activities or land development activities are to be performed.
Stabilization	The use of practices that prevent exposed soil from eroding.
Start of Construction	The first land-disturbing activity associated with a development, including land preparation such as clearing, grading, and filling; installation of streets and walkways; excavation for basements, footings, piers, or foundations; erection of temporary forms; and installation of accessory buildings such as garages.
Stormwater	The water which drains off a catchment area during and after a fall of rain or snow; waters consisting of precipitation runoff.
Stormwater Better Site Design	Non-structural site design approaches and techniques that can reduce a site's impact on the watershed and can provide for non-structural stormwater management. Stormwater better site design includes conserving and protecting natural areas and open space, reducing impervious cover and using natural features for stormwater management.
Stormwater Management	The collection, conveyance, storage, treatment and disposal of stormwater runoff in a manner intended to prevent increased flood damage, streambank channel erosion, habitat degradation and water quality degradation, and to enhance and promote the public health, safety and general welfare.
Stormwater Management Facility	Any infrastructure that controls or conveys stormwater runoff.
Stormwater Management Measure	Any stormwater management facility or non-structural stormwater practice.

Stormwater Management Permit	The permit issued by the Town Engineer to the applicant which is required for undertaking any land development activity.
Stormwater Management Plan	A document describing how existing runoff characteristics will be affected by a land development project and containing measures for complying with the provisions of the *Stormwater Management Ordinance*.
Stormwater Management System	The entire set of structural and non-structural stormwater management facilities and practices that are used to capture, convey and control the quantity and quality of the stormwater runoff from a site.
Stormwater Retrofit	A stormwater management practice designed for a currently developed site that previously had either no stormwater management practice in place or a practice inadequate to meet the stormwater management requirements of the site.
Structural Stormwater Control	A structural stormwater management facility or device that controls stormwater runoff and changes the characteristics of that runoff including, but not limited to, the quantity and quality, the period of release or the velocity of flow of such runoff.
Subdivision	The division of a tract or parcel of land resulting in one or more new lots or building sites for the purpose, whether immediately or in the future, of sale, other transfer of ownership or land development, and includes divisions of land resulting from or made in connection with the layout or development of a new street or roadway or a change in an existing street or roadway.
Town Engineer	Town of Windsor Town Engineer or his designee.
Town Manager	Town of Windsor Town Manager or his designee.
Water Quality Volume (WQv)	The storage needed to capture and treat 90% of the average annual stormwater runoff volume. Numerically, WQv will vary as a function of long term rainfall statistical data.
Watercourse	A permanent or intermittent stream or other body of water, either natural or man-made, which gathers or carriers surface water. This includes, but is not limited to lakes, ponds, rivers, and streams.
Waterway	A channel that directs surface runoff to a watercourse or to a public storm drain.

3.0 EROSION AND SEDIMENT CONTROL

3.1 Regulatory Requirements

Land-disturbing activities are subject to the requirements of Chapter 14, Article VIII of the *Windsor Code of Ordinances*. In addition to the information contained in this Stormwater Manual, the Town of Windsor will utilize the policy, criteria and information including technical specifications and standards in the latest edition of the Connecticut Guidelines for Soil Erosion and Sediment Control, as well as the Town's Engineering Standards and Specifications as amended, for the proper implementation of the requirements of the *Erosion and Sediment Control Ordinance*. These documents may be updated and expanded periodically, based on improvements in science, engineering, monitoring and local maintenance experience.

3.2 Erosion and Sediment Control Plans

Each application for an Erosion and Sediment Control Permit shall be accompanied by an Erosion and Sediment Control Plan. The plan shall be prepared in accordance with the criteria established in applicable design manuals listed in Section 3.1 and must be submitted with the stamp and signature of a Professional Engineer licensed in the state of Connecticut. The plan shall include all of the information required in the Erosion and Sediment Control Permit Application (Appendix A). This includes:

1. A natural resources map identifying soils, vegetative cover, and other resources protected under federal, state or local ordinances or regulations.

2. Schedule for construction of the development site, including the installation and inspection of temporary erosion and sediment control measures; clearing and grubbing; rough grading; construction of utilities, infrastructure, and buildings; and final grading and landscaping. Schedule shall identify the expected date on which clearing will begin, the estimated duration of exposure of cleared areas, areas of clearing, installation of temporary erosion and sediment control measures, and establishment of permanent vegetation.

3. A scaled site plan prepared by a Professional Engineer licensed in the state of Connecticut. The plan(s) shall be provided at a scale of 1 inch equals 40 feet with at least two-foot contours and spot elevations provided as necessary. The preferable plan size is 24 inches by 36 inches. The plan shall show the following:

    a. All features necessary to evaluate erosion and sediment control including, but not limited to, labeled roadways, buildings, driveways, property lines, vegetated areas, limits if trees, waterbodies, watercourses, detention basins, retention basins, and drainage structures.

    b. Proposed area alterations including cleared, excavated, filled, or graded areas. Cross-sections for these shall be provided when requested by the Town Engineer.

    c. Location and design details of all proposed erosion and sediment control measures and stormwater management facilities necessary throughout all phases of construction and

after completion of development of the site. Depending upon the complexity of the project, the drafting of intermediate plans may be required at the close of each construction season.

d. Sequencing of grading and construction activities, and installation and/or typical application of soil erosion and sediment control measures.

e. Soil types listed in tabular form.

4. Seeding mixtures and rates, types of sod, method of seedbed preparation, expected seeding dates, type and rate of lime and fertilizer application, and type and quantity of mulching for both temporary and permanent vegetative control measures.

5. Provisions for maintenance of control facilities, including easements and estimates of the cost of maintenance.

6. Provisions for control of waste at the site including, but not limited to, discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste.

7. Contingency provisions including procedures if unforeseen erosion or sedimentation problems arise.

3.3 Design Requirements

1. Grading, erosion control practices, sediment control practices, and waterway crossings shall meet the design criteria set forth in the latest edition of the Connecticut Guidelines for Soil Erosion and Sediment Control, and shall be adequate to prevent transportation of sediment from the site to the satisfaction of the Town Engineer.

2. Cut and fill slopes shall be no greater than 4:1 for grassed slopes that require mowing and no greater than 2:1 for other stabilized slopes, except as approved by the Town Engineer to meet other community or environmental objectives.

3. Clearing and grading of natural resources, such as forests and wetlands, shall not be permitted, except when in compliance with all other federal, state and local regulations and ordinances. Clearing techniques that retain natural vegetation and drainage patterns, as described in the latest edition of the Connecticut Guidelines for Soil Erosion and Sediment Control, shall be used to the satisfaction of the Town Engineer.

4. Clearing, except that necessary to establish sediment control devices, shall not begin until all sediment control devices have been installed and inspected.

5. Phasing shall be required on all sites disturbing greater than 5 acres, with the size of each phase to be established at the time of application and approved by the Town Engineer. No more than one phase shall be cleared at a time, unless greater clearing is approved by the Town Engineer.

6. Erosion control requirements shall include the following:

    a. Soil stabilization shall be completed within five (5) days of clearing or inactivity in construction.

    b. If seeding or other vegetative erosion control method is used, it shall become established within two weeks or the Town may require the site to be reseeded or a non-vegetative option to be employed.

    c. Special techniques that meet the design criteria outlined in the latest edition of the Connecticut Guidelines for Soil Erosion and Sediment Control on steep slopes or in drainage ways shall be used to ensure stabilization.

    d. Soil stockpiles must be stabilized as per the latest edition of the Connecticut Guidelines for Soil Erosion and Sediment Control.

    e. The entire site must be stabilized, using a heavy mulch layer or other method that does not require germination to control erosion, at the close of the construction season.

    f. Techniques shall be employed to prevent the blowing of dust or sediment from the site.

    g. Techniques that divert upland runoff past disturbed slopes shall be employed.

7. Sediment control requirements shall include:

    a. Settling basins, sediment traps, or tanks and perimeter controls.

    b. Settling basins that are designed in a manner that allows adaptation to provide long term stormwater management, if required by the Town Engineer.

    c. Protection for adjacent properties by the use of a vegetated buffer strip in combination with perimeter controls.

8. Waterway and watercourse protection requirements shall include:

    a. A temporary stream crossing installed and approved by federal, state or local agency if a watercourse will be crossed regularly during construction.

    b. Stabilization of the watercourse channel before, during, and after any in-channel work.

    c. All on-site stormwater conveyance channels designed according to the criteria outlined in the latest edition of the Connecticut Guidelines for Soil Erosion and Sediment Control and to all conditions of approval received from a federal, state or local agency.

    d. Stabilization adequate to prevent erosion at the outlets of all pipes and paved channels.

9. Construction site access requirements shall include:

    a. A temporary access road provided at all sites.

    b. Other measures required by the Town Engineer in order to ensure that sediment is not tracked onto public streets by construction vehicles or washed into storm drains.

4.0 POST-CONSTRUCTION STORMWATER MANAGEMENT

4.1 Regulatory Requirements

Land development activities are subject to the requirements of Chapter 14, Article IX of the *Windsor Code of Ordinances*. In addition to the information contained in this Stormwater Manual, the Town of Windsor will utilize the policy, criteria and information including technical specifications and standards in the latest edition of the Connecticut Guidelines for Stormwater Quality Management, as well as the Town's Engineering Standards and Specifications as amended, for the proper implementation of the requirements of the *Stormwater Management Ordinance*. These documents may be updated and expanded periodically, based on improvements in science, engineering, monitoring and local maintenance experience.

4.2 Stormwater Concept Plan and Consultation Meeting

Before any Stormwater Management Permit Application is submitted, it is recommended that the land owner or developer meet with the Town Engineer for a consultation meeting on a concept plan for the post-development stormwater management system to be utilized in the proposed land development project. This consultation meeting should take place at the time of the preliminary plan of subdivision or other early step in the development process. The purpose of this meeting is to discuss the post-development stormwater management measures necessary for the proposed project, as well as to discuss and assess constraints, opportunities and potential ideas for stormwater management designs before the formal site design engineering is commenced.

To accomplish this goal the following information should be included in the concept plan, which should be submitted in advance of the meeting:

1. Existing Conditions/Proposed Site Plans

    Existing conditions and proposed site layout plans shall be provided at a scale of 1 inch equals 40 feet with at least two-foot contours and spot elevations provided as necessary. The preferable plan size is 24 inches by 36 inches. Existing conditions and proposed site layout sketch plans shall illustrate at a minimum: existing and proposed topography; perennial and intermittent streams; mapping of predominant soils from soil surveys (when available); boundaries of existing predominant vegetation and proposed limits of clearing and grading; and location of existing and proposed roads, buildings, parking areas and other impervious surfaces.

2. Natural Resources Inventory

   A written or graphic inventory of the natural resources at the site and surrounding area as it exists prior to the commencement of the project shall be provided. This description should include a discussion of soil conditions, forest cover, topography, wetlands, and other native vegetative areas on the site, as well as the location and boundaries of other natural feature protection and conservation areas such as wetlands, lakes, ponds, floodplains, stream buffers and other setbacks (e.g., drinking water well setbacks, septic setbacks). Particular attention should be paid to environmentally sensitive features that provide particular opportunities or constraints for development.

3. Stormwater Management System Concept Plan

   A written or graphic concept plan of the proposed post-development stormwater management system shall be provided and include the following: preliminary selection and location of proposed structural stormwater controls; location of existing and proposed conveyance systems such as grass channels, swales, and storm drains; flow paths; location of floodplain/floodway limits; relationship of site to upstream and downstream properties and drainages; and preliminary location of proposed stream channel modifications, such as bridge or culvert crossings.

Local watershed plans, the Town Plan of Conservation and Development, the Town of Windsor Natural Resource Inventory (if applicable), and any relevant resource protection plans will be consulted in the discussion of the concept plan.

4.3 Stormwater Management Plan Requirements

The stormwater management plan shall detail how post-development stormwater runoff will be controlled or managed and how the proposed project will meet the requirements of this Town's *Stormwater Management Ordinance*, including the performance criteria in Section 4.6 below.

The stormwater management plan shall be in accordance with the criteria established in this section and must be submitted with the stamp and signature of a Professional Engineer licensed in the state of Connecticut, who must verify that the design of all stormwater management facilities and practices meet the submittal requirements outlined in the Stormwater Management Permit Application submittal checklist (Appendix B).

The stormwater management plan must ensure that the requirements and criteria in this manual are being complied with and that opportunities are being taken to minimize adverse post-development stormwater runoff impacts from the development. The plan shall consist of maps, narrative, and supporting design calculations (hydrologic and hydraulic) for the proposed stormwater management system. As a minimum, the Engineer shall include all applicable Town of Windsor standard details in the development design plans. The Town Engineer may require additional details.

The plan shall include all of the information required in the Stormwater Management Permit Application (Appendix B). This includes:

1. Vicinity Map

2. Project Narrative

   A project narrative including a description of the project and purpose, potential stormwater impacts, both on-site and off-site critical resources, and proposed stormwater management practices shall be provided. The narrative shall include the following:

   a. Natural and manmade features at the site, including, at a minimum, wetlands, watercourses, floodplains, and development (roads, buildings, and other structures).

   b. Site topography, drainage patterns, flow paths, and ground cover.

   c. Impervious areas and runoff coefficients.

   d. Site soils as defined by USDA soil surveys including soil names, map unit, erodibility, permeability, depth, texture, and soil structure.

   e. Stormwater discharges from the site, including quality and known sources of pollutants and sediment loadings.

   f. Critical areas, buffers, and setbacks established by the local state and federal regulatory authorities.

   g. Water quality classification of on-site and adjacent waterbodies.

   h. Identification of any on-site or adjacent waterbodies included on the Connecticut 303(d) list of impaired waters.

   i. Potential pollution sources (e.g. erosive soils, steep slopes, vehicle fueling, vehicle washing).

   j. Types of anticipated stormwater pollutants and the relative or calculated load of each pollutant, if specifically requested by the Town Engineer.

   k. Summary of calculated pre- and post-development peak flows.

   l. Summary of calculated pre- and post-development groundwater recharge, if specifically requested by the Town Engineer.

   m. Critical on-site resources (e.g. wells, aquifers, wetlands, streams, ponds, public drinking water supplies).

   n. Critical off-site resources (e.g. wells, aquifers, wetlands, streams, ponds, public drinking water supplies).

o. Neighboring land uses.

p. Source controls and pollution prevention.

q. Alternative site planning and design.

r. Stormwater treatment practices describing how the selected stormwater controls will be appropriate and effective.

s. Flood control and peak runoff attenuation management practices.

t. Where applicable, a narrative describing how the stormwater management system corresponds with any watershed protection plans and Windsor's Open Space and Agricultural Preservation Plan.

3. Existing Conditions and Proposed Site Plans

Existing conditions and proposed plans prepared by a Professional Engineer licensed in the state of Connecticut shall be provided. Plans shall be provided at a scale of 1 inch equals 40 feet with at least two-foot contours and spot elevations provided as necessary. The preferable plan size is 24 inches by 36 inches. Existing conditions and proposed site plans shall illustrate at a minimum:

a. Topography, drainage patterns, drainage boundaries, and flow paths.

b. Labeled roadways, buildings, driveways, and property lines.

c. Locations of stormwater discharges.

d. Perennial and intermittent streams.

e. The Connecticut River encroachment limits, if applicable, will be shown on the plans as per the limits indicated on the United States Geological Survey mapping.

f. USDA soil types (listed in tabular form and shown on the plans).

g. Proposed borehole investigations.

h. Vegetation and proposed limits of clearing and disturbance.

i. Resource protection areas such as wetlands, lakes, ponds, and other setbacks (stream buffers, drinking water well setbacks, septic setbacks, etc.).

j. Roads, buildings, and other structures.

k. Utilities and easements.

l. Temporary and permanent conveyance systems (grass channels, swales, ditches, storm drains, etc.) including grades, dimensions, and direction of flow.

m. Drainage structure features such as, pipe materials, pipe lengths, pipe sizes, pipe slopes, drainage structure top types, top of frame and invert elevations.

n. Cross-section and profile drawings and design details for each of the structural stormwater controls in the system.

o. Floodplain and floodway limits, if applicable, shall be indicated on the plans as defined by the Flood Insurance Rate Maps and the Flood Insurance Study for the Town of Windsor, Connecticut, Hartford County both by the Federal Emergency Management Agency (September 26, 2008 or as amended).

p. Location, size, maintenance access, and limits of disturbance of proposed structural stormwater management practices (treatment practices, flood control facilities, stormwater diversion structures, etc.).

q. Final landscaping plans for structural stormwater management practices and site re-vegetation.

r. Locations of non-structural stormwater management practices (i.e., source controls).

4. Hydrologic and Hydraulic Design Calculations

Hydrologic and hydraulic design calculations shall be provided for both pre- and post-development conditions and shall include the following. Runoff from a drainage area of less than 200 acres may be calculated using the Rational Method. Figure 1, which provides the rainfall intensity for the Town of Windsor area, shall be used in the drainage calculations using the Rational Method.

For drainage areas greater than 200 acres, the Soil Conservation Method (SCS), comparable gauged streams, or other methods approved by the Town Engineer may be used for runoff calculation.

a. A topographic map of existing conditions with the drainage boundaries indicated meeting the requirements of item #3 above.

b. A topographic map of developed site conditions with the post-development drainage basin boundaries indicated meeting the requirements of item #3 above.

c. Description of methodologies, assumptions, site parameters and used in analyzing both the existing* conditions and post-development** site hydrology.

*For redevelopment sites, pre-development conditions shall be modeled using the established guidelines for the portion of the site undergoing land development activities.

**If the land development activity on a redevelopment site constitutes more than 50 percent of the site area for the entire site, then the performance criteria in Section 4.6 must be met for the stormwater runoff from the entire site.

d. Watershed map with locations of design points and watershed areas (acres) for runoff calculations. Either a field survey shall be performed depicting the entire watershed area or the Metropolitan District Commission's (MDC) base mapping shall be used at a minimum size scale of 1 inch equals 200 feet. The watershed mapping shall be provided at a standard scale between 1 inch equals 20 feet and 1 inch equals 200 feet with at least two-foot contours and spot elevations as necessary. The selected scale shall provide the largest, legible plan. Preferable plan size is 24 inches by 36 inches. This mapping will provide features necessary to evaluate hydraulic runoff conditions including, but not limited to, sub-drainage area delineation with acreage calculation, labeled roadways, buildings, driveways, property lines vegetated areas, limits of trees, waterbodies, watercourses, detention basins, retention basins, drainage structures, and sub-watershed boundaries.

e. Description of the design storm frequency, intensity, and duration.

f. Time of concentration (and associated flow paths) calculations. The time of concentration used for drainage calculations shall be based upon the use of multiple segment flow paths and model field conditions.

g. Imperviousness of the entire site and each area subbasin (listed in tabular form and shown on the plan).

h. Runoff curve numbers or volumetric runoff coefficients. Runoff coefficients shall be based on the weighted value for the different surfaces. Table 1 provides runoff coefficients, which shall be used in the Rational Method.

i. Peak runoff rates, volumes, and velocities for each subbasin (24-hour storm).

   (i) Stream Channel Protection: 1-year frequency ("over-control" of 1-year storm)

   (ii) Conveyance Protection: 10-year frequency

   (iii) Overbank Flooding Protection (Peak Runoff Attenuation): 10-year, 25-year, and 50-year frequency

   (iv) Extreme Flooding Protection: safely pass the 100-year frequency or larger storm

j. Hydrograph routing calculations

   (i) Culvert capacities

   (ii) Infiltration rates (where applicable)

   (iii) Dam breach analysis (where applicable)

(iv) Documentation analysts, where detention is proposed

k. Stormwater Management System: Location of non-structural site design features and the placement of existing and proposed structural stormwater controls, including:

(i) Design water surface elevations

(ii) Storage volumes available from zero to maximum head

(iii) Velocities throughout the entire drainage system

(iv) Pipe capacities,

(v) All orifice/restrictor sizing information

(vi) Supporting calculations to show that the facility is designed according to the applicable design criteria

(vii) Stage-storage or outlet rating curves

(viii) Inflow and outflow hydrographs

(ix) Elevations and hydraulic grade lines for all existing and proposed stormwater conveyance elements including stormwater drains, pipes, culverts, catch basin, channels, swales and areas of overland flow

(x) Gutter flow calculations

5. Post-Development Downstream Analysis

A downstream peak flow analysis that includes the assumptions, results and supporting calculations to show safe passage of post-development design flows downstream. The analysis of downstream conditions in the report shall address each and every point or area long the project site's boundaries at which runoff will exit the property. The analysis shall focus on the portion of the drainage channel or watercourse immediately downstream from the project. This area shall extend downstream from the project to a point in the drainage basin where the project area is 10 percent of the total basin area. In calculating runoff volumes and discharge rates, consideration may need to be given to any planned future upstream land use changes.

6. Construction-Phase Erosion and Sediment Control Plan

An erosion and sediment control plan in accordance with the Town of Windsor *Erosion and Sediment Control Ordinance*, the Connecticut Erosion and Sedimentation Control Act, and the CT DEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters from Construction Activities. The plan shall also include information on the sequence/phasing of construction and temporary stabilization measures, as well as temporary structures that will be converted into permanent stormwater controls.

7. Landscaping and Open Space Plan

   A detailed landscaping and vegetation plan describing the woody and herbaceous vegetation that will be used within and adjacent to stormwater management facilities and practices. The landscaping plan must also include: the arrangement of planted areas, natural and open space areas and other landscaped features on the site plan; information necessary to construct the landscaping elements shown on the plan drawings; descriptions and standard for the methods, materials and vegetation that are to be used in construction; density of plantings; descriptions of the stabilization and management techniques used to establish vegetation; and a description of who will be responsible for ongoing maintenance of vegetation for the stormwater management facility and what practices will be employed to ensure that adequate vegetative cover is preserved.

8. Operations and Maintenance Plan

   Detailed description of ongoing operations and maintenance procedures for stormwater management facilities and practice to ensure their continued function as designed and constructed or preserved. These plans will identify the parts or components of a stormwater management facility or practice that need to be regularly or periodically inspected and maintained, and the equipment and skills or training necessary. The plan shall include an inspection and maintenance schedule, maintenance tasks, responsible parties for maintenance, funding, access and safety issues. Provisions for the periodic review and evaluation of the effectiveness of the maintenance program and the need for revisions or additional maintenance procedures shall be included in the plan.

9. Maintenance Access Easements

   The applicant must ensure access from public right-of-way to stormwater management facilities and practices requiring maintenance at the site for the purpose of inspection and repair by securing all the maintenance access easements needed on a permanent basis. Such access shall be sufficient for all necessary equipment for maintenance activities. Upon final inspection and approval, a plat or document indicating that such easements exist shall be recorded on the Land Records maintained in the office of the Windsor town Clerk and shall remain in effect in perpetuity.

10. Inspection and Maintenance Agreements

    Unless an on-site stormwater management facility or practice is dedicated to and accepted by the Town of Windsor as provided in Section 4.4 below, the applicant must execute an easement and an Inspection and Maintenance Agreement binding on all subsequent owners of land served by an on-site stormwater management facility or practice in accordance with Section 4.4.

11. Evidence of Acquisition of Applicable Local and Non-Local Permits

    The applicant shall certify and provide documentation to the Town Engineer that all other applicable environmental permits have been acquired for the site prior to the approval of the stormwater management plan.

4.4 Stormwater Management Inspection and Maintenance Agreements

Prior to the issuance of any permit for a land development activity requiring a stormwater management facility or practice hereunder and for which the Town Engineer requires ongoing maintenance, the applicant or owner of the site must, unless an on-site stormwater management facility or practice is dedicated to and accepted by the Town if Windsor, execute an Inspection and Maintenance Agreement and/or a conservation easement, if applicable, that shall be binding in perpetuity on all subsequent owners of the site.

The Inspection and Maintenance Agreement, if applicable, must be approved by the Town Engineer prior to plan approval, and recorded in the Land Records maintained by the Windsor Town Clerk upon final plat approval.

The inspection and maintenance agreement shall identify by name or official title the person(s) responsible for carrying out the inspection and maintenance. Responsibility for the operation and maintenance of the stormwater management facility or practice, unless assumed by a governmental agency, shall remain with the property owner and shall pass to any successor owner. If portions of the land are sold or otherwise transferred, legally binding arrangements shall be made to pas the inspection and maintenance responsibility to the appropriate successors in title. These arrangements shall designate for each portion of the site, the person to be permanently responsible for its inspection and maintenance.

As part of the Inspection and Maintenance Agreement, a schedule shall be developed for when and how often routine inspection and maintenance will occur to ensure proper function of the stormwater management facility or practice. The agreement shall also include plans for annual inspections to ensure proper performance of the facility between scheduled maintenance and shall also include remedies for the default thereof.

In addition to enforcing the terms of the Inspection and Maintenance Agreement, the Town Engineer may also enforce all of the provisions for ongoing inspection and maintenance in Section 4.9 of this manual.

A template Inspection & Maintenance Agreement is included as Appendix C. A template Certificate of Title (as required by Section 9 of the *Stormwater Management Ordinance*) is included as Appendix D.

The Town of Windsor, in lieu of an Inspection and Maintenance Agreement, may accept dedication of any existing or future stormwater management facility for maintenance, provided such facility meets all the requirements of the *Stormwater Management Ordinance* and this manual and includes adequate and perpetual access and sufficient area, by easement or otherwise, for inspection and regular maintenance.

4.5 Modifications for Off-Site Facilities

The stormwater management plan for each land development project shall provide for stormwater management measures located on the site of the project, unless provisions are made to manage stormwater by an off-site or regional facility. The off-site or regional facility must be located on

property legally dedicated for the purpose, must be designed and adequately sized to provide a level of stormwater quantity and quality control that is equal to or greater than that which would be afforded by on-site practices and there must be a legally-obligated entity responsible for long-term operation and maintenance of the off-site or regional stormwater facility. In addition, on-site measures shall be implemented, where necessary, to protect upstream and downstream properties and drainage channels from the site to the off-site facility.

A stormwater management plan shall be submitted to the Town Engineer that shows the adequacy of the off-site or regional facility.

To be eligible for a modification, the applicant must demonstrate to the satisfaction of the Town Engineer that the use of an off-site or regional facility will not result in the following impacts to upstream or downstream areas:

1. Increased threat of flood damage to public health, life, or property;

2. Deterioration of existing culverts, bridges, dams, or other structures;

3. Accelerated streambank or streambed erosion or siltation;

4. Degradation of in-stream biological functions or habitat; or

5. Water quality impairment in violation of State water quality standards, and/or violation of any state or federal regulations.

4.6 Post-Development Stormwater Management Performance Criteria

The following performance criteria shall be applicable to all stormwater management plans:

4.6.1 Water Quality

All stormwater runoff generated from a site shall be adequately treated before discharge. It will be presumed that a stormwater management system complies with this requirement if:

a. It is sized to treat the prescribed water quality treatment volume from the site, as defined in the Connecticut Guidelines for Stormwater Quality Management;

b. Appropriate structural stormwater controls or non-structural practices are selected, designed, constructed or preserved, and maintained according to the specific criteria in the Connecticut Guidelines for Stormwater Quality Management; and

c. Runoff from "establishments" (as defined in C.G.S. 22a-134) is adequately treated and addressed through the use of appropriate structural stormwater controls, non-structural practices and pollution prevention practices.

4.6.2 Stream Channel Protection

Protection of stream channels from bank and bed erosion and degradation shall be provided by using all of the following approaches:

a. Preservation, restoration and/or reforestation (with native vegetation) of the applicable stream buffer;
b. 24-hour extended detention storage for the 1-year*, 24-hr return frequency storm event; and

c. Erosion prevention measures such as energy dissipation and velocity control.

*Runoff rates from the 2-year storm may be used to satisfy the requirements of (b).

4.6.3 Overbank Flooding Protection

Downstream overbank flood and property protection shall be provided by controlling (attenuating) the post-development peak discharge rate to the pre-development rate for the 50-year, 24-hour return frequency storm event. If control of the 1-year, 24-hour storm under Section 4.6.2 is exempted, then peak discharge rate attenuation of the 2-year through 25-year return frequency storm event must be provided.

4.6.4 Extreme Flooding Protection

Extreme flood and public safety protection shall be provided by controlling and safely conveying the 100-year, 24-hour return frequency storm event such that flooding is not exacerbated.

4.6.5 Watershed Preservation

Diversions of surface runoff from one watershed to another will not be permitted unless such diversion will have no significant hydraulic changes as a result of such diversion. The Town Engineer shall approve any such diversion.

4.6.6 Structural Stormwater Controls

All structural stormwater management facilities shall be selected and designed using the appropriate criteria from the Connecticut Guidelines for Stormwater Quality Management. All structural stormwater controls must be designed appropriately to meet their intended function. For other structural stormwater controls not included in the Connecticut Guidelines for Stormwater Quality Management, or for which pollutant removal rates have not been provided, the effectiveness and pollutant removal of the structural control must be documented through prior studies, literature reviews, or other means and receive approval from the Town Engineer before being included in the design of a stormwater management system. In addition, if hydrologic or topographic conditions, or land use activities warrant greater control than that provided by the minimum control requirements, the Town Engineer may impose additional requirements deemed necessary to protect upstream and downstream properties and aquatic resources from damage due to increased

volume, frequency, and rate of stormwater runoff or increased non-point source pollution loads created on the site in question.

Applicants shall consult the CT Stormwater Quality Manual for guidance on the factors that determine the site design feasibility study when selecting and locating a structural stormwater control.

4.6.7 Drainage System Guidelines

Stormwater conveyance facilities, which may include but are not limited to culverts, stormwater drainage pipes, catch basins, yard drains, drop inlets, junction boxes, headwalls, gutter, swales, channels, ditches, and energy dissipaters shall be provided when necessary for the protection of public rights-of-way and/or private properties adjoining project sites and/or public rights-of-way. Stormwater conveyance facilities that are designed to carry runoff from more than one parcel shall meet the following requirements:

a. The discharge of all stormwater shall be into a suitable watercourse or drainage system provided adequate capacity is available to convey the additional water. Otherwise provisions shall be made to satisfactorily increase the capacity of the watercourse or downstream drainage system. Permission from the Town Engineer or adjacent property owner is required for any connection to the Town's storm drainage system or across an adjacent property boundary. If stormwater will be discharged onto adjacent property, proper easements or drainage rights must be acquired from the adjacent property owner.

b. All culverts, pipe systems and open channel flow systems shall be sized in accordance with the stormwater management plan using the methods included in this manual and the CT Stormwater Quality Manual.

c. A 25-year storm event shall be used for the design of all drainage pipes. 50-year storm events shall be used for the design of all minor structures (200-1,000 acres); 100-year storm events shall be used for the design of all major (greater than 1,000 acres) structures.

d. Table 2 provides the roughness coefficient, n, which shall be used in Manning's Equation.

e. The minimum acceptable inside diameter for pipe installed as part of the Town of Windsor's drainage system is 15 inches.

f. The minimum acceptable pipe slope is 0.5 percent.

g. Pipe with a slope exceeding 10 percent shall have a corrugated interior to reduce the flow velocity.

h. The minimum acceptable, self-cleansing stormwater velocity is 3.0 feet per second for pipe flow.

i. The minimum acceptable pipe cover is 2.0 feet, unless otherwise approved by the Town Engineer based on ASTM or manufacturer's test results.

j. Catch basins shall have a maximum spacing of 350 feet measured along the gutter line of the roadway. However, the Town Engineer may request gutter flow calculations to determine the best number and location for catch basins.

k. Catch basins shall have a maximum headwater of 1.0 feet below the top of grate.

l. Wherever possible, catch basins within intersection areas shall be located a minimum of five feet from the point of curvature of the curb line and upgrade of a sidewalk ramp.

m. A catch basin or manhole shall be located at each drainage system grade change, horizontal drainage system change, or at the junction of two or more pipes.

n. Gutter flow calculations for the location and spacing of catch basins, if required by the Town Engineer, will require catch basins to be located such that water shall not spread onto the center of the lane closest to the gutter.

o. Underdrains shall be installed in all areas where wet soil conditions prevail within two feet of the top of road surface grade, where the road design intercepts the natural water flow, or where directed by the Town Engineer. Underdrain outlets shall be connected to drainage structures where practical.

p. Footing drains connected to a drainage system shall be equipped to prevent backflow for a 100-year storm event.

q. The Town Engineer shall approve footing drain, collector drainage, and underdrain connections to the Town's storm drainage system. The Town shall not be responsible for maintenance and replacement of any private footing drains, collector drainage, or underdrain regardless of the connection to the Town's drainage system.

r. Fencing around some or all of the proposed detention basins may be required by the Town Engineer for public safety. All headwalls, endwalls, wingwalls, etc. with vertical drops of 30 inches or greater, which are located in close proximity to a roadway, sidewalk, bikeway, or property subject to significant pedestrian activity, or as deemed necessary by the Town Engineer, shall have a fence.

s. Drainage easements, when required by the Town Engineer for the discharge of stormwater from the Town's drainage system onto private properties, shall be provided for the purposes of access, installation, and maintenance at a minimum of 20 feet in width centered on the drainage pipe. If the pipe is not in the center of the easement, the easement shall provide at least 10 feet on one side of the pipe. The easement width may be increased if the depth of pipe exceeds 10 feet. These easement areas shall extend a minimum of 20 feet beyond the drainage outfall.

t. All subsurface drainage collection systems, footing drains, roof drains, or concentrated surface flows (swales, channels) shall be directed into a drainage system or into an existing catch basin. No pipe or other concentrated discharge is permitted to flow over the sidewalk or onto the paved surface of the road unless permitted by the Town Engineer.

u. If well draining soil conditions and an acceptable water table elevation are present, infiltrators, dry wells, or other suitable stormwater containment devices may be used upon approval of the Town Engineer. Soil boring and percolation information shall be provided to the Town Engineer. If practicable, overflows shall be provided to all dry wells.

v. Detention basins or other methods may be used to ensure that the peak discharge from the development does not exceed the predevelopment condition. Detention basins shall have emergency spillways set at an elevation, which will only allow the discharge of stormwater during a 100-year storm event.

w. All detention basins serving a watershed area of five acres or more shall be analyzed with hydrographs and the routing of these hydrographs through the detention basin. Hydrographs shall be provided for basin inflow and outflow. Smaller watershed areas for detention basins may be analyzed with the TR-55 method.

x. Detention basin calculations shall include the maximum storage capacity and the time required for the basin to return to a pre-storm water elevation.

4.6.8 Dam Design Guidelines

Any land-disturbing activity that on a site that proposes a dam shall comply with the CT DEP regulations regarding dam safety.

The requirements in Sections 4.6.3 and 4.6.4 may be adjusted or waived by the Town Engineer for sites where the post-development downstream analysis shows that uncontrolled post-development conditions will not increase downstream peak flows, or that meeting the requirement will cause greater peak flow downstream impacts than the uncontrolled post-development conditions.

4.7 Design and Construction of Stormwater Management Facilities

Drainage systems shall be designed and installed with the materials and methods indicated in the Town if Windsor's Engineering Standards and Specifications. If not covered under the Engineering Standards and Specifications, drainage system or installation shall conform to the Connecticut Department of Transportation's Standard Specification for Roads, Bridges, and Incidental Construction, Form 816, as amended.

4.8 Construction Inspections of Post-Development Stormwater Management Systems

4.8.1 Inspections to Ensure Plan Compliance During Construction

Periodic inspections of the stormwater management system construction shall be conducted by the Town Engineer or conducted and certified by a professional engineer. Construction inspections shall utilize the approved stormwater management plan for establishing compliance.

All inspections shall be documented with written reports that contain the following information:

a. The date and location of the inspection;

b. Whether construction is in compliance with the approved stormwater management plan;

c. Variations from the approved construction specifications; and

d. Any other variations or violations of the conditions of the approved stormwater management plan.

If any violations are found, the applicant shall be notified in writing of the nature of the violation and the required corrective actions.

4.8.2 Final Inspection and As-Built Plans

Upon completion of a project, and before a certificate of occupancy shall be granted, the applicant is responsible for certifying that the completed project is in accordance with the approved stormwater management plan. All applicants are required to submit actual "as-built" plans for any stormwater management facilities or practices after final construction is completed. The plans must be submitted on mylar and must show the final design specifications for all stormwater management facilities and practices and must be certified by a Professional Engineer. A final inspection by the Town Engineer is required before the release of any performance securities can occur.

4.9 On-going Inspection and Maintenance of Stormwater Facilities and Practices

4.9.1 Long-Term Maintenance Inspection of Stormwater Facilities and Practices

Stormwater management facilities and practices included in a stormwater management plan that are subject to an Inspection and Maintenance Agreement must undergo ongoing inspections to document maintenance and repair needs and ensure compliance with the requirements of the agreement, the plan and the *Stormwater Management Ordinance* and this manual.

A stormwater management facility or practice shall be inspected on a periodic basis by the responsible person in accordance with the approved Inspection and Maintenance Agreement. In the event that the stormwater management facility has not been maintained and/or becomes a danger to public safety or public health, the Town Engineer shall notify the person responsible for carrying out the maintenance plan by registered or certified mail to the person in the Inspection and Maintenance Agreement. The notice shall specify the measures needed to comply with the agreement and the plan and shall specify the time within which measures shall be completed. If the responsible person fails or refuses to meet the requirements of the Inspection and Maintenance Agreement, the Town Engineer may correct the violation as provided in Section 4.9.4 hereof.

Inspection programs by the Town Engineer may be established on a reasonable basis: including but not limited to: routine inspections, random inspection, inspections based upon complaints or other notice of possible violations, and joint inspections with other agencies performing inspections under environmental or safety laws.

4.9.2 Right-of-Entry for Inspection

The terms of the Inspection and Maintenance Agreement shall provide for the Town Engineer to enter the property at reasonable times and in a reasonable manner for the purpose of inspection. This includes the right to enter a property when the Town Engineer has a reasonable basis to believe that a violation of the *Stormwater Management Ordinance* is occurring or has occurred and to enter when necessary for abatement of a public nuisance or correction of a violation of the *Stormwater Management Ordinance*.

4.9.3 Records of Maintenance Activities

Parties responsible for the operation and maintenance of a stormwater management facility shall provide records of all maintenance and repairs to the Town Engineer.

4.9.4 Failure to Maintain

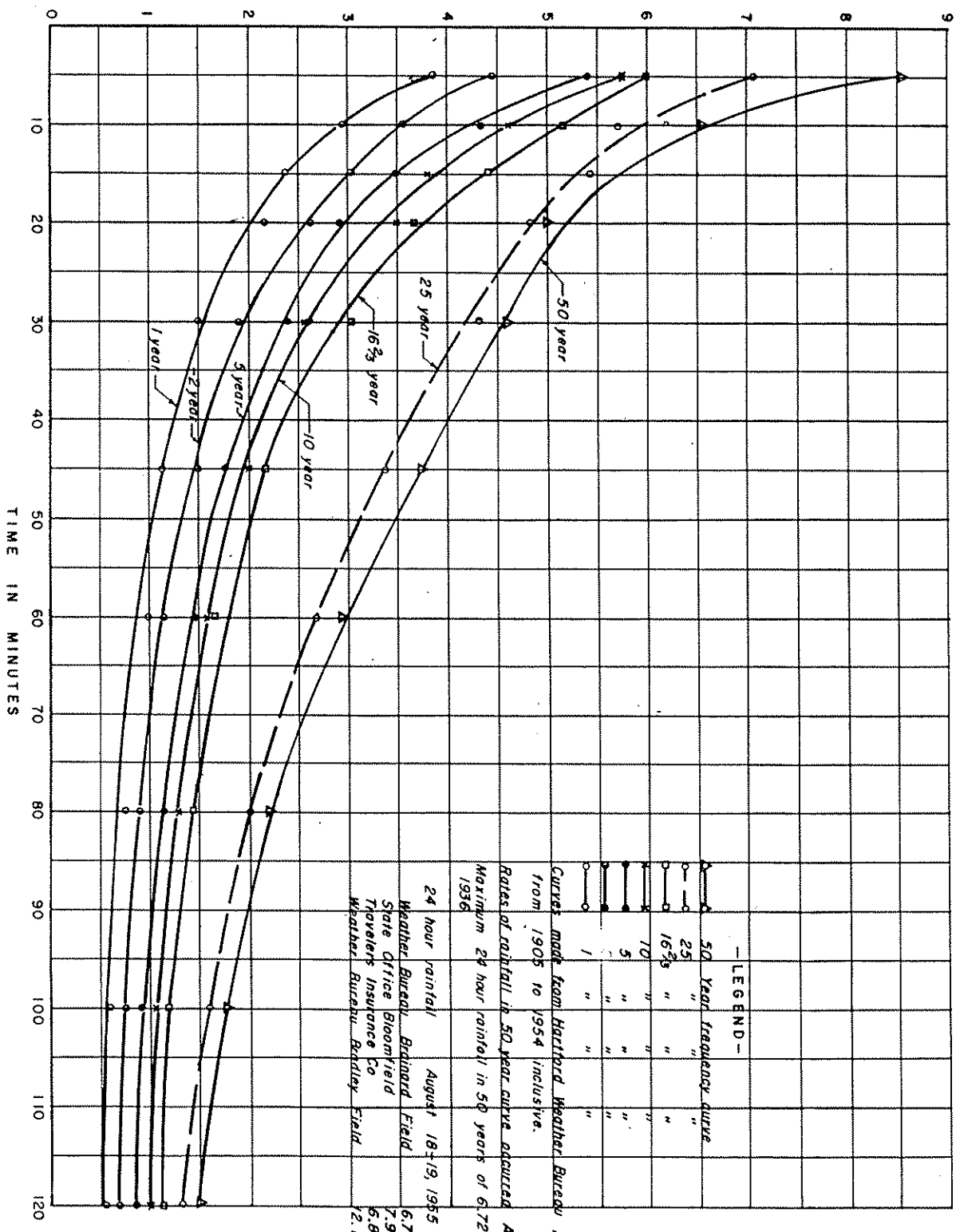
If a responsible person fails or refuses to meet the requirements of the Inspection and Maintenance Agreement, the Town Engineer, after thirty (30) days written notice (except that in the event the violation constitutes an immediate danger to public health or public safety, 24-hours notice shall be sufficient), may correct a violation of the design standards or maintenance requirements by performing the necessary work to place the facility or practice in proper working condition. The Town Engineer may assess the owner(s) of the facility for the cost of repair work, which shall be a lien on the property, and may be placed on the tax bill for such property and collected in the ordinary manner for such taxes.

TABLES

Table 1 – Runoff Coefficients for the Rational Method	
Type of Area/Surface	**Runoff Coefficient**
Business:	
Downtown Areas	0.85
Neighborhood Areas	0.60
Residential:	
Single-Family Area	0.40
Multi-Family Units, Detached	0.50
Multi-Family Units, Attached	0.65
Suburban	0.35
Industrial:	
Light Areas	0.65
Heavy Areas	0.75
Parks/Cemeteries	0.15
Playgrounds	0.30
Railroad Areas	0.30
Unimproved Areas	0.20
Lawns:	
Sandy Soil, Flat: 0 to 2%	0.10
Sandy Soil, Average: 2 to 7%	0.15
Sandy Soil, Steep: >7%	0.20
Heavy Soil, Flat: 0 to 2%	0.15
Heavy Soil, Average: 2 to 7%	0.20
Heavy Soil, Steep: >7%	0.30
Paved Roadway/Driveway	0.90
Roof	0.85

Table 2 – Pipe Roughness Coefficients	
Pipe Material	**Manning's Roughness Coefficient, n**
Reinforced Concrete	0.013
Corrugated-Interior Polyethylene	0.020
Smooth-Interior Polyethylene	0.012
Corrugated Metal	0.024
Corrugated Metal, Fully Paved	0.013

FIGURES



Center for Public Property Management
TOWN OF WINDSOR
Engineering Division

INTENSITY, DURATION, & FREQUENCY OF RAINFALL AT WINDSOR

SCALE HOR. —— VER. —— DATE MAR. 86

APPENDIX A

Erosion and Sediment Control Permit Application

TOWN OF WINDSOR
First in Connecticut. First for its citizens.

TOWN OF WINDSOR
ENGINEERING
275 BROAD STREET
WINDSOR, CONNECTICUT 06095

PERMIT NO. _____
Date _____
Permit Fee _____
Starting Date _____
Issued By
_____

APPLICATION FOR PERMIT
Erosion & Sediment Control Permit

☐ 1. PROJECT ADDRESS

Address: _____

Map No. _____ Block No. _____ Parcel No. _____ (According to Town Assessor's Map)

Number of Acres to be Disturbed: _____ *(Permit is required for disturbances of 0.5 acres or greater)*

☐ Copy of registration under CT DEP General Permit for the Discharge of Stormwater and Dewatering Wastewaters Associated with Construction Activities is attached. *(Required for disturbances of 5.0 acres or greater)*

☐ 2. OWNER(S) OF RECORD

Name: _____

Home/Mailing Address: _____ Telephone: _____

Business Address: _____ Telephone: _____

As OWNER OF THE PROPERTY I hereby authorize this Erosion & Sediment Control Permit Application and I consent to necessary and proper inspections of the above property by agents of the Town in accordance with the *Erosion & Sediment Control Ordinance*.

Dated: _____, 20____ _____
Signature of **PROPERTY OWNER**

☐ 3. APPLICANT ☐ Check here if SAME AS OWNER

Name: _____

Business Address: _____ Telephone: _____

E-mail address: _____

As APPLICANT I am familiar with all the information provided in this application and aware that any permit obtained through deception, inaccurate or misleading information is subject to revocation and penalties.

Dated: _____, 20____ _____
Signature of **APPLICANT**

☐ 4. PROFESSIONAL ENGINEER

Name: _____

Business Address: _____ Telephone: _____

E-mail address: _____

☐ 5. INDIVIDUAL RESPONSIBLE FOR MONITORING E&S CONTROL MEASURES

Name: _____

Business Address: _____

Daytime Telephone: _____ Nighttime/Emergency Telephone: _____

TOWN OF WINDSOR
ENGINEERING
275 BROAD STREET

EROSION AND SEDIMENT CONTROL PERMIT APPLICATION

☐ 6. ON-SITE MONITOR OF E&S CONTROL MEASURE INSTALLATION AND MAINTENANCE

Name: _____

Business Address: _____

Daytime Telephone: _____ Nighttime/Emergency Telephone: _____

☐ 7. NATURAL RESOURCES MAP

☐ 8. SITE PLAN

☐ Check here if submitted with application to Planning and Zoning Department as part of separate application for Site Plan Approval, Subdivision Application, or Special Use Permit.

On a scaled site plan prepared by a Connecticut Licensed Professional Engineer, show the following:

a. ☐ Proposed area alterations including cleared, excavated, filled, or graded areas.

b. ☐ Location and design details of all proposed soil erosion and sediment control measures and storm water management facilities.

c. ☐ Sequence of grading and construction activities, and installation and/or typical application of soil erosion and sediment control measures.

d. ☐ Soil types listed in tabular form and shown on plan.

☐ 9. SOIL EROSION AND SEDIMENT CONTROL DATA

☐ Shown on SITE PLAN, or ☐ Described in SEPARATE ATTACHMENT

In narrative format, describe the following:

a. ☐ Proposed soil erosion and sediment control measures.

b. ☐ Phasing plan, if applicable.

c. ☐ Schedule of grading and construction activities including the sequence for installation and/or application of soil erosion and sediment control measures and final stabilization of the site. Include start and stop dates as well as duration of activity.

d. ☐ Installation and/or application procedures as well as operation and maintenance programs for soil erosion and sediment control measures (including identification of person(s) responsible for each procedure or program).

f. ☐ Provisions for control of waste at the site including, but not limited to, discarded building materials, concrete truck washout, chemicals, litter, and sanitary waste.

g. ☐ Contingency provisions. Describe your procedures if unforeseen erosion or sedimentation problems arise.

The APPLICANT understands and agrees that any land clearing, construction, or development involving the movement of earth shall be in accordance with the Erosion and Sediment Control Plan.

Applicant's Signature _____ Date _____

Owner's Signature _____ Date _____

Received by (Name of Engineering Representative): _____

c: Town Planner
Building Official
Environmental Planner
Construction Inspector

APPENDIX B

Stormwater Management Permit Application

TOWN OF WINDSOR
First in Connecticut. First for its citizens.

TOWN OF WINDSOR
ENGINEERING
275 BROAD STREET
WINDSOR, CONNECTICUT 06095

PERMIT NO. _____
Date _____
Permit Fee _____
Starting Date _____
Issued By
_____

APPLICATION FOR PERMIT
Stormwater Management Permit

☐ 1. PROJECT ADDRESS

Address: _____

Map No. _____ Block No. _____ Parcel No. _____ (According to Town Assessor's Map)

Amount of Impervious Cover to be created: _____ (square feet or acres)

Size of Land Disturbing Activities: _____ (square feet or acres)

(Permit is required for the creation of 5,000 square feet or more of impervious cover, or activities that involve land disturbing activities of one (1.0) acre or more)

☐ 2. OWNER(S) OF RECORD

Name: _____

Home/Mailing Address: _____ Telephone: _____

Business Address: _____ Telephone: _____

As OWNER OF THE PROPERTY I hereby authorize this Stormwater Management Permit Application and I consent to necessary and proper inspections of the above property by agents of the Town in accordance with the *Stormwater Management Ordinance*.

Dated: _____, 20____ _____
Signature of **PROPERTY OWNER**

☐ 3. APPLICANT ☐ Check here if SAME AS OWNER

Name: _____

Business Address: _____ Telephone: _____

E-mail address: _____

As APPLICANT I am familiar with all the information provided in this application and aware that any permit obtained through deception, inaccurate or misleading information is subject to revocation and penalties.

Dated: _____, 20____ _____
Signature of **APPLICANT**

☐ 4. PROFESSIONAL ENGINEER

Name: _____

Business Address: _____ Telephone: _____

E-mail address: _____

☐ 5. INDIVIDUAL RESPONSIBLE FOR MONITORING STORMWATER MANAGEMENT SYSTEM CONSTRUCTION ACTIVITIES

Name: _____

Business Address: _____

Daytime Telephone: _____ Nighttime/Emergency Telephone: _____

☐ 6. ON-SITE MONITOR OF CONSTRUCTION ACTIVITIES

Name: _____

Business Address: _____

Daytime Telephone: _____ Nighttime/Emergency Telephone: _____

☐ 7. VICINITY MAP

☐ 8. PROJECT NARRATIVE

A project narrative including a description of the project and purpose, potential stormwater impacts, both on-site and off-site critical resources, and proposed stormwater management practices shall be provided. The narrative shall include all items listed in Section 4.3 of the Town Stormwater Manual.

☐ 9. SITE PLANS

☐ Check here if submitted with application to Planning and Zoning Department as part of separate application for Site Plan Approval, Subdivision Application, or Special Use Permit. The following checklist shall still be completed if plans have been jointly submitted.

On a scaled site plan prepared by a Connecticut Licensed Professional Engineer, show the following:

		Existing Conditions Plan	**Proposed Site Plan**
a.	Topography, drainage patterns, drainage boundaries, and flow paths.	☐	☐
b.	Labeled roadways, buildings, driveways, and property lines.	☐	☐
c.	Locations of stormwater discharges.	☐	☐
d.	Perennial and intermittent streams.	☐	☐
e.	The Connecticut River encroachment limits, if applicable, will be shown on the plans as per the limits indicated on the United States Geological Survey mapping.	☐	☐
f.	USDA soil types (listed in tabular form and shown on the plans).	☐	☐
g.	Proposed borehole investigations.	☐	☐
h.	Vegetation and proposed limits of clearing and disturbance.	☐	☐
i.	Resource protection areas such as wetlands, lakes, ponds, and other setbacks (stream buffers, drinking water well setbacks, septic setbacks, etc.).	☐	☐
j.	Roads, buildings, and other structures.	☐	☐
k.	Utilities and easements.	☐	☐

		Existing Conditions Plan	Proposed Site Plan
l.	Temporary and permanent conveyance systems (grass channels, swales, ditches, storm drains, etc.) including grades, dimensions, and direction of flow.	☐	☐
m.	Drainage structure features such as pipe materials, pipe lengths, pipe sizes, pipe slopes, drainage structure top types, top of frame and invert elevations.	☐	☐
n.	Cross-section and profile drawings and design details for each of the structural stormwater controls in the system.	☐	☐
o.	Floodplain and floodway limits, if applicable, shall be indicated on the plans as defined by the Flood Insurance Rate Maps and the Flood Insurance Study for the Town of Windsor, Connecticut, Hartford County both by the Federal Emergency Management Agency (September 26, 2008 or as amended).	☐	☐
p.	Location, size, maintenance access, and limits of disturbance of proposed structural stormwater management practices (treatment practices, flood control facilities, stormwater diversion structures, etc.).	☐	☐
q.	Final landscaping plans for structural stormwater management practices and site re-vegetation.	☐	☐
r.	Locations of non-structural stormwater management practices (i.e. source controls).	☐	☐

☐ 10. HYDROLOGIC AND HYDRAULIC DESIGN CALCULATIONS

Hydrologic and hydraulic design calculations shall be provided for both pre- and post-development conditions and shall include all information listed in Section 4.3 of the Town Stormwater Manual.

☐ 11. POST-DEVELOPMENT DOWNSTREAM ANALYSIS

A downstream peak flow analysis in accordance with Section 4.3 of the Town Stormwater Manual.

☐ 12. CONSTRUCTION-PHASE EROSION AND SEDIMENT CONTROL PLAN

☐ Submitted with Erosion & Sediment Control Permit Application.

☐ 13. LANDSCAPING AND OPEN SPACE PLAN

☐ Check here if submitted with application to Planning and Zoning Department as part of separate application for Site Plan Approval, Subdivision Application, or Special Use Permit.

☐ 14. OPERATIONS AND MAINTENANCE PLAN

An operations and maintenance plan in accordance with Section 4.3 of the Town Stormwater Manual.

☐ 15. INSPECTION AND MAINTENANCE AGREEMENTS

Unless an on-site stormwater management facility or practice is dedicated to and accepted by the Town of Windsor, the applicant must execute an easement and an inspection and maintenance agreement binding on all subsequent owners of land served by an on-site stormwater management facility or practice.

☐ 16. OTHER APPLICABLE LOCAL AND NON-LOCAL PERMITS

Please provide a list of all other applicable local, state, and federal permits and the permit status of each application.

PERMIT REQUIRED	ISSUING AGENCY	PERMIT STATUS

The APPLICANT understands and agrees that any land development activities shall be in accordance with the Stormwater Management Plan.

Applicant's Signature _____ Date _____

Owner's Signature _____ Date _____

Received by (Name of Engineering Representative): _____

APPENDIX C

Template Inspection & Maintenance Agreement

STORMWATER MANAGEMENT
INSPECTION AND MAINTENANCE AGREEMENT

THIS AGREEMENT, made to and entered into this {day} day of {month}, {year} by and between {name of owner}, representing {name of company}, and the Town of Windsor, herein referred to as the "TOWN", pursuant to Chapter 14 Article IX of the Windsor Code of Ordinances (Stormwater Management Ordinance),

WHEREAS, the OWNER is the owner of the following described lands of Windsor, County of Hartford, State of Connecticut, and known as "{insert address}" being more particularly bounded and described on Schedule A attached.

{Insert legal description of land}, and incorporated herein by reference.

WITNESSETH

WE, the OWNER(S), with full authority to execute deeds, mortgages, other covenant, all rights, titles, and interests in the property described above, do hereby convent with the TOWN and agree as follows:

WHEREAS, the OWNER is developing the Property; and

WHEREAS, the Site Plan, known as "{insert name of site plan}", prepared by {insert name of engineer} of {city/town, state}, with the latest revision date of {insert date}, herein after called the "Plan", which is expressly made a part hereof, as approved or to be approved by the TOWN, provides for on-site stormwater management practices within the confines of the property; and

WHEREAS, the TOWN requires that on-site Stormwater Management Practices as shown on the Plan be constructed and adequately maintained by the OWNER, its heirs, successors and assigns.

WHEREAS, the Owner has agreed to perform maintenance on the Stormwater Management Facilities to ensure that the facilities are maintained in proper working condition to meet design standards and other provisions established, which said maintenance has been deemed to be of mutual benefit to the TOWN and the OWNER.

NOW THEREFORE, THIS INSPECTION AND MAINTENANCE AGREEMENT WITNESSETH, that in consideration on the mutual promises contained herein, the parties hereto do agree as follows:

1. The OWNER shall install and maintain all of the aforesaid Stormwater Management Facilities to Town specifications pursuant to the approved Plan.

2. The OWNER shall conduct inspections and maintenance to ensure proper performance of the Storm Management Facilities as follows:

- {insert list of inspection and maintenance activities based on site specific facilities}
  {THE FOLLOWING IS A LIST OF STANDARD I&M PROCEDURES MOST COMMON TO SITE DEVELOPMENT. THESE ITEMS MAY BE MADE MORE STRICT OR MORE LENIENT BY THE TOWN ENGINEER BASED ON SITE SPECIFIC CIRCUMSTANCES}
- Parking Area Surface Cleaning – All paved parking areas shall be swept annually between April 1st and July 1st.
- Catch Basins – All basin rim areas and sumps shall be kept clear of sediment, trash, and debris. All catch basins shall be inspected annually between May 1st and September 15th and sumps shall be cleaned when the depth of accumulated material exceeds 1 foot. Accumulated sand, dirt and debris shall be disposed of off-site in a proper manner.
- Storm Drainage Pipes and Structures – All storm drainage structures and pipes shall be kept in proper working condition.
- Rip-Rap Outlet/Level Spreader – The area should be inspected at least semi-annually and after substantial rainfall events. The area shall be cleared of all sediment deposits and invasive plant species. Damage and deterioration of the area shall be repaired immediately.
- Outlet Control Structures – Outlet control structure shall be inspected monthly. Debris and sediment within the structure shall be removed as needed or at least once per year between May 1st and September 15th.
- Detention Basins –
  - Detention basins and forebays shall be inspected monthly for evidence of erosion. Undercut or eroded areas shall be repaired within 30 days of documentation.
  - Detention areas shall be inspected for invasive vegetation at least once every six months.
  - Forebays and detention basins shall be mowed once per year at the end of the growing season no later than October 15th.
- Siltation forebays – Accumulated sediment from siltation forebays shall be removed once every five years. Accumulated materials shall be disposed of off-site in a proper manner.
- Refer to the latest edition of the Connecticut Guidelines for Stormwater Quality Management, a well as the Town's Engineering Standards and Specifications, as amended, and the Town's Stormwater Manual, as amended, for the proper implementation of stormwater management.

3. The OWNER agrees to permit the Town Engineer, or his/her representative, to enter the property at reasonable times and in a reasonable manner for the purpose of inspection.

4. Inspection programs by the Town Engineer may be established on a reasonable basis: including but not limited to: routine inspections, random inspections, inspections based upon complaints or other notice of possible violations, and joint

inspections with other agencies performance inspection under environmental or safety laws.

5. Records of all maintenance and repairs to the stormwater management facilities shall be kept on-site and shall be provided to the Town Engineer upon request. Failure to maintain these documents may subject to OWNER to violations under the Town's *Stormwater Management Ordinance*.

6. This agreement shall be recorded by the OWNER in the Town of Windsor Land Records.

7. This agreement shall run with the land and shall ensure to the benefit of and be binding upon and enforceable upon all the parties hereto, their heirs, personal representatives, successors and assigns, and any person claiming under OWNER shall be bound by the provisions hereof.

8. Upon recording, the OWNER shall obtain a certificate of title to the Town of Windsor from a lawyer licensed to practice in Connecticut certifying that the Inspection and Maintenance Agreement is valid and binding upon the owner and its heirs, successors and assigns as appropriate, free from all mortgages or other encumbrances which could defeat its priority on the land records.

IN WITNESS WHEREOF, the parties hereto executed this Agreement, the day and year first above written.

Signed, Sealed and Delivered in
the presence of:

_____ _____

{OWNER}

_____

TOWN OF WINDSOR

_____ By _____

Its Town Engineer
Duly Authorized

_____

STATE OF CONNECTICUT)
: ss. Windsor
COUNTY OF HARTFORD)

Personally appeared {TOWN ENGINEER}, Town Engineer of the TOWN OF WINDSOR, hereunto duly authorized Signer and Sealer of the foregoing instrument and acknowledged the same to be his free act and deed and the free act and deed of said TOWN OF WINDSOR, before me.

In Witness Whereof, I hereunto set my hand and seal.

Notary Public
My Commission Expires:

STATE OF CONNECTICUT)
: ss. Windsor
COUNTY OF HARTFORD)

Personally appeared {OWNER}, {Title}, and acknowledged the same to be his free act and deed as such {Title}, and the free act and deed of said corporation before me.

In Witness Whereof, I hereunto set my hand and seal.

Notary Public
My Commission Expires:

APPENDIX D

Template Certificate of Title

CERTIFICATE OF TITLE

To: Town of Windsor
275 Broad Street
Windsor, CT 06095

From: [Name] , Esquire
[Name of law firm]
[Address of law firm]
[Town/City, State]

THIS IS TO CERTIFY that I have examined or caused to be examined the Land Records indexed in the Town of Windsor, County of Hartford and State of Connecticut, with respect to title to a certain piece of parcel of land located at [address], Windsor, Connecticut and being more particularly bounded and described on Schedule A attached hereto and incorporated herein by reference.

Said premises are subject to the following:

1. Building, building line and zoning regulations of the Town of Windsor and to any and all provisions of any ordinance, municipal regulation, public act and Inland Wetlands regulation of the Town of Windsor.

2. An inchoate lien for property taxes to the Town of Windsor on the list of October 1, [year] not yet due payable.

3. Any facts which an accurate survey or personal inspection of the premises might reveal.

4. A Stormwater Inspection & Maintenance Agreement from [name of owner] (owner of land) to the Town of Windsor dated [date] and recorded on [date] in Volume [volume], Page [page] of the Windsor Land Records.

In my opinion, the same stands in the name of [name of owner] (owner of land) free and clear of all encumbrances filed as of record appears except as above and said Stormwater Inspection & Maintenance Agreement is valid and binding upon the owner and his/her/its heirs, successors and assigns free of all mortgages and other encumbrances which could defeat its priority on the Land Records.

Date at Windsor, Connecticut this [day] day of [month], 2009

[Name of law firm]

By:_____
[Name of attorney], Esquire