Atlantic County

MODEL RESILIENCY GUIDELINES

Post-Sandy Planning Grant, Phase II

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Atlantic County Model Resiliency Guidelines

Atlantic County, New Jersey

May 2018

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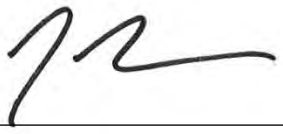

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Introduction

The purpose of this document is to provide a set of standards that municipalities can adopt in whole, or in part to improve aspects of their local zoning and land development ordinances. The main focus of these standards is on enhancing resiliency and promoting sustainability. Some of these recommendations are standards that can be inserted into existing ordinances, others are complete ordinance language that can be used to replace older standards or introduced as new ordinances.

The document includes a number of references. Some of the ordinance sections are adapted from other communities throughout the state, or are model standards that have been released for public use by other entities. The goal of gathering these model ordinances and guidelines together is to provide a source of information that is accessible to municipalities within Atlantic County. This document can provide guidance, it can provide useful language, and it can help towns keep costs down when considering changes to their zoning and land development ordinances.

The flood damage prevention model ordinance is the most stringent version currently available from NJDEP. Any community that is susceptible to the effects of coastal or riverine flooding should seriously consider adopting all or parts of that ordinance.

The Coastal Community Resiliency Guidelines provide green infrastructure standards to improve storm water management design through natural, non-structural solutions in combination with standard design options. Flood Hazard Area ordinance recommendations deal with issues such as bulk standards, the elevation of finished first floors, locating utilities and mechanical systems, and flood proofing.

No adverse impact standards require significantly more information from an applicant and specialized expertise for municipal review. These standards aim to take a holistic view of developments and their impacts on existing and future land use. No adverse impact may be appropriate in the most flood prone and at-risk portions of a community.

The bulkhead model ordinance contained in this document is a comprehensive approach to regulating the design, construction, and upkeep of bulkheads. Communities where bulkheads are necessary should review their ordinances to ensure that appropriate standards are in place. Where necessary, the model ordinance can supplement or replace existing regulations.

There are several general site plan design recommendations included in the model ordinance. These include language for parking lots and on-site circulation, building design standards, and

landscaping standards. This model language is not reserved exclusively for coastal areas and is intended to help municipalities update older land development ordinances with an eye on improving the sustainability and resiliency of new developments.

The Pinelands Commission Jurisdiction section is incorporated as a reference for municipalities and developers. Land development ordinances for the Atlantic County municipalities under Pinelands Commission jurisdiction are all in compliance with the Pinelands regulations at this time. The information here is not intended to replace or supplement that language, but rather to provide a brief informational summary and connect the Pinelands requirements to the other model language and the principles of sustainability and resiliency.

The Tree Preservation ordinance is an in-depth ordinance that would enable communities to require significant replacement of, and compensation for trees that are removed during the course of site work and construction. This ordinance requires a substantial commitment by the municipality and requires the creation of a municipal tree specialist position. There environmental benefits of having in kind replacement and financial compensation for tree removal, but they could amount to an unsustainable economic burden for development in some communities. Municipalities should consider adopting a tree preservation ordinance that incorporates tome or all of the material included here.

The Critical Area model ordinance included here provides municipalities with guidelines on how to protect sensitive environmental features. NJDEP regulations protect wetlands and regulate development in flood hazard and riparian areas, but the critical area model ordinance includes other types of sensitive features such as wooded areas and steep slopes. Towns that prioritize the protection and preservation of environmental features should consider adoption an ordinance of this nature if one is not already in place.

The following recommendations and appendices are meant to assist municipal decision makers. These are not one-size-fits-all solutions, but the standards within these documents can help municipalities update and amend their land development ordinances in a variety of ways.

Flood Damage Prevention Model Ordinance

In the wake of Superstorm Sandy, it has become increasingly critical for municipalities in coastal areas and other areas subject to flooding to adopt more stringent design standards to limit or prevent the loss of property and create a more sustainable and resilient community. NJDEP has prepared, and is consistently updating its Flood Damage Prevention Model Ordinances. The most current version, dated May 15, 2017 is included as Appendix A of this document. It is recommended that communities include the optional higher standards that are highlighted in blue. The additional, marginal expense that may be associated with development to these standards is worthwhile as it enhances resilience and reduces the impacts of flooding on individual property owners and the community as a whole.

Green Infrastructure Standards

For additional information, please see Appendix B, which includes engineering diagrams and additional details from the Green Infrastructure Guidance Manual for New Jersey.

A. Storm Water

1. Subdivisions

    a. Require retention and detention facilities based on the 24-hour, 100-year storm *(APA, PAS 584).*

    b. Prior to any site alterations in the subdivision, require the development and submittal of a stormwater control plan, stormwater operations maintenance manual, and budget *(APA, PAS 584).*

    c. Require green infrastructure and low-impact development techniques in stormwater management. Techniques appropriate for subdivision design elements include, but are not limited to, bioswales and enhanced roadside infiltration ditches *(APA, PAS 584).*

2. Stormwater design elements: Green Infrastructure such as bioretention planters, biofiltration planters, bioretention swales, hybrid bioretention planters, and stormwater trees may be implemented to leverage additional sustainability goals, including increasing park density, reducing urban heat island effect, and connecting people with greenery. (NACTO, Urban Street Stormwater Guide)

    a. Bioretention Planter: a planter with vertical walled sides that detains and infiltrates stormwater into the soil below.

    b. Biofiltration Planter: a planter with vertical walled sides and a closed bottom with and underdrain. Cell treats runoff for quality and reduces peak flow to the sewer. (NACTO, Urban Street Stormwater Guide)

    c. Bioretention Swale: designed with graded side slopes for a greater variety of plantings and infiltrating into the soil. (NACTO, Urban Street Stormwater Guide)

    d. Hybrid bioretention Planter: (NACTO, Urban Street Stormwater Guide)

    e. Stormwater Trees: planted in connected tree pits, tree trenches, or walled cells. (NACTO, Urban Street Stormwater Guide)

f. Pervious Lane: permeable pavement comprised of interlocking concrete pavers or porous asphalt/concrete that infiltrates runoff directly underneath roadway. (NACTO, Urban Street Stormwater Guide)

g. Tidal Check Values: Tide gates, flood gates, or check valves provide back-flow protection for coastal and inland community's stormwater systems. They close atomically during flooding events and can be installed in retention basins, levees, locks and dams, fish bypass systems, city stormwater collection systems, highways, parking lots, and large industrial and office complexes.

3. Owners Association Management of Infrastructure and Open Spaces:

a. Require stormwater and flood protection infrastructure to be turned over to the local government for maintenance *(APA, PAS 584).*

b. Require a reserve study from the developer to identify ongoing maintenance costs of stormwater and flood protection infrastructure with reasonable maintenance and replacement life cycles as a condition of preliminary plan or final plat approval. Ensure that maintenance and replacement life cycles incorporate projected sea-level rise *(APA, PAS 584).*

c. Require the developer, especially in a phased subdivision, to identify annual maintenance costs of stormwater and flood protection infrastructure and fund the maintenance of such facilities until the OA is established *(APA, PAS 584).*

d. Include a mechanism provided for in final platting, such as a maintenance covenant, where the local government has the ability to take over maintenance of any stormwater facility that is not being maintained by the OA and assess subdivision property owners for the cost of any such maintenance *(APA, PAS 584).*

e. Require any pond, retention basin, or other waterbody to be included on one lot where possible, or at least to be entirely contained within a single subdivision *(APA, PAS 584).*

B. Energy and Utility Resiliency Standards

1. Prohibit exemption from flood protection standards for municipally owned utilities *(APA, PAS 584).*

2. Locate utility easements outside flood hazard areas where possible *(APA, PAS 584).*

3. Adopt a definition of critical facilities that includes major utility equipment (e.g., power substations, water/wastewater pumping stations) and require that critical facilities that are utilities be located outside the 500-year floodplain *(APA, PAS 584).*

4. Require that public utility facilities that cannot be located outside the floodplain be redundant to provide service to the affected area in the event of a flood *(APA, PAS 584).*

5. Require that utility transmission lines containing toxic or flammable materials be buried to a depth at least below the calculated maximum depth of scour for a 100-year flood, especially in velocity floodplain areas (floodways and coastal V-zones) *(APA, PAS 584).*

Flood Hazard Area Ordinance Recommendations

A. Additional Considerations

1. Bulk Standards

   a. Lot Coverage: Stairs, steps, ADA-compliant ramps and related elements providing essential access to the first floor (only), where necessary to conform with BFE lowest floor requirements, should be allowed to exceed lot coverage minimums by up to 10%, especially on pre-existing, undersized lots.

   b. Height. The Base Flood Elevation (BFE) on FEMA's FIRMs and PFIRMs is a measurement of height above a fixed point in the ground, not a measurement of flood height above the level of the ground at your property. The BFEs on the FEMA's Flood Insurance Rate Maps are referenced in a vertical datum called North American Vertical Datum of 1988 (NAVD 88). To determine the height that your building must be raised above the ground, you need to subtract the elevation of the ground from the BFE.

   c. Exceptions should be adopted within local zoning for structures exceeding prescribed local height limits when elevating structures above the BFE to a recommended Design Flood Elevation (DFE). A Design Flood Elevation (DFE) is an additional freeboard above the 100-year Base Flood Elevation (BFE) for any buildings or substantial improvements on a lot *(RBDG Hoboken, 2015). Recommended Design Flood Elevations are in the table below.*

Building Type	Zone X	Zone A	Zone V
Residential Structures	+ 1 ft	+ 1 ft	+ 2 ft
Building and other structures with school or day-care facilities; and other nonessential facilities	+ 1 ft	+ 1 ft	+ 2 ft
Essential facilities	+ 1 ft	+ 2 ft	+ 3 ft
Buildings and other facilities that manufacture, process, handle, store, use or dispose of hazardous materials	+ 1 ft	+ 2 ft	+ 3 ft

Table X. Freeboard Requirements *(RBDG Hoboken, 2015).*

2. Limit uses in floodways to those tolerant of occasional flooding, including but not limited to agriculture, outdoor recreation, and natural resources (AC MitPlan, 2016).

3. Identify and document repetitively flooded properties. Explore mitigation opportunities for repetitively flooded properties, and if necessary, carry out acquisition, relocation, elevation, and flood-proofing measures to protect these properties *(AC MitPlan, 2016).*

4. Prohibit fill to create building sites *(APA, PAS 584).*

5. Any enclosure that is below the DFE, but above grade must be fitted with adequate flood openings *(RBDG Hoboken, 2015).*

6. Uses permitted below the Design Flood Elevation (DFE)
   a. Residential Units below the DFE
      i. New residential units are not permitted below the DFE *(RBDG Hoboken, 2015)*.
      ii. An existing residential unit below DFE may remain in place if the total work

done in the unit and/or the building is not a substantial improvement *(RBDG Hoboken, 2015)*.

iii. If substantial improvements are to be made, the unit must be relocated or eliminated *(RBDG Hoboken, 2015)*.

b. Commercial Uses below the DFE

i. Commercial buildings or mixed-use buildings may have dry floodproofed non-residential uses such as offices or retail units below the DFE *(RBDG Hoboken, 2015)*.

ii. Commercial uses below the DFE must be dry floodproofed *(RBDG Hoboken, 2015)*.

iii. A floodproofed building or unit must provide a FEMA Floodproofing Certificate certified by a licensed engineer *(RBDG Hoboken, 2015)*.

c. Other Acceptable Uses

i. Building access, lobbies and emergency hallways;

ii. Storage;

iii. Parking (where permitted), driveways, and loading docks; and,

iv. Non-residential uses that are floodproofed *(RBDG Hoboken, 2015)*.

7. Floodproofing

a. Wet Floodproofing and Flood Openings Standards

i. Flood openings must allow automatic inflow and outflow of water to minimize pressure on walls and must also allow water levels within the enclosure to rise and fall at the same rate as those outside *(RBDG Hoboken, 2015)*.

ii. Number of openings must be engineered for the amount of enclosed space. The number may vary based on the type of vent, but a general rule of thumb would be 1 square inch of vent area to 1 square foot of enclosed floor area *(RBDG Hoboken, 2015)*.

iii. Vents must be located on at least two sides of the enclosed area *(RBDG Hoboken, 2015)*.

iv. The bottom of each vent opening may not be located more than 12 inches above the interior floor or the exterior grade immediately below the opening, whichever is higher *(RBDG Hoboken, 2015)*.

v. Screens, grates, grills or other covers or devices must be freemoving and must not resist or impede automatic flow of floodwater *(RBDG Hoboken,*

2015).

vi. All wet floodproofed areas must use materials designed to withstand contact with floodwaters *(RBDG Hoboken, 2015)*

b. Dry Floodproofing Standards

i. Can only be used for non-residential buildings or for commercial uses in mixed-use buildings in "A" or "AE" zones *(RBDG Hoboken, 2015)*.

ii. Dry floodproofing measures are not permitted in the "V" zone *(RBDG Hoboken, 2015)*.

iii. All buildings that use dry floodproofing must provide the required FEMA Floodproofing Certificate *(RBDG Hoboken, 2015)*.

iv. Where possible, use automatic or "passive" floodproofing measures. Measures that require human intervention before an event may result in higher insurance premiums *(RBDG Hoboken, 2015)*.

8. Foundation Design

a) Use pilings and footings in solid perimeter foundation design. *(RBDG Hoboken, 2015)*

b) Do not use fill to raise the ground level *(RBDG Hoboken, 2015).*

c) Any enclosure that is below the DFE, but above grade must be fitted with adequate flood openings *(RBDG Hoboken, 2015).*

d) The floor of any cellar or crawl space that is below grade on all four (4) sides should be raised to match or exceed the height of the lowest adjacent grade next to the building. When a building is substantially improved, this is required. On new construction in the SFHA, building below grade is not permitted *(RBDG Hoboken, 2015).*

B. Mechanical Systems and Utilities

1. Requirements

a) All new or replacement utility connections must be located at or above the Design Flood Elevation *(RBDG Hoboken, 2015).*

b) All new mechanical equipment must also be located above DFE *(RBDG Hoboken, 2015).*

2. Recommendations for Existing Systems

a) Relocate

i. Move external equipment to the roof *(RBDG Hoboken, 2015).*

ii. Relocate internal equipment to higher floors *(RBDG Hoboken, 2015).*

iii. Build an additional equipment room above DFE *(RBDG Hoboken, 2015).*

iv. Replace multi-unit systems with smaller on-demand systems within individual units *(RBDG Hoboken, 2015).*

v. Remove fuel tanks if heating systems are replaced with a natural gas system *(RBDG Hoboken, 2015).*

vi. Consider clearance and venting requirements before relocating *(RBDG Hoboken, 2015).*

b) Elevate

i. In areas below the DFE, raise internal equipment as high as possible *(RBDG Hoboken, 2015).*

ii. Place external equipment on platforms above the DFE *(RBDG Hoboken, 2015).*

iii. Equipment must be anchored against wind *(RBDG Hoboken, 2015).*

c) Floodproof

i. Mechanical equipment in non-residential buildings MAY be located inside barriers that are designed to resist flood loads and keep floodwaters away from the equipment. In new construction, however, elevation of mechanical equipment provides a higher level of protection and is preferable *(RBDG Hoboken, 2015).*

d) Electrical

i. When replacing electrical wiring in areas below DFE, wires should run down from the ceiling, instead of along the floor, and outlets should be elevated above the DFE *(RBDG Hoboken, 2015).*

ii. Any wiring installed below the DFE must be water-resistant and comply with the National Electric Code *(RBDG Hoboken, 2015).*

iii. All new electric meters and panels must be relocated above the DFE

(RBDG Hoboken, 2015).

iv. Use conduits mounted on walls, which will be easier to replace after flooding *(RBDG Hoboken, 2015).*

v. Where permitted, place electric equipment such as disconnects, panels, switch gear, and transformers above the DFE. Make sure they are accessible by stairs and a work platform if higher than 65 inches above the ground or floor *(RBDG Hoboken, 2015).*

vi. Branch circuits and secondary electrical components vulnerable to flooding can be isolated from the building's electrical system to allow power to be safely restored. All work must comply with the National Electric Code *(RBDG Hoboken, 2015).*

e) Elevators & Lifts

i. Elevators and lifts may access areas below DFE, but motors, elevator controls, and hydraulic pumps must be located above the DFE *(RBDG Hoboken, 2015).*

ii. Cabs and shafts should be designed to resist flood loads and constructed of flood damage-resistant materials *(RBDG Hoboken, 2015).*

iii. Use float switches to avoid sending cabs to areas below the DFE during a flood.

iv. Refer to *FEMA's Technical Bulletin 4: Elevator Installation for Buildings Located in Special Flood Hazard Areas* in accordance with the National Flood Insurance Program for additional technical guidance *(RBDG Hoboken, 2015).*

f) Heating and Cooling Equipment

i. Electrical service is only permitted below the DFE to meet life safety and electrical code requirements *(RBDG Hoboken, 2015).*

ii. Furnaces, water heaters and other equipment can be protected by floodproof gates in non-residential buildings, but elevating equipment above the DFE offers the surest protection from flood damage *(RBDG Hoboken, 2015).*

iii. Vents and fill inlets on all mechanical equipment should be elevated above the DFE or protected against infiltration of floodwater *(RBDG Hoboken,*

2015).

iv. Underground Storage Tanks must be properly anchored or removed since submerged tanks can collapse or be dislodged *(RBDG Hoboken, 2015).*

v. For existing buildings, consider converting to natural gas *(RBDG Hoboken, 2015)*.

g) Water and Sewer Pipes

i. Utility pipes and lines that come from the ground must be installed to prevent the entry of floodwaters *(RBDG Hoboken, 2015)*.

ii. Backflow prevention valves should be added to sewer lines and floor drains to minimize stormwater and sewage flowing into buildings *(RBDG Hoboken, 2015)*.

iii. The City requires installation of backflow valves when new sewer lines are installed or existing lines are replaced *(RBDG Hoboken, 2015)*.

iv. In areas expected to have waves and debris, pipes and lines should be attached to the inland side of a foundation element or placed in conduit that will resist impacts *(RBDG Hoboken, 2015)*.

h) Duplicate Power Sources

i. Back-up power such as natural gas generators or battery back-ups should be used to provide power to life safety equipment, alarms, or emergency lighting *(RBDG Hoboken, 2015)*.

ii. Install generator-ready hookups for quick-connections after floodwater recedes *(RBDG Hoboken, 2015)*.

Yard Area Standards in Flood Hazard Areas

Purpose:

The purpose of providing alternative setback standards for principal and accessory structures, as well as projections and encroachments is to provide relief for structures that are required to have a finished first floor elevated above base flood elevation, and to offer flexibility for minimizing impacts on sensitive environmental areas.

A. Projections and encroachments. Yards and courts required by this article shall be free of buildings, structures or parts thereof, except permitted accessory structures, and no building or structure shall project into any front, side or rear yard required by this article, nor shall use be made of such yard, except as follows:
   (1) Windowsills, cornices, bay windows and other architectural window treatments may project into the front, rear or larger side yard by no more than two feet, provided that the sum of all projections on any building facade, combined with any projected features from Subsection (2) below shall not exceed 15% of the total area of that facade.
   (2) Chimneys and fireplaces may project into a rear or side yard by not more than two feet; provided, however, that no projection shall be permitted into a side yard of less than seven feet. The sum of all projections on any building facade by chimneys and flues combined with projected features from Subsection (1) above shall not exceed 15% of the total area of that facade.
   (3) The sum of all projections from Subsection (1) and (2) above shall not exceed 10% of the total area of all building facades.
   (4) Stairs, canopies and awnings.
      (a) Projections by stairs to the first floor (only) where not required pursuant to Subsection (4)(b) below, canopies, and fixed or operational awnings shall be limited to five feet, but in the front yard they may not extend closer than two feet to the front property line.
      (b) Stairs, steps, ADA-compliant ramps and related elements providing access to the first floor (only), where necessary to conform with BFE lowest floor requirements, may project into any setback, up to but in no case beyond the property line.
   (5) Balconies, single-story porches, second-story porches and decks of any kind must meet the principal building setback standards, as set forth in [Schedule], under "Minimum front yard," except that stairs, steps, ADA-compliant ramps and related

elements providing access to the first floor (only), where necessary to conform with BFE lowest floor requirements, may project into a yard in accordance with Subsection (4) herein.

(6) Wheelchair ramps shall not be subject to any yard requirements.

(7) There shall be no outdoor stairs providing access to second stories in single-family zones, except that for all bay front, canal front, lagoon front, and beach front lots, projections by stairs are permitted only on the water side to extend to the second-floor level, but not above.

(8) Decorative masonry foundation walls up to the finished first floor and projecting no more than four inches.

(9) Roofs may project beyond a building wall, provided no part of any roof shall be closer than three feet to any property line; this includes the overhang plus any associated leaders, gutters or other attachments.

No Adverse Impact Standards

Notes: Mandating no adverse impact standards is a bold step that a community can take. These standards place a significant cost burden on applicants and require thorough professional review. The standards may be beneficial for communities that suffer significant repetitive losses, and may be best applied to developments over a certain size, disturbance, or impervious cover threshold. The municipality and its reviewing boards must be prepared and equipped to conduct the necessary reviews.

Purpose: No Adverse Impact floodplain management considers the impacts of a development proposal on properties adjacent to the project as well as upstream and downstream of a project. The purpose of this assessment is to ensure that development on one property does not have a negative impact on the rights of other property owners, or the community as a whole. The goal is to take a comprehensive view of development and floodplain management. Additional information is required as part of the development proposal, for which a submission checklist should be prepared. A thorough review of all application materials must be undertaken by Board professionals, municipal engineers, floodplain administrators, and any other designated administrative officer.

A. After examination of the National Flood Insurance Program standards for floodplain development, the [INSERT MUNICIPALITY / GOVERNING BODY] has made the judgment that due to its geographic location, topography and the extensive [riverine/coastal] floodplain systems within its jurisdiction that the minimum standards of the National Flood Insurance Program are not wholly sufficient to protect its citizens and their properties from the effects of flooding, especially in situations where flooding possibly could be exacerbated by development that would otherwise be allowable under the minimum standards of the National Flood Insurance Program, and that additional protections must be employed to protect the lives and property within the jurisdiction of the [MUNICIPALITY].

B. No structure or land shall be located, extended, converted, altered, or developed in any way within the special flood hazard area, nor shall any development permit be issued except as otherwise provided in this chapter, until the [BOARD] makes a determination that the project would not increase danger to life or property and would have no adverse impact based upon the affirmative findings that:

1. The granting of the development permit will not create a danger that fill, construction materials or other debris or construction spoils may be swept onto properties upstream from, downstream from, or adjacent to the project area, or increase erosion and sedimentation; and
2. The granting of the development permit will result in no rise in the base flood elevation as defined by [this chapter]; and
3. The granting of the development permit will not result in increased flood peaks, increased flood stages, or increased flood velocities during the base flood discharge; and
4. The granting of the development permit will not increase or alter the width or extent of the floodway or special flood hazard area except within the property or properties upon which the development is located or the property of a consenting owner, where such property is protected from future development by means of a conservation easement or other, similar restriction that is acceptable to the [Board/administrative agent]; and
5. The granting of the development permit will not increase the susceptibility of any property to flooding during the base flood except the property or properties upon which the development is located or the property of a consenting owner, where such property is protected from future development by means of a conservation easement or other, similar restriction that is acceptable to the [board/administrative agent]; and
6. The granting of the development permit will not increase the susceptibility of existing or proposed structure to flooding during the base flood; and
7. The granting of the development permit will not detrimentally impact the functionality or level of service of any street, bridge or culvert, or public utility during the base flood; and
8. The granting of the development permit will not reduce the effective base flood storage volume of the floodplain; [and]
9. The granting of the development permit will not increase the susceptibility of any critical facility to flooding, nor detrimentally impact access thereto during the base flood; and
10. The granting of the development permit will not otherwise increase the probability of flooding or property damage and thereby create a danger to life and property,

or otherwise create conditions that are injurious to the public health, safety, and welfare, or detrimental to the value of adjoining property and associated uses; and

11. The use, structure, or other activity that is the subject of the development permit will comply with all other requirements and specifications of [municipal zoning / land development ordinance / code].

C. The burden of proof shall lie with the applicant, who shall be required to present evidence to substantiate any affirmative finding. The administrator shall maintain records containing specific evidence to substantiate any affirmative finding.

D. In order to evaluate development proposals in the context of the required findings, the following, minimum information is required at the time of application for development permit:

1. A narrative, written in non-technical language, which explains how no adverse impact is being accomplished with respect to the proposed project.
2. No rise certification documentation by a professional engineer is required to show that proposed encroachment into the special flood hazard area will cause no rise in the water surface elevation of the 100-year base flood as defined in [this chapter].
3. No adverse impact certification documentation by a professional engineer is required to show that the proposed encroachment into the special flood hazard area will create no adverse impact upon any other property owner.
4. Other information as may be required by the [Board / administrative agent] in order to evaluate the proposed floodplain development permit in the context of the required findings that are set forth in subsection 34-33(b), above.
5. All data and conclusions shall be demonstrated using the most current hydraulic and hydrological models employed by the Federal Emergency Management Agency (hereafter, FEMA), NJDEP or other best available data, for the purposes of flood risk assessment and mapping. If there is no model available for the basin or watercourse affected by proposed development, a full hydraulic and hydrological model shall be developed by a professional engineer and approved by the [board / administrative agent] and/or FEMA/NJDEP as appropriate.
6. Hydraulic and hydrologic conditions shall be evaluated within the project area, as

well as upstream and downstream of the project area along the channel to the point where water surface profiles consistently meet the existing conditions as defined in the effective model. The [board / administrative agent] shall have the authority to determine the reach and scope of any hydraulic and hydrologic evaluation.

7. The developer or property owner of any development project that causes an increase in the base flood elevation or a change in the geographic extent of the special flood hazard area or floodway shall be responsible for revisions to the flood insurance rate maps, which shall be approved by FEMA, in accordance with 44 CFR 70. The developer or property owner shall be responsible for preparing and recording appropriate legal documents in which all property owners affected by the increased flood elevations or change to the geographic extent of the special flood hazard area or floodway have consented to the impacts upon their property, including development restrictions approved by the [board]. A letter of map revision (LOMR) must be obtained and new flood insurance rate maps produced and presented to the [administrative agent] within six months of completion of the proposed encroachment. The applicant shall enter into a written agreement with the city and provide financial security that is sufficient to cover all costs associated with completion of the LOMR and FIRMs. Such agreement and security shall be provided in accordance with the improvement guarantee requirements and procedures which are set forth in [applicable chapter of municipal code].

Utility Line Placement in Flood Hazard Areas

Purpose: The purpose of providing enhanced standards for utility lines in flood hazard areas is to ensure that critical infrastructure is properly designed and protected from environmental hazards.

A. Utility Line Placement

1. All new utility connections shall be provided underground and buried to a depth of at least one foot greater than the calculated maximum depth of scour for a flood of 100-year frequency.
2. Suspended utility transmission lines shall be designed such that the lowest point of the suspended line is at least six (6) feet higher than the elevation of the flood of 100-year frequency;
3. Towers and other appurtenant structures shall be designed and placed to withstand and offer minimal obstruction to flood flows; and
4. Utility transmission lines that do not carry toxic or flammable materials shall be buried to a depth of at least one foot greater than the calculated maximum depth of scour for a flood of 100-year frequency. The maximum depth of scour shall be determined from any of the accepted hydraulic engineering methods, but final calculated figures shall be subject to approval by the [Board and the Floodplain Administrator/Manager].
5. Utility transmission lines carrying toxic or flammable materials shall be buried to a depth of at least twice the calculated maximum depth of scour for a flood of 100-year frequency. The maximum depth of scour shall be determined from any of the accepted hydraulic engineering methods, but final calculated figures shall be subject to approval by the [Board and the Floodplain Administrator/Manager].

Bulkhead Model Ordinance

§XX CONSTRUCTION OF MARINE BULKHEADS.

§XX-1 Definitions.

Erosion shall mean the wearing away of natural (earth) and unnatural (embankment, slope, protection, structure, etc.) surfaces by the action of natural forces, particularly moving water and materials carried by it.

Lagoon shall mean any man-made or man-improved body of water.

Marine Bulkhead shall mean any bulkhead or retaining wall which retains earth (or other material) on one side and is exposed to water in a lagoon or other body of water along all or part of any of its boundary lines.

Marine Bulkhead Construction shall mean new construction, reconstruction, alteration, extension or repair to the bulkhead.

Revetment shall mean bank protection to prevent erosion.

Riprap (or rip rap) shall mean rock or boulders, 6" or greater in diameter, used to armor shorelines, streambeds, bridge abutments, pilings and other shoreline structures against scour and water or ice erosion.

Waterfront Lot shall mean any lot which has a lagoon or other body of water along all or part of any of its boundary lines.

§XX-2 Building Permit Required.

a. No marine bulkhead construction and no fill shall be placed on any waterfront lot without being certified by a Professional Engineer and obtaining a building permit for such construction to the bulkhead, from the [municipal construction office]

§XX-3 Bulkhead Required for new construction.

a. No building permit shall be issued for the construction of any principal structure on a waterfront lot until a Professional Engineer certification has been obtained, certifying that the existing bulkhead is acceptable and there is no need for marine bulkhead construction on the lot. If the existing bulkhead is unacceptable or if construction of a bulkhead is necessary, a building permit for construction of the bulkhead shall be obtained on such lot. The application for the building permit to construct the bulkhead may be made simultaneously with the application for the building permit for the

construction of the principal structure.

b. All development on waterfront lots shall provide bulkhead or bank stabilization in accordance with the New Jersey Department of Environmental Protection.

c. New marine bulkheads must utilize vinyl sheeting, whereas re-sheathing an existing wood bulkhead with wood sheets is permitted.

d. Where bulkhead is not permissible by the New Jersey Department of Environmental Protection, and rip-rap is used instead for erosion control and for shoreline protection, the rip-rap should be maintained as per all applicable requirements at all times.

§XX-4 Permit Applications.

a. Application for Permits:

i. Applications for a bulkhead permit shall be submitted to the [municipal Construction Office] and shall be accompanied by fees established by the [municipality].

ii. All new, altered, replacement, or reconstructed marine bulkheads in the [municipality] shall be designed by a Professional Engineer licensed to practice in the State of New Jersey.

iii. Applications shall be accompanied by four (4) sets of signed and sealed plans and

specifications, showing the size, shape, configuration, materials, dimensions, soil profile and location of the bulkhead(s), including existing and proposed bulkheads.

iv. All plans shall be based upon an accurate, current survey, within five (5) years of the application date, of the premises prepared by a Professional Surveyor licensed to practice in the State of New Jersey.

v. Applications shall be accompanied by fees as established by the [municipal council].

vi. Applications shall be accompanied by copies of permits from the New Jersey Department of Environmental Protection regarding the proposed bulkhead.

b. Permit approvals:

i. The [municipal] Engineer shall review the application and plans and grant or

deny the application within twenty (20) business days upon receipt of a complete application.

ii. The review by the [municipal] Engineer shall be in conformance with this Chapter, consistent with the standards contained herein.

iii. No building permit shall be issued by the Construction Official until he has received such plans marked "approved by the [municipal engineer]."

§XX-5 Inspections Prior to Issuance of Certificate of Occupancy for new construction.

Prior to the issuance of a certificate of occupancy for a building on a waterfront lot, the Construction Official shall inspect and approve the installed bulkhead with particular reference to conformance with the plans approved and with the standards of materials set forth below.

§XX-6 Standards for Marine Bulkhead Construction.

All marine bulkheads shall conform to the following standards:

a. The design engineer shall certify on the plan the type of water (i.e., freshwater or saltwater) to which the exposed side of the marine bulkhead will be exposed.

b. The design engineer is responsible for obtaining a soil sample from behind the wall (land side of wall). This soil profile shall be provided on the plans indicating the description, analysis and conditions of soils, at a minimum depth of the proposed pile of the bulkhead.

c. The design engineer shall provide a soil analysis in front of the wall (water side) indicating water depth in front of the wall, depth of mud line, depth of firm bottom and the allowance for future dredging, if needed.

d. All marine bulkhead designs shall take into account the following minimum factors:

i. Soil analysis and conditions in front of the wall

ii. Soil analysis and conditions behind the wall

iii. Water depth in front of the wall (to mud line and to firm bottom, with allowance for future dredging, if needed)

iv. Tide fluctuations

v. Sheet pile and face pile (if used) embedment depth

vi. Sheet pile and face pile (if used) exposed length above bottom of lagoon and

above water

vii. Sheet pile anchorage conditions behind wall.

viii. Currents, scour, and wave action potential

ix. Use of the wall and land behind the wall (boat anchorage, davit attachments, special loading, driveways, buildings, surcharges, decks, swimming pools, etc.)

x. Drainage behind the wall

xi. Wall backfill materials

xii. Slope behind the wall

xiii. Type and strength of materials used in the wall

e. All marine bulkheads shall be generally of the deep-water, anchored (or "navy") type, unless otherwise approved by the [municipal Engineer], which typically consist of the following elements:

i. Face piles (tapered, round piles seaward of all other bulkhead components).

ii. Sheet piles (sheathing).

iii. Walers (horizontal beams between face piles and sheet piles)

a) One at the top of the wall.

b) One at or right above low tide (if needed for design conditions).

c) Intermediate (if needed for design conditions).

d) Maximum spacing of 4' between walers.

iv. Anchor systems will be either :

a) Steel tie rods with ogee washers and nuts, through the face piles and sheet piles, and tied into dead men, drag, and/or anchor piling, or

b) Helical anchoring system through the face piles and sheet piles.

c) Helical anchor systems will be designed by a professional engineer in the State of NJ and a certification will be required after construction that the helical anchoring system has been constructed per the plans and specifications.

v. Key logs, dead men, drag, and/or anchor piles for tie rod anchorage.

vi. Wall caps.

f. Piles and wales shall be pressure-treated in accordance with all regulations. Anchor piles and anchor logs may be untreated local oak or pine timbers. However, anchor piles and anchor logs are to be treated if any portion is to be constructed above mean low water.

g. Sheet piling shall be tongue and groove.

h. Only clean fill shall be used for fill behind or on the landward side of the bulkhead.

i. All hardware used in the construction of bulkheads shall be new, unused and galvanized or stainless steel. All such hardware shall be to the dimensions shown in the respective designs as submitted to and approved by the [municipality].

j. All bulkheads shall be erected true to lines and grades shown in the application for the building permit and shall be properly backfilled so they will remain firm and in place. Minor modifications shall be permitted when required by the NJDEP due to field conditions.

k. Pilings are to be spaced a maximum of eight (8) feet apart on center, and driven a minimum of 8' into solid bottom, or greater if determined by the design engineer.

l. Sheets will be driven a minimum of 5' into solid bottom, or greater if determined by the design engineer.

m. All bulkheads shall be constructed to tie into existing bulkheads on either or both sides, if any exist, or shall be constructed with returns (at 90 degrees to the main bulkhead) into the protected property, to prevent flanking of the main bulkhead.

n. According to New Jersey Department of Environmental Protection (NJDEP) swimming pools shall be set back 15 feet. If a swimming pool is setback closer than 15 feet an NJDEP permit is required. In any instance where a pool is to be installed adjacent to a bulkhead, a Professional Engineering certification is required stating that the pool will not have a negative effect on the bulkhead.

o. The contractor shall not cut or alter any bulkhead tie rods or auger piles to accommodate the construction of an in-ground pool.

p. Decking or structures shall not be constructed on top of the bulkhead or attached to the bulkhead.

q. Decking or structures shall not be cantilevered over the bulkhead.

r. The bulkhead height must be reviewed by the [municipal Engineer] for conformance on a case-by-case basis.

s. New bulkheads will replace existing bulkheads and shall not be constructed waterward of the existing bulkhead except as permitted by the New Jersey Department of Environmental Protection, and shall be in line with and tie into any adjacent legally constructed bulkheads, except as otherwise permitted or required by the New Jersey Department of Environmental Protection.

t. If the requirements of New Jersey Department of Environmental Protection do not permit any of these standards, then New Jersey Department of Environmental Protection determination shall govern.

§XX-7 Minimum Material Standards.

All materials, preservatives, and components incorporated into bulkheads constructed within the [municipality] shall conform and be maintained in accordance with the following requirements:

a. Wood

i. Material

All wood used in marine bulkhead construction shall be Southern Pine (or a wood of equivalent strength and durability approved by the [Municipal Engineer]), and graded by a recognized lumber grading agency, meeting the following minimum standards:

a) Round piles: ASTM D 25 8" tip diameter, natural taper, spaced a maximum of 8' center, and driven a minimum of 8' into solid bottom, or greater if determined by the design engineer.

b) Square or sawn piling: not permitted

c) Walers: Marine Framing Grade No.2, minimum 6" x 6".

d) Stringer, decking, handrail and wall caps: No.1

e) Anchor piles: ASTM D 25, minimum 8" tip diameter, natural taper, and length and depth as determined by the design engineer.

f) Key logs: minimum 6" x 8" or 8" diameter and 16' long, continuous for the

entire length of the bulkhead with 4' overlaps.

ii. Preservative

All wood used in bulkhead construction shall be pressure-treated in accordance with the following specifications:

a) Round piles: saltwater 2.5 CCA, AWPAO&C18

b) Walers: saltwater 2.5 CCA, AWPAC2&C18

c) Sheet piles: saltwater 2.5 CCA, AWPA C2 & C18

d) Wallcaps: 0.25 CCA

iii. If required, wood shall be wrapped utilizing New Jersey Department of Environmental Protection approved materials.

b. Vinyl

i. Vinyl used in bulkhead shall be extruded from rigid impact modified, weatherable, UV resistant, polyvinyl chloride (PVC)Such PVC shall meet the minimum requirements of ASTM D4216 for cell classification, current edition, and shall be rated by the manufacturer to resist rot, decay, marine borer, termite, and ultraviolet deterioration on a pro-rated basis for a minimum of fifty (50) years from the date of installation.

ii. All vinyl materials shall be installed in strict accordance with the specifications, recommendations, and installation instructions of the vinyl sheet pile manufacturer.

c. Steel

i. Galvanized steel (or Stainless Steel)

a. All tie rods shall be ASTM A-36 steel, 3/4" minimum diameter, hot-dipped galvanized steel, per ASTM A-153 with 2.0 ounces of zinc per square foot, with matching hexagonal nuts (ASTM A-307) and cast iron ogee washers (ASTM A-47).

b. All bolts shall be 5/8" mm1mum diameter, hot-forged bolts, with hexagonal heads (ASTM A-307), with matching hexagonal nuts and washers.

c. All hardware (including plates and turnbuckles) shall be of the same materials and protective coatings as the tie rods.

d. Stainless steel: if stainless steel is used for tie rods or hardware, it shall be 300 series stainless steel, with matching hexagonal nuts and washers.

§XX-8 Minimum Installation Standards.

a. All wood materials shall be installed in strict accordance with the specifications, recommendations, and installation instructions of the Southern Pine Council (SPC) as contained in the current edition of the SPC Marine Construction Manual.

b. All materials shall be installed in strict accordance with the specifications, recommendations, and installation instructions as per the design plans.

c. A design professional shall provide to the Municipal Floodplain Manager and the Construction Official a certification indicating that the particular type, length, thickness and shape of bulkhead and the type of support and anchoring system is adequate and appropriate for the loads and conditions anticipated at the site and that all materials have been constructed per the approved specifications and design plans and/or copies of the material delivery tickets from the contractors shall be provided indicating all materials and quantities of the piles, sheeting and anchoring system per the approved specifications and plans.

§XX-9 Fees.

Prior to the issuance of any permit for constructing the bulkheads, a fee of [XXX.XX dollars] shall be collected to cover the flood review. In addition to this fee, the township permit fee and inspection fees will be determined by the Construction Subcode Official and will also be collected at the time of review.

§XX-10 Notification of Commencement of Construction.

a. No Marine Bulkhead construction shall commence before and unless a permit for construction has been obtained in accordance with the requirements of this Chapter.

b. The permittee shall notify the [Municipal Construction Officer] at least two (2) business days before construction is to commence or recommence on any Marine Bulkhead for which a permit has been issued.

c. Any work performed without notification to the [Municipal Construction Officer] is

subject to removal by and at the cost and expense of the permittee.

d. The [Municipal Construction Officer] may make periodic visits to the job site to verify that the work is proceeding in accordance with permit requirements.

e. The permittee and the contractor shall provide safe and adequate access to the site of the work for the [Municipal Construction Officer] for purposes of making the required inspections.

f. After construction of the bulkhead, the professional engineer shall provide to the Municipal Flood Plain Manager and/or the Construction Official a certification indicating that the particular type, length, thickness and shape of bulkhead and the type of support and anchoring system is adequate and appropriate for the loads and conditions anticipated at the site, that all materials have been constructed per the approved specifications and installed per the approved design plans.

§XX Maintenance of Bulkheads and Waterfront Lots

§XX-1 Maintenance of bulkheads and waterfront lots; duty to repair

a. Statutory Authorization. The Legislature of the State of New Jersey has in N.J.S.A. 40:68-4 entitled, "Ordinances relating to waterfronts," delegated the responsibility to local government units to adopt and promulgate rules and regulations for waterfront properties.

b. All private bulkheads and waterfront lots within the [municipality] shall be maintained so that they shall not pose a danger to the health, safety, or welfare of citizens of the [Municipality].

c. All bulkheads and water front lots shall be kept in a state of repair which will prevent erosion or damage to abutting, adjacent, or adjoining properties, or the lagoon on which it fronts.

d. Whenever a bulkhead on a waterfront lot has deteriorated to such a degree that it poses a danger to the property, or the abutting, adjacent, or adjoining properties, or to the lagoon on which its fronts, the owner shall be required to make the necessary repairs to correct such conditions.

e. The [Municipal Code Enforcement Officer and/or Flood Plain Manager] are hereby appointed to administer and implement the maintenance requirements of bulkheads on

waterfront lots.

f. The [Municipal Code Enforcement Officer and/or Flood Plain Manager] may:

i. Perform visual inspections of bulkheads as per resident complaints, at the time of property sale and/or issuance of a Certificate of Occupancy, and/or at the time of repairs to the structure on the property

ii. document any form of degradation as follows:

a. Members, which are missing, bowed, bent, leaning, leaking.

b. Holes in the sheet piles.

c. Evidence of settlement or sinkholes in the ground landward of the bulkhead.

d. Evidence of Bulkhead backfill deposited in the lagoon seaward of the bulkhead.

e. Other indications that it is structurally unsound or unsafe.

f. Evidence of any soil loss or damage to any adjoining property or adjoining structures.

iii. Advise permittee when additional local, Federal or State permits may be required.

iii. Maintain written reports or maintenance records for each property inspected. Records shall be kept on file for FEMA inspection.

iv. Maintain all records pertaining to the administration of this subsection and make these records available for inspection.

v. Service any notice of violation, issue stop-work orders, revoke permits and take corrective actions as required to enforce these requirements.

g. [[Municipal Code Enforcement Officer and/or Flood Plain Manager] Procedures.

i. Inspection of Bulkheads. Prior to selling or renting any building on a bulkheaded property, the [[Municipal Code Enforcement Officer and/or Flood Plain Manager may make as many inspections of the property in question as may be necessary to ensure that all provisions of this subsection are fully administered. In exercising this power, the [Municipal Code Enforcement Officer and/or Flood Plain

Manager has a right, upon presentation of proper credentials, to enter on any premises within the territorial jurisdiction at any reasonable hour for the purposes of inspection or other action of enforcement that may be required.

ii. Rejection of Permits. The [[Municipal Code Enforcement Officer and/or Flood Plain Manager may reject an application for certificate of compliance by notifying the applicant in writing, stating the reason for the rejection. Applications may be rejected for refusal or failure to comply with any requirement of this subsection, local, State or Federal laws; or for false statements or misrepresentations made in attempting to secure a certificate of compliance. Any certification mistakenly issued in violation of an applicable State or local law may be revoked.

iii. Determination for Remediation. When the [Municipal Code Enforcement Officer and/or Flood Plain Manager] determines that remediation of a bulkhead is required; it shall be his duty to notify the owner of the property. The owner or occupant shall remedy any defect. Subsequent to remediation, the owner shall reapply for an inspection prior to the issuance of a certificate of compliance as promulgated herein. The re-inspection fee shall be applicable as specified with [section xxx of the municipal code].

iv. Appeal. Any owner who has received an order to take corrective action may appeal from the order to the Zoning Board of Adjustment by giving notice of appeal in writing in conformance with [section xxx of the municipal code]. In the absence of an appeal, the order shall be final. The Board shall hear an appeal within a reasonable time and may affirm, modify and affirm or revoke the order.

v. Failure to Comply with Order. If the owner of the property fails to comply with an order to take corrective action from which no appeal has been taken, or fails to comply with an order of the Board following an appeal, he shall be guilty of a misdemeanor and shall be punishable at the discretion of the Court in conformance with subsection [xxx"Violations of Penalties" of this Code].

h. When notified by the [Municipal Code Enforcement Officer and/or Flood Plain Manager] of a deteriorated bulkhead, a property owner shall submit a plan, along with a notarized letter or Attorney letter, indicating the plan of corrective action to the [municipality] no later than 30 days from the receipt of the notice.

i. Upon approval of the plan of corrective action by the [municipal Engineer], the property owner shall complete all necessary repairs within 120 days.

j. When a property is sold, part of the Certificate of Occupancy inspection will include the bulkhead. If the bulkhead has deteriorated, it will be the responsibility of the buyer to submit a plan, along with a notarized letter or Attorney letter, indicating the plan of corrective action to the [municipality] no later than 30 days from the receipt of the notice. At this point a Certificate of Occupancy will be issued and the owner must complete all necessary repairs within 120 days.

k. If permits are required from State or Federal Government Agencies, such permits shall be immediately applied for upon receipt of the [municipal] approval.

l. In the event the property owner fails to submit a corrective action plan, or fails to implement such plan following approval by the [municipality], he shall be liable for the penalties and violations contained herein.

i. If any of the specific time periods as set forth in sections E and F expire or are not extended with the consent of the [municipality], Code Enforcement shall issue a 10 day notice of violation.

ii. After the expiration of the 10 day notice of violation, Code Enforcement shall issue violations of this section with the [Municipal Court].

m. Maintenance requirements also apply to bank slopes, rip-rap, revetments, sod vegetation, or other types of bank stabilization on waterfront lots within the [municipality].

§XX-2 Final Inspection

a. The permittee shall notify the [Municipal Construction Officer] of the completion of the work done under the permit issued.

b. The [Municipal Construction Officer] shall, within 5 business days of the notification, make an inspection of the completed work to determine if it conforms to the approved plans issued with the permit.

c. If it is in conformance, the permittee will be so advised, and the permit file shall be marked as "completed".

d. If it is not in conformance, the permittee will be so advised, and will be provided with a list of specific deficiencies requiring correction. The permittee shall then advise the [Municipal Construction Officer] when corrections have been made, and a re-inspection

will be made.

§XX-3 Utilities

a. It is the responsibility of the permittee to protect all existing utilities at the bulkhead site.

b. The permittee shall obtain current utility mark-out from all applicable utilities prior to commencement of construction.

§XX-4 Nonapplicability.

This section shall not apply to any valid building permits issued and outstanding prior to the effective date hereof.

Parking and Circulation

A. Parking

1. Surface Parking
    a. Parking design standards that generally reduce impervious area *(APA, PAS 584).*
        i. Reduce overall imperviousness associated with parking lots by providing compact car spaces, minimizing stall dimensions, incorporating efficient parking lanes, and using pervious materials in the spillover parking areas where possible.
        ii. Encourage shared parking between compatible users.
2. Structured Parking
    a. All garages below the DFE must be wet floodproofed *(RBDG Hoboken, 2015)*.
    b. Use dry floodproofed commercial spaces to envelope parking in new buildings to protect the streetscape *(RBDG Hoboken, 2015)*.
    c. For all non-private parking below the DFE, floodprone spaces must be marked as such *(RBDG Hoboken, 2015)*.
    d. Recess garage walls to reduce impact on streetscape *(RBDG Hoboken, 2015)*.
    e. Regular fenestration (windows) consistent with the pattern of fenestration on floors above grade is required for garage walls fronting on a street or pedestrian way *(RBDG Hoboken, 2015)*.
    f. Use planting beds, rain gardens or green wall systems installed and maintained by the property owner(s) to soften design along the streetscape *(RBDG Hoboken, 2015)*..
3. Electric Charging Stations
    a. Incorporate requirements for electric charging station installations in:
        i. Multi-family residential developments
        ii. Office developments greater than 10,000 square feet in gross floor area
        iii. Parking facilities open to the public with more than 100 parking spaces
4. Bicycle Parking
    a. Mandate minimum bicycle parking for large commercial developments and multi-family residential developments
    b. Incorporate bike parking, lockers, and changing facilities as part of public transportation hubs.
5. Permeable Pavement
    a. Encourage / require permeable pavement for parking lots used by passenger

vehicles. At minimum, the parking stall areas should be recommended as they receive less wear and tear, but the drive aisles could be recommended as well.

b. Require maintenance documents for permeable pavement be incorporated into master deeds for properties as part of condo / homeowners association manuals, and site maintenance manuals as part of the storm water management maintenance manual.

Building Design Standards

Purpose: Buildings are the largest source of energy consumption. Land development design standards can provide guidelines to improve building efficiency and sustainability. The following sections can be incorporated into existing design standards, or a new standalone section can be created.

A. Energy Efficiency Standards
    1. Building Design and Orientation
        a. Where possible, development projects should maximize Renovation and Reuse of Existing Buildings
        b. Passive Solar Heating and Cooling
            i. "Skin-load Dominated" Buildings (Small Commercial and residential)
                a. Orient windows to the south
                b. Use deciduous landscaping to shade the summer sun and maximize heating from winter sun
                c. Ensure that insulation is properly rated
                d. Downsize HVAC equipment for efficiency
                e. Incorporate thermally massive construction
            ii. "Internal-load Dominated" buildings (Larger commercial and industrial)
                a. Daylight workspaces with properly oriented windows
                b. Utilize high-performance glazing to reduce heat gain while admitting light
                c. Install high-efficiency HVAC system
                d. Provide shading devices such as roof overhangs, controllable shades, etc.
            iii. Windows
                - Placement
                - Design
                - Glazing Specification
    2. Lighting
        a. Mandate fully shielded and cutoff light fixtures that are compatible with dark skies guidelines.
        b. Utilize programmable switches, sensors or timers to adjust lighting levels for different times of day, and to reduce energy consumption.

c. Require lighting fixtures that utilize LED bulbs or a similar efficient model.

B. Roofs

1. Cool Roofs - Painting roofs lighter shades or utilizing reflective surface finishing can improve building efficiency.
2. Green Roofs – Permit green roofs, which consist of a Lightweight engineered soil media, underlain by drainage layer and a high-quality impermeable membrane that protects the building structure. Green roofs are useful for assisting with storm water management, but they also protect the roof, can be used as an amenity, reduce the urban heat island effect, reduce noise, reduce cooling needs in the summer and heating needs in the winter, and provide water quality and management benefits.

Landscaping Standards

Landscape Design for Site Efficiency and Resiliency

Purpose: The purpose of implementing landscaping design standards for energy efficiency is to improve building system efficiency through landscaping design. Landscape placement and species selection can enhance shading during summer months to reduce energy requirements and costs for cool, and can act as insulation to improve building heat retention during winter months.

1. Planting for Solar insolation and shading:
    a. Deciduous plantings should be planted to cast a shadow on southern building exposures. Large trees with substantial canopies such as oaks and maples are preferred. Trees with finer canopies such as birch and locusts are also acceptable.
    b. Evergreen trees and shrubs should be planted along the northern side of buildings. Evergreen trees that cast shadows on southern building exposures are not preferred. These plantings may be incorporated into buffer areas, but should be located at a sufficient distance from buildings so as not to contribute to shading.
    c. Smaller trees and shrubs are preferred along the eastern and western sides of buildings. Foundation plantings along these exposures are preferred.
    d. Shade trees or shade structures (e.g. pergolas, trellises, etc.) should be located to cast shadows on exterior HVAC units during summer months. Screening design for HVAC units should also consider shading.
2. Landscape plans shall consider alternative irrigation source designs. Where feasible, plans should consider the incorporation of cisterns, rain barrels, downspout planters, and other similar functions.
3. Parking area designs shall provide shade by deciduous trees. Trees shall be of a type suitable and adaptable to planting within a parking lot for shading. A minimum of 50% of any parking lot shall be shaded within fifteen (15) years after tree planting.
4. Planting for Wind Resistance
    a. In areas vulnerable to heavy winds and coastal storms, trees should be planted in groups rather than as single specimens.
    b. Trees planted in groves with several different types of trees grouped together are also more resilient.

c. Planting new trees and shrubs in close proximity to existing single trees can improve their resiliency as well.
d. Trees with deep, wide spreading root systems are preferred for windy areas.
e. Large maturing tress should not be planted where the water table or compacted layers of soil are within eighteen (18") inches of the soil surface. Smaller maturing trees are preferred in these situations.

Landscape Species Selection

Purpose: Landscape plans should incorporate native species wherever possible. Native plant species are well-suited to the climate in which they are located, and tend to be more resistant to environmental factors such as salt, wind, and drought. Non-native species may be used to supplement native species, but under no circumstances shall invasive plant species be used in an approved landscape plan.

1. Development applications that are required by this Chapter to include a landscape plan shall utilized preferred native plant species wherever possible. This list is attached as Appendix C of this document.
2. For coastal areas, and areas subject to tidal flooding, salt tolerant and wind resistant species are preferred.
3. Invasive Species – No tree listed on the NJDEP Invasive Plant List or USDA Invasive Plants Field and Reference Guide may be planted.

Create and/or maintain aesthetically pleasing landscapes along county roads *(AC SPRP, 2015).*

1 Create a variable width, naturally vegetated buffer system along all drainage ways that also encompasses critical environmental features such as steep slopes, and wetlands.

2 Minimize clearing and grading of woodlands and native vegetation to the minimum amount needed to build lots, allow access, and provide fire protection.

3 Conserve trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native plants.

4 Reduce water use for landscaping by imposing mandatory water-use restrictions *(AC MitPlan, 2016).*

Shoreline Protection within Barrier Islands

1 Natural Design Elements: Natural and nature-based features can enhance the resilience of coastal areas challenged by sea level rise and coastal storms. (Army Corps, 2013) Natural design elements may include traditional beach restoration and nourishment or even new approaches such as living shorelines. Living shorelines are designed with plants, sand, and limited use of rock to provide shoreline protection and maintain valuable habitat. Living shoreline projects often utilize a variety of structural and organic materials, such as wetland plants, submerged aquatic vegetation, oyster reefs, coir fiber logs, sand fill, and stone. The benefits of living shorelines include shoreline stabilization, creation of habitat, protection from intertidal environment, and water quality improvement (NOAA).

2 Structural Design Elements: Structural measures reduce coastal risks by decreasing shoreline erosion, wave damage and flooding. Traditional structures include levees, storm surge barrier gates, seawalls, revetments, groins, and nearshore breakwaters. The purpose of levees, seawalls and storm surge barrier gates is to reduce coastal flooding, while revetments, groins, and breakwaters are intended to reduce coastal erosion. All of these measures can reduce wave damage (Army Corps, 2013).

3 Policy Actions: Establishment of an erosion setback line which is located landward of the first stable natural vegetation at a specified distance based on the long-term rate of erosion *(AC MitPlan, 2016).* This setback line provides a buffer between a hazard area and coastal development.

Pinelands Commission Jurisdiction

Any person intending to proceed with development located within the Pinelands Areas of Atlantic County shall also be required to comply with the requirements of the Pinelands Comprehensive Management Plan (CMP). These resiliency guidelines are intended to take an integrated approach to stormwater management, resiliency, mobility and land use planning that is both intentional and opportunistic in their complementary benefits to the Pineland's CMP. The Pinelands CMP advances many resilient community development standards, including but not limited to the following:

Wetlands & Water Quality

According to the Comprehensive Management Plan, most types of commercial and residential development are prohibited in wetlands. Exceptions are non-intensive land uses such as forestry (lumbering), agricultural operations compatible with wetlands (such as blueberry and cranberry farming), and certain other low intensity activities. Public improvements, such as roads and utility distribution lines, are permitted to cross wetlands in limited instances (Pineland Commission Website).

To prevent environmental degradation and protect the region's water quality, a protective zone around wetlands must be established. Generally, no development is allowed within 300 feet of a wetland. This distance can be reduced if it can be shown that the proposed development will not significantly harm the wetland area (Pineland Commission Website).

Fire

The Pinelands Comprehensive Management Plan requires certain preventive measures to minimize the danger posed by wildfires. These measures include maintaining "fuel breaks" around homes and other buildings and road access requirements. A minimum fuel break of not less than 30 feet should be established and maintained around structures by the selective removal or thinning of trees, brush, ground cover and dead plant material. The type of vegetation in the area determines whether a site is a low, moderate, high, or extreme fire hazard area. (Pinelands Commission)

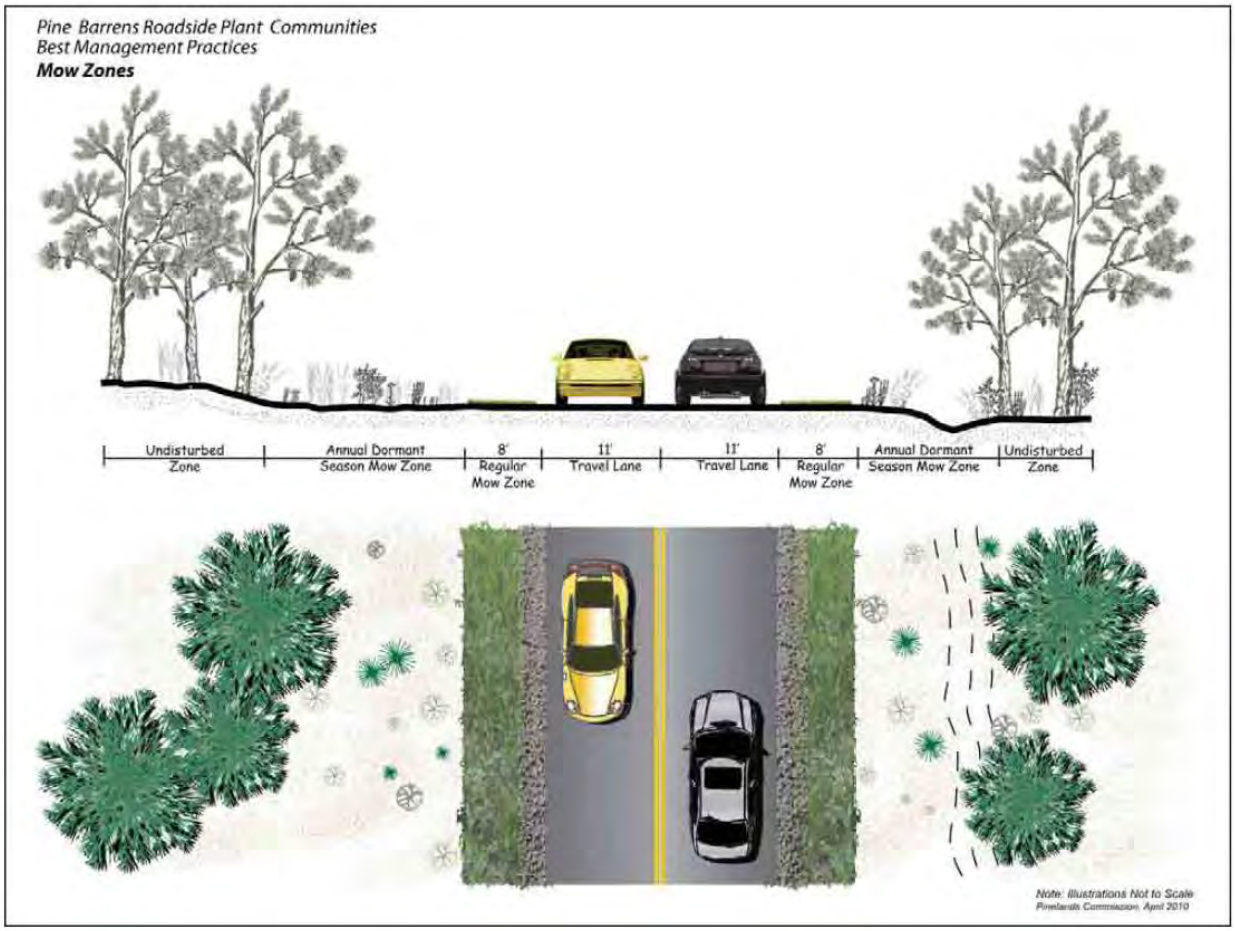
Vegetation:

The Pinelands Commission developed Best Management Practices (BMPs) for the mowing and maintenance of Pinelands roadsides. Among the recommended practices are:

- Mowing only the minimum width of roadside needed to maintain safe vehicle pull-off and clear sight at turns and intersections;

- Mowing to a height of six (6) inches to allow common native low-growing groundcovers like bearberry and teaberry to survive and thrive;
- Restoring roadside soils to nearly undisturbed conditions following road improvements;
- Avoiding mowing sparsely vegetated areas at all times; and
- Mowing rare plant populations and portions of roadsides beyond the necessary safe vehicle pull-off areas only once a year during the dormant season.

The BMPs for mowing and maintenance of Pinelands roadsides are illustrated in the figure below.



Mowing and Maintenance Best Management Practices For Pine Barrens Roadside Plant Communities[1]

Mowing and Maintenance Regimes

The following mowing and maintenance practices are intended to protect and promote native Pinelands vegetation while addressing traffic safety concerns relative to roadside shoulders. *Please refer to the typical section on the following page, which illustrates the 3 vegetated Zones described below.*

1. Regular-Mow Zone

The regular-mow zone includes any vegetated portion of the road shoulder within 8 feet from the outside edge of the travel lane. The purpose of this zone is to provide safe emergency vehicle pull-off areas and to allow road maintenance activities including maintenance of drainage swales and access to utilities. This zone may be wider than 8 feet where drainage swales or utilities are set farther back from the roadway.

a. Regular-Mow Zone Mowing and Maintenance Regime

The regular-mow zone should be mowed as frequently as needed to maintain its practical functions. Because typical roadside mowers have a 5- to 6-foot cutting width and paved/gravel portions of road shoulders ordinarily vary from 2- to 3-feet in width, it is expected that no more than one pass will be required during each mowing event. Vegetation height in these areas should be kept below 10 inches at all times to prevent contact with the bottom of vehicles, which may cause the vegetation to catch fire under certain conditions. However, to benefit some native Pine Barrens species, mowing height should be no lower than 6 inches above the ground.

To encourage native Pinelands species and minimize the establishment of non-native species, only use clean fill along roadsides that is obtained from a local source. Do not use nutrient-rich or high pH soil or soil amendments. Areas of any zone that are currently sparsely vegetated should not be mowed. This will reduce soil erosion and soil compaction caused by mower wheels and help promote re-vegetation.

b. Rare Plant Hotspots Mowing Regime

To prevent impacts to known rare plant populations, the dormant-season mow zone mowing regime, described in Section 2, should be followed at sites where rare plants are found ("*rare plant hotspots*"). The boundaries of rare plant hotspots should be marked with signs to alert roadside managers to their location and avoid untimely mowing that would be detrimental to these rare plant populations.

2. Dormant-Season Mow Zone

The widths of dormant-season mow zones vary and these zones are kept free of all woody plants that present potential hazards to drivers. Where intersection sight lines extend into the dormant-season mow zone, vegetation that is likely to obstruct such sight lines must be maintained below 30 inches at all times.

Dormant-Season Mow Zone Mowing and Maintenance Regime

The dormant-season mow zone is mowed no more frequently than one time each year. The dormant season extends from December 1st to March 31st. However, mowing activity should be confined to the month of March to allow the full, uninterrupted life cycle of plants - including growth, flowering, seed production, seed dispersal and seedling establishment.

Set mowing height no lower than 6 inches above the ground to avoid damage to short-statured, woody native species (e.g., Bearberry, Wintergreen, and Pine Barrens Heather), which are excellent groundcover for roadsides.

Areas of any zone that are currently sparsely vegetated should not be mowed. This will reduce soil erosion and soil compaction caused by mower wheels and help promote re-vegetation.

Annual mowing will remove the tops of any woody plants. However, exclusive use of dormant-season mowing may not be adequate to prevent some vigorous woody species from growing to a height that obstructs sight lines, especially where establishment is already underway (e.g., Pitch Pine sprouts). In these cases, it may be necessary to selectively cut such plants to ensure unobstructed sight lines.

3. Undisturbed Zone

This zone begins at the tree line of adjacent forest cover and defines the limit of the dormant-season mow zone.

Undisturbed Zone Mowing and Maintenance Regime

Mowing is not recommended in this zone except to remove tree limbs that may hang over and shade the dormant-season mow zone.

[1] ***Note***: Adapted from Van Clef, Michael, Ph.D.; Ecological Solutions, LLC; May 2009; "*Best Management Practices For Pine Barrens Roadside Plant Communities*"

April 2010

Tree Preservation Ordinance

A comprehensive tree preservation ordinance may be beneficial for some of the County's more rural, Pinelands communities. The following ordinance is comprehensive and includes detailed standards that may be above and beyond what some communities need to implement. However, for a municipality that is concerned with preserving and protecting forested areas and trees of particular specimen value, this model may be a useful starting point.

§ XX-1. Intent and purpose.

A. Indiscriminate, uncontrolled and excess destruction, removal and cutting of trees upon lots and tracts of land within [municipality] will cause increased drainage control costs, increased soil erosion and sedimentation, decreased fertility of the soil, degradation of water resources, decreased groundwater recharge, increased buildup of atmospheric carbon dioxide, the establishment of a heat island effect and increased dust and pollution. The singular or cumulative effect of any of the foregoing could adversely impact the character of [municipality], decrease property values, render the land unfit and unsuitable for its most appropriate use, and negatively affect the health, safety and general welfare of [municipality]'s residents. Thus, the [municipality] governing body desires to regulate and control indiscriminate and excessive cutting of trees within the [municipality] and to require appropriate tree replacement.

B. It is recognized that there is a strong interrelationship between the integrity of the [municipality] 's water resources, development on steep slopes, tree removal, soil disturbance, stormwater management and the general use of the land resources. Fewer trees throughout the [municipality] also correlates with increased air pollution. Therefore, the governing body finds that the appropriate management of these resources is an important health, safety and general welfare concern. Managing the [municipality] 's tree resources is consistent with the state-approved community forestry management plan, as in P.L. 1996, c. 135.1 The appropriate management guidelines for tree preservation to be utilized are:

1. The American National Standard, ANSI A300 (Part 5) — Management;

2. Trees and Development: A Technical Guide to Preservation of Trees During Land Development, Nelda Matheny and James R. Clark; and

3. Protection and Care of the Urban Forest, NJDEP Division of Parks and Forestry.

C. Trees are declared to be an important cultural, ecological, scenic and economic resource. Proper management of this resource will ensure its maintenance and result in economic returns. A forestry management program is intended to meet the objectives of preserving, protecting, enhancing and maintaining trees and providing opportunities for the continued use of forest resources which are compatible with the maintenance of the environment. This will be accomplished by ensuring management of forest and trees through the application of sound management practices. To that end, it shall be unlawful to cut down, damage, poison or in any other manner destroy or cause to be destroyed any trees covered by this chapter, except in accordance with the provisions of this chapter.

1. Editor's Note: See N.J.S.A. 13:1L-17.1 et seq.

§ XX-2. Definitions.

As used in this chapter, the following terms shall have the meanings indicated:

CALIPER: ANSI Z60 FOR NURSERY STOCK—"Caliper" is a type of diameter measurement used in the nursery industry. The height measurement shall be taken from ground level for field-grown stock and from the soil line for container-grown stock, which should be at or near the top of the root flare. Caliper measurement of the trunk shall be taken six inches above the top of root flare up to and including four-inch caliper size. If the caliper at six inches above the ground exceeds four inches, the caliper should be measured at 12 inches above the top of root flare. Seldom are tree trunks perfectly round. The most accurate measurement will result from the use of a diameter tape. Caliper measurements taken with manual or electronic slot or pincer type caliper tools should be the average of the smallest and largest measurements.

COMMUNITY FORESTRY MANAGEMENT PLAN — A plan developed by a municipality that outlines the goals and objectives for managing trees on municipal property with the intent of minimizing liability to the municipality and maximizing the useful life of the tree resource. The plan is to be approved by the New Jersey Department of Environmental Protection, Division of Parks and Forestry, New Jersey Forest Service. A Shade Tree Commission shall be formed to oversee the implementation of the community forestry management plan.

DIAMETER BREAST HEIGHT (DBH)—The diameter of a tree measured 4 1/2 feet above the uphill/highest side.

EROSION — The detachment and movement of soil or rock fragments by water, ice, wind and gravity.

EXEMPT AREA—The lot area as provided in this chapter for which tree replacement shall not be required.

FOREST MANAGEMENT PLAN — A plan for the management of timbered or forested lands approved by the New Jersey Department of Environmental Protection, New Jersey Forest Service, or similar state or federal agency.

HISTORIC TREE — A tree that has been found to be of notable historic interest to [Municipality] because of its age, type, size or historic association and which has been so designated and that designation has been officially made and promulgated as part of the official records of the [Municipality].

OPEN SPACE — Any parcel or area of land or water essentially unimproved and set aside, dedicated, designated or reserved for public or private use and enjoyment or for the use and enjoyment of owners and occupants of land adjoining or neighboring such open spaces, provided that such areas may be improved with only those buildings, structures, streets and off-street parking and other improvements that are designated to be incidental to the natural openness of the land.

SHADE TREE COMMISSION — Shade tree commissions can be formed by municipal ordinance, N.J.S.A. 40:64-1 et seq. The enforcement of this chapter shall be the duty of the Shade Tree Commission of [Municipality] and its agents, such as the Tree Specialist, through the regulation, planting, care and control of shade, ornamental and evergreen trees and shrubs in the streets, highways, public places of the [Municipality] and tree removal on all lands within the [Municipality].

SPECIMEN TREE — Any tree in fair or better condition which is so designated by the Shade Tree Commission based on considerations of whether the tree is a rare species or specimen thereof; is abnormal in height, trunk diameter or dripline circumference for a tree of its species; has foliage of an unusual quality for a tree of its species; occupies a location which confers special shade tree, fragrance, erosion control, aesthetic, scenic enhancement, historic, preservation or cultural values to the community. For purposes of this definition, "in fair or better condition" shall mean that a tree has a relatively sound and solid trunk with no evidence of extensive decay or visual evidence of being hollow and with no major insect or pathological problem.

TREE — Any deciduous or coniferous species which has a DBH of six inches or greater.

TREE ESCROW FUND — A fund established by the governing body for the administration and

promotion of tree and shrubbery resource sustainability projects and practices which may be consistent with the Community Stewardship Incentive Program as outlined within the New Jersey Shade Tree and Community Forestry Assistance Act, P.L. 1996, c. 135.2

TREE PLANTING PLAN—A specific plan adopted by [Municipality] for the location and placement of trees on public property.

TREE PRESERVATION AND REMOVAL PLAN (TREE SAVE PLAN) — A specific plan that contains tree locations and other information in accordance with § 405-5 herein.

TREE REMOVAL PERMIT — The permit issued by the Shade Tree Commission or its designee to remove or destroy a tree or trees.

TREE REPLACEMENT PLAN — A specific plan for replacement of removed trees in accordance with the provision of this chapter.

TREE SPECIALIST —

A. The Mayor shall appoint a Tree Specialist. This individual shall be responsible for the inspection of sites for which application(s) are filed under this chapter. This individual will be responsible for the administration and protection requirements of this chapter and enforcement of the chapter as directed by the Shade Tree Commission.
B. A Tree Specialist is either of the following:
    1. A forester who shall have a bachelor's degree in forestry or arboriculture from a college or university, shall be certified as a certified tree expert by the State of New Jersey and shall have a minimum of three years' experience in planting, care and maintenance of trees. The forester shall have the responsibility of reviewing an approved forest management plan and inspecting the forested site for plan compliance if requested by the Tax Assessor.
    2. A conservation officer who shall be certified as a certified tree expert by the State of New Jersey and shall have a minimum of three years' experience in planting, care and maintenance of trees.
C. The Tree Specialist shall be paid from the Tree Escrow Fund, which is established herein, and shall be paid in accordance with a fee schedule established by contract with the municipality.

2. Editor's Note: See N.J.S.A. 13:1L-17.1 et seq.

§ XX-3. Applicability.

The terms and provisions of this chapter shall apply as follows:

A. Unless specifically excepted in Subsection C below, it shall be unlawful for any person to remove or cause to remove trees with a DBH of six inches or more without first having obtained a tree removal permit as provided herein.

B. Specimen and historic trees.

1. Trees which have been designated as specimen or historic under the provisions of this chapter shall be maintained in a living condition, and it shall be unlawful for any person to remove such tree without an approved tree removal permit. No specimen or historic tree shall be removed unless the applicant has obtained the approval of the Shade Tree Commission.
2. The condition of trees proposed to be saved shall be evaluated by use of guides as follows:
   a. Evaluation of Hazard Trees in Urban Areas, ISA Books, Nelda Matheny andJames R. Clark.

   b. Urban Tree Risk Management, USDA Forest Service, Northeastern Area.

   c. The Guide for Plant Appraisal, the Council of Tree and Landscape Appraisers.

C. . Exceptions. The provisions of this chapter shall not apply to the following:

1. Any property upon which no trees are located, as confirmed by a statement of no tree verification.
2. Any tree of less than six inches DBH.
3. Any tree or trees removed or cut in accordance with a forest management plan, provided that such plan is filed with the Tree Specialist, Shade Tree Commission and Tax Assessor.
4. Any tree or trees removed or cut in accordance with an approved conservation plan prepared by the Soil Conservation District, provided that such plan has been filed with the Shade Tree Commission and Tax Assessor.
5. 5, Any tree or trees planted and grown for commercial purposes on property used as a commercial nursery, tree farm, garden center, Christmas tree plantation or tree orchard.
6. Any tree growing in a utility right-of-way or fire trail subject to the approval of the Shade Tree Commission.

§ XX-4. Tree removal permits.

A. Any person wishing to obtain a tree removal permit shall make application to the Shade Tree Commission by filing a written application with the Tree Specialist and paying such fees as are set forth in § 405-8. No permit shall be issued until a tree preservation and removal plan for the lot or parcel has been reviewed and approved as compliant with § 405-5 by the Tree Specialist.

B. Where an application, as required by this chapter, has been submitted, no permit shall be issued until a tree save plan for the lot or parcel, if necessary, has been reviewed and approved as compliant with § 405-5 by the Tree Specialist, and until the filing of a written report of an on-site inspection by the Tree Specialist. Where an application is made in connection with the construction of a building or other improvement, no building permit shall be issued until the tree removal permit has been issued.

C. All required escrow and bond fees for any application, including required tree replacements or fees, shall be verified as paid prior to the issuance of the tree removal permit.

D. Tree removal permit applications shall be filed at the Tree Specialist's office and shall be completed in full. The application must be deemed complete and all required fees, as set forth in § 405-8, be paid prior to review.

E. Inspections. After the application is complete and reviewed, the Tree Specialist shall inspect the trees and property which are the subject of the permit application within 30 days.

F. Permit approval or denial. The Tree Specialist shall approve or deny the tree removal permit within 10 business days after completion of the inspection. The Tree Specialist shall notify the applicant in writing of the factual basis and criteria for any denial. The final decision of the Tree Specialist may be appealed to the governing body by filing written notice within 10 days of the final decision. The governing body shall hold a public hearing and issue its decision within 60 days after notice of appeal is filed, unless the applicant requests and the governing body consents to an extension of time. The governing body may delegate its appeal responsibilities to the Shade Tree Commission.

§ XX-5. Tree preservation and removal plan.

A tree preservation and removal plan shall be submitted to the Tree Specialist's office. Applications that require Planning Board or Zoning Board approval shall have tree preservation

and removal plans as part of the submittal to the Planning Board or Zoning Board and said plans provided to the Tree Specialist for review and approval in accordance with this chapter. Tree preservation and removal plans shall contain the following:

A. The name and address of the applicant.
B. The name and address of the owner of the property from which the trees are to be removed.
C. The lot and block of the property.
D. The shape and dimensions of the lot or parcel, including the location of all existing and proposed easements. If the tree removal permit is for a single-family residence, the plan shall consist of a tree location sketch containing the minimum amount of pertinent information to enable the determination of compliance with the regulations in this chapter, including the information set forth in Subsection D(1), (2), (6) and (8) below. The plan for any other property shall include a survey prepared by a licensed land surveyor that contains tree locations. The survey shall contain, at a scale of no less than one inch equals 50 feet, the following information:
    1. The existing and proposed tree preservation limits.
    2. The proposed limit of the clearing and all individual trees to be retained outside the tree clearing identified by some approved method as determined by the Tree Specialist, such as flagging, prior to the field inspection. For any clearing greater than or equal to three acres, a representative 5% of the wooded areas proposed to be cleared shall be inventoried. The representative 5% shall be determined by agreement between the Tree Specialist and the applicant. Where less than three acres is proposed to be cleared, all trees to be removed shall be inventoried.
    3. The installation and limits of a temporary existing tree protection fence along the limits of the proposed tree removal shall be in compliance with § 405-10.
    4. Locations of all forest types shall be identified by common and botanical names of dominant tree species.
    5. All specimen and historic trees to be removed shall be indicated on the plan. All reasonable efforts shall be made to preserve such trees, including, but not limited to, if feasible, relocation of infrastructure, roadways and buildings. Removal of such trees shall require specific written approval of the governing body with consideration of the Shade Tree Commission's recommendations.
    6. A proposed tree replacement plan in accordance with this chapter. A tree replacement plan shall be considered the proposed landscaping plan required for

all subdivision and site plan approvals.

7. A North arrow.
8. The location of existing and proposed structures and improvements, if any.

§ XX-6. Term of permit.

Any and all permits approved by the Shade Tree Commission shall be declared null and void if the tree removal is not completed within a reasonable time, not to exceed 12 months after permit issuance. In no case will the permit be valid for more than 12 months. Permits not used within this period will require a new application and the payment of new fees. For purposes of this section, a permit shall no longer be valid when the work authorized by the permit is completed.

§ XX-7. Criteria for issuance of permits.

A. Upon completion of the Tree Specialist's field inspection report and review of any requested recommendations, the Tree Specialist shall approve a permit if:
    1 The tree preservation and removal plan is compliant with § 405-5;
    2 The tree replacement plan is approved by the Tree Specialist;
    3 None of the conditions set forth below in Subsection B exists;
    4 At least one of the criteria as follows has been satisfied:
        a. The tree is located in an area where a structure or improvements will be placed in accordance with the approval of Planning/Zoning Boards and the tree cannot be relocated on the site because of age, type or size of the tree.
        b. The tree is dead, diseased, injured, in danger of falling, is too close to existing or proposed structures, interferes with existing utility service, creates unsafe vision or clearance or conflicts with other ordinances or regulations.
        c. The tree is to be removed for harvesting as a commercial product or for the purpose of making land available for farming or other agricultural activity, or is to be removed in furtherance of a forest management plan or soil conservation plan, or to serve some other purpose which is consistent with the purposes of this chapter.
B. The Tree Specialist may deny a permit if the removal will contribute to extra runoff of surface water onto adjacent properties, erosion or silting, and such conditions are not otherwise satisfactorily abated, or if the tree removal causes:

1 Impairment to the growth or development of remaining trees on the applicant's property or upon adjacent properties;
2 Soil instability;
3 Dust;
4 Drainage or sewerage problems;
5 Dangerous or hazardous conditions; or
6 Depression of the value of adjacent properties.

§ XX-8. Fees.

A. Application.
1. The applicant, at time of filing the application with the Tree Specialist, shall pay the application fee of $10 for each new or existing lot. No application shall be considered without the payment of the required fees. An inspection fee of $25 will be applied to all applications requiring an on-site verification.
2. The replacement fee will be in accordance with § 405-9.

B. Tree Escrow Fund.

1. A Tree Escrow Fund shall be established and maintained by the Chief Financial Officer of Jackson Township to receive and disburse replacement tree contributions. Appropriations from the Tree Fund shall be authorized by the governing body with consideration of the Shade Tree Commission recommendation in accordance with the municipal tree planting plan.
2. The primary purpose of said fund is to provide for the planting and maintenance of trees and shrubs on public property. The fund will also cover administrative costs to implement the provisions of this chapter, including but not limited to site inspections, processing of permits and supervision of tree replacements. Administrative costs imposed in accordance with this chapter shall not exceed 30% of the fund, as determined on an annual basis.

§ XX-9. Replacement trees.

A. Tree replacement schedule.

1 Any tree removed pursuant to this chapter, unless exempt under § 405-3C, shall be replaced based on the following:

Number of Trees to be Removed	Size/Diameter (inches)	Number of Replacement Trees	Size of Replacement Trees	Or Dollar Amount
1	Greater than 6 up to 10	1	2 to 2 1/2	$240
2	Greater than 6 up to 10	1	3 1/2 to 4	$420
1	Greater than 10 up to 16	2	2 to 2 1/2	$480
1	Greater than 16 up to 23	2	3	$840
1	Greater than 23 up to 30	4	3 1/2 to 4	$1,680
1	Greater than 30	5	3 1/2 to 4	$2,100

2 In cases where the tree cost requirement criteria is combined with other criteria of this subsection, the value of proposed shade, ornamental, evergreen and shrub material shall be deducted from the calculated amount for replacement trees. The value of the proposed landscape material shall be calculated based upon average local material costs for planting.

B. The applicant will receive a one-for-one replacement tree credit should stands of 10 or more trees greater than four inches in diameter be preserved within the limit of the disturbance line.

C. All replacement trees shall be planted on site in accordance with the foregoing. However, if one or more of the following conditions exist, some or all of the replacement trees may be planted off site:

1 The site in question cannot physically accommodate the total replacement number of trees, and the applicant contributes an amount equal to the calculated monetary value of nonreplaced trees to the Tree Escrow Fund; or

2 The Tree Specialist and applicant agree in writing that the applicant shall make payment to the Tree Escrow Fund based upon the chart provided; or

3 The Tree Specialist and applicant agree in writing that the applicant shall plant replacement trees off site on municipally owned property pursuant to the municipal tree planting plan.

D. Notwithstanding the tree replacement fee schedule in Subsection A above, in all commercial and industrial applications, the tree replacement fee shall be $25 per tree, with a maximum amount of $2,500 per acre. Specimen and historic trees shall not be included in this fee calculation, but shall be assessed a separate fee in accordance with the fee schedule provided in Subsection A above.

§ XX-10. Protection of existing trees during construction.

A. Protective barriers.

1. Prior to construction and any tree removals, suitable tree protective barriers shall be erected, and this protection, where required, shall remain until such time as the protection is authorized to be removed by the Tree Specialist or after issuance of a final certificate of occupancy. In addition, during construction, no attachments or wires shall be attached to any of said trees so protected. Where some grading must take place within the dripline of trees in the protection zone, appropriate measures shall be taken to minimize impact to the trees. Any trees seriously damaged during construction must be professionally treated by a New Jersey certified tree expert or replaced if the damage is beyond treatment.
2. A detail of the existing tree self-supported protective barrier shall be provided on all applications. The protective barrier shall be a minimum of four feet high. (2)
3. The self-supported protective barrier shall be placed, as determined by the Tree Specialist, at the dripline of any tree along the limit of clearing and around the

entire dripline for trees to remain undisturbed within the limit of clearing. Refer to: Trees and Development, Table 6.2, page 74.

4. It shall be unlawful for any person in the construction of any structure or other improvement to place solvents, material, construction machinery or temporary soil deposits within the dripline.

B. Street right-of-way and utility easements may be delineated by placing stakes a minimum of 50 feet apart and tying ribbon, plastic tape, rope, etc., from stake to stake along the outside perimeters of such areas to be cleared.

C. Large property areas separate from construction and land clearing areas into which no equipment will venture may also be delineated as set forth above in § 405-10B, as determined by the Tree Specialist following a field evaluation.

§ XX-11. Tree replacement.

Any tree removed pursuant to a tree removal permit shall be replaced as provided below, unless said tree is located in an exempt area, is dead or fatally diseased as determined by a certified tree expert, or tree replacement payment is made pursuant to § 405-9. Tree replacement shall be required in accordance with the standards set forth in ANSI Z60.1, American Standard for Nursery Stock. Tree replacement shall be in accordance with either Subsection A, B, C or D below or a combination of Subsections A, B, C and D.

A. One-to-one tree replacement. For each tree six inches in DBH or greater that is removed, the applicant shall prepare a replanting plan for other areas of the property. The replacement plan or landscape plan shall reflect a one-to-one tree replacement for each tree six inches or greater to be removed. All proposed replacement trees shall be in accordance with selections from Trees For New Jersey Streets, published by the New Jersey Shade Tree Federation, and Street Tree Factsheets, a publication of the Municipal Tree Restoration Program, and submitted for review and approval prior to the issuance of a tree removal permit.

B. Tree area replacement/reforestation. For each square foot of tree area to be removed, the applicant shall prepare a reforestation scheme on other treeless open space areas of the property to compensate for the tree removals. The reforestation plan shall be based on a twenty-foot-by-twenty-foot grid. Of this number of trees, 10% shall be balled and burlaped, two-inch to two-and-one-half-inch caliper; 20% shall be balled and burlaped, one-and three-fourths-inch to two-inch caliper; 30% shall be bare root one-and-one-fourth-inch to one-and-one-half-inch caliper; and 40% shall be bare root six-

foot- to eight-foot-tall whips. A mixture of trees, indigenous to the area and site, shall be utilized. Proposed trees shall be planted in natural groves and may be spaced five feet to 20 feet on center. The ground shall be seeded with a grass mixture approved by the Shade Tree Commission. The reforestation formula shall follow the guidelines as set forth in the New Jersey No Net Loss Reforestation Act, P.L. 1993, c. 106 (N.J.S.A. 13:1L-14.2).

C. Credits. The permit applicant will receive a one-to-one replacement tree credit:
   1. For stands of 10 or more trees with a DBH of six inches or greater preserved within the limit of the disturbance line; or
   2. Forested areas of one acre or greater, which are left natural and conveyed to the [Municipality] with a deed restriction that they will remain forested and undeveloped. This conveyance excludes all previous dedicated easements.

D. All replacement trees shall be planted on site, unless all of the replacement trees cannot be physically accommodated. In such instance, the applicant shall pay the tree replacement fee in accordance with the schedule in § 405-9.

E. Exempt areas.
   1. For all existing residential properties and new residential development with a proposed lot area of less than 40,000 square feet, up to 50% of the lot area may be exempt area. For residential development with a proposed area of 40,000 square feet or greater, up to 20,000 square feet in area may be exempt area. The exempt area shall be calculated as a contiguous, circular area from a fixed point within the footprint of the existing or proposed primary residential structure on the property. The exempt area should be calculated to minimize any adverse environmental impacts.
   2. Agricultural operations are exempt from replacement requirements because such operations are governed by the Right to Farm Act, N.J.S.A. 4:1C-1 to 4:1C-10, which preempts local regulation. Property owners claiming exemption under this subsection must continue to farm the property in question as described on the tree removal permit for a minimum of five consecutive years after the date of clearing or date of commencement of the prescribed farming activity that is deemed compliant by the Tree Specialist. An approved permit must be submitted prior to clearing. If the property is not farmed as prescribed on the tree removal permit within three years of the tree removal or is developed for any other use before the five years expires, the reforestation replacement obligation in accordance with § 405-11B will be enforced according to the new use of the property.
   3. In all commercial, industrial and nonresidential developments, with a proposed

buildable lot area less than 40,000 square feet, up to 50% of the lot area may be exempt area. For development with a proposed buildable area of 40,000 square feet or greater, up to 20,000 square feet in area may be exempt area. The exempt area shall be calculated as a contiguous, circular area from a fixed point within the footprint of the existing or proposed primary structure on the property. The exempt area should be calculated to minimize any adverse environmental impacts.

4. Utility line clearance operations, provided that such plan is filed with the Tree Specialist and work performed in accordance with ANSI A300 Part 7: BMP Utility Pruning of Trees, and Board of Tree Experts Pruning Standards for Shade Trees, Section 5.5.

§ XX-12. Emergencies.

In case of emergencies, such as hurricanes, fire, windstorm, ice storm, flood, freezing temperatures or other disaster, or in the case of dead or diseased trees which are a hazard to persons or property, the requirements of the regulations set forth in this chapter may be waived by the Tree Specialist upon a finding that such waiver is necessary so that the public or private work to restore order on the property in the Township will not be impeded.

§ XX-13. Stop-work orders.

A. The Shade Tree Commission is hereby authorized to issue stop-work orders to the holder of the tree removal permit, and the Tree Specialist is authorized to recommend the issuance of stop-work orders in the event that there is:
   1. A failure to comply with the approved plan, such as a site plan, forest management plan or soil conservation plan;
   2. Noncompliance with the tree removal permit granted pursuant to this chapter; or
   3. Noncompliance with the provisions of this chapter.

B. The stop-work order shall remain in effect until the Shade Tree Commission, upon recommendation of the Tree Specialist, has determined that the resumption of work will not violate the plans, permit or the provisions of this chapter.

§ XX-14. Enforcement.

The Shade Tree Commission in conjunction with the Tree Specialist shall oversee all tree removals pursuant to an issued tree removal permit. The Tree Specialist shall conduct adequate inspections of all sites for which a tree removal permit has been issued. Upon the ascertainment of a violation of this chapter, the Tree Specialist or Shade Tree Commission shall refer

enforcement actions to the Code Enforcement Officer.

§ XX-15. Applicability to tree removal construction companies; permit required.

All provisions of this chapter shall apply to any person removing trees on behalf of any other person, including all tree removal construction companies or persons in the business of removing trees or construction. It shall be unlawful for any person or company to remove or cause to be removed any tree or undertake any work for which a permit is required pursuant to this chapter unless a valid permit therefor is in effect and is displayed in accordance with the provisions set forth in § 405-16; such removal or work shall constitute a violation of this section and shall subject the person or company violating this section to all penalties provided herein.

§ XX-16. Display of permit; carrying of plan or authorization; right of entry.

A. The applicant shall prominently display on the site the tree removal permit issued. Such permit shall be displayed continuously while trees are being removed or replaced or work done as authorized on the permit and for 10 days thereafter. In addition, the person or persons cutting or removing trees, if other than the applicant, shall carry with him/her authorization from the owner or applicant authorizing such person to cut or remove trees. In the event that the trees are being cut or removed in accordance with a forest management plan or a soil conservation plan, a copy of the plan shall be in the possession of the person cutting or removing such trees.
B. As a condition for the issuance of the permit, the applicant shall agree in writing to the entry onto his/her premises by the Tree Specialist and all law enforcement officers as necessary to effectuate the provisions of this chapter, and such entries shall be deemed lawful. Failure to allow such entry shall be unlawful and shall constitute a violation of this chapter and shall constitute failure to display the permit as required herein. It shall be unlawful and considered a violation of this chapter for any person to engage in the business of plant cutting, trimming, removal, spraying or otherwise treating trees, shrubs or vines within the Township and without the applicable certification or license for the designated work. All contractors offering tree care services for hire within [MUNICIPALITY] shall register annually with the Tree Specialist, provide a current certificate of insurance showing evidence of employer liability and workers' compensation coverage for the work to be performed, and shall comply with applicable OSHA regulations, ANSI Z133.1 Safety Standards, New Jersey Board of Tree Experts Pruning Standards for Shade Trees and ANSI A300 Practice Standards.

§ XX-17. Duties of Tree Specialist.

The Tree Specialist shall perform the duties set forth in this chapter and shall be responsible for the enforcement of the provisions of this chapter as directed by the Shade Tree Commission. In this regard, the Tree Specialist is authorized and shall perform any necessary inspections and is further authorized and shall issue violation notices and shall sign complaints and provide testimony in the Municipal Court for violations of this chapter.

§ XX-18. Violations and penalties.

A. Any person, firm, partnership, corporation, association or other legal entity violating any of the provisions of this chapter shall, upon conviction of such violation, be punished by a fine of up to $2,000 for each offense, in the discretion of the Judge before whom conviction may be had. Each illegally removed tree shall be considered a separate violation. Each violation of any of the provisions of this chapter and each day the same is violated shall be defined and taken to be a separate and distinct offense. In addition, the court may order restitution (fine and/or appraised value, whichever is greater) and/or replacement of the tree illegally removed.

In addition to other remedies, the Shade Tree Commission, Tree Specialist or other authorized official may institute any appropriate legal action to prevent a continuing violation of the terms of this chapter.

Critical Area Model Ordinance

1.01 Purpose

The purposes of this critical area ordinance are to identify and protect environmentally sensitive lands in [the municipality] and to promote public health, safety, and welfare by providing appropriate and reasonable controls for the development of such lands. Specifically, this ordinance is intended to:

1. Comply with other local, regional, state, and federal regulations and permits.
2. Protect people, property, and public resources and facilities from injury, loss of life, financial loss, or property damage due to natural hazards such as flooding, erosion, landslides, seismic events, soil subsidence, or unstable slopes.
3. Protect unique, fragile, and valuable elements of the environment, including, but not limited to, fish and wildlife habitat, wetlands, vegetation specimens, riparian habitats, and other healthy, functioning ecosystems.
4. Ensure the availability of quality water by preventing adverse impacts on groundwater, wetlands, streams, and other water sources.
5. Provide [city or county] officials with complete and accurate information in order to adequately prepare them to make decisions regarding development in critical areas.
6. Mitigate unavoidable impacts to critical areas and prevent avoidable impacts by regulating development and alterations in or near critical areas.
7. Require innovative planning, design, and construction techniques for development in critical areas by requiring applicants and their professional consultants to utilize current technologies.

102. Definitions

As used in this ordinance, the following words and terms will have the meanings specified herein:

Aquifer. A geological formation, group of formations, or part of a formation that is capable of yielding, storing, or transmitting a significant amount of groundwater to a well or spring.

Aquifer recharge areas. Areas where geological formations are present that, due to the presence of certain soils, geology, and surface water, act to recharge an aquifer by the downward percolation of water.

Best management practices. Conservation practices or systems of practices and management that: (a) control soil loss and protect water quality from degradation caused by nutrients, animal waste, toxins, and sediment, and (b) minimize adverse impacts to surface water and

groundwater flow, as well as to the chemical, physical, and biological characteristics of critical areas.

Buffer. An area that is adjacent to or part of a critical area that protects the critical area from adverse impacts and may also provide wildlife habitat related to the critical area.

Erosion. The process whereby wind, rain, ice, and other natural agents wear away soil, sediment, or rock fragments.

Frequently flooded areas. Areas in the floodplain subject to a 1 percent or greater chance of flooding in any given year (also known as the 100-year floodplain designations of the Federal Emergency Management Agency and the National Flood Insurance Program).

Impervious surface. Any surface that prevents or impedes the absorption of stormwater into previously undeveloped land. Such surfaces may include, but are not limited to, gravel, asphalt, and concrete paving, rooftops, walkways, patios, driveways, parking lots, and packed-earth material.

Riparian habitat. The transitional areas adjacent to aquatic systems (e.g., streams and rivers) that contain elements of both aquatic and terrestrial ecosystems that mutually influence one another.

Seismic hazard areas. Areas that are potentially subject to severe risk of damage as a result of earthquake-induced ground shaking, slope failure, settlement, soil liquefaction, or surface faulting.

Wetlands. Areas that are inundated or saturated by surface or groundwater at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas.

103. Applicability of Regulations

1. This ordinance applies to any alteration of either public or private land, water, or vegetation within environmentally critical areas and their buffers. This may include, but is not limited to, new structures, additions to structures, short subdivisions and subdivisions, grading and drainage activity, and tree and vegetation removal.

2. The following activities will be fully exempt from critical areas review and will not be subject to the provisions of this ordinance:

a. Activities in response to emergency situations which threaten the public health, safety, or welfare, or which pose an immediate risk of damage to a utility facility or private property.

b. Normal and routine maintenance, repair, and replacement of existing utility facilities, if the activity does not further alter or increase the impact to critical areas or their buffers.

104. General Requirements

1. Compliance with other local, regional, state, and federal regulations and permits is required, in addition to critical areas requirements.

2. If any regulation conflicts with the requirements of this ordinance, that which provides more protection to the critical area will govern.

3. If compliance with all applicable regulations relating to critical areas is impossible, the requirements of the critical area ordinance will prevail.

4. The application for development in a critical area will be reviewed in conjunction with any other related applications.

105. Submittal Requirements

1. Applications for any development within a critical area or associated buffer must at a minimum include the following:

(a) A completed application.

(b) A critical area report (required components listed below).

2. Required characteristics or components of a critical area report include:

(a) Preparation by a qualified professional.

(b) Incorporation of best management practices and scientifically valid methods and studies.

(c) Special reports. When a critical area is determined to be on-site, the appropriate department may require submittal of additional reports and studies prepared by qualified specialists to make an assessment or delineation of the critical area. Some critical areas may have special report requirements, which will be detailed in their specific sections.

(d) Site plan. Additional site plan information may be required for sites that include landslide- or flood-prone areas, riparian corridors, wetlands, or steep slope areas or their buffers.

(e) Technical assessments. Technical reports and other studies and submittals must be prepared as required by the appropriate department detailing soils, geological, hydrological, drainage, plant ecology and botany, and other pertinent site information.

106. Critical Area Project Review Process

(1) As part of this review, the [municipality] must:

(a) Verify the information submitted by the applicant;

(b) Evaluate the project area and vicinity for critical areas;

(c) Assign the [planning director] the responsibility to determine whether the proposed project is likely to impact the functions or values of critical areas; and

(d) Assign the [planning director] the responsibility to determine if the proposed project adequately addresses the impacts and avoids impacts to the critical area associated with the project.

(2) If the proposed project is within or adjacent to or is likely to impact a critical area, the [municipality] must:

(a) Require a critical area report from the applicant that has been prepared by a qualified professional;

(b) Review and evaluate the critical area report;

(c) Determine whether the development proposal conforms to the purposes and performance standards of this ordinance;

(d) Assess the potential impacts to the critical area and determine if they can be avoided or minimized; and

(e) Determine if any mitigation proposed by the applicant is sufficient to protect the functions and values of the critical area and public health, safety, and welfare concerns consistent with the goals, purposes, objectives, and requirements of this ordinance.

107. Aquifer Recharge Areas

107.1 Classification and Designation

[Alternative 1]

Critical aquifer recharge areas (CARAs) shall be categorized as follows:

(1) Category I includes those areas that are highly susceptible to groundwater contamination and are located within a sole-source aquifer or a wellhead protection area.

(2) Category II includes those areas that have medium susceptibility to groundwater contamination and are located within a sole-source aquifer or a wellhead protection area or are highly susceptible to groundwater contamination but are not located within a sole-source aquifer or a wellhead protection area.

(3) Category III includes those areas that currently or may in the future provide recharge to aquifers that are currently or potentially will become potable water supplies.

[Alternative 2]

Critical aquifer recharge areas (CARAs) are those areas with a critical recharging effect on aquifers used for potable water. CARAs have geologic conditions associated with infiltration rates that create a high potential for contamination of groundwater resources or contribute significantly to the replenishment of groundwater. These areas include but are not limited to: wellhead protection areas, sole-source aquifers, susceptible groundwater management areas, special protection areas, moderate or highly vulnerable aquifer recharge areas.

107.2 Permitted Uses and Activities

(1) The following activities are allowed in CARAs and do not require the submission of a critical areas report:

(a) Construction of structures and improvements, including additions, resulting in less than [5 percent or 2,500 square feet] (whichever is greater) total site impervious surface area that does not result in a change of use or increase the use of a hazardous substance.

(b) Development and improvement of parks, recreation facilities, open space, or conservation areas resulting in less than [5 percent] total site impervious surface area that does not increase the use of a hazardous substance.

(c) On-site domestic septic systems releasing fewer than 14,500 gallons of effluent per day and that are limited to a maximum density of one system per acre.

107.3 Additional Report Requirements for CARAs

A hydrogeological assessment may be required, depending on the condition and location of the CARA. The scope of the report will be determined according to site-specific conditions. The assessment must prove that the proposed development will not cause significant impacts on the aquifer quality or recharge.

Fish and Wildlife Conservation Areas

Classification and Designation: A fish and wildlife habitat conservation area must be designated as such if it possesses one or more of the following characteristics:

(1) Areas with which state-designated endangered, threatened, or sensitive species have primary association;

(2) Species and habitats of local importance;

(3) Naturally occurring ponds under twenty acres and their submerged aquatic beds that provide fish or wildlife habitat;

(4) Waters of the state;

(5) Lakes, ponds, streams, and rivers planted with game fish by a governmental entity;

(6) State natural area preserves and natural resource conservation areas;

(7) Unintentionally created ponds;

(8) Areas of rare plant species and high-quality ecosystems;

(9) State priority habitats and areas associated with state priority species; or

(10) Land useful or essential for preserving connections between habitat blocks and open spaces.

Regulatory Approaches

(1) Alterations. A habitat conservation area may be altered only if the proposed alteration of the habitat or the mitigation proposed does not degrade the quantitative and qualitative functions and values of the habitat. All new structures and land alterations are prohibited from habitat conservation areas, except in accordance with this ordinance.

(2) Nonindigenous Species. No plant, wildlife, or fish species not indigenous to the region may be introduced into a habitat conservation area unless authorized by a state or federal permit or approval.

(3) Approval of Activities. The [planning director] will condition approvals of activities allowed within or adjacent to a habitat conservation area or its buffers as necessary to minimize or mitigate any potential adverse impacts.

Conditions may include, but are not limited to, the following:

(a) Establishment of buffer zones;

(b) Preservation of critically important vegetation and habitat features;

(c) Limitation of access to the habitat area, including fencing to deter unauthorized access;

(d) Seasonal restriction of construction activities;

(e) Establishment of a duration and timetable for periodic review of mitigation activities; and

(f) Requirement of a performance bond, when necessary, to ensure completion and success of proposed mitigation.

(4) Mitigation

(a) Mitigation sites must be located to preserve or achieve contiguous wildlife habitat corridors in accordance with a mitigation plan that is part of an approved critical area report to minimize the isolating effects of development on habitat areas, so long as mitigation of aquatic habitat is located within the same

aquatic ecosystem as the area disturbed.

(b) Mitigation of alterations to habitat conservation areas must achieve equivalent or greater biologic and hydrologic functions and must include mitigation for adverse impacts upstream or downstream of the development proposal site. Mitigation must address each function affected by the alteration to achieve functional equivalency or improvement on a per function basis.

(5) Buffers

(a) The [board / administrative agent] will require the establishment of buffer areas for activities adjacent to habitat conservation areas when needed to protect habitat conservation areas. Buffers must consist of an undisturbed area of native vegetation or areas identified for restoration established to protect the integrity, functions, and values of the affected habitat. Required buffer widths must reflect the sensitivity of the habitat and the type and intensity of human activity proposed to be conducted nearby. Habitat conservation areas and their buffers must be preserved in perpetuity through the use of native growth protection areas and critical area tracts.

(b) When a species is more susceptible to adverse impacts during specific periods of the year, seasonal restrictions may apply. Larger buffers may be required, and activities may be further restricted during the specified season.

(c) The [board / administrative agent] may allow the recommended habitat-area buffer width to be reduced with a critical area report, only if:

(i) It will not reduce stream or habitat functions;

(ii) It will provide additional natural resource protection, such as buffer enhancement;

(iii) The total area contained in the buffer area after averaging is no less than that which would be contained within the standard buffer; and

(iv) The buffer area width is not reduced by more than 25 percent in any location.

Sources

- American Planning Associate Planning Advisory Services:
    - PAS 556 – Smart Codes: Model Land-Development Regulations – Critical Areas
    - PAS 558 – Planning for a New Energy and Climate Future
    - PAS 559 – Complete Streets: Best Policy and Implementation Practices
    - PAS 571 – Green Infrastructure: A Landscape Approach
    - PAS 584 – Subdivision Design and Flood Hazard Areas – No Adverse Impact
- Township of Berkeley – Bulkhead Ordinance
- City of Margate – Projections into Yard Areas Ordinance
- Township of Jackson – Tree Removal Ordinance
- NJDEP Model Flood Hazard Control Ordinance http://www.nj.gov/dep/floodcontrol/modelord.htm
- Native Plant Society of New Jersey http://www.npsnj.org/pages/nativeplants_Plant_Lists.html
- Green Infrastructure Guidance Manual for New Jersey, prepared by the Rutgers Cooperative Extension Water Resources Program. http://water.rutgers.edu/GreenInfrastructureGuidanceManual.html

Appendices

Appendix A: NJDEP Model Flood Hazard Control Ordinance

Appendix B: Green Infrastructure Engineering Standards

Appendix C: Native and Salt Resistant Plant Species for New Jersey

Appendix A: NJDEP Model Flood Hazard Control Ordinance

Purpose:

The following model ordinances provide examples for municipalities to use to update their flood damage prevention ordinances. These models are frequently updated by the New Jersey Department of Environmental Protection as new information becomes available.

The Model "D" ordinance below is appropriate for communities with mapped base flood elevations, designated floodways, and areas that have a 1% annual chance of flooding (100-year flood plain). These communities tend to be affected by riverine flooding.

The Model "E" ordinance is designed for communities that deal with areas that have mapped base flood elevations, a 1% annual chance of flooding, and are affected by flooding from the ocean and the damage risks associated with wave action.

The Model "D & E" ordinance is designed for communities that have mapped base flood elevations, a 1% chance of flooding, have designated floodways, and are affected by wave action and tidal flooding.

The nature of the flood hazard in the municipality based on best available mapping data should dictate which model is the appropriate basis for the municipal flood damage prevention ordinance. Within each model, the text highlighted in yellow is to customize the name of the municipality and other unique information, the text highlighted in green represents the baseline standards for the particular ordinance, and the text highlighted in blue represents heightened optional standards. Each community must assess its flood hazard risk and the need for more stringent standards.

Model Ordinance "D"

THE FLOOD DAMAGE PREVENTION ORDINANCE
(60.3) D
Required changes highlighted in GREEN
Optional higher standards highlighted in BLUE
Unique and to be reviewed data highlighted in YELLOW

SECTION 1.0
STATUTORY AUTHORIZATION, FINDINGS OF FACT, PURPOSE AND OBJECTIVES

1.1 STATUTORY AUTHORIZATION

The Legislature of the State of New Jersey has in N.J.S.A. 40:48-1,et seq., delegated the responsibility to local governmental units to adopt regulations designed to promote public health, safety, and general welfare of its citizenry. Therefore, the (governing body) of the (twp/city/boro) of (municipality) of (county) County, New Jersey does ordain as follows:

1.2 FINDINGS OF FACT

a) The flood hazard areas of the (twp/city/boro) of (municipality) are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.
b) These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazard which increase flood heights and velocities, and when inadequately anchored, causes damage in other areas. Uses that are inadequately floodproofed, elevated or otherwise protected from flood damage also contribute to the flood loss.

1.3 STATEMENT OF PURPOSE

It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

a) Protect human life and health;
b) Minimize expenditure of public money for costly flood control projects;
c) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
d) Minimize prolonged business interruptions;
e) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, bridges located in areas of special flood hazard;
f) Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;
g) Ensure that potential buyers are notified that property is in an area of special flood hazard; and
h) Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

1.4 METHODS OF REDUCING FLOOD LOSSES

In order to accomplish its purposes, this ordinance includes methods and provisions for:

a) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;

b) Requiring that uses vulnerable to floods including facilities which serve such uses, be protected against flood damage at the time of initial construction;
c) Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
d) Controlling filling, grading, dredging, and other development which may increase flood damage; and,
e) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

SECTION 2.0
DEFINITIONS

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

AO Zone- Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet.

AH Zone- Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown in this zone

Appeal — A request for a review of the (local administrator)'s interpretation of any provision of this ordinance or a request for a variance.

Area of Shallow Flooding — A designated AO or AH zone on a community's Digital Flood Insurance Rate Map (DFIRM) with a one percent annual or greater chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of Special Flood Hazard —Land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year. It is shown on the FIRM as Zone V, VE, V1-30, A, AO, A1-A30, AE, A99, or AH.

Base Flood —A flood having a one percent chance of being equaled or exceeded in any given year.

Base Flood Elevation (BFE) – The flood elevation shown on a published Flood Insurance Study (FIS) including the Flood Insurance Rate Map (FIRM). For zones AE, AH, AO, and A1-30 the elevation represents the water surface elevation resulting from a flood that has a 1-percent or greater chance of being equaled or exceeded in any given year.

Basement — Any area of the building having its floor subgrade (below ground level) on all sides.

Breakaway Wall — A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces without causing damage to the elevated portion of the building or supporting foundation system.

[optional – higher standard – cumulative losses/lower threshold – insert the following]

Cumulative Substantial Improvement *— Any reconstruction, rehabilitation, addition, or other improvement of a structure that equals or exceeds 50 percent [lower threshold – e.g.: replace 50 percent with 40 percent] of the market value of the structure at the time of the improvement or repair when counted cumulatively for 10 years.*

[optional – higher standard – cumulative losses/lower threshold – end]

Development — Any man made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials located within the area of special flood hazard.

Digital Flood Insurance Rate Map (DFIRM) — The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Elevated Building — A non-basement building (i) built, in the case of a building in an Area of Special Flood Hazard, to have the top of the elevated floor, elevated above the base flood elevation plus freeboard by means of piling, columns (posts and piers), or shear walls parallel to the flow of the water, and (ii) adequately anchored so as not to impair the structural integrity of the building during a flood up to the magnitude of the base flood. In an Area of Special Flood Hazard "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of flood waters.

Existing Manufactured Home Park or Subdivision — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

Flood or Flooding — A general and temporary condition of partial or complete inundation of normally dry land areas from:

a) The overflow of inland or tidal waters and/or
b) The unusual and rapid accumulation or runoff of surface waters from any source.

Flood Insurance Rate Map (FIRM) — The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Flood Insurance Study (FIS) — The official report in which the Federal Insurance Administration has provided flood profiles, as well as the Flood Insurance Rate Map(s) and the water surface elevation of the base flood.

Floodplain Management Regulations — Zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such State or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Floodproofing — Any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Floodway — The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without accumulatively increasing the water surface elevation more than 0.2 foot.

Freeboard — A factor of safety usually expressed in feet above a flood level for purposes of flood plain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Highest Adjacent Grade — The highest natural elevation of the ground surface prior to construction next to the proposed or existing walls of a structure.

Historic Structure — Any structure that is:

a) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
b) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;
c) Individually listed on a State inventory of historic places in States with historic preservation programs which have been approved by the Secretary of the Interior; or
d) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
    (1) By an approved State program as determined by the Secretary of the Interior; or
    (2) Directly by the Secretary of the Interior in States without approved programs.

Lowest Floor — The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for the parking of vehicles, building access or storage in an area other than a basement is not considered a building's lowest floor provided that such enclosure is not built so to render the structure in violation of other applicable non-elevation design requirements of 44 CFR Section 60.3.

Manufactured Home — A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

Manufactured Home Park or Manufactured Home Subdivision — A parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

New Construction — Structures for which the start of construction commenced on or after the effective date of a floodplain regulation adopted by a community and includes any subsequent improvements to such structures.

New Manufactured Home Park or Subdivision — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of the floodplain management regulations adopted by the municipality.

Recreational Vehicle — A vehicle which is [i] built on a single chassis; [ii] 400 square feet or less when measured at the longest horizontal projections; [iii] designed to be self-propelled or permanently towable by a light duty truck; and [iv] designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Start of Construction — (For other than new construction or substantial improvements under the Coastal Barrier Resources Act (P.L. No. 97-348)) includes substantial improvements and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site such as the pouring of a slab or footings, the installation of pilings, the construction of columns, or any work beyond the stage of excavation, or the placement of a manufactured home on a foundation.

Permanent construction does not include land preparation, such as clearing, grading and filling nor does it include the installation of streets and/or walkways, nor does it include excavation for a basement, footings or piers, or foundations or the erection of temporary forms, nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure — A walled and roofed building, a manufactured home, or a gas or liquid storage tank that is principally above ground.

[optional – higher standard – cumulative losses – replace Substantial Damage below with the following]

Substantial Damage *— Damage of any origin sustained by a structure whereby the cost of restoring the structure to it's before damaged condition would equal or exceed fifty (50) percent of the market value of the structure before the damage occurred. Substantial Damage also means flood-related damages sustained by a structure on two or more separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25 percent of the market valve of the structure before the damages occurred.*

[optional – higher standard – cumulative losses – end]

Substantial Damage — Damage of any origin sustained by a structure whereby the cost of restoring the structure to its condition before damage would equal or exceed fifty (50) percent ***[optional – higher standard – lower threshold – e.g.: replace 50 percent with 40 percent]*** of the market value of the structure before the damage occurred.

[optional – higher standard – cumulative losses – replace Substantial Improvement below with the following]

Substantial Improvement *— Any reconstruction, rehabilitation, addition, or other improvement of a structure during a 10-year period the cost of which equals or exceeds fifty (50) percent of the market value of the structure before the "start of construction" of the improvement. Substantial improvement also means "cumulative substantial improvement." This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed or "repetitive loss". The term does not, however, include either:*

(1) Any project for improvement of a structure to correct existing violations of State or local health, sanitary or safety code specifications which have been identified by the local code enforcement officer and which are the minimum necessary to assure safe living conditions; or

(2) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".

[optional – higher standard – cumulative losses – end]

Substantial Improvement — Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty (50) percent ***[optional – higher standard – lower threshold – e.g.: replace 50 percent with 40 percent]*** of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:

a) Any project for improvement of a structure to correct existing violations of State or local health, sanitary or safety code specifications which have been identified by the local code enforcement officer and which are the minimum necessary to assure safe living conditions; or

b) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".

Variance — A grant of relief from the requirements of this ordinance that permits construction in a manner that would otherwise be prohibited by this ordinance.

Violation — The failure of a structure or other development to be fully compliant with this ordinance. A new or substantially improved structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in 44 CFR §60.3(b)(5), (c)(4), (c)(10), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.

SECTION 3.0
GENERAL PROVISIONS

3.1 LANDS TO WHICH THIS ORDINANCE APPLIES

This ordinance shall apply to all areas of special flood hazards within the jurisdiction of the (twp/city/boro) of (municipality), (county) County, New Jersey.

3.2 BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD

The areas of special flood hazard for the (twp/city/boro) of (municipality), Community No. (comm ID D), are identified and defined on the following documents prepared by the Federal Emergency Management Agency:

a) A scientific and engineering report "Flood Insurance Study, (county) County, New Jersey (All Jurisdictions)" dated (effective date).
b) "Flood Insurance Rate Map for (county) County, New Jersey (All Jurisdictions)" as shown on Index and panel(s) (panels), whose effective date is (effective date).

The above documents are hereby adopted and declared to be a part of this ordinance. The Flood Insurance Study and maps are on file at (street address), (town), New Jersey.

3.3 PENALTIES FOR NONCOMPLIANCE

No structure or land shall hereafter be constructed, re-located to, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violation of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions) shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall upon conviction thereof be fined not more than [$_____] or imprisoned for not more than [____] days, or both, for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the (twp/city/boro) of (municipality), from taking such other lawful action as is necessary to prevent or remedy any violation.

3.4 ABROGATION AND GREATER RESTRICTIONS

This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and other ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

3.5 INTERPRETATION

In the interpretation and application of this ordinance, all provisions shall be:

a) Considered as minimum requirements;
b) Liberally construed in favor of the governing body; and,
c) Deemed neither to limit nor repeal any other powers granted under State statutes.

3.6 WARNING AND DISCLAIMER OF LIABILITY

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the area of special flood hazards or uses permitted within such areas will be free from flooding or flood damages.

This ordinance shall not create liability on the part of the (twp/city/boro) of (municipality), any officer or employee thereof or the Federal Insurance Administration, for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made thereunder.

SECTION 4.0
ADMINISTRATION

4.1 ESTABLISHMENT OF DEVELOPMENT PERMIT

A Development Permit shall be obtained before construction or development begins, including placement of manufactured homes, within any area of special flood hazard established in section 3.2. Application for a Development Permit shall be made on forms furnished by the (local administrator) and may include, but not be limited to; plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing. Specifically, the following information is required:

a) Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures;
b) Elevation in relation to mean sea level to which any structure has been floodproofed.
c) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in section 5.2-2; and,
d) Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

4.2 DESIGNATION OF THE LOCAL ADMINISTRATOR

The (local administrator) is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions.

4.3 DUTIES AND RESPONSIBILITIES OF THE ADMINISTRATOR

Duties of the (local administrator) shall include, but not be limited to:

4.3-1 PERMIT REVIEW

a) Review all development permits to determine that the permit requirements of this ordinance have been satisfied.
b) Review all development permits to determine that all necessary permits have been obtained from those Federal, State or local governmental agencies from which prior approval is required.
c) Review all development permits to determine if the proposed development is located in the floodway. If located in the floodway, assure that the encroachment provisions of 5.3 a) are met.

4.3-2 USE OF OTHER BASE FLOOD AND FLOODWAY DATA

When base flood elevation and floodway data has not been provided in accordance with section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, the (local administrator) shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, in order to administer sections 5.2-1, SPECIFIC STANDARDS, RESIDENTIAL CONSTRUCTION, and 5.2-2, SPECIFIC STANDARDS, NONRESIDENTIAL CONSTRUCTION.

4.3-3 INFORMATION TO BE OBTAINED AND MAINTAINED

a) Obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.
b) For all new or substantially improved floodproofed structures:
   i. verify and record the actual elevation (in relation to mean sea level); and
   ii. maintain the floodproofing certifications required in section 4.1 c).
c) Maintain for public inspection all records pertaining to the provisions of this ordinance.

4.3-4 ALTERATION OF WATERCOURSES

a) Notify adjacent communities and the New Jersey Department of Environmental Protection, Bureau of Flood Control and the Land Use Regulation Program prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration.
b) Require that maintenance is provided within the altered or relocated portion of said watercourse so the flood carrying capacity is not diminished.

4.3-5 SUBSTANTIAL DAMAGE REVIEW

a) After an event resulting in building damages, assess the damage to structures due to flood and non-flood causes.
b) Record and maintain the flood and non-flood damage of substantial damage structures and provide a letter of Substantial Damage Determination to the owner and the New Jersey Department of Environmental Protection, Bureau of Flood Control.
c) Ensure substantial improvements meet the requirements of sections 5.2-1, SPECIFIC STANDARDS, RESIDENTIAL CONSTRUCTION, 5.2-2, SPECIFIC STANDARDS, NONRESIDENTIAL CONSTRUCTION and 5.2-3, SPECIFIC STANDARDS, MANUFACTURED HOMES.

4.3-6 INTERPRETATION OF FIRM BOUNDARIES

Make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in section 4.4.

4.4 VARIANCE PROCEDURE

4.4-1 APPEAL BOARD

a) The (appeal board) as established by (governing body) shall hear and decide appeals and requests for variances from the requirements of this ordinance.
b) The (appeal board) shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the (local administrator) in the enforcement or administration of this ordinance.
c) Those aggrieved by the decision of the (appeal board), or any taxpayer, may appeal such decision to the (name of appropriate court), as provided in (statute).
d) In passing upon such applications, the (appeal board), shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and:
    i. the danger that materials may be swept onto other lands to the injury of others;
    ii. the danger to life and property due to flooding or erosion damage;
    iii. the susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
    iv. the importance of the services provided by the proposed facility to the community;
    v. the necessity to the facility of a waterfront location, where applicable;
    vi. the availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;
    vii. the compatibility of the proposed use with existing and anticipated development;

viii. the relationship of the proposed use to the comprehensive plan and floodplain management program of that area;
ix. the safety of access to the property in times of flood for ordinary and emergency vehicles;
x. the expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and,
xi. the costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

e) Upon consideration of the factors of section 4.4-1 d) and the purposes of this ordinance, the (appeal board) may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.
f) The (local administrator) shall maintain the records of all appeal actions, including technical information, and report any variances to the Federal Insurance Administration upon request.

4.4-2 CONDITIONS FOR VARIANCES

a) Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items i.-xi. in section 4.4-1 d) have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.
b) Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.
c) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
d) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
e) Variances shall only be issued upon:
i. A showing of good and sufficient cause;
ii. A determination that failure to grant the variance would result in exceptional hardship to the applicant; and,
iii. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in section 4.4- 1 d), or conflict with existing local laws or ordinances.
f) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

SECTION 5.0
PROVISIONS FOR FLOOD HAZARD REDUCTION

5.1 GENERAL STANDARDS

In all areas of special flood hazards, compliance with the applicable requirements of the Uniform Construction Code (N.J.A.C. 5:23) and the following standards, whichever is more restrictive, are required:

5.1-1 ANCHORING

a) All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.
b) All manufactured homes to be placed or substantially improved shall be anchored to resist flotation, collapse or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.

5.1-2 CONSTRUCTION MATERIALS AND METHODS

a) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
b) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

5.1-3 UTILITIES

a) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
b) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters;
c) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding; and
d) For all new construction and substantial improvements the electrical, heating, ventilation, plumbing and air-conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

5.1-4 SUBDIVISION PROPOSALS

a) All subdivision proposals and other proposed new development shall be consistent with the need to minimize flood damage;
b) All subdivision proposals and other proposed new development shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;
c) All subdivision proposals and other proposed new development shall have adequate drainage provided to reduce exposure to flood damage; and,
d) Base flood elevation data shall be provided for subdivision proposals and other proposed new development which contain at least fifty (50) lots or five (5) acres (whichever is less).

5.1-5 ENCLOSURE OPENINGS

All new construction and substantial improvements having fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria: A minimum of two (2) openings in at least two (2) exterior walls of each enclosed area, having a total net area of not less than one (1) square inch for every square foot of enclosed area subject

to flooding shall be provided. The bottom of all openings shall be no higher than one (1) foot above grade. Openings may be equipped with screens, louvers, or other covering or devices provided that they permit the automatic entry and exit of floodwaters.

5.2 SPECIFIC STANDARDS

In all areas of special flood hazards where base flood elevation data have been provided as set forth in section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD or in section 4.3-2, USE OF OTHER BASE FLOOD DATA, the following standards are required:

5.2-1 RESIDENTIAL CONSTRUCTION

a) New construction and substantial improvement of any residential structure located in an A or AE zone shall have the lowest floor, including basement together with the attendant utilities (including all electrical, heating, ventilating, air- conditioning and other service equipment) and sanitary facilities, elevated at or above the base flood elevation plus one (1) foot or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***;

b) Require within any AO or AH zone on the municipality's DFIRM that all new construction and substantial improvement of any residential structure shall have the lowest floor, including basement together with the attendant utilities and sanitary facilities, elevated above the depth number specified in feet plus one (1) foot, above the highest adjacent grade ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]*** (at least three (3) feet if no depth number is specified). And, require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

5.2-2 NONRESIDENTIAL CONSTRUCTION

In an Area of Special Flood Hazard, all new construction and substantial improvement of any commercial, industrial or other nonresidential structure located in an A or AE zone shall have the lowest floor, including basement together with the attendant utilities and sanitary facilities as well as all electrical, heating, ventilating, air-conditioning and other service equipment: either

a) Elevated to or above the base flood elevation plus one (1) foot or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***; and

b) Require within any AO or AH zone on the municipality's DFIRM to elevate above the depth number specified in feet plus one (1) foot, above the highest adjacent grade ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]*** (at least three (3) feet if no depth number is specified). And, require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures;

or

c) Be floodproofed so that below the base flood level plus one (1) foot or as required by ASCE/SEI 24-14, Table 6-1, whichever is more restrictive ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***, the structure is watertight with walls substantially impermeable to the passage of water;

d) Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and,

e) Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of this subsection. Such certification shall be provided to the official as set forth in section 4.3-3 b) ii.

5.2-3 MANUFACTURED HOMES

a) Manufactured homes shall be anchored in accordance with section 5.1-1 b).
b) All manufactured homes to be placed or substantially improved within an area of special flood hazard shall:
   i. Be consistent with the need to minimize flood damage,
   ii. Be constructed to minimize flood damage,
   iii. Have adequate drainage provided to reduce exposure to flood damage,
   iv. Be elevated on a permanent foundation such that the top of the lowest floor is at or above the base flood elevation plus one (1) foot or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive and; ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***.
   v. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.

5.3 FLOODWAYS

Located within areas of special flood hazard established in section 3.2 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, the following provisions apply:

a) Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless a technical evaluation demonstrates that encroachment shall not result in any increase in flood levels during the occurrence of the base flood discharge.
b) If section 5.3 a) is satisfied, all new construction and substantial improvements must comply with section 5.0 PROVISIONS FOR FLOOD HAZARD REDUCTION.
c) In all areas of special flood hazard in which base flood elevation data has been provided and no floodway has been designated, the accumulative effect of any proposed development, when combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than two-tenths (0.2) of a foot at any point.

SECTION 6.0
SEVERABILITY

If any section, subsection, paragraph, sentence, clause, or phrase of this Ordinance shall be declared invalid for any reason whatsoever, such a decision shall not affect the remaining portions of the Ordinance, which shall remain in full force and effect, and for this purpose the provisions of this Ordinance are hereby declared to be severable.

SECTION 7.0
ENACTMENT

7.01 ADOPTION

This Ordinance shall be effective on *(effective date)* and shall remain in force until modified, amended or rescinded by *(twp/city/boro) of (municipality), (county) County,* New Jersey.

ENACTED AND ADOPTED by the *[Board, Council, etc.]* this *[day]* day of *[month], [year]*.

ATTEST: *[Board, Council, etc.]* of the *(twp/city/boro) of (municipality),*

_____ By: _____
(twp/city/boro) of (municipality), Secretary *[Board, Council, etc.]* President

APPROVED, this [day] day of [month], [year], by the Mayor of [Name of Municipality]

ATTEST:

[Name of Municipality] Secretary Mayor_____

Model Ordinance "E"

THE FLOOD DAMAGE PREVENTION ORDINANCE

(60.3) E

Required changes highlighted in GREEN

Optional higher standards highlighted in BLUE

Unique and to be reviewed data highlighted in YELLOW

SECTION 1.0
STATUTORY AUTHORIZATION, FINDINGS OF FACT, PURPOSE AND OBJECTIVES

1.1 STATUTORY AUTHORIZATION

The Legislature of the State of New Jersey has in N.J.S.A. 40:48-1,et seq., delegated the responsibility to local governmental units to adopt regulations designed to promote public health, safety, and general welfare of its citizenry. Therefore, the (governing body) of the (twp/city/boro) of (municipality) of (county) County, New Jersey does ordain as follows:

1.2 FINDINGS OF FACT

a) The flood hazard areas of the (twp/city/boro) of (municipality) are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

b) These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazard which increase flood heights and velocities, and when inadequately anchored, causes damage in other areas. Uses that are inadequately floodproofed, elevated or otherwise protected from flood damage also contribute to the flood loss.

1.3 STATEMENT OF PURPOSE

It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

a) Protect human life and health;

b) Minimize expenditure of public money for costly flood control projects;

c) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;

d) Minimize prolonged business interruptions;

e) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, bridges located in areas of special flood hazard;

f) Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;

g) Ensure that potential buyers are notified that property is in an area of special flood hazard; and

h) Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

1.4 METHODS OF REDUCING FLOOD LOSSES

In order to accomplish its purposes, this ordinance includes methods and provisions for:

a) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;

b) Requiring that uses vulnerable to floods including facilities which serve such uses, be protected against flood damage at the time of initial construction;
c) Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
d) Controlling filling, grading, dredging, and other development which may increase flood damage; and,
e) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

SECTION 2.0
DEFINITIONS

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

AO Zone- Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet.

AH Zone- Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown in this zone

Appeal — A request for a review of the (local administrator)'s interpretation of any provision of this ordinance or a request for a variance.

Area of Shallow Flooding — A designated AO or AH zone on a community's Digital Flood Insurance Rate Map (DFIRM) with a one percent annual or greater chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of Special Flood Hazard —Land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year. It is shown on the FIRM as Zone V, VE, V1-30, A, AO, A1-A30, AE, A99, or AH.

Base Flood —A flood having a one percent chance of being equaled or exceeded in any given year.

Base Flood Elevation (BFE) – The flood elevation shown on a published Flood Insurance Study (FIS) including the Flood Insurance Rate Map (FIRM). For zones AE, AH, AO, and A1-30 the elevation represents the water surface elevation resulting from a flood that has a 1-percent or greater chance of being equaled or exceeded in any given year. For zones VE and V1-30 the elevation represents the stillwater elevation (SWEL) plus wave effect (BFE = SWEL + wave effect) resulting from a flood that has a 1-percent or greater chance of being equaled or exceeded in any given year.

Basement — Any area of the building having its floor subgrade (below ground level) on all sides.

Breakaway Wall — A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces without causing damage to the elevated portion of the building or supporting foundation system.

Coastal A Zone – The portion of the Special Flood Hazard Area (SFHA) starting from a Velocity (V) Zone and extending up to the landward Limit of the Moderate Wave Action delineation. Where no V Zone is mapped the Coastal A Zone is the portion between the open coast and the landward Limit of the Moderate Wave Action delineation. Coastal A Zones may be subject to wave effects, velocity flows, erosion, scour, or a combination of these forces. Construction and development in Coastal A Zones is to be regulated the same as V Zones/Coastal High Hazard Areas.

Coastal High Hazard Area — An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

[optional – higher standard – cumulative losses/lower threshold – insert the following]

Cumulative Substantial Improvement *— Any reconstruction, rehabilitation, addition, or other improvement of a structure that equals or exceeds 50 percent [lower threshold – e.g.: replace 50 percent with 40 percent] of the market value of the structure at the time of the improvement or repair when counted cumulatively for 10 years.*

[optional – higher standard – cumulative losses/lower threshold – end]

Development — Any man made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials located within the area of special flood hazard.

Digital Flood Insurance Rate Map (DFIRM) — The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Elevated Building — A non-basement building (i) built, in the case of a building in an Area of Special Flood Hazard, to have the top of the elevated floor or, in the case of a building in a Coastal High-Hazard Area or Coastal A Zone, to have the bottom of the lowest horizontal structural member of the elevated floor, elevated above the base flood elevation plus freeboard by means of piling, columns (posts and piers), or shear walls parallel to the flow of the water, and (ii) adequately anchored so as not to impair the structural integrity of the building during a flood up to the magnitude of the base flood. In an Area of Special Flood Hazard "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of flood waters. In Areas of Coastal High Hazard and Coastal A Zones "elevated buildings" also includes a building otherwise meeting the definition of "elevated building" even though the lower area is enclosed by means of breakaway walls.

Erosion — The process of gradual wearing away of land masses.

Existing Manufactured Home Park or Subdivision — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

Flood or Flooding — A general and temporary condition of partial or complete inundation of normally dry land areas from:

a) The overflow of inland or tidal waters and/or
b) The unusual and rapid accumulation or runoff of surface waters from any source.

Flood Insurance Rate Map (FIRM) — The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Flood Insurance Study (FIS) — The official report in which the Federal Insurance Administration has provided flood profiles, as well as the Flood Insurance Rate Map(s) and the water surface elevation of the base flood.

Floodplain Management Regulations — Zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such State or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Floodproofing — Any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Freeboard — A factor of safety usually expressed in feet above a flood level for purposes of flood plain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Highest Adjacent Grade — The highest natural elevation of the ground surface prior to construction next to the proposed or existing walls of a structure.

Historic Structure — Any structure that is:

a) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
b) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;
c) Individually listed on a State inventory of historic places in States with historic preservation programs which have been approved by the Secretary of the Interior; or
d) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
    (1) By an approved State program as determined by the Secretary of the Interior; or

(2) Directly by the Secretary of the Interior in States without approved programs.

Limit of Moderate Wave Action (LiMWA) – Inland limit of the area affected by waves greater than 1.5 feet during the Base Flood. Base Flood conditions between the V Zone and the LiMWA will be similar to, but less severe than those in the V Zone.

Lowest Floor — The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for the parking of vehicles, building access or storage in an area other than a basement is not considered a building's lowest floor provided that such enclosure is not built so to render the structure in violation of other applicable non-elevation design requirements of 44 CFR Section 60.3.

Manufactured Home — A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

Manufactured Home Park or Manufactured Home Subdivision — A parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

New Construction — Structures for which the start of construction commenced on or after the effective date of a floodplain regulation adopted by a community and includes any subsequent improvements to such structures.

New Manufactured Home Park or Subdivision — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of the floodplain management regulations adopted by the municipality.

Primary Frontal Dune — A continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves from coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from the relatively steep slope to a relatively mild slope.

Recreational Vehicle — A vehicle which is [i] built on a single chassis; [ii] 400 square feet or less when measured at the longest horizontal projections; [iii] designed to be self-propelled or permanently towable by a light duty truck; and [iv] designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Sand Dunes — Naturally occurring or man-made accumulations of sand in ridges or mounds landward of the beach.

Start of Construction — (For other than new construction or substantial improvements under the Coastal Barrier Resources Act (P.L. No. 97-348)) includes substantial improvements and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction

of a structure on a site such as the pouring of a slab or footings, the installation of pilings, the construction of columns, or any work beyond the stage of excavation, or the placement of a manufactured home on a foundation.

Permanent construction does not include land preparation, such as clearing, grading and filling nor does it include the installation of streets and/or walkways, nor does it include excavation for a basement, footings or piers, or foundations or the erection of temporary forms, nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure — A walled and roofed building, a manufactured home, or a gas or liquid storage tank that is principally above ground.

[optional – higher standard – cumulative losses – replace Substantial Damage below with the following]

Substantial Damage *— Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty (50) percent of the market value of the structure before the damage occurred. Substantial Damage also means flood-related damages sustained by a structure on two or more separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25 percent of the market valve of the structure before the damages occurred.*

[optional – higher standard – cumulative losses – end]

Substantial Damage — Damage of any origin sustained by a structure whereby the cost of restoring the structure to its condition before damage would equal or exceed fifty (50) percent ***[optional – higher standard – lower threshold – e.g.: replace 50 percent with 40 percent]*** of the market value of the structure before the damage occurred.

[optional – higher standard – cumulative losses – replace Substantial Improvement below with the following]

Substantial Improvement *— Any reconstruction, rehabilitation, addition, or other improvement of a structure during a 10-year period the cost of which equals or exceeds fifty (50) percent of the market value of the structure before the "start of construction" of the improvement. Substantial improvement also means "cumulative substantial improvement." This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed or "repetitive loss". The term does not, however, include either:*

(1) Any project for improvement of a structure to correct existing violations of State or local health, sanitary or safety code specifications which have been identified by the local code enforcement officer and which are the minimum necessary to assure safe living conditions; or

(2) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".

[optional – higher standard – cumulative losses – end]

Substantial Improvement — Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty (50) percent ***[optional – higher standard – lower threshold – e.g.: replace 50 percent with 40 percent]*** of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:

a) Any project for improvement of a structure to correct existing violations of State or local health, sanitary or safety code specifications which have been identified by the local code enforcement officer and which are the minimum necessary to assure safe living conditions; or

b) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".

Variance — A grant of relief from the requirements of this ordinance that permits construction in a manner that would otherwise be prohibited by this ordinance.

Violation — The failure of a structure or other development to be fully compliant with this ordinance. A new or substantially improved structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in 44 CFR §60.3(b)(5), (c)(4), (c)(10), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.

SECTION 3.0
GENERAL PROVISIONS

3.1 LANDS TO WHICH THIS ORDINANCE APPLIES

This ordinance shall apply to all areas of special flood hazards within the jurisdiction of the (twp/city/boro) of (municipality), (county) County, New Jersey.

3.2 BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD

The areas of special flood hazard for the (twp/city/boro) of (municipality), Community No. (comm ID E), are identified and defined on the following documents prepared by the Federal Emergency Management Agency:

a) A scientific and engineering report "Flood Insurance Study, (county) County, New Jersey (All Jurisdictions)" dated (effective date).

b) "Flood Insurance Rate Map for (county) County, New Jersey (All Jurisdictions)" as shown on Index and panel(s) (panels), whose effective date is (effective date).

The above documents are hereby adopted and declared to be a part of this ordinance. The Flood Insurance Study and maps are on file at (street address), (town), New Jersey.

3.3 PENALTIES FOR NONCOMPLIANCE

No structure or land shall hereafter be constructed, re-located to, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violation of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions) shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with

any of its requirements shall upon conviction thereof be fined not more than [$_____] or imprisoned for not more than [____] days, or both, for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the (twp/city/boro) of (municipality), from taking such other lawful action as is necessary to prevent or remedy any violation.

3.4 ABROGATION AND GREATER RESTRICTIONS

This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and other ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

3.5 INTERPRETATION

In the interpretation and application of this ordinance, all provisions shall be:

a) Considered as minimum requirements;
b) Liberally construed in favor of the governing body; and,
c) Deemed neither to limit nor repeal any other powers granted under State statutes.

3.6 WARNING AND DISCLAIMER OF LIABILITY

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the area of special flood hazards or uses permitted within such areas will be free from flooding or flood damages.

This ordinance shall not create liability on the part of the (twp/city/boro) of (municipality), any officer or employee thereof or the Federal Insurance Administration, for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made thereunder.

SECTION 4.0
ADMINISTRATION

4.1 ESTABLISHMENT OF DEVELOPMENT PERMIT

A Development Permit shall be obtained before construction or development begins, including placement of manufactured homes, within any area of special flood hazard established in section 3.2. Application for a Development Permit shall be made on forms furnished by the (local administrator) and may include, but not be limited to; plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing. Specifically, the following information is required:

a) Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures;
b) Elevation in relation to mean sea level to which any structure has been floodproofed.
c) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in section 5.2-2; and,
d) Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

4.2 DESIGNATION OF THE LOCAL ADMINISTRATOR

The (local administrator) is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions.

4.3 DUTIES AND RESPONSIBILITIES OF THE ADMINISTRATOR

Duties of the (local administrator) shall include, but not be limited to:

4.3-1 PERMIT REVIEW

a) Review all development permits to determine that the permit requirements of this ordinance have been satisfied.
b) Review all development permits to determine that all necessary permits have been obtained from those Federal, State or local governmental agencies from which prior approval is required.
c) Review all development permits in the coastal high hazard and Coastal A Zone area to determine if the proposed development alters sand dunes or other natural coastal protections so as to increase potential flood damage.
d) Review plans for walls to be used to enclose space below the base flood level in accordance with section 5.3-2 d).

4.3-2 USE OF OTHER BASE FLOOD DATA

When base flood elevation data has not been provided in accordance with section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, the (local administrator) shall obtain, review, and reasonably utilize any base flood elevation data available from a Federal, State or other source, in order to administer sections 5.2-1, SPECIFIC STANDARDS, RESIDENTIAL CONSTRUCTION, and 5.2-2, SPECIFIC STANDARDS, NONRESIDENTIAL CONSTRUCTION.

4.3-3 INFORMATION TO BE OBTAINED AND MAINTAINED

a) Obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.
b) For all new or substantially improved floodproofed structures:
   i. verify and record the actual elevation (in relation to mean sea level); and
   ii. maintain the floodproofing certifications required in section 4.1 c).
c) In coastal high hazard and Coastal A Zone areas, certification shall be obtained from a registered professional engineer or architect that the provisions of 5.3-2 a) and 5.3-2 b) i. and ii. are met.
d) Maintain for public inspection all records pertaining to the provisions of this ordinance.

4.3-4 ALTERATION OF WATERCOURSES

a) Notify adjacent communities and the New Jersey Department of Environmental Protection, Bureau of Flood Control and the Land Use Regulation Program prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration.
b) Require that maintenance is provided within the altered or relocated portion of said watercourse so the flood carrying capacity is not diminished.

4.3-5 SUBSTANTIAL DAMAGE REVIEW

a) After an event resulting in building damages, assess the damage to structures due to flood and non-flood causes.

b) Record and maintain the flood and non-flood damage of substantial damage structures and provide a letter of Substantial Damage Determination to the owner and the New Jersey Department of Environmental Protection, Bureau of Flood Control.
c) Ensure substantial improvements meet the requirements of sections 5.2-1, SPECIFIC STANDARDS, RESIDENTIAL CONSTRUCTION, 5.2-2, SPECIFIC STANDARDS, NONRESIDENTIAL CONSTRUCTION and 5.2-3, SPECIFIC STANDARDS, MANUFACTURED HOMES.

4.3-6 INTERPRETATION OF FIRM BOUNDARIES

Make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in section 4.4.

4.4 VARIANCE PROCEDURE

4.4-1 APPEAL BOARD

a) The (appeal board) as established by (governing body) shall hear and decide appeals and requests for variances from the requirements of this ordinance.
b) The (appeal board) shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the (local administrator) in the enforcement or administration of this ordinance.
c) Those aggrieved by the decision of the (appeal board), or any taxpayer, may appeal such decision to the (name of appropriate court), as provided in (statute).
d) In passing upon such applications, the (appeal board), shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and:
   i. the danger that materials may be swept onto other lands to the injury of others;
   ii. the danger to life and property due to flooding or erosion damage;
   iii. the susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
   iv. the importance of the services provided by the proposed facility to the community;
   v. the necessity to the facility of a waterfront location, where applicable;
   vi. the availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;
   vii. the compatibility of the proposed use with existing and anticipated development;
   viii. the relationship of the proposed use to the comprehensive plan and floodplain management program of that area;
   ix. the safety of access to the property in times of flood for ordinary and emergency vehicles;
   x. the expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and,
   xi. the costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.
e) Upon consideration of the factors of section 4.4-1 d) and the purposes of this ordinance, the (appeal board) may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.

f) The (local administrator) shall maintain the records of all appeal actions, including technical information, and report any variances to the Federal Insurance Administration upon request.

4.4-2 CONDITIONS FOR VARIANCES

a) Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items i.-xi. in section 4.4-1 d) have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.

b) Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.

c) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.

d) Variances shall only be issued upon:

i. A showing of good and sufficient cause;

ii. A determination that failure to grant the variance would result in exceptional hardship to the applicant; and,

iii. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in section 4.4- 1 d), or conflict with existing local laws or ordinances.

e) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

SECTION 5.0
PROVISIONS FOR FLOOD HAZARD REDUCTION

5.1 GENERAL STANDARDS

In all areas of special flood hazards, compliance with the applicable requirements of the Uniform Construction Code (N.J.A.C. 5:23) and the following standards, whichever is more restrictive, are required:

5.1-1 ANCHORING

a) All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.

b) All manufactured homes to be placed or substantially improved shall be anchored to resist flotation, collapse or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.

5.1-2 CONSTRUCTION MATERIALS AND METHODS

a) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.

b) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

5.1-3 UTILITIES

a) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
b) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters;
c) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding; and
d) For all new construction and substantial improvements the electrical, heating, ventilation, plumbing and air-conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

5.1-4 SUBDIVISION PROPOSALS

a) All subdivision proposals and other proposed new development shall be consistent with the need to minimize flood damage;
b) All subdivision proposals and other proposed new development shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;
c) All subdivision proposals and other proposed new development shall have adequate drainage provided to reduce exposure to flood damage; and,
d) Base flood elevation data shall be provided for subdivision proposals and other proposed new development which contain at least fifty (50) lots or five (5) acres (whichever is less).

5.1-5 ENCLOSURE OPENINGS

All new construction and substantial improvements having fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria: A minimum of two (2) openings in at least two (2) exterior walls of each enclosed area, having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one (1) foot above grade. Openings may be equipped with screens, louvers, or other covering or devices provided that they permit the automatic entry and exit of floodwaters.

5.2 SPECIFIC STANDARDS

In all areas of special flood hazards where base flood elevation data have been provided as set forth in section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD or in section 4.3-2, USE OF OTHER BASE FLOOD DATA, the following standards are required:

5.2-1 RESIDENTIAL CONSTRUCTION

a) For Coastal A Zone construction see section 5.3 COASTAL HIGH HAZARD AREA AND COASTAL A ZONE.

b) New construction and substantial improvement of any residential structure located in an A or AE zone shall have the lowest floor, including basement together with the attendant utilities (including all electrical, heating, ventilating, air- conditioning and other service equipment) and sanitary facilities, elevated at or above the base flood elevation plus one (1) foot or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]*****;**

c) Require within any AO or AH zone on the municipality's DFIRM that all new construction and substantial improvement of any residential structure shall have the lowest floor, including basement together with the attendant utilities and sanitary facilities, elevated above the depth number specified in feet plus one (1) foot, above the highest adjacent grade ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]*** (at least three (3) feet if no depth number is specified). And, require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

5.2-2 NONRESIDENTIAL CONSTRUCTION

In an Area of Special Flood Hazard, all new construction and substantial improvement of any commercial, industrial or other nonresidential structure located in an A or AE zone (for Coastal A Zone construction see section 5.3 COASTAL HIGH HAZARD AREA AND COASTAL A ZONE) shall have the lowest floor, including basement together with the attendant utilities and sanitary facilities as well as all electrical, heating, ventilating, air-conditioning and other service equipment:

either

a) Elevated to or above the base flood elevation plus one (1) foot or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***; and

b) Require within any AO or AH zone on the municipality's DFIRM to elevate above the depth number specified in feet plus one (1) foot, above the highest adjacent grade ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]*** (at least three (3) feet if no depth number is specified). And, require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures;

or

c) Be floodproofed so that below the base flood level plus one (1) foot or as required by ASCE/SEI 24-14, Table 6-1, whichever is more restrictive ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***, the structure is watertight with walls substantially impermeable to the passage of water;

d) Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and,

e) Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of this subsection. Such certification shall be provided to the official as set forth in section 4.3-3 b) ii.

5.2-3 MANUFACTURED HOMES

a) Manufactured homes shall be anchored in accordance with section 5.1-1 b).

b) All manufactured homes to be placed or substantially improved within an area of special flood hazard shall:

i. Be consistent with the need to minimize flood damage,

ii. Be constructed to minimize flood damage,
iii. Have adequate drainage provided to reduce exposure to flood damage;
iv. Be elevated on a permanent foundation such that the top of the lowest floor is at or above the base flood elevation plus one (1) foot or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive; and, ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***.
v. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.

5.3 COASTAL HIGH HAZARD AREA AND COASTAL A ZONE

Coastal high hazard areas (V or VE Zones) and coastal A Zones are located within the areas of special flood hazard established in section 3.2. These areas have special flood hazards associated with high velocity waters from tidal surges and hurricane wave wash; therefore, the following provisions shall apply:

5.3-1 LOCATION OF STRUCTURES

a) All buildings or structures shall be located landward of the reach of the mean high tide.
b) The placement of manufactured homes shall be prohibited, except in an existing manufactured home park or subdivision.

5.3-2 CONSTRUCTION METHODS

a) ELEVATION

All new construction and substantial improvements shall be elevated on piling or columns so that:

i. The bottom of the lowest horizontal structural member of the lowest floor (excluding the piling or columns) is elevated to or above the base flood elevation plus one (1) foot. ***[optional freeboard standard – replace "one (1) foot" with two (2) feet or three (3) feet]*** or as required by ASCE/SEI 24-14, Table 4-1, whichever is more restrictive,
ii. All electrical, heating, ventilating, air-conditioning, mechanical equipment and other equipment servicing the building is elevated one (1) foot above the base flood elevation, ***[optional freeboard standard – replace "one (1) foot" with two (2) feet or three (3) feet]*** and
iii. With all space below the lowest floor's supporting member open so as not to impede the flow of water, except for breakaway walls as provided or in section 5.3-2 d).

b) STRUCTURAL SUPPORT

i. All new construction and substantial improvements shall be securely anchored on piling or columns.
ii. The pile or column foundation and structure attached thereto shall be anchored to resist flotation, collapse or lateral movement due to the effects of wind and water loading values each of which shall have a one percent chance of being equaled or exceeded in any given year (100-year mean recurrence interval).
iii. Prohibit the use of fill for structural support of buildings within Zones V1-30, VE, V, and Coastal A on the community's FIRM.

c) CERTIFICATION

A registered professional engineer or architect shall develop or review the structural design specifications and plans for the construction and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for compliance with the provisions of section 5.3-2 a) and 5.3-2 b) i. and ii.

d) SPACE BELOW THE LOWEST FLOOR

i. Any alteration, repair, reconstruction or improvement to a structure started after the enactment of this ordinance shall not enclose the space below the lowest floor unless breakaway walls, open wood lattice-work or insect screening are used as provided for in this section.

ii. Breakaway walls, open wood lattice-work or insect screening shall be allowed below the base flood elevation provided that they are intended to collapse under wind and water loads without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Breakaway walls shall be designed for a safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional engineer or architect certifies that the designs proposed meet the following conditions.

(i) breakaway wall collapse shall result from a water load less than that which would occur during the base flood and,

(ii) the elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement or other structural damage due to the effects of wind and water load acting simultaneously on all building components (structural and non-structural). Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards.

iii. If breakaway walls are utilized, such enclosed space shall be used solely for parking of vehicles, building access, or storage and not for human habitation.

iv. Prior to construction, plans for any breakaway wall must be submitted to the Construction Code Official or Building Sub-Code Official for approval.

5.3-3 SAND DUNES

Prohibit man-made alteration of sand dunes within Coastal A Zones, VE and V Zones on the community's DFIRM which would increase potential flood damage.

SECTION 6.0
SEVERABILITY

If any section, subsection, paragraph, sentence, clause, or phrase of this Ordinance shall be declared invalid for any reason whatsoever, such a decision shall not affect the remaining portions of the Ordinance, which shall remain in full force and effect, and for this purpose the provisions of this Ordinance are hereby declared to be severable.

SECTION 7.0
ENACTMENT

7.01 ADOPTION

This Ordinance shall be effective on *(effective date)* and shall remain in force until modified, amended or rescinded by *(twp/city/boro) of (municipality), (county) County,* New Jersey.

ENACTED AND ADOPTED by the *[Board, Council, etc.]* this *[day]* day of *[month], [year]*.

ATTEST: *[Board, Council, etc.]* of the *(twp/city/boro) of (municipality),*

_____ By: _____
(twp/city/boro) of (municipality), Secretary *[Board, Council, etc.]* President

APPROVED, this [day] day of [month], [year], by the Mayor of [Name of Municipality]

ATTEST:

[Name of Municipality] Secretary Mayor_____

THE FLOOD DAMAGE PREVENTION ORDINANCE

(60.3) D&E

Required changes highlighted in GREEN

Optional higher standards highlighted in BLUE

Unique and to be reviewed data highlighted in YELLOW

SECTION 1.0
STATUTORY AUTHORIZATION, FINDINGS OF FACT, PURPOSE AND OBJECTIVES

1.1 STATUTORY AUTHORIZATION

The Legislature of the State of New Jersey has in N.J.S.A. 40:48-1,et seq., delegated the responsibility to local governmental units to adopt regulations designed to promote public health, safety, and general welfare of its citizenry. Therefore, the (governing body) of the (twp/city/boro) of (municipality) of (county) County, New Jersey does ordain as follows:

1.2 FINDINGS OF FACT

a) The flood hazard areas of the (twp/city/boro) of (municipality) are subject to periodic inundation which results in loss of life and property, health and safety hazards, disruption of commerce and governmental services, extraordinary public expenditures for flood protection and relief, and impairment of the tax base, all of which adversely affect the public health, safety, and general welfare.

b) These flood losses are caused by the cumulative effect of obstructions in areas of special flood hazard which increase flood heights and velocities, and when inadequately anchored, causes damage in other areas. Uses that are inadequately floodproofed, elevated or otherwise protected from flood damage also contribute to the flood loss.

1.3 STATEMENT OF PURPOSE

It is the purpose of this ordinance to promote the public health, safety, and general welfare, and to minimize public and private losses due to flood conditions in specific areas by provisions designed to:

a) Protect human life and health;
b) Minimize expenditure of public money for costly flood control projects;
c) Minimize the need for rescue and relief efforts associated with flooding and generally undertaken at the expense of the general public;
d) Minimize prolonged business interruptions;
e) Minimize damage to public facilities and utilities such as water and gas mains, electric, telephone and sewer lines, streets, bridges located in areas of special flood hazard;
f) Help maintain a stable tax base by providing for the sound use and development of areas of special flood hazard so as to minimize future flood blight areas;
g) Ensure that potential buyers are notified that property is in an area of special flood hazard; and
h) Ensure that those who occupy the areas of special flood hazard assume responsibility for their actions.

1.4 METHODS OF REDUCING FLOOD LOSSES

In order to accomplish its purposes, this ordinance includes methods and provisions for:

a) Restricting or prohibiting uses which are dangerous to health, safety, and property due to water or erosion hazards, or which result in damaging increases in erosion or in flood heights or velocities;

b) Requiring that uses vulnerable to floods including facilities which serve such uses, be protected against flood damage at the time of initial construction;
c) Controlling the alteration of natural floodplains, stream channels, and natural protective barriers, which help accommodate or channel flood waters;
d) Controlling filling, grading, dredging, and other development which may increase flood damage; and,
e) Preventing or regulating the construction of flood barriers which will unnaturally divert flood waters or which may increase flood hazards in other areas.

SECTION 2.0
DEFINITIONS

Unless specifically defined below, words or phrases used in this ordinance shall be interpreted so as to give them the meaning they have in common usage and to give this ordinance its most reasonable application.

AO Zone- Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet.

AH Zone- Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown in this zone

Appeal — A request for a review of the (local administrator)'s interpretation of any provision of this ordinance or a request for a variance.

Area of Shallow Flooding — A designated AO or AH zone on a community's Digital Flood Insurance Rate Map (DFIRM) with a one percent annual or greater chance of flooding to an average depth of one to three feet where a clearly defined channel does not exist, where the path of flooding is unpredictable and where velocity flow may be evident. Such flooding is characterized by ponding or sheet flow.

Area of Special Flood Hazard —Land in the floodplain within a community subject to a one percent or greater chance of flooding in any given year. It is shown on the FIRM as Zone V, VE, V1-30, A, AO, A1-A30, AE, A99, or AH.

Base Flood —A flood having a one percent chance of being equaled or exceeded in any given year.

Base Flood Elevation (BFE) – The flood elevation shown on a published Flood Insurance Study (FIS) including the Flood Insurance Rate Map (FIRM). For zones AE, AH, AO, and A1-30 the elevation represents the water surface elevation resulting from a flood that has a 1-percent or greater chance of being equaled or exceeded in any given year. For zones VE and V1-30 the elevation represents the stillwater elevation (SWEL) plus wave effect (BFE = SWEL + wave effect) resulting from a flood that has a 1-percent or greater chance of being equaled or exceeded in any given year.

Basement — Any area of the building having its floor subgrade (below ground level) on all sides.

Breakaway Wall — A wall that is not part of the structural support of the building and is intended through its design and construction to collapse under specific lateral loading forces without causing damage to the elevated portion of the building or supporting foundation system.

Coastal A Zone – The portion of the Special Flood Hazard Area (SFHA) starting from a Velocity (V) Zone and extending up to the landward Limit of the Moderate Wave Action delineation. Where no V Zone is mapped the Coastal A Zone is the portion between the open coast and the landward Limit of the Moderate Wave Action delineation. Coastal A Zones may be subject to wave effects, velocity flows, erosion, scour, or a combination of these forces. Construction and development in Coastal A Zones is to be regulated the same as V Zones/Coastal High Hazard Areas.

Coastal High Hazard Area — An area of special flood hazard extending from offshore to the inland limit of a primary frontal dune along an open coast and any other area subject to high velocity wave action from storms or seismic sources.

[optional – higher standard – cumulative losses/lower threshold – insert the following]

Cumulative Substantial Improvement *— Any reconstruction, rehabilitation, addition, or other improvement of a structure that equals or exceeds 50 percent [lower threshold – e.g.: replace 50 percent with 40 percent] of the market value of the structure at the time of the improvement or repair when counted cumulatively for 10 years.*

[optional – higher standard – cumulative losses/lower threshold – end]

Development — Any man made change to improved or unimproved real estate, including but not limited to buildings or other structures, mining, dredging, filling, grading, paving, excavation or drilling operations, or storage of equipment or materials located within the area of special flood hazard.

Digital Flood Insurance Rate Map (DFIRM) — The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Elevated Building — A non-basement building (i) built, in the case of a building in an Area of Special Flood Hazard, to have the top of the elevated floor or, in the case of a building in a Coastal High-Hazard Area or Coastal A Zone, to have the bottom of the lowest horizontal structural member of the elevated floor, elevated above the base flood elevation plus freeboard by means of piling, columns (posts and piers), or shear walls parallel to the flow of the water, and (ii) adequately anchored so as not to impair the structural integrity of the building during a flood up to the magnitude of the base flood. In an Area of Special Flood Hazard "elevated building" also includes a building elevated by means of fill or solid foundation perimeter walls with openings sufficient to facilitate the unimpeded movement of flood waters. In Areas of Coastal High Hazard and Coastal A Zones "elevated buildings" also includes a building otherwise meeting the definition of "elevated building" even though the lower area is enclosed by means of breakaway walls.

Erosion — The process of gradual wearing away of land masses.

Existing Manufactured Home Park or Subdivision — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including, at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed before the effective date of the floodplain management regulations adopted by a community.

Flood or Flooding — A general and temporary condition of partial or complete inundation of normally dry land areas from:

a) The overflow of inland or tidal waters and/or
b) The unusual and rapid accumulation or runoff of surface waters from any source.

Flood Insurance Rate Map (FIRM) — The official map on which the Federal Insurance Administration has delineated both the areas of special flood hazards and the risk premium zones applicable to the community.

Flood Insurance Study (FIS) — The official report in which the Federal Insurance Administration has provided flood profiles, as well as the Flood Insurance Rate Map(s) and the water surface elevation of the base flood.

Floodplain Management Regulations — Zoning ordinances, subdivision regulations, building codes, health regulations, special purpose ordinances (such as a floodplain ordinance, grading ordinance and erosion control ordinance) and other applications of police power. The term describes such State or local regulations, in any combination thereof, which provide standards for the purpose of flood damage prevention and reduction.

Floodproofing — Any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage to real estate or improved real property, water and sanitary facilities, structures and their contents.

Floodway — The channel of a river or other watercourse and the adjacent land areas that must be reserved in order to discharge the base flood without accumulatively increasing the water surface elevation more than 0.2 foot.

Freeboard — A factor of safety usually expressed in feet above a flood level for purposes of flood plain management. "Freeboard" tends to compensate for the many unknown factors that could contribute to flood heights greater than the height calculated for a selected size flood and floodway conditions, such as wave action, bridge openings, and the hydrological effect of urbanization of the watershed.

Highest Adjacent Grade — The highest natural elevation of the ground surface prior to construction next to the proposed or existing walls of a structure.

Historic Structure — Any structure that is:

a) Listed individually in the National Register of Historic Places (a listing maintained by the Department of Interior) or preliminarily determined by the Secretary of the Interior as meeting the requirements for individual listing on the National Register;
b) Certified or preliminarily determined by the Secretary of the Interior as contributing to the historical significance of a registered historic district or a district preliminarily determined by the Secretary to qualify as a registered historic district;

c) Individually listed on a State inventory of historic places in States with historic preservation programs which have been approved by the Secretary of the Interior; or
d) Individually listed on a local inventory of historic places in communities with historic preservation programs that have been certified either:
    (1) By an approved State program as determined by the Secretary of the Interior; or
    (2) Directly by the Secretary of the Interior in States without approved programs.

Limit of Moderate Wave Action (LiMWA) – Inland limit of the area affected by waves greater than 1.5 feet during the Base Flood. Base Flood conditions between the V Zone and the LiMWA will be similar to, but less severe than those in the V Zone.

Lowest Floor — The lowest floor of the lowest enclosed area (including basement). An unfinished or flood resistant enclosure, usable solely for the parking of vehicles, building access or storage in an area other than a basement is not considered a building's lowest floor provided that such enclosure is not built so to render the structure in violation of other applicable non-elevation design requirements of 44 CFR Section 60.3.

Manufactured Home — A structure, transportable in one or more sections, which is built on a permanent chassis and is designed for use with or without a permanent foundation when attached to the required utilities. The term "manufactured home" does not include a "recreational vehicle".

Manufactured Home Park or Manufactured Home Subdivision — A parcel (or contiguous parcels) of land divided into two (2) or more manufactured home lots for rent or sale.

New Construction — Structures for which the start of construction commenced on or after the effective date of a floodplain regulation adopted by a community and includes any subsequent improvements to such structures.

New Manufactured Home Park or Subdivision — A manufactured home park or subdivision for which the construction of facilities for servicing the lots on which the manufactured homes are to be affixed (including at a minimum, the installation of utilities, the construction of streets, and either final site grading or the pouring of concrete pads) is completed on or after the effective date of the floodplain management regulations adopted by the municipality.

Primary Frontal Dune — A continuous or nearly continuous mound or ridge of sand with relatively steep seaward and landward slopes immediately landward and adjacent to the beach and subject to erosion and overtopping from high tides and waves from coastal storms. The inland limit of the primary frontal dune occurs at the point where there is a distinct change from the relatively steep slope to a relatively mild slope.

Recreational Vehicle — A vehicle which is [i] built on a single chassis; [ii] 400 square feet or less when measured at the longest horizontal projections; [iii] designed to be self-propelled or permanently towable by a light duty truck; and [iv] designed primarily not for use as a permanent dwelling but as temporary living quarters for recreational, camping, travel, or seasonal use.

Sand Dunes — Naturally occurring or man-made accumulations of sand in ridges or mounds landward of the beach.

Start of Construction — (For other than new construction or substantial improvements under the Coastal Barrier Resources Act (P.L. No. 97-348)) includes substantial improvements and means the date the building permit was issued, provided the actual start of construction, repair, reconstruction, rehabilitation, addition, placement, or other improvement was within 180 days of the permit date. The actual start means either the first placement of permanent construction of a structure on a site such as the pouring of a slab or footings, the installation of pilings, the construction of columns, or any work beyond the stage of excavation, or the placement of a manufactured home on a foundation.

Permanent construction does not include land preparation, such as clearing, grading and filling nor does it include the installation of streets and/or walkways, nor does it include excavation for a basement, footings or piers, or foundations or the erection of temporary forms, nor does it include the installation on the property of accessory buildings, such as garages or sheds not occupied as dwelling units or not part of the main structure. For a substantial improvement, the actual start of construction means the first alteration of any wall, ceiling, floor, or other structural part of a building, whether or not that alteration affects the external dimensions of the building.

Structure — A walled and roofed building, a manufactured home, or a gas or liquid storage tank that is principally above ground.

[optional – higher standard – cumulative losses – replace Substantial Damage below with the following]

Substantial Damage *— Damage of any origin sustained by a structure whereby the cost of restoring the structure to its before damaged condition would equal or exceed fifty (50) percent of the market value of the structure before the damage occurred. Substantial Damage also means flood-related damages sustained by a structure on two or more separate occasions during a 10-year period for which the cost of repairs at the time of each such flood event, on the average, equals or exceeds 25 percent of the market valve of the structure before the damages occurred.*

[optional – higher standard – cumulative losses – end]

Substantial Damage — Damage of any origin sustained by a structure whereby the cost of restoring the structure to its condition before damage would equal or exceed fifty (50) percent ***[optional – higher standard – lower threshold – e.g.: replace 50 percent with 40 percent]*** of the market value of the structure before the damage occurred.

[optional – higher standard – cumulative losses – replace Substantial Improvement below with the following]

Substantial Improvement *— Any reconstruction, rehabilitation, addition, or other improvement of a structure during a 10-year period the cost of which equals or exceeds fifty (50) percent of the market value of the structure before the "start of construction" of the improvement. Substantial improvement also means "cumulative substantial improvement." This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed or "repetitive loss". The term does not, however, include either:*

(1) Any project for improvement of a structure to correct existing violations of State or local health, sanitary or safety code specifications which have been identified by the local code enforcement officer and which are the minimum necessary to assure safe living conditions; or
(2) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".

[optional – higher standard – cumulative losses – end]

Substantial Improvement — Any reconstruction, rehabilitation, addition, or other improvement of a structure, the cost of which equals or exceeds fifty (50) percent ***[optional – higher standard – lower threshold – e.g.: replace 50 percent with 40 percent]*** of the market value of the structure before the "start of construction" of the improvement. This term includes structures which have incurred "substantial damage", regardless of the actual repair work performed. The term does not, however, include either:

a) Any project for improvement of a structure to correct existing violations of State or local health, sanitary or safety code specifications which have been identified by the local code enforcement officer and which are the minimum necessary to assure safe living conditions; or
b) Any alteration of a "historic structure", provided that the alteration will not preclude the structure's continued designation as a "historic structure".

Variance — A grant of relief from the requirements of this ordinance that permits construction in a manner that would otherwise be prohibited by this ordinance.

Violation — The failure of a structure or other development to be fully compliant with this ordinance. A new or substantially improved structure or other development without the elevation certificate, other certifications, or other evidence of compliance required in 44 CFR §60.3(b)(5), (c)(4), (c)(10), (e)(2), (e)(4), or (e)(5) is presumed to be in violation until such time as that documentation is provided.

SECTION 3.0
GENERAL PROVISIONS

3.1 LANDS TO WHICH THIS ORDINANCE APPLIES

This ordinance shall apply to all areas of special flood hazards within the jurisdiction of the (twp/city/boro) of (municipality), (county) County, New Jersey.

3.2 BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD

The areas of special flood hazard for the (twp/city/boro) of (municipality), Community No. (comm ID D&E), are identified and defined on the following documents prepared by the Federal Emergency Management Agency:

a) A scientific and engineering report "Flood Insurance Study, (county) County, New Jersey (All Jurisdictions)" dated (effective date).
b) "Flood Insurance Rate Map for (county) County, New Jersey (All Jurisdictions)" as shown on Index and panel(s) (panels), whose effective date is (effective date).

The above documents are hereby adopted and declared to be a part of this ordinance. The Flood Insurance Study and maps are on file at (street address), (town), New Jersey.

3.3 PENALTIES FOR NONCOMPLIANCE

No structure or land shall hereafter be constructed, re-located to, extended, converted, or altered without full compliance with the terms of this ordinance and other applicable regulations. Violation of the provisions of this ordinance by failure to comply with any of its requirements (including violations of conditions and safeguards established in connection with conditions) shall constitute a misdemeanor. Any person who violates this ordinance or fails to comply with any of its requirements shall upon conviction thereof be fined not more than [$_____] or imprisoned for not more than [____] days, or both, for each violation, and in addition shall pay all costs and expenses involved in the case. Nothing herein contained shall prevent the (twp/city/boro) of (municipality), from taking such other lawful action as is necessary to prevent or remedy any violation.

3.4 ABROGATION AND GREATER RESTRICTIONS

This ordinance is not intended to repeal, abrogate, or impair any existing easements, covenants, or deed restrictions. However, where this ordinance and other ordinance, easement, covenant, or deed restriction conflict or overlap, whichever imposes the more stringent restrictions shall prevail.

3.5 INTERPRETATION

In the interpretation and application of this ordinance, all provisions shall be:

a) Considered as minimum requirements;
b) Liberally construed in favor of the governing body; and,
c) Deemed neither to limit nor repeal any other powers granted under State statutes.

3.6 WARNING AND DISCLAIMER OF LIABILITY

The degree of flood protection required by this ordinance is considered reasonable for regulatory purposes and is based on scientific and engineering considerations. Larger floods can and will occur on rare occasions. Flood heights may be increased by man-made or natural causes. This ordinance does not imply that land outside the area of special flood hazards or uses permitted within such areas will be free from flooding or flood damages.

This ordinance shall not create liability on the part of the (twp/city/boro) of (municipality), any officer or employee thereof or the Federal Insurance Administration, for any flood damages that result from reliance on this ordinance or any administrative decision lawfully made thereunder.

SECTION 4.0
ADMINISTRATION

4.1 ESTABLISHMENT OF DEVELOPMENT PERMIT

A Development Permit shall be obtained before construction or development begins, including placement of manufactured homes, within any area of special flood hazard established in section 3.2. Application for a Development Permit shall be made on forms furnished by the (local administrator) and may include, but not be limited to; plans in duplicate drawn to scale showing the nature, location, dimensions, and elevations of the area in question; existing or proposed structures, fill, storage of materials, drainage facilities; and the location of the foregoing. Specifically, the following information is required:

a) Elevation in relation to mean sea level, of the lowest floor (including basement) of all structures;
b) Elevation in relation to mean sea level to which any structure has been floodproofed.

c) Certification by a registered professional engineer or architect that the floodproofing methods for any nonresidential structure meet the floodproofing criteria in section 5.2-2; and,
d) Description of the extent to which any watercourse will be altered or relocated as a result of proposed development.

4.2 DESIGNATION OF THE LOCAL ADMINISTRATOR

The (local administrator) is hereby appointed to administer and implement this ordinance by granting or denying development permit applications in accordance with its provisions.

4.3 DUTIES AND RESPONSIBILITIES OF THE ADMINISTRATOR

Duties of the (local administrator) shall include, but not be limited to:

4.3-1 PERMIT REVIEW

a) Review all development permits to determine that the permit requirements of this ordinance have been satisfied.
b) Review all development permits to determine that all necessary permits have been obtained from those Federal, State or local governmental agencies from which prior approval is required.
c) Review all development permits to determine if the proposed development is located in the floodway. If located in the floodway, assure that the encroachment provisions of 5.3 a) are met.
d) Review all development permits in the coastal high hazard and Coastal A Zone area to determine if the proposed development alters sand dunes or other natural coastal protections so as to increase potential flood damage.
e) Review plans for walls to be used to enclose space below the base flood level in accordance with section 5.4-2 d).

4.3-2 USE OF OTHER BASE FLOOD AND FLOODWAY DATA

When base flood elevation and floodway data has not been provided in accordance with section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD, the (local administrator) shall obtain, review, and reasonably utilize any base flood elevation and floodway data available from a Federal, State or other source, in order to administer sections 5.2-1, SPECIFIC STANDARDS, RESIDENTIAL CONSTRUCTION, and 5.2-2, SPECIFIC STANDARDS, NONRESIDENTIAL CONSTRUCTION.

4.3-3 INFORMATION TO BE OBTAINED AND MAINTAINED

a) Obtain and record the actual elevation (in relation to mean sea level) of the lowest floor (including basement) of all new or substantially improved structures, and whether or not the structure contains a basement.
b) For all new or substantially improved floodproofed structures:
   i. verify and record the actual elevation (in relation to mean sea level); and
   ii. maintain the floodproofing certifications required in section 4.1 c).
c) In coastal high hazard and Coastal A Zone areas, certification shall be obtained from a registered professional engineer or architect that the provisions of 5.4-2 a) and 5.4-2 b) i. and ii. are met.
d) Maintain for public inspection all records pertaining to the provisions of this ordinance.

4.3-4 ALTERATION OF WATERCOURSES

a) Notify adjacent communities and the New Jersey Department of Environmental Protection, Bureau of Flood Control and the Land Use Regulation Program prior to any alteration or relocation of a watercourse, and submit evidence of such notification to the Federal Insurance Administration.
b) Require that maintenance is provided within the altered or relocated portion of said watercourse so the flood carrying capacity is not diminished.

4.3-5 SUBSTANTIAL DAMAGE REVIEW

a) After an event resulting in building damages, assess the damage to structures due to flood and non-flood causes.
b) Record and maintain the flood and non-flood damage of substantial damage structures and provide a letter of Substantial Damage Determination to the owner and the New Jersey Department of Environmental Protection, Bureau of Flood Control.
c) Ensure substantial improvements meet the requirements of sections 5.2-1, SPECIFIC STANDARDS, RESIDENTIAL CONSTRUCTION, 5.2-2, SPECIFIC STANDARDS, NONRESIDENTIAL CONSTRUCTION, and 5.2-3, SPECIFIC STANDARDS, MANUFACTURED HOMES.

4.3-6 INTERPRETATION OF FIRM BOUNDARIES

Make interpretations where needed, as to the exact location of the boundaries of the areas of special flood hazards (for example, where there appears to be a conflict between a mapped boundary and actual field conditions). The person contesting the location of the boundary shall be given a reasonable opportunity to appeal the interpretation as provided in section 4.4.

4.4 VARIANCE PROCEDURE

4.4-1 APPEAL BOARD

a) The (appeal board) as established by (governing body) shall hear and decide appeals and requests for variances from the requirements of this ordinance.
b) The (appeal board) shall hear and decide appeals when it is alleged there is an error in any requirement, decision, or determination made by the (local administrator) in the enforcement or administration of this ordinance.
c) Those aggrieved by the decision of the (appeal board), or any taxpayer, may appeal such decision to the (name of appropriate court), as provided in (statute).
d) In passing upon such applications, the (appeal board), shall consider all technical evaluations, all relevant factors, standards specified in other sections of this ordinance, and:
   i. the danger that materials may be swept onto other lands to the injury of others;
   ii. the danger to life and property due to flooding or erosion damage;
   iii. the susceptibility of the proposed facility and its contents to flood damage and the effect of such damage on the individual owner;
   iv. the importance of the services provided by the proposed facility to the community;
   v. the necessity to the facility of a waterfront location, where applicable;
   vi. the availability of alternative locations for the proposed use which are not subject to flooding or erosion damage;
   vii. the compatibility of the proposed use with existing and anticipated development;
   viii. the relationship of the proposed use to the comprehensive plan and floodplain management program of that area;

ix. the safety of access to the property in times of flood for ordinary and emergency vehicles;
x. the expected heights, velocity, duration, rate of rise, and sediment transport of the flood waters and the effects of wave action, if applicable, expected at the site; and,
xi. the costs of providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities such as sewer, gas, electrical, and water systems, and streets and bridges.

e) Upon consideration of the factors of section 4.4-1 d) and the purposes of this ordinance, the (appeal board) may attach such conditions to the granting of variances as it deems necessary to further the purposes of this ordinance.
f) The (local administrator) shall maintain the records of all appeal actions, including technical information, and report any variances to the Federal Insurance Administration upon request.

4.4-2 CONDITIONS FOR VARIANCES

a) Generally, variances may be issued for new construction and substantial improvements to be erected on a lot of one-half acre or less in size contiguous to and surrounded by lots with existing structures constructed below the base flood level, providing items i.-xi. in section 4.4-1 d) have been fully considered. As the lot size increases beyond the one-half acre, the technical justification required for issuing the variance increases.
b) Variances may be issued for the repair or rehabilitation of historic structures upon a determination that the proposed repair or rehabilitation will not preclude the structure's continued designation as a historic structure and the variance is the minimum necessary to preserve the historic character and design of the structure.
c) Variances shall not be issued within any designated floodway if any increase in flood levels during the base flood discharge would result.
d) Variances shall only be issued upon a determination that the variance is the minimum necessary, considering the flood hazard, to afford relief.
e) Variances shall only be issued upon:
i. A showing of good and sufficient cause;
ii. A determination that failure to grant the variance would result in exceptional hardship to the applicant; and,
iii. A determination that the granting of a variance will not result in increased flood heights, additional threats to public safety, extraordinary public expense, create nuisances, cause fraud on or victimization of the public as identified in section 4.4- 1 d), or conflict with existing local laws or ordinances.
f) Any applicant to whom a variance is granted shall be given written notice that the structure will be permitted to be built with a lowest floor elevation below the base flood elevation and that the cost of flood insurance will be commensurate with the increased risk resulting from the reduced lowest floor elevation.

SECTION 5.0
PROVISIONS FOR FLOOD HAZARD REDUCTION

5.1 GENERAL STANDARDS

In all areas of special flood hazards, compliance with the applicable requirements of the Uniform Construction Code (N.J.A.C. 5:23) and the following standards, whichever is more restrictive, are required:

5.1-1 ANCHORING

a) All new construction and substantial improvements shall be anchored to prevent flotation, collapse, or lateral movement of the structure.
b) All manufactured homes to be placed or substantially improved shall be anchored to resist flotation, collapse or lateral movement. Methods of anchoring may include, but are not to be limited to, use of over-the-top or frame ties to ground anchors. This requirement is in addition to applicable state and local anchoring requirements for resisting wind forces.

5.1-2 CONSTRUCTION MATERIALS AND METHODS

a) All new construction and substantial improvements shall be constructed with materials and utility equipment resistant to flood damage.
b) All new construction and substantial improvements shall be constructed using methods and practices that minimize flood damage.

5.1-3 UTILITIES

a) All new and replacement water supply systems shall be designed to minimize or eliminate infiltration of flood waters into the system;
b) New and replacement sanitary sewage systems shall be designed to minimize or eliminate infiltration of flood waters into the systems and discharge from the systems into flood waters;
c) On-site waste disposal systems shall be located to avoid impairment to them or contamination from them during flooding; and
d) For all new construction and substantial improvements the electrical, heating, ventilation, plumbing and air-conditioning equipment and other service facilities shall be designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

5.1-4 SUBDIVISION PROPOSALS

a) All subdivision proposals and other proposed new development shall be consistent with the need to minimize flood damage;
b) All subdivision proposals and other proposed new development shall have public utilities and facilities such as sewer, gas, electrical, and water systems located and constructed to minimize flood damage;
c) All subdivision proposals and other proposed new development shall have adequate drainage provided to reduce exposure to flood damage; and,
d) Base flood elevation data shall be provided for subdivision proposals and other proposed new development which contain at least fifty (50) lots or five (5) acres (whichever is less).

5.1-5 ENCLOSURE OPENINGS

All new construction and substantial improvements having fully enclosed areas below the lowest floor that are usable solely for parking of vehicles, building access or storage in an area other than a basement and which are subject to flooding shall be designed to automatically equalize hydrostatic flood forces on exterior walls by allowing for the entry and exit of floodwaters. Designs for meeting this requirement must either be certified by a registered professional engineer or architect or must meet or exceed the following minimum criteria: A minimum of two (2) openings in at least two (2) exterior walls of each enclosed area, having a total net area of not less than one (1) square inch for every square foot of enclosed area subject to flooding shall be provided. The bottom of all openings shall be no higher than one (1) foot

above grade. Openings may be equipped with screens, louvers, or other covering or devices provided that they permit the automatic entry and exit of floodwaters.

5.2 SPECIFIC STANDARDS

In all areas of special flood hazards where base flood elevation data have been provided as set forth in section 3.2, BASIS FOR ESTABLISHING THE AREAS OF SPECIAL FLOOD HAZARD or in section 4.3-2, USE OF OTHER BASE FLOOD DATA, the following standards are required:

5.2-1 RESIDENTIAL CONSTRUCTION

a) For Coastal A Zone construction see section 5.4 COASTAL HIGH HAZARD AREA AND COASTAL A ZONE.

b) New construction and substantial improvement of any residential structure located in an A or AE zone shall have the lowest floor, including basement together with the attendant utilities (including all electrical, heating, ventilating, air- conditioning and other service equipment) and sanitary facilities, elevated at or above the base flood elevation plus one (1) foot or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]*****;**

c) Require within any AO or AH zone on the municipality's DFIRM that all new construction and substantial improvement of any residential structure shall have the lowest floor, including basement together with the attendant utilities and sanitary facilities, elevated above the depth number specified in feet plus one (1) foot, above the highest adjacent grade ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]*** (at least three (3) feet if no depth number is specified). And, require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures.

5.2-2 NONRESIDENTIAL CONSTRUCTION

In an Area of Special Flood Hazard, all new construction and substantial improvement of any commercial, industrial or other nonresidential structure located in an A or AE zone (for Coastal A Zone construction see section 5.4 COASTAL HIGH HAZARD AREA AND COASTAL A ZONE) shall have the lowest floor, including basement together with the attendant utilities and sanitary facilities as well as all electrical, heating, ventilating, air-conditioning and other service equipment:

either

a) Elevated to or above the base flood elevation plus one (1) foot or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive; and ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***; and

b) Require within any AO or AH zone on the municipality's DFIRM to elevate above the depth number specified in feet plus one (1) foot, above the highest adjacent grade ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]*** (at least three (3) feet if no depth number is specified). And, require adequate drainage paths around structures on slopes to guide floodwaters around and away from proposed structures;

or

c) Be floodproofed so that below the base flood level plus one (1) foot or as required by ASCE/SEI 24-14, Table 6-1, whichever is more restrictive ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***, the structure is watertight with walls substantially impermeable to the passage of water;

d) Have structural components capable of resisting hydrostatic and hydrodynamic loads and effects of buoyancy; and,
e) Be certified by a registered professional engineer or architect that the design and methods of construction are in accordance with accepted standards of practice for meeting the applicable provisions of this subsection. Such certification shall be provided to the official as set forth in section 4.3-3 b) ii.

5.2-3 MANUFACTURED HOMES

a) Manufactured homes shall be anchored in accordance with section 5.1-1 b).
b) All manufactured homes to be placed or substantially improved within an area of special flood hazard shall:
   i. Be consistent with the need to minimize flood damage,
   ii. Be constructed to minimize flood damage,
   iii. Have adequate drainage provided to reduce exposure to flood damage; and,
   iv. Be elevated on a permanent foundation such that the top of the lowest floor is at or above the base flood elevation plus one (1) foot or as required by ASCE/SEI 24-14, Table 2-1, whichever is more restrictive ***[optional – higher standard – freeboard – replace "one foot" with two feet or three feet]***.
   v. The manufactured home chassis is supported by reinforced piers or other foundation elements of at least equivalent strength that are no less than 36 inches in height above grade and be securely anchored to an adequately anchored foundation system to resist floatation, collapse, and lateral movement.

5.3 FLOODWAYS

Located within areas of special flood hazard established in section 3.2 are areas designated as floodways. Since the floodway is an extremely hazardous area due to the velocity of flood waters which carry debris, potential projectiles, and erosion potential, the following provisions apply:

a) Prohibit encroachments, including fill, new construction, substantial improvements, and other development unless a technical evaluation demonstrates that encroachment shall not result in any increase in flood levels during the occurrence of the base flood discharge.
b) If section 5.3 a) is satisfied, all new construction and substantial improvements must comply with section 5.0 PROVISIONS FOR FLOOD HAZARD REDUCTION.
c) In all areas of special flood hazard in which base flood elevation data has been provided and no floodway has been designated, the accumulative effect of any proposed development, when combined with all other existing and anticipated development, shall not increase the water surface elevation of the base flood more than two-tenths (0.2) of a foot at any point.

5.4 COASTAL HIGH HAZARD AREA AND COASTAL A ZONE

Coastal high hazard areas (V or VE Zones) and coastal A Zones are located within the areas of special flood hazard established in section 3.2. These areas have special flood hazards associated with high velocity waters from tidal surges and hurricane wave wash; therefore, the following provisions shall apply:

5.4-1 LOCATION OF STRUCTURES

a) All buildings or structures shall be located landward of the reach of the mean high tide.
b) The placement of manufactured homes shall be prohibited, except in an existing manufactured home park or subdivision.

5.4-2 CONSTRUCTION METHODS

a) ELEVATION

All new construction and substantial improvements shall be elevated on piling or columns so that:

i. The bottom of the lowest horizontal structural member of the lowest floor (excluding the piling or columns) is elevated to or above the base flood elevation plus one (1) foot. ***[optional freeboard standard – replace "one (1) foot" with two (2) feet or three (3) feet]*** or as required by ASCE/SEI 24-14, Table 4-1, whichever is more restrictive,
and,

ii. All electrical, heating, ventilating, air-conditioning, mechanical equipment and other equipment servicing the building is elevated one (1) foot above the base flood elevation, ***[optional freeboard standard – replace "one (1) foot" with two (2) feet or three (3) feet]*** and

iii. With all space below the lowest floor's supporting member open so as not to impede the flow of water, except for breakaway walls as provided or in section 5.4-2 d).

b) STRUCTURAL SUPPORT

i. All new construction and substantial improvements shall be securely anchored on piling or columns.

ii. The pile or column foundation and structure attached thereto shall be anchored to resist flotation, collapse or lateral movement due to the effects of wind and water loading values each of which shall have a one percent chance of being equaled or exceeded in any given year (100-year mean recurrence interval).

iii. Prohibit the use of fill for structural support of buildings within Zones V1-30, VE, V, and Coastal A on the community's FIRM.

c) CERTIFICATION

A registered professional engineer or architect shall develop or review the structural design specifications and plans for the construction and shall certify that the design and methods of construction to be used are in accordance with accepted standards of practice for compliance with the provisions of section 5.4-2 a) and 5.4-2 b) i. and ii.

d) SPACE BELOW THE LOWEST FLOOR

i. Any alteration, repair, reconstruction or improvement to a structure started after the enactment of this ordinance shall not enclose the space below the lowest floor unless breakaway walls, open wood lattice-work or insect screening are used as provided for in this section.

ii. Breakaway walls, open wood lattice-work or insect screening shall be allowed below the base flood elevation provided that they are intended to collapse under wind and water loads without causing collapse, displacement or other structural damage to the elevated portion of the building or supporting foundation system. Breakaway walls shall be designed for a safe loading resistance of not less than 10 and no more than 20 pounds per square foot. Use of breakaway walls which exceed a design safe loading of 20 pounds per square foot (either by design or when so required by local or State codes) may be permitted only if a registered professional

engineer or architect certifies that the designs proposed meet the following conditions.

(i) breakaway wall collapse shall result from a water load less than that which would occur during the base flood and,

(ii) the elevated portion of the building and supporting foundation system shall not be subject to collapse, displacement or other structural damage due to the effects of wind and water load acting simultaneously on all building components (structural and non-structural). Water loading values used shall be those associated with the base flood. Wind loading values used shall be those required by applicable State or local building standards.

iii. If breakaway walls are utilized, such enclosed space shall be used solely for parking of vehicles, building access, or storage and not for human habitation.

iv. Prior to construction, plans for any breakaway wall must be submitted to the Construction Code Official or Building Sub-Code Official for approval.

5.4-3 SAND DUNES

Prohibit man-made alteration of sand dunes within Coastal A Zones, VE and V Zones on the community's DFIRM which would increase potential flood damage.

SECTION 6.0
SEVERABILITY

If any section, subsection, paragraph, sentence, clause, or phrase of this Ordinance shall be declared invalid for any reason whatsoever, such a decision shall not affect the remaining portions of the Ordinance, which shall remain in full force and effect, and for this purpose the provisions of this Ordinance are hereby declared to be severable.

SECTION 7.0
ENACTMENT

7.01 ADOPTION

This Ordinance shall be effective on *(effective date)* and shall remain in force until modified, amended or rescinded by *(twp/city/boro) of (municipality), (county) County,* New Jersey.

ENACTED AND ADOPTED by the *[Board, Council, etc.]* this *[day]* day of *[month], [year].*

ATTEST: *[Board, Council, etc.]* of the *(twp/city/boro) of (municipality),*

_____ By: _____

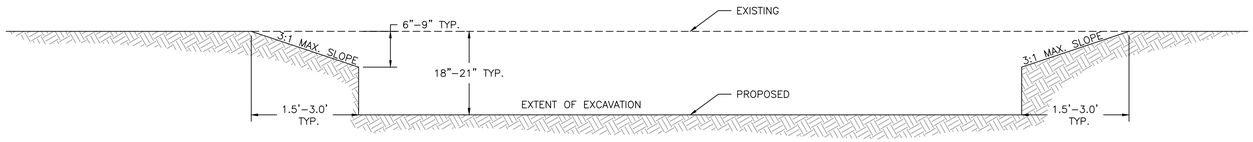
(twp/city/boro) of (municipality), Secretary *[Board, Council, etc.]* President

APPROVED, this [day] day of [month], [year], by the Mayor of [Name of Municipality]

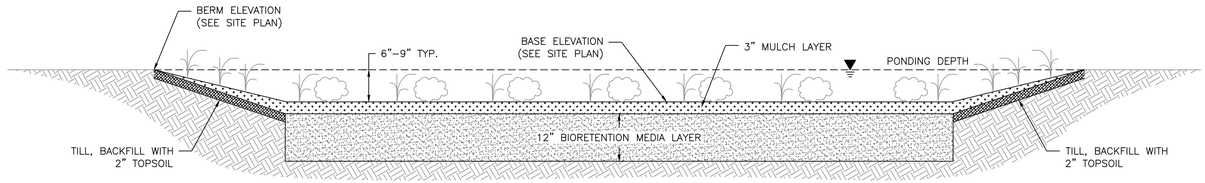
ATTEST:

[Name of Municipality] Secretary Mayor_____

Appendix B: Green Infrastructure Engineering Standards



1.1 DT–1 RAIN GARDEN EXCAVATION SECTION
N.T.S.



1.2 DT–1 RAIN GARDEN SECTION
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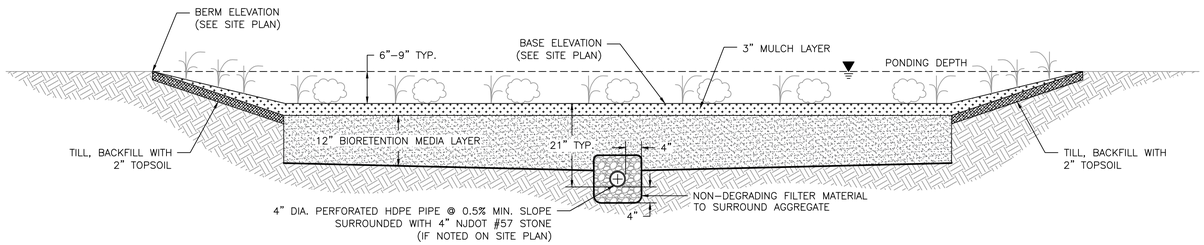

1.3 DT–1 RAIN GARDEN SECTION W. UNDERDRAIN
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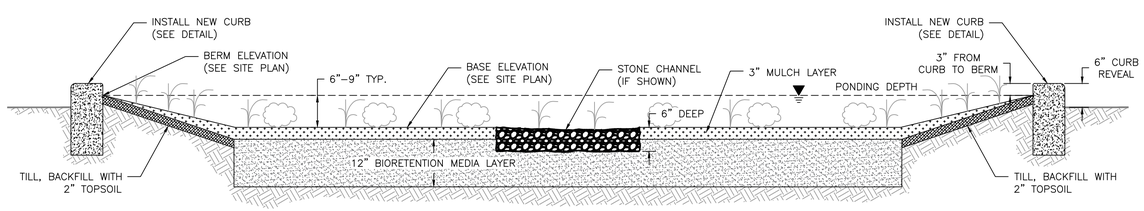

1.4 DT–1 CURBED RAIN GARDEN SECTION
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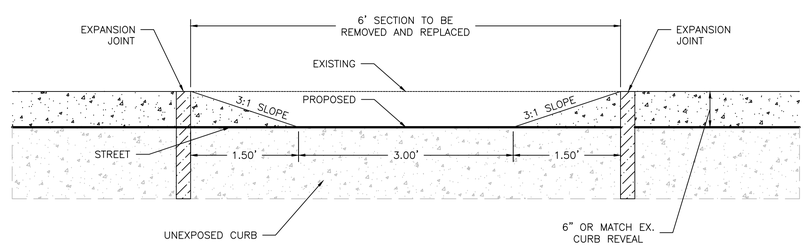

1.5 DT–1 CURB CUT CROSS SECTION
N.T.S.

PROFESSIONAL ENGINEER

DRAWN	CHECKED	APPROVED	DATE
KWG	CCO	CCO	XX.XX.XX

DATE XX/XX/XX

REVISIONS

No.	DATE	DESCRIPTION

[PROJECT SITE NAME]
[PROJECT NAME]
[ADDRESS, CITY]
[COUNTY NAME] COUNTY, NJ

BIORETENTION DETAILS

RUTGERS New Jersey Agricultural Experiment Station

SHEET #
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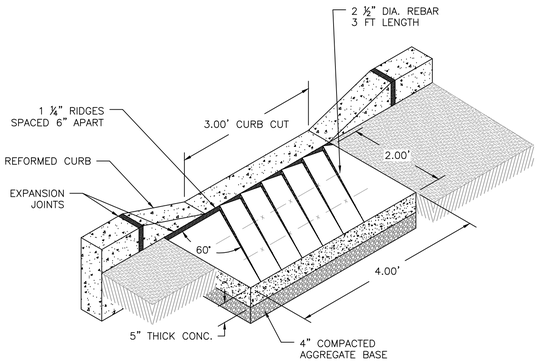

1.6 DT-1 CONCRETE FLOW PAD
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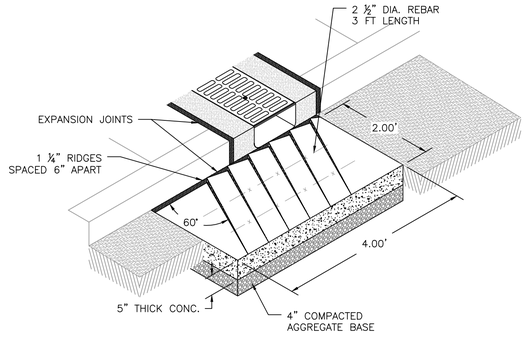
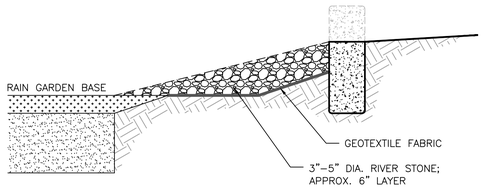
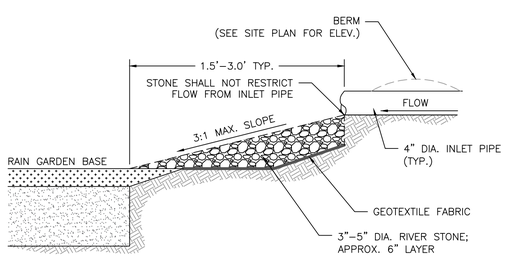




1.7 DT-1 INLET/OUTLET CURB CUT PROTECTION
N.T.S.

1.8 DT-1 STONE-LINED CHANNEL
N.T.S.



1.9 DT-1 INLET PROTECTION CROSS SECTION
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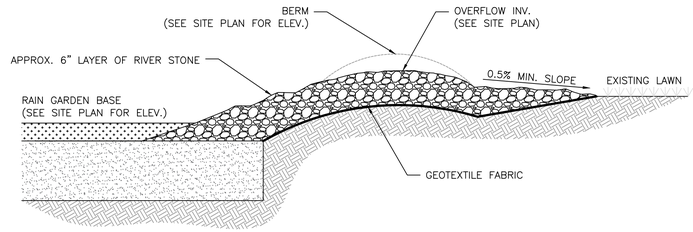

1.10 DT-1 ROCK-LINED OVERFLOW
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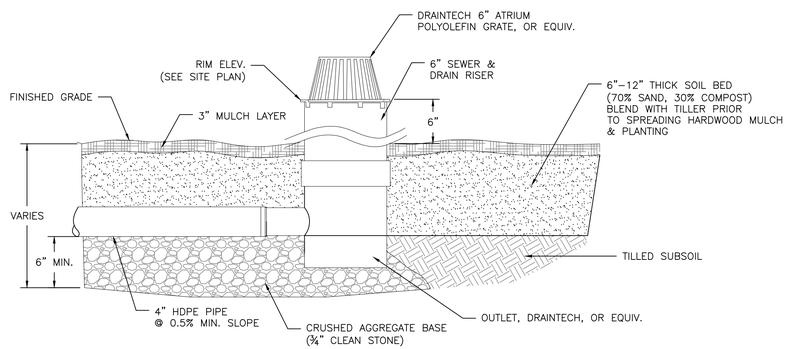

1.11 DT-1 DRAINTECH OUTLET
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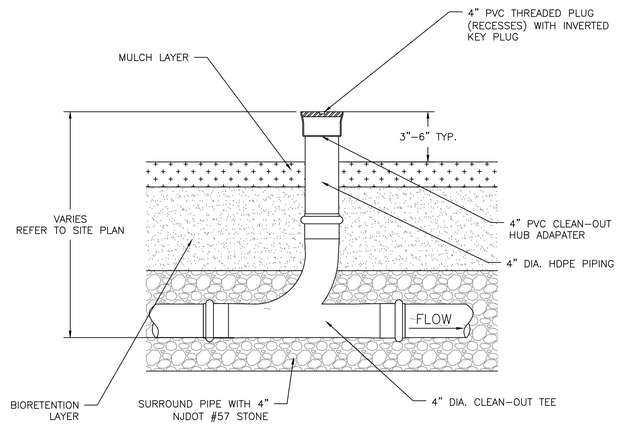

1.12 DT-1 RAIN GARDEN CLEANOUT
N.T.S.

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No.	DATE	DESCRIPTION

PROFESSIONAL ENGINEER

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KWG	CCO	CCO	XX.XX.XX

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[PROJECT SITE NAME]
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[ADDRESS, CITY]
[COUNTY NAME] COUNTY, NJ

BIORETENTION DETAILS

RUTGERS New Jersey Agricultural Experiment Station

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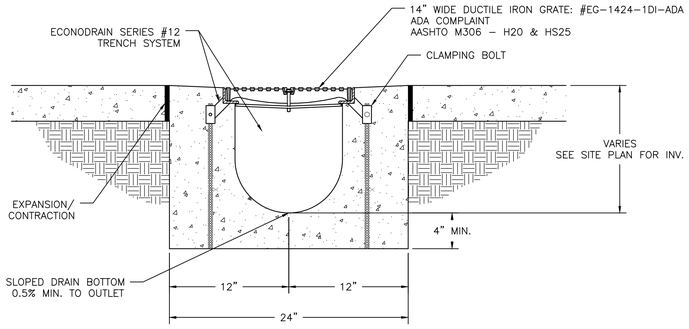

1.13 DT-1 SAWCUT EXISTING SLAB TRENCH DRAIN INSTALLATION

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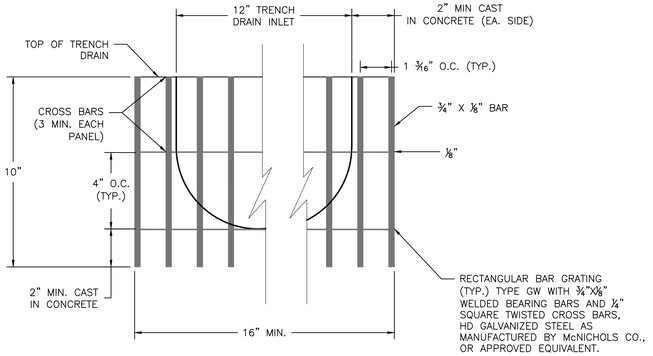
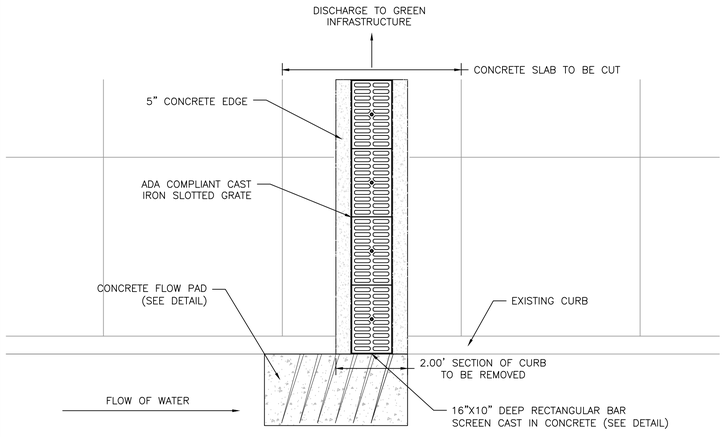


1.14 DT-1 TRENCH DRAIN BAR SCREEN

N.T.S.



1.15 DT-1 TRENCH DRAIN PLAN VIEW

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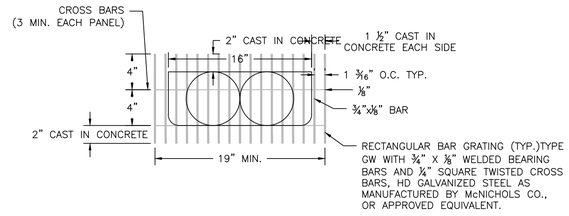

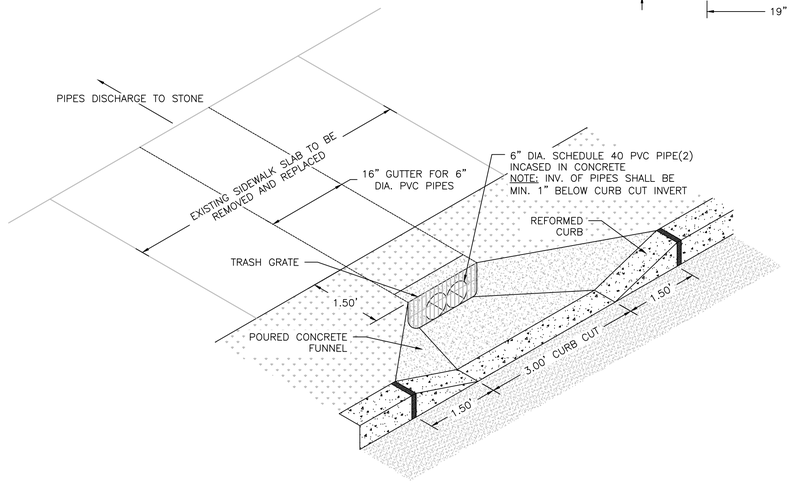

1.16 DT-1 CURB CUT AND CONCRETE FUNNEL

N.T.S.

PROFESSIONAL ENGINEER

DATE XX/XX/XX

DRAWN	CHECKED	APPROVED	DATE
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REVISIONS

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[PROJECT SITE NAME]
[PROJECT NAME]
[ADDRESS, CITY]
[COUNTY NAME] COUNTY, NJ

TRENCH DRAIN DETAILS

RUTGERS New Jersey Agricultural Experiment Station

SHEET #

1.0

1.17 BIORETENTION GENERAL SPECIFICATIONS

CONSTRUCTION NOTES

1. The contractor shall verify all information prior to excavation including elevations and locations of existing utilities.
2. The contractor shall notify the engineer immediately if any field conditions differ materially from those represented on these drawings and the specifications or if, in the contractor's opinion, said conditions conflict with the designs shown hereon.
3. The engineer shall inspect all planting bed areas before mulching to insure that adequate drainage exists. If any areas to be mulched show evidence of poor drainage, the contractor shall take corrective action.
4. The contractor shall avoid disturbing all existing trees. Any disturbance to trees or tree roots must be coordinated with the property owner.
5. Dimensions and shape will vary, refer to site plan.
6. River stone protection dimensions are typical and may vary per site. Consult the engineer and site plan for dimensions on a per site basis.
7. River stone protection shall slope to rain garden base.
8. Refer to site plan to determine outlet type (rock-lined overflow or draintech riser).
9. Refer to site plan for all elevations and inverts.
10. The contractor shall excavate 12 inches lower than the base elevation shown on the site plans. The slopes of the rain garden shall be at a 2:1 maximum.
11. The subgrade of the rain garden shall be level to ensure proper drainage. The contractor shall obtain engineer approval prior to backfilling with 12 inches of bioretention media.
12. The contractor shall install overflow if specified in site plans prior to backfilling with bioretention media.
13. The bioretention layer shall be level to ensure proper drainage. The contractor shall obtain engineer approval prior to spreading mulch and planting.
14. Inlet and outlet protection shall be underlain with geotextile fabric.
15. Inlets and outlets shall not inhibit the flow of water from the street. The river stone shall be placed below the bottom of the pipe.
16. The contractor shall till the berm section and backfill with topsoil.
17. All disturbed areas exclusive of rain garden and sloped berm shall be restored to original conditions by contractor.
18. The contractor shall have a pre-construction meeting with the project engineer prior to any work on site.

SPECIFICATIONS

1. Max cover over top of pipe is 4 feet. Contact ADS (pipe manufacturer) if otherwise greater.
2. The approval of materials and mixing of sand, compost, and soil shall be done under the supervision of the project engineer/landscape architect. Bioretention media shall consist of 70% sand and 30% compost mixture.
3. Sand shall at the minimum conform to the sieve analysis for concrete aggregate sand (ASTM c-33). USGA tee/green sieve gradation mix is preferable where available.
4. Underlying soils shall be tilled/scarified prior to spreading/mixing of bioretention media.

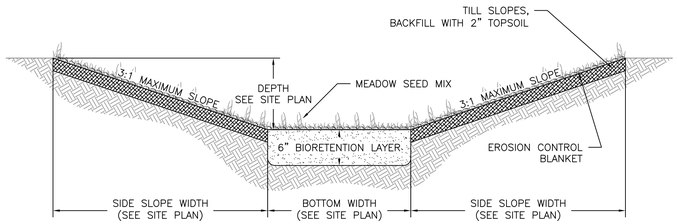
5. All bioretention media shall be placed from the sides of the facilities, and in no event shall any tracked or wheeled equipment be permitted to cross the rain garden.
6. Rain garden shall be constructed to dimensions indicated on the site plan.
7. 3-5-inch diameter washed river stone shall be used for stone channel and inlet/outlet protection.
8. Non-dyed, triple-shredded hardwood mulch shall be used.
9. Planting of rain garden and sloped berm shall be completed as indicated on the site plan.
10. The contractor shall perform all work in conformance with the NJDOT Standard Specifications for Road and Bridge Construction, 2007 or latest version.

1.18 TRENCH DRAIN GENERAL SPECIFICATIONS

1. **CONSTRUCTION NOTES**
2. The contractor shall verify all information prior to excavation including elevations and locations of existing utilities.
3. The contractor shall notify the engineer immediately if any field conditions differ materially from those represented on these drawings and the specifications or if, in the contractor's opinion, said conditions conflict with the designs shown hereon.
4. The contractor shall avoid disturbing all existing trees. Any disturbance to trees or tree roots must be coordinated with the property owner.
5. Inlet and outlet protection shall be underlain with geotextile fabric.
6. Inlet and outlet curb cuts shall not inhibit the flow of water from the street. The curb cut shall be slightly lower than the road. The concrete slab shall be placed just below the bottom of the curb cut.
7. The contractor shall sawcut, remove, and replace a 6-foot section of curb for the concrete funnel. The entire curb shall be reinstalled with a 3-foot depressed section flush with the pavement and adjoining 18-inch 3:1 sloped sections.
8. The contractor shall pour the concrete flow pad as shown with 60° ridges. The ridges shall be 1 1/4 inches in height.
9. All areas exclusive from the trench drain and/or curb cut shall be restored to original conditions.
10. The contractor shall have a pre-construction meeting with the engineer prior to any work on-site.

SPECIFICATIONS

1. Trench drain shall be Econodrain® Series #12 as manufactured by Econodrain®, or approved equivalent.
2. The grate for the trench drain shall be cast iron ADA grate part number EG-1424-2 CI-ADA with locking fasteners, or equal.
3. End cap cutouts are to be removed upon approval.
4. Stone for protection shall be 3-5-inch diameter washed river stone.
5. The contract shall be performed in conformance with the NJDOT Standard Specifications for Road and Bridge Construction, 2007 or latest version.
6. The contractor shall only use concrete with 4,500 psi strength



2.1 DT-2 BIOSWALE CROSS SECTION
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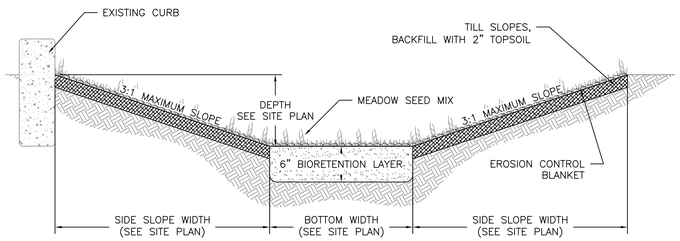

2.2 DT-2 CURBED BIOSWALE CROSS SECTION
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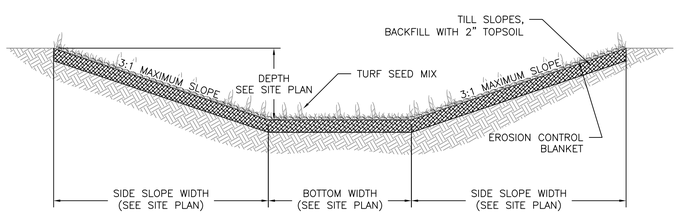

2.3 DT-2 GRASSED SWALE CROSS SECTION
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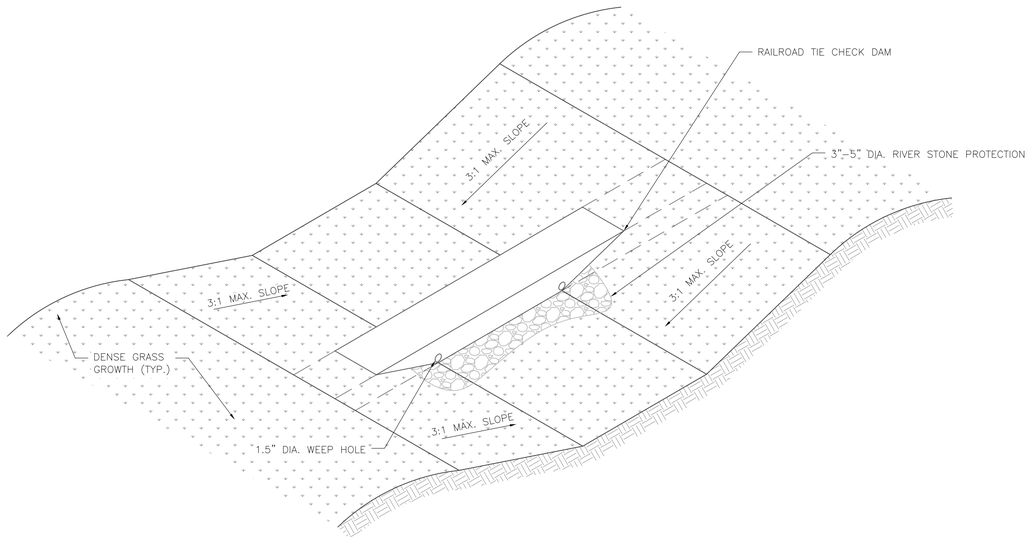

2.4 DT-2 CHECK DAM ISOMETRIC
N.T.S.

PROFESSIONAL ENGINEER

	DRAWN	CHECKED	APPROVED	DATE
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REVISIONS		
No.	DATE	DESCRIPTION

[PROJECT SITE NAME]
[PROJECT NAME]
[ADDRESS, CITY]
[COUNTY NAME] COUNTY, NJ

BIOSWALE DETAILS

RUTGERS New Jersey Agricultural Experiment Station

SHEET #
2.0

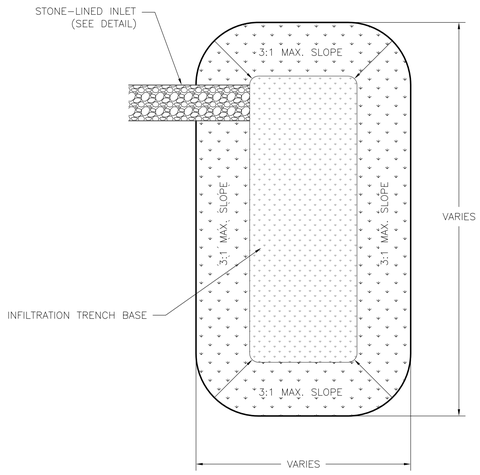
2.5 BIOSWALE SPECIFICATIONS

CONSTRUCTION NOTES

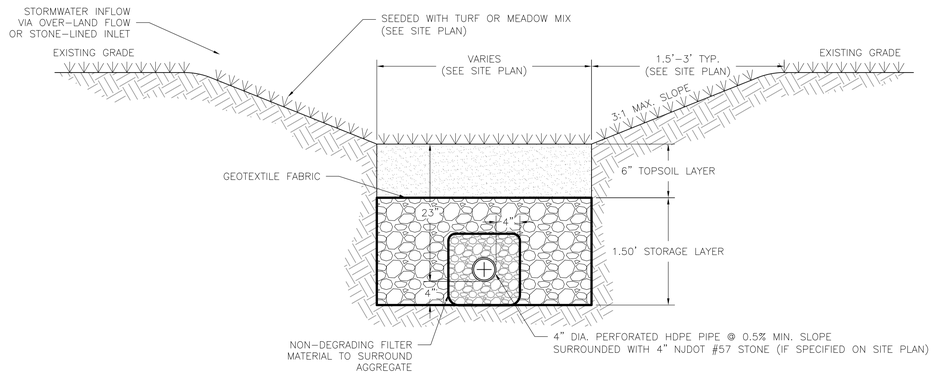
1. The contractor shall verify all information prior to excavation including elevations and locations of existing utilities.
2. The contractor shall notify the engineer immediately if any field conditions differ materially from those represented on these drawings and the specifications or if, in the contractor's opinion, said conditions conflict with the designs shown hereon.
3. The engineer shall inspect all planting bed/seeding areas before planting/seeding to insure that adequate drainage exists for bioswales. If any areas to be planted/seeded show evidence of poor drainage, the contractor shall take corrective action.
4. The contractor shall have all utilities marked before any excavation. If any utilities interfere with the project, the contractor shall notify the engineer.
5. The contractor shall avoid over-compacting the existing materials to avoid poor infiltration.
6. The contractor shall verify that the swale will capture stormwater runoff from the desired drainage area.
7. The contractor shall establish all elevations and lines as shown on the site plan for review by the engineer prior to construction.
8. The contractor shall verify that the subgrade is consistent with line, grade, and elevations as indicated on the site plan. Any areas showing erosion or potential ponding shall be regraded before subbase installation.
9. Immediately after the subgrade is approved by the engineer, the contractor shall begin subbase construction which includes all materials below the swale base and above the native subgrade.
10. Prior to backfilling the bioswale with bioretention media, the contractor shall scarify native soil to promote infiltration into the underlying subgrade.
11. The bioretention media layer shall be installed evenly over the native subgrade.
12. The bioswale shall have an infiltration of at least 5-30 ft/day or 50% of the hydraulic conductivity (D2434).
13. The contractor shall install a gabion basket check dam (if specified) as shown on site plans. A minimum of six inches of the basket shall be buried.
14. The contractor shall install erosion control blanket along the base and side slopes of the newly constructed swale for stabilization.

SPECIFICATIONS

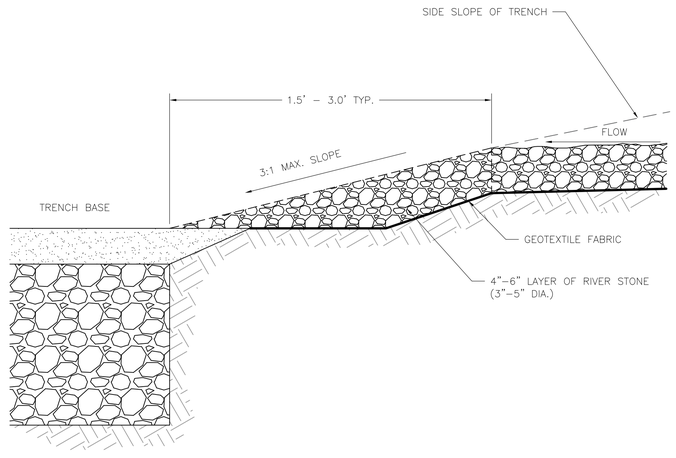
1. The bioretention layer shall be comprised of 70% sand and 30% compost mixture.
2. Inlet protection for the swale shall be comprised of 3-5-inch diameter washed river stone. Stone shall be placed on geotextile fabric.
3. The gabion basket check dam shall be dura-weld galvanized and PVC coated baskets. Baskets are typically 6'x3'x1'; refer to site plan for basket size.
4. Gabion stone shall be 4-10-inch diameter washed.
5. The swale shall be seeded with contractor turf mix unless specified otherwise on plans.



3.1 DT-3 INFILTRATION TRENCH PLAN VIEW
N.T.S.



3.3 DT-3 INFILTRATION TRENCH CROSS SECTION
N.T.S.



3.2 DT-3 STONE LINED INLET FOR INFILTRATION TRENCH
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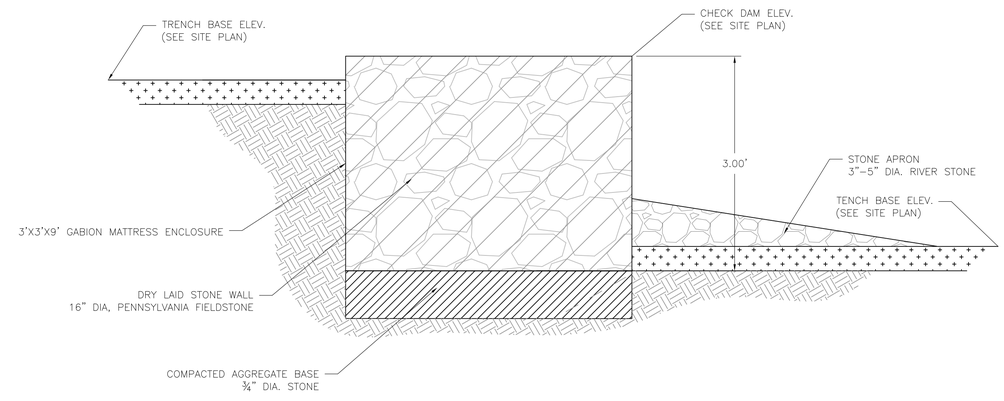

3.4 DT-3 GABION STONE CHECK DAM
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DATE XX/XX/XX

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INFILTRATION TRENCH DETAILS

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SHEET #
3.0

3.5 INFILTRATION TRENCH SPECIFICATIONS

CONSTRUCTION NOTES

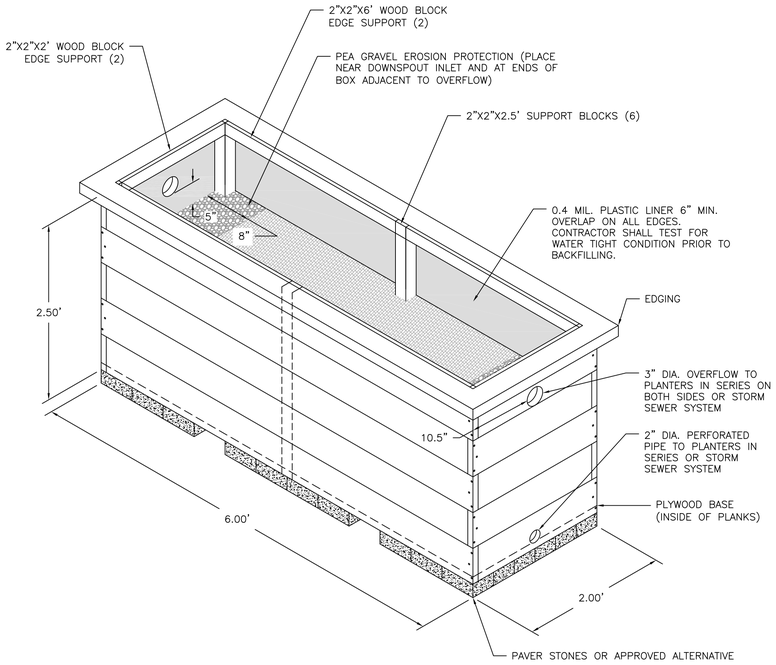
1. The planter box shall be built according to the dimensions in detail 4.1 and as indicated on the plans.
2. An existing downspout shall be modified to enter the 1st planter box in series. The downspout shall be fitted with a diverter allowing flow to be directed to the box or existing storm sewer connection.
3. Planter boxes in series shall be placed flush against each other as shown in the site plan.
4. The contractor shall discuss any modifications with the engineer and property owner before action is taken.
5. The paver stone base or approved alternative shall be positioned prior to any other construction.
6. The planter box shall be built as shown in detail 4.1. Supports shall be used on the inside of the box as shown.
7. The contractor shall position and level the planter box and then install waterproof liner prior to backfilling with materials.
8. All overflow piping shall be comprised of 3-inch diameter PVC piping. Overflow pipes shall be placed as shown and connected to planter boxes in series. Ends that are positioned inside the planter shall be capped with a PVC pipe grate. See specification items #12 and #13.
9. The underdrain pipe shall be a 2-inch perforated PVC pipe.
10. All pipes shall be fitted and secured with adhesive that is in conformance with local plumbing codes.
11. The existing downspout shall be directed into the first planter box in series.
12. The last box in series (farthest from downspout) shall have a 2-inch atrium grate for overflow. The overflow shall discharge to the existing storm sewer connection.
13. The contractor shall place and compact each aggregate and soil layer once the planter box is constructed.
14. Planter boxes connected in series shall have the overflow and underdrain connect throughout the entire system.

SPECIFICATIONS

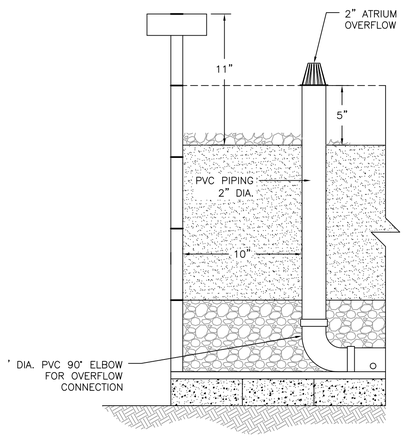
1. The planter boxes shall be level when installed.
2. Prior to installation, the contractor shall provide engineer shop drawings of downspout connections and piping.
3. The gravel layer shall be comprised of No. 57 washed stone.
4. The sandy compost mix shall be comprised of 85% washed sand and 15% compost.
5. The diverter shall be ‘Save the Rain’ metal diverter or approved equivalent.
6. All PVC piping shall be schedule 40.
7. The erosion protection shall be comprised of 3-5-inch diameter washed river stone.
8. The plants shall be specified by the planting schedule.
9. All wood material is to be 2-inch dimensional lumber (2”x4”, 2”x6”, and/or 2”x8”) and pressure treated for use in exterior applications.
10. The planter base shall be pressure treated or marine grade plywood suitable for use in exterior applications.
11. All connecting screws and hardware are to be galvanized or coated and approved for exterior use with treated lumber.
12. The overflow pipe grates shall be NDS 3-inch structural-foam polyolefin grate model #16 or equivalent.
13. The overflow atrium shall be NDS 2-inch atrium grate, part #270 or approved equivalent.

3.0 Infiltration Trench

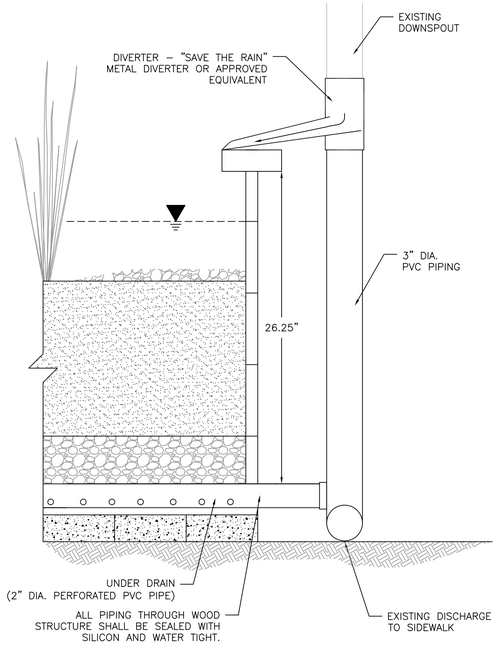
14. Upon engineers request, the paver stone base may be replaced with 4’x4’ pressure treated wood blocking or concrete formed pad.
15. The underdrain pipe (2-inch diameter) shall have holes drilled manually by the contractor. The perforations shall not by made in the sections of the underdrain that are exposed between planter boxes as shown in detail. Perforation hole size shall be 3/8”; hole spacing shall be 5”(±1/8”); number of rows shall be 2 @ 120° (±5°).



4.1 DT-4 DOWNSPOUT PLANTER ISOMETRIC
N.T.S.



4.3 DT-4 OVERFLOW CONNECTION CROSS SECTION
N.T.S.



4.4 DT-4 UNDERDRAIN CONNECTION CROSS SECTION
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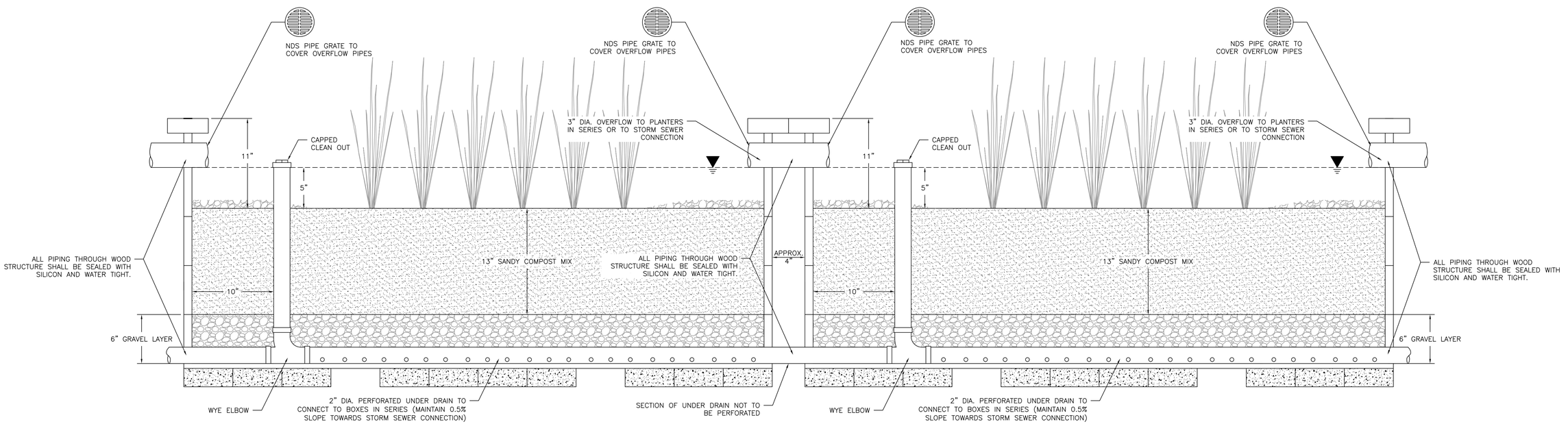

4.2 DT-4 DOWNSPOUT PLANTER CROSS SECTION
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[COUNTY NAME] COUNTY, NJ

DOWNSPOUT PLANTER BOX DETAILS

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4.5 DOWNSPOUT PLANTER BOX SPECIFICATIONS

CONSTRUCTION NOTES

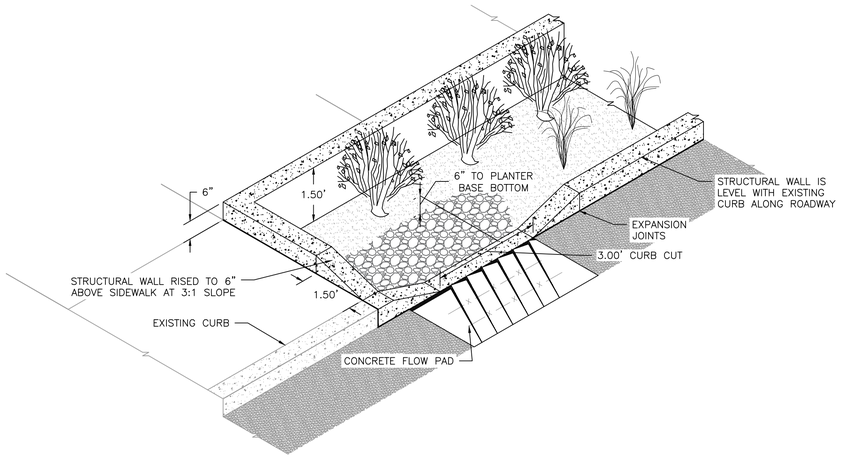
1. The planter box shall be built according to the dimensions in detail 4.1 and as indicated on the plans.
2. An existing downspout shall be modified to enter the 1st planter box in series. The downspout shall be fitted with a diverter allowing flow to be directed to the box or existing storm sewer connection.
3. Planter boxes in series shall be placed flush against each other as shown in the site plan.
4. The contractor shall discuss any modifications with the engineer and property owner before action is taken.
5. The paver stone base or approved alternative shall be positioned prior to any other construction.
6. The planter box shall be built as shown in detail 4.1. Supports shall be used on the inside of the box as shown.
7. The contractor shall position and level the planter box and then install waterproof liner prior to backfilling with materials.
8. All overflow piping shall be comprised of 3-inch diameter PVC piping. Overflow pipes shall be placed as shown and connected to planter boxes in series. Ends that are positioned inside the planter shall be capped with a PVC pipe grate. See specification items #12 and #13.
9. The underdrain pipe shall be a 2-inch perforated PVC pipe.
10. All pipes shall be fitted and secured with adhesive that is in conformance with local plumbing codes.
11. The existing downspout shall be directed into the first planter box in series.
12. The last box in series (farthest from downspout) shall have a 2-inch atrium grate for overflow. The overflow shall discharge to the existing storm sewer connection.
13. The contractor shall place and compact each aggregate and soil layer once the planter box is constructed.
14. Planter boxes connected in series shall have the overflow and underdrain connect throughout the entire system.

SPECIFICATIONS

1. The planter boxes shall be level when installed.
2. Prior to installation, the contractor shall provide engineer shop drawings of downspout connections and piping.
3. The gravel layer shall be comprised of No. 57 washed stone.
4. The sandy compost mix shall be comprised of 85% washed sand and 15% compost.
5. The diverter shall be ‘Save the Rain’ metal diverter or approved equivalent.
6. All PVC piping shall be schedule 40.
7. The erosion protection shall be comprised of 3-5-inch diameter washed river stone.
8. The plants shall be specified by the planting schedule.
9. All wood material is to be 2-inch dimensional lumber (2”x4”, 2”x6”, and/or 2”x8”) and pressure treated for use in exterior applications.
10. The planter base shall be pressure treated or marine grade plywood suitable for use in exterior applications.
11. All connecting screws and hardware are to be galvanized or coated and approved for exterior use with treated lumber.
12. The overflow pipe grates shall be NDS 3-inch structural-foam polyolefin grate model #16 or equivalent.
13. The overflow atrium shall be NDS 2-inch atrium grate, part #270 or approved equivalent.

4.0 Downspout Planter

14. Upon engineers request, the paver stone base may be replaced with 4’x4’ pressure treated wood blocking or concrete formed pad.
15. The underdrain pipe (2-inch diameter) shall have holes drilled manually by the contractor. The perforations shall not by made in the sections of the underdrain that are exposed between planter boxes as shown in detail. Perforation hole size shall be 3/8”; hole spacing shall be 5”(±1/8”); number of rows shall be 2 @ 120° (±5°).



5.1 DT-5 STORMWATER PLANTER ISOMETRIC
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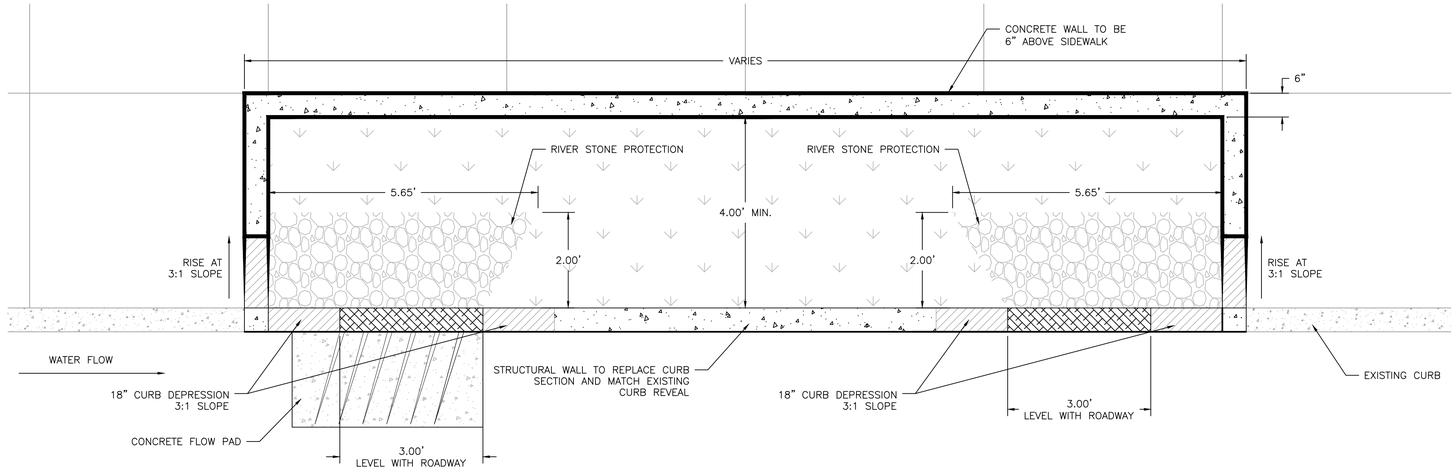
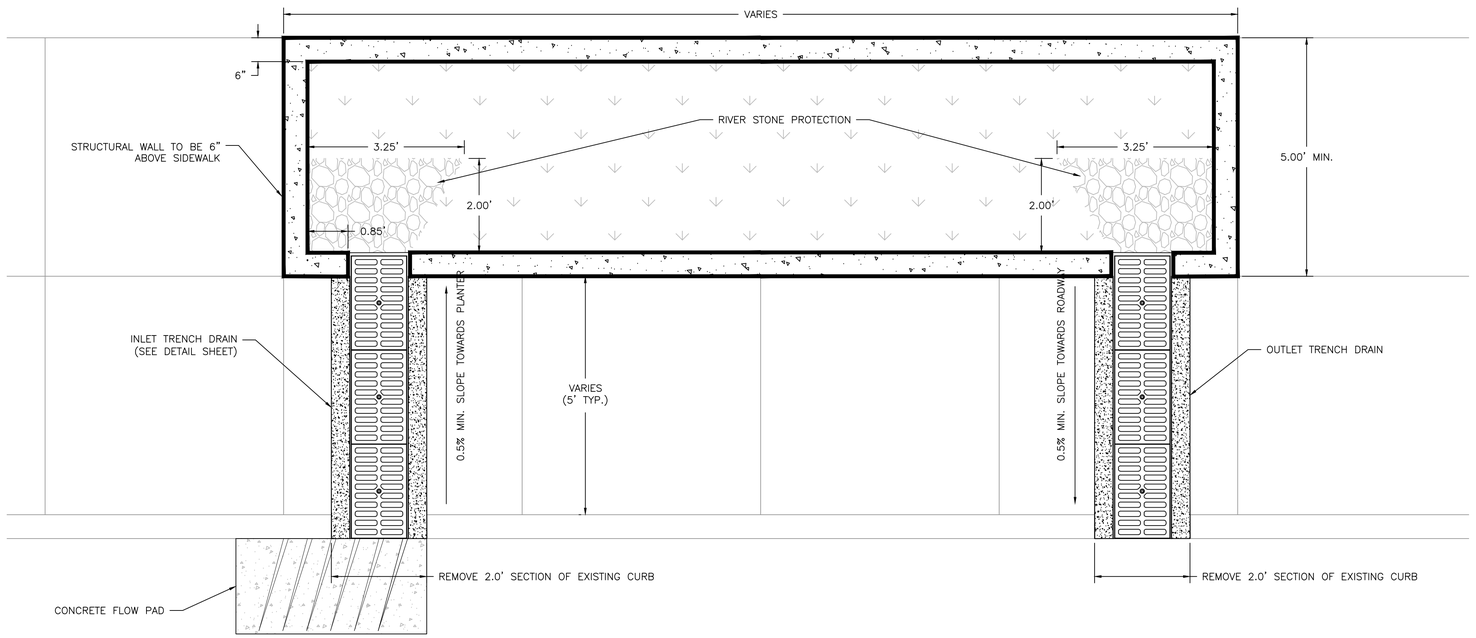


5.2 DT-5 CURB SIDE STORMWATER PLANTER
N.T.S.



5.3 DT-5 STORMWATER PLANTER
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STORMWATER PLANTER DETAILS

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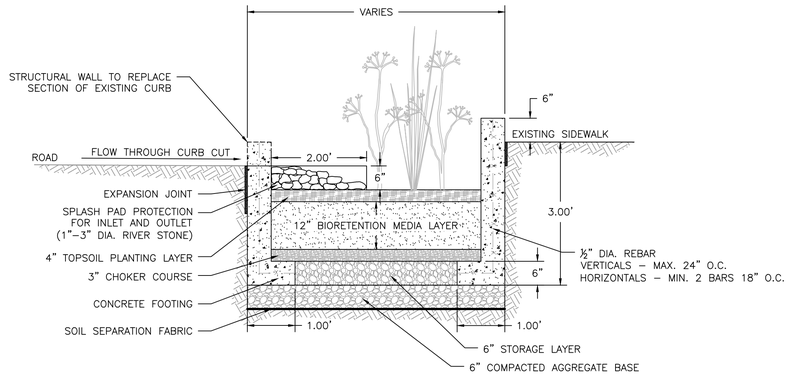

5.4 DT–5 STORMWATER PLANTER CROSS SECTION
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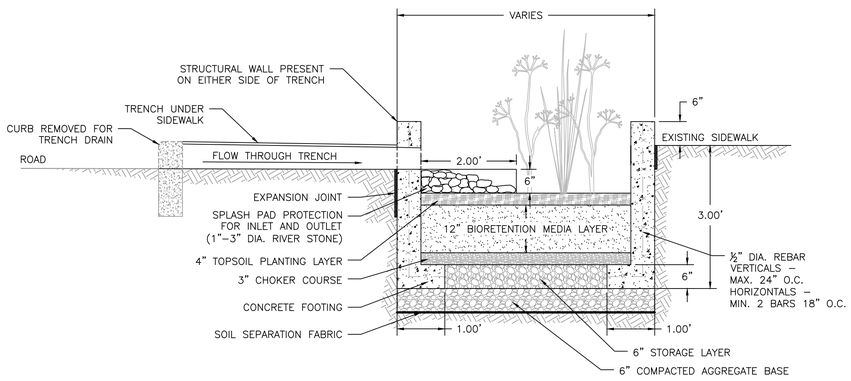

5.5 DT–5 STORMWATER PLANTER TRENCH DRAIN CROSS SECTION
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[COUNTY NAME] COUNTY, NJ

STORMWATER PLANTER DETAILS

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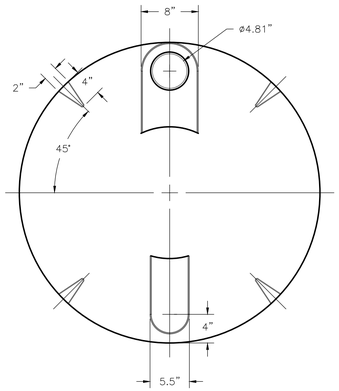
5.6 STORMWATER PLANTER SPECIFICATIONS

CONSTRUCTION NOTES

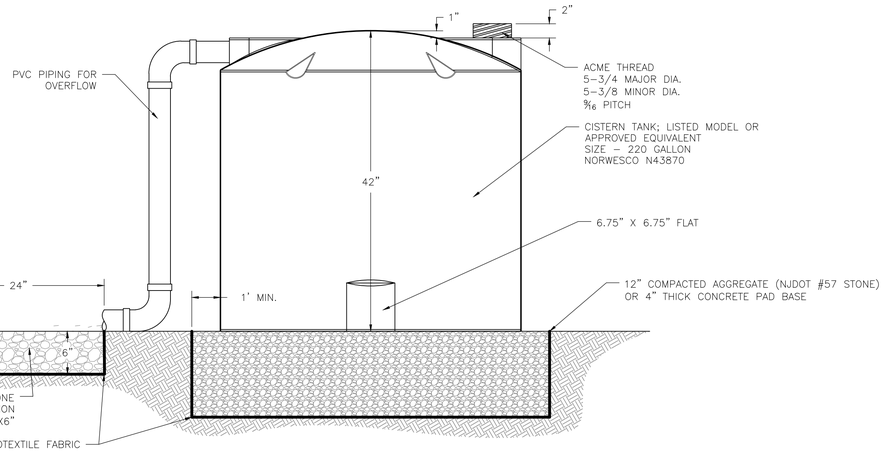
1. The contractor shall verify all information prior to excavation including elevations and locations of existing utilities.
2. The contractor shall notify the engineer immediately if any field conditions differ materially from those represented on these drawings and the specifications or if, in the contractor's opinion, said conditions conflict with the designs shown hereon.
3. The structural wall shall be 6 inches above sidewalk as a safety precaution. For a curb-side planter, the structural wall adjacent to the roadway shall be level with the existing curb. The rise of the structural wall shall have a 3:1 slope as shown in detail 5.4.
4. The grate or lid must be installed prior to backfilling.
5. Sand shall at the minimum conform to the sieve analysis for concrete aggregate sand (ASTM c-33). USGA tee/green sieve gradation mix is preferable where available.
6. The approval of materials and mixing of sand, compost, and soil shall be done under the supervision of the project engineer/landscape architect.
7. Underlying soils shall be tilled/scarified prior to spreading/mixing of bioretention media.
8. The stormwater planter shall be staked out and approved by the engineer prior to installation.
9. The separation fabric shall be installed prior to backfilling the stormwater planter.
10. All bioretention media shall be placed from the sides of the facilities, and in no event shall any tracked or wheeled equipment be permitted to cross the planter base.
11. All areas exclusive from the stormwater planter and trench drain shall be restored to original conditions.

SPECIFICATIONS

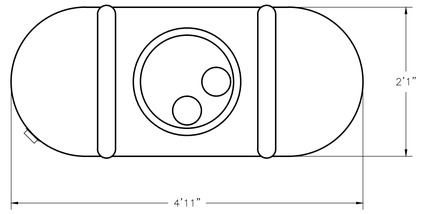
1. Bioretention media shall be comprised of 70% sand and 30% compost mixture.
2. The choker course shall be comprised of 3/8" pea gravel.
3. The storage layer and compacted aggregate layer shall be comprised of DOT No. 57 washed stone.
4. Refer to the site plan for dimensions and the planting plan.
5. The structural wall shall be a deep concrete curb in conformance with the NJDOT Standard Specifications for Road and Bridge Construction, 2007 or latest version.
6. The contractor shall only use concrete with 4,500 psi strength.

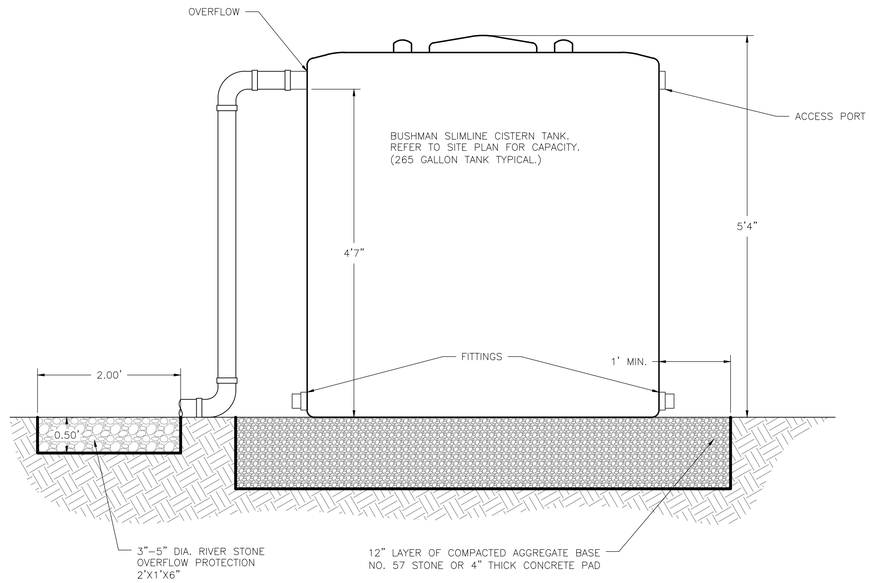


TOP VIEW



6.1 DT-6 CISTERN TANK (GAL. SIZES VARY)
N.T.S.





6.2 DT-6 BUSHMAN SLIMLINE CISTERN (GAL. SIZES VARY)
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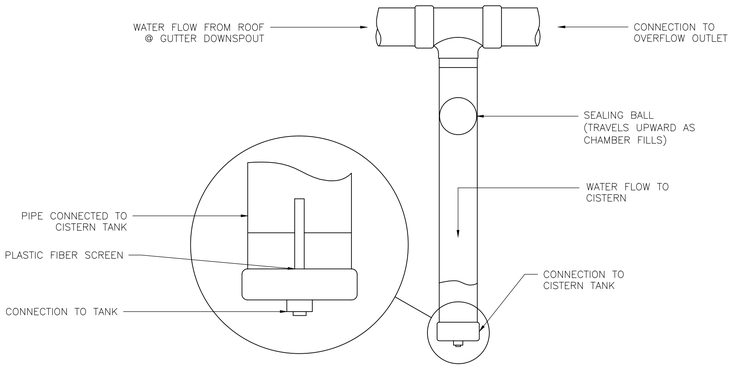
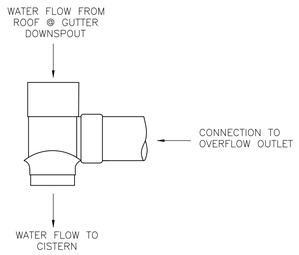
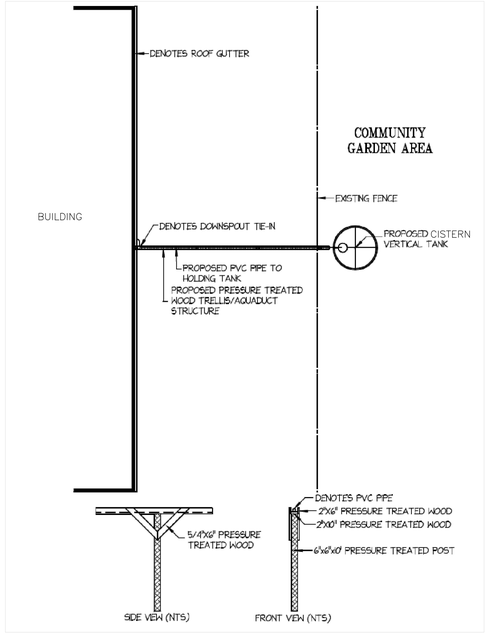


3 DT-6 FIRST FLUSH DIVERTER
6.3



NOTE: ALL PIPING AVAILABLE IN 3" AND 4" SYSTEMS.

6.4 DT-6 Y-SHAPED CISTERN DIVERTER
N.T.S.



6.5 DT-6 TRELLIS
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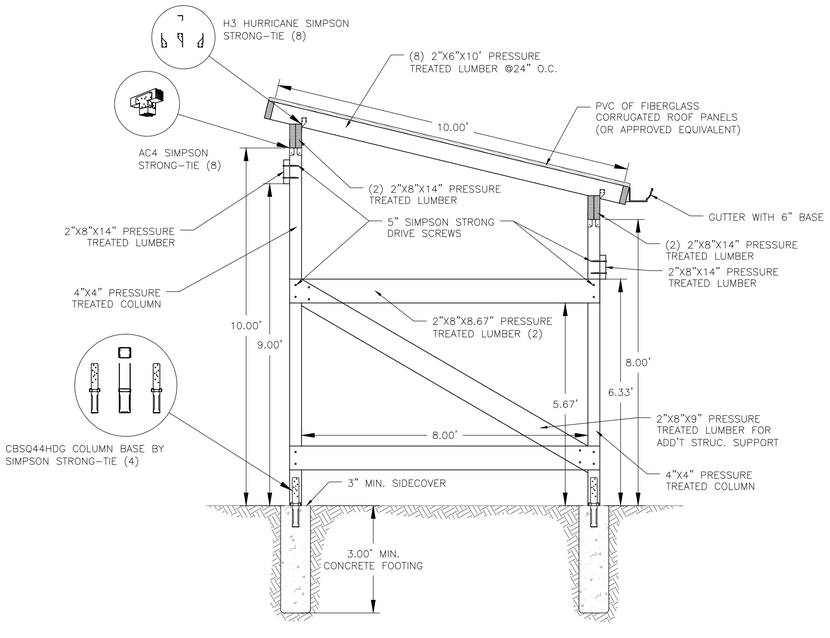

6.7 DT-6 SHADE STRUCTURE SIDE VIEW
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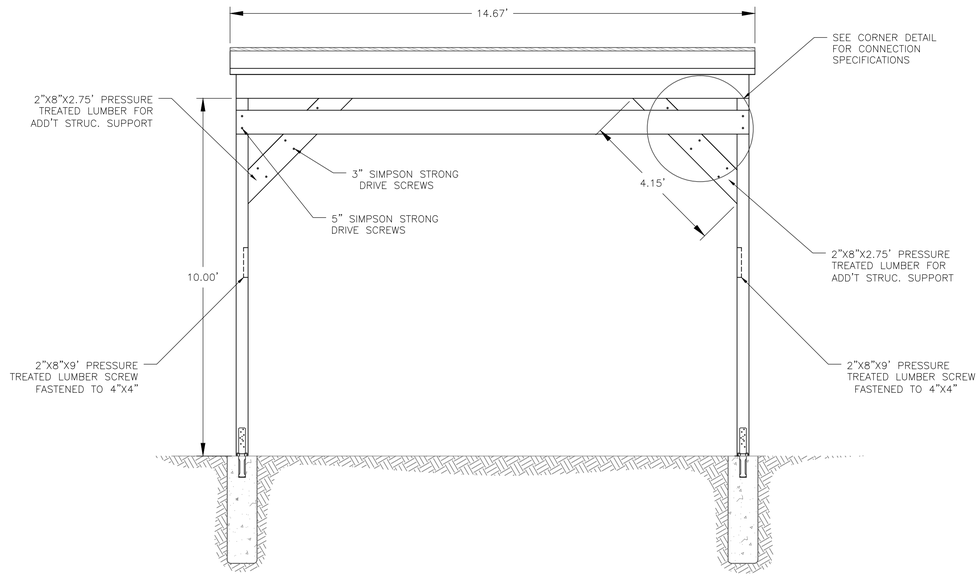

6.9 DT-6 SHADE STRUCTURE FRONT VIEW
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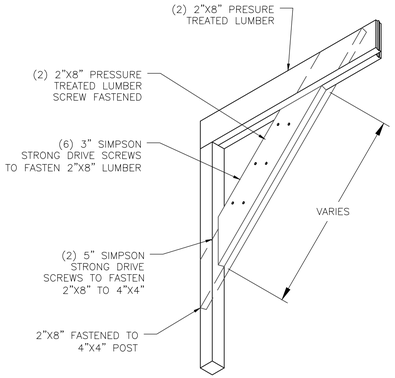
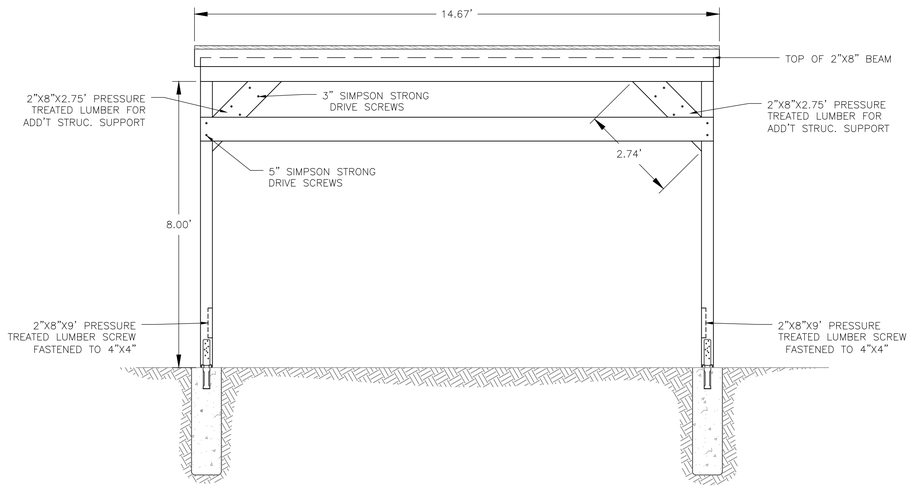


6.9 DT-6 SHADE STRUCTURE CORNER DETAIL
N.T.S



6.10 DT-6 SHADE STRUCTURE BACK VIEW
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SHADE STRUCTURE DETAILS

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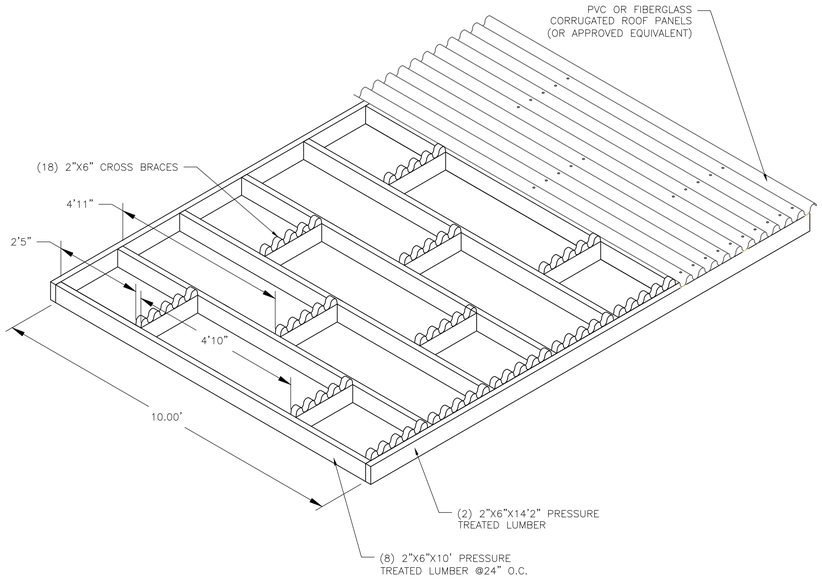

6.11 DT-6 SHADE STRUCTURE ROOF DETAIL
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[COUNTY NAME] COUNTY, NJ

SHADE STRUCTURE DETAILS

RUTGERS New Jersey Agricultural Experiment Station

SHEET #
6.0

6.6 CISTERN GENERAL SPECIFICATIONS

CONSTRUCTION NOTES

1. The contractor shall verify all information prior to installation including elevations and locations of existing utilities.
2. The contractor shall notify the engineer immediately if any field conditions differ materially from those represented on these drawings and the specifications or if, in the contractor's opinion, said conditions conflict with the designs shown hereon.
3. The contractor shall have a pre-construction meeting with the engineer prior to any work on site.
4. The contractor shall avoid disturbing the existing area. Any disturbance to sidewalks or landscaped vegetation and trees must be coordinated with the property owner.
5. The contractor shall use PVC piping for connection from roof to cistern.
6. All pipes used for connection from rooftop to cistern shall be clear of any clogs or obstructions. All pipes shall be fitted and secured with adhesive in conformance with local plumbing codes.
7. The contractor shall provide a crushed aggregate base or concrete slab with 4,500 psi strength to support the cistern as indicated on the plan.
8. The overflow from the cistern shall connect to the nearest storm sewer catch basin inlet.
9. The contractor shall not make any modifications at the site until consulting with the engineer.
10. The contractor is required to submit shop drawings of all materials and construction methods to the engineer for review and approval prior to purchase and installation.
11. All systems shall be tested by the engineer for leaks and water tight fittings prior to acceptance and payment.
12. The contractor shall use Simpson Strong Ties in connectors for the shade structure.
13. The contractor shall use pressure treated lumber.
14. The contractor shall install concrete footings with a minimum 3-foot depth.
15. The contractor shall not make any modifications at the site until consulting with the engineer.
16. The contractor is required to submit shop drawings of all materials and construction methods to the engineer for review and approval prior to purchase and installation of the gutter.

SPECIFICATION

1. Crushed aggregate base shall be comprised of DOT No. 57 stone. The alternative concrete pad shall be concrete with 4,500 psi strength.
2. The cistern shall be 220 gallon Norwesco n43870, 130 Gal. Bushman Slimline BSLT130, Bushman Slimline BSLT265e, or approved equivalent.
3. All disturbed areas exclusive of the cistern shall be restored to original conditions by the contractor.
4. The contractor shall provide shop drawings of downspout connections to the cistern for engineers approval prior to installation.
5. The diverter filter box shall be a Rainharvesting® first flush downspout diverter (product code: wdds9x) or equivalent.
6. Overflow shall discharge to a lawn area unless specified otherwise. Stone protection comprised of 3-5-inch diameter washed river stone shall be installed as shown in the detail.

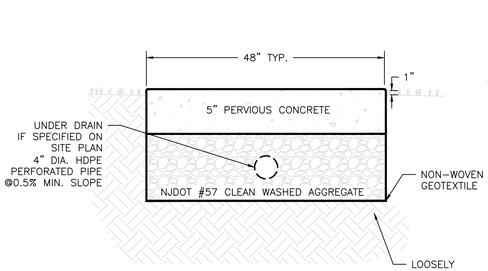
6.12 SHADE STRUCTURE SPECIFICATIONS

CONSTRUCTION NOTES

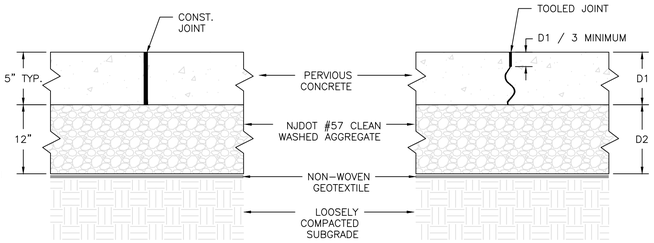
1. The contractor shall verify all information prior to installation including elevations and locations of existing utilities.
2. The contractor shall notify the engineer immediately if any field conditions differ materially from those represented on these drawings and the specifications or if, in the contractor's opinion, said conditions conflict with the designs shown hereon.
3. The contractor shall have a pre-construction meeting with the engineer prior to any work on site.
4. The contractor shall minimize disturbance during construction. Any disturbance to sidewalks or landscaped vegetation and trees must be coordinated with the property owner.
5. The contractor shall use PVC piping for the connection from the roof to the cistern.
6. All pipes used for connection from the shade structure to the cistern shall be clear of any clogs or obstructions. All pipes shall be fitted and secured with adhesive in conformance with local plumbing codes.
7. The overflow from the cistern shall connect to the nearest storm sewer catch basin inlet.
8. The contractor shall not make any modifications at the site until consulting with the engineer.
9. The contractor is required to submit shop drawings of all materials and construction methods to the engineer for review and approval prior to installation.

SPECIFICATIONS

1. The contractor shall use Simpson Strong Tie in connectors and strong drive screws for the shade structure.
2. The contractor shall use pressure treated lumber.
3. The contractor shall install concrete footings with a minimum 3-foot depth.
4. The roof panels shall be corrugated PVC or fiberglass panels.
5. The gutter shall have a 6-inch base.
6. The contractor shall only use concrete with 4,500 psi strength.
7. All disturbed areas exclusive of the shade structure shall be restored to original conditions by the contractor.

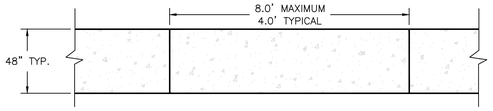


TYPICAL SECTION



PERVIOUS CONSTRUCTION JOINT

PERVIOUS CONTRACTION JOINT



JOINT SPACING – PLAN VIEW

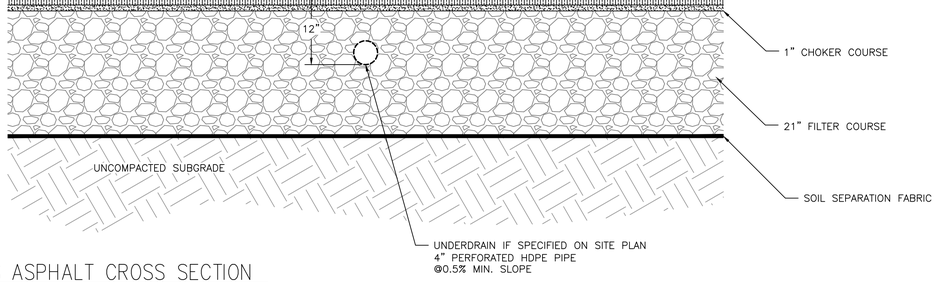
INSTALLATION

JOINT CUTTING

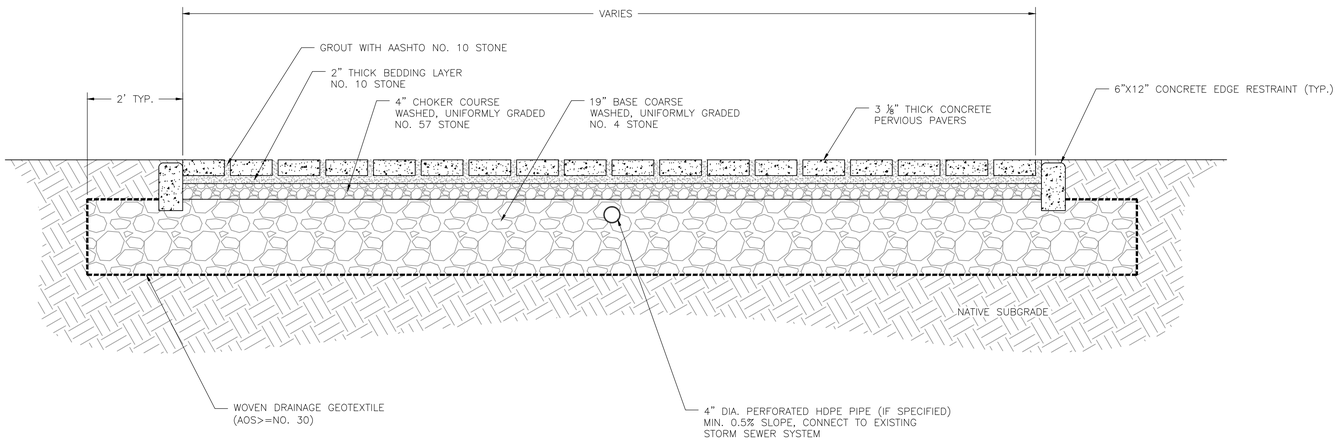
CURING

NOTES:
1. PERVIOUS CONCRETE MUST BE SUPPLIED AND INSTALLED BY NRMCA CERTIFIED PRODUCERS AND CONTRACTORS.
2. JOINT TO BE CUT IN FRESH PAVEMENT WITH A PERVIOUS CONCRETE JOINT TOOL ONLY.
3. PERVIOUS CONCRETE MUST BE COVERED WITH 6 MIL. PLASTIC, SECURELY FASTENED, FOR SEVEN (7) DAYS.
4. EXPANSION JOINTS TO BE PLACED EVERY THIRD JOINT OR 20 FEET (WHICHEVER IS LESS) AND AT EACH DRIVEWAY CUT AS PER THE DETAIL AND SPECIFICATIONS. A FULL-DEPTH SAWCUT CAN BE USED IN LIEU OF EXPANSION JOINTS.

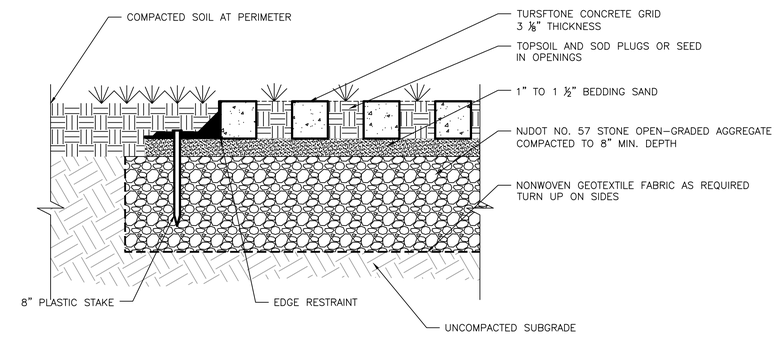
7.1 DT-7 PERVIOUS CONCRETE CROSS SECTION
N.T.S.



7.2 DT-7 POROUS ASPHALT CROSS SECTION
N.T.S.



7.3 DT-7 INTERLOCKING PAVERS CROSS SECTION
N.T.S.



7.4 DT-7 GRASS PAVERS CROSS SECTION
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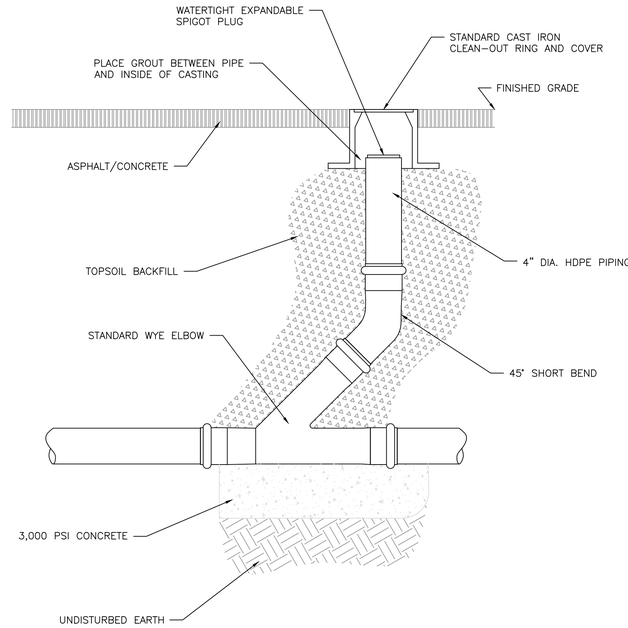


7.5 DT-7 PERMEABLE PAVEMENTS CLEANOUT
N.T.S.

PROFESSIONAL ENGINEER

DRAWN KWG | CHECKED CCO | APPROVED CCO | DATE XX.XX.XX | DATE XX/XX/XX

REVISIONS

No.	DATE	DESCRIPTION

[PROJECT SITE NAME]
[PROJECT NAME]
[ADDRESS, CITY]
[COUNTY NAME] COUNTY, NJ

PERMEABLE PAVEMENT DETAILS

RUTGERS New Jersey Agricultural Experiment Station

SHEET #

DT-7.0

ASPHALT AND SUB-BASE MATERIALS				
PROPOSED ELEVATION	LAYER	DEPTH	PROPERTIES	STONE
100.00	POROUS ASPHALT	0'-2"	SEE SPECIFICATIONS	-
99.83	CHOKER COURSE	0'-3"	SAND	BC SAND
99.75	FILTER COURSE	2'-0"	WASHED CRUSHED STONE	AASHTO No. 57
98.00	SOIL SEPARATION FABRIC	2'-0"	NON-WOVEN GEOTEXTILE	-

7.6 DT-7 POROUS ASPHALT MATERIALS TABLE

TABLE 901.03-1 STANDARD SIZES OF COARSE AGGREGATE

		AMOUNTS FINER THAN EACH LABORATORY SIEVE, % BY WEIGHT														
No.	NOMINAL SIZE	4"	3 ½"	3"	2 ½"	2"	1 ½"	1"	¾"	½"	⅜"	No. 4	No. 8	No. 16	No. 50	No. 100
1	3 ½" – 1 ½"	100	90–100		25–60		0–15		0–5							
2	2 ½" – 1 ½"			100	90–100	35 –70	0–15		0–5							
3	2" – 1"				100	90–100	35–70	0–15		0–5						
4	1 ½" – ¾"					100	90–100	20–55	0–15		0–5					
5	1" – ½"						100	90–100	20–55	0–10	0–5					
57	1"–No. 4						100	95– 100		25–60		0–10	0–5			
67	¾" – No. 4							100	90–100		20–55	0–10	0–5			
7	½" – No. 4								100	90–100	40–70	0–15	0–5			
8	⅜" – No. 8									100	85–100	10–30	0–10	0–5		
9	No. 4 – No. 16										100	85–100	10–40	0–10	0–5	
10	No. 4 – No. 200										100	85–100				10–30

7.7 DT-7 NJDOT STANDARD SPECIFICATIONS FOR AGGREGATE

PROFESSIONAL ENGINEER

DATE XX/XX/XX

DRAWN	CHECKED	APPROVED	DATE
KWG	CCO	CCO	XX.XX.XX

REVISIONS

No.	DATE	DESCRIPTION

[PROJECT SITE NAME]
[PROJECT NAME]
[ADDRESS, CITY]
[COUNTY NAME] COUNTY, NJ

PERMEABLE PAVEMENT DETAILS

RUTGERS New Jersey Agricultural Experiment Station

SHEET #

DT-7.0

7.8 PERMEABLE PAVEMENTS SPECIFICATIONS

CONSTRUCTION NOTES

1. The contractor shall verify all information prior to excavation including elevations and locations of existing utilities.
2. The contractor shall notify the engineer immediately if any field conditions differ materially from those represented on these drawings and the specifications or if, in the contractor's opinion, said conditions conflict with the designs shown hereon.
3. The contractor shall have a pre-construction meeting with the engineer prior to any work on site.
4. The contractor shall avoid over compacting the existing materials to avoid poor infiltration.
5. The contractor shall establish all elevations and lines as shown in the site plan for review by the engineer before any construction begins.
6. The contractor shall verify that the subgrade is consistent with line, grade, and elevations as indicated in the site plan. Any areas showing erosion or potential ponding shall be regraded before subbase installation.
7. Immediately after the subgrade is approved by the engineer, the contractor shall begin subbase construction which includes all materials below the pavement and above the existing subgrade.
8. The contractor shall place geotextile fabric in conformance with manufacturer's specifications. All adjacent fabric shall be overlapped by at least 16 inches. The fabric shall be secured at least four feet outside of the excavated base.
9. The filter course aggregate shall be installed in 8-inch maximum lifts and compacted to a maximum of 95% standard proctor (ASTM d698/AASHTO t99).
10. The choker course shall be installed evenly over the filter course; the contractor shall notify the engineer for approval. The choker base shall be at least four inches thick. The choker, gravel, and stone base aggregate shall be installed to a maximum of 95% standard proctor compaction.
11. The infiltration rate shall be at least 5-30 ft/day or 50% of the hydraulic conductivity (D2434).
12. Subbase courses densities shall be approved by the engineer; rolling and shaping shall resume until densities are acceptable. Water shall be poured over subbbase course materials during compaction.
13. The contractor shall perform all rolling and shaping from the low side to the high side until each layer conforms to grade as indicated and layers are smooth.
14. After subbase aggregate installation, the geotextile fabric shall be folded back along all bed edges. The fabric shall remain secure until adjacent soils establish vegetation. Any necessary measures shall be taken to prevent sediment from washing into beds.
15. The asphalt and concrete mixing plant, hauling and placing equipment, and installation shall be in conformance with National Asphalt Pavement Association's *Porous Asphalt Pavements for Stormwater Management* (NAPA IS-131) and the NJDOT Standard Specifications for Road and Bridge Construction, 2007 or latest version.

SPECIFICATIONS

1. The contract shall be performed in conformance with the NJDOT Standard Specifications for Road and Bridge Construction, 2007 or latest version.

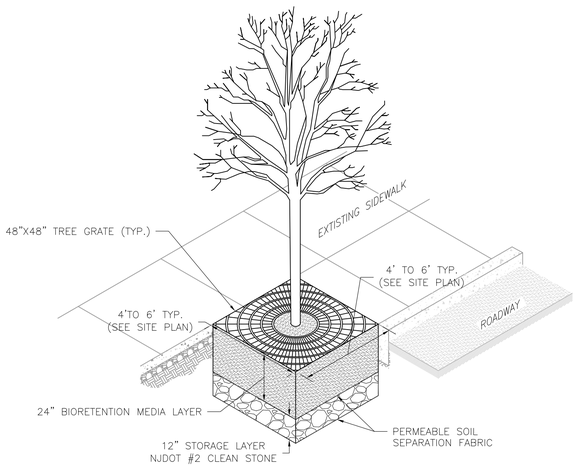
7.0 Permeable Pavements

2. Finished pavements shall show no marks from rollers and be free from low lying spots subject to puddle formation. The entire surface shall drain properly. All elevations must be within 0.1 feet.
3. All work must meet the standards of the engineer before payment. Additional work and testing will be necessary if standards are not met.
4. The thickness of No. 57 aggregate is 12 inches under pervious concrete sidewalks.
5. Porous asphalt mix design criteria:

Sieve size (inch/mm)	percent passing (%)
0.75/19	100
0.50/12.5	85-100
0.375/9.5	55-75
No.4/4.75	10-25
No.8/2.36	5-10
No.200/0.075 (#200)	2-4

Binder content (AASHTO t164)	6-6.5%
Binder performance grade	64-22
Fiber content by total mixture mass	0.3%
Cellulose or 0.4% Mineral	
Rubber solids (SBR) content by weight of the bitumen	1.5-3%
Air void content (ASTMd6752/ASSHTO t275)	16.0-22.0%
Draindown (ASTM d6390)* < 0.%	
Retained tensile strength (AASHTO 283)** > 80%	
Cantabro abrasion test engaed samples (ASTM d7064-04) < 20%	
Cantabro abrasion test on 7 day aged samples < 30%	

6. *Cellulose or mineral fibers may be used to reduce draindown.
7. **If the RTS (retained tensile strength) values fall below 80% when tested per NAPA IS-131 (with a single freeze thaw cycle rather than 5), then in step 4, the contractor shall employ an antistrip additive, such as hydrated lime (ASTM c977) or a fatty amine, to raise the RTS value above 80%.



8.1 / DT-8 ENHANCED TREE PIT ISOMETRIC
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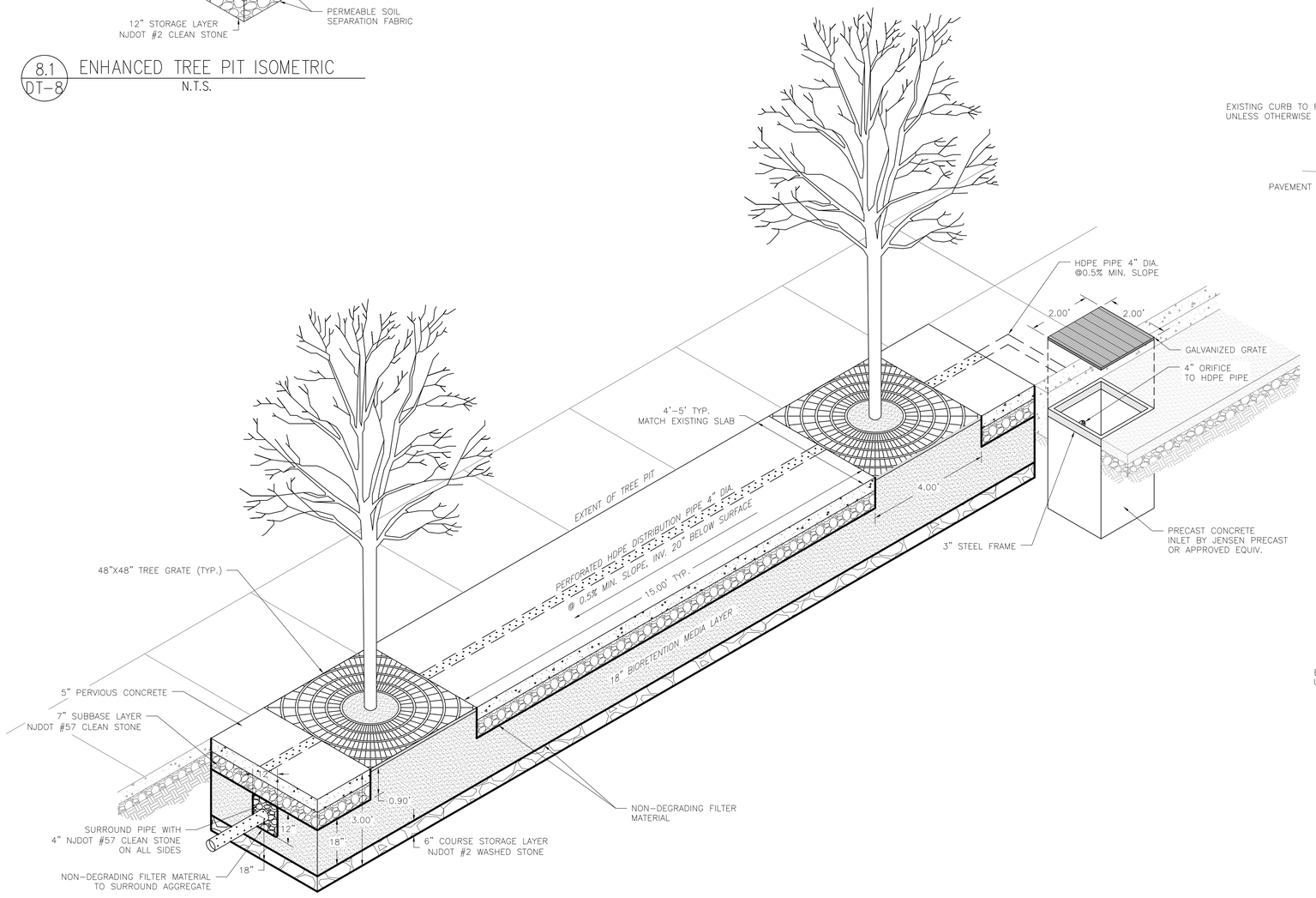

8.1 / DT-8 CONTINUOUS TREE PIT ISOMETRIC
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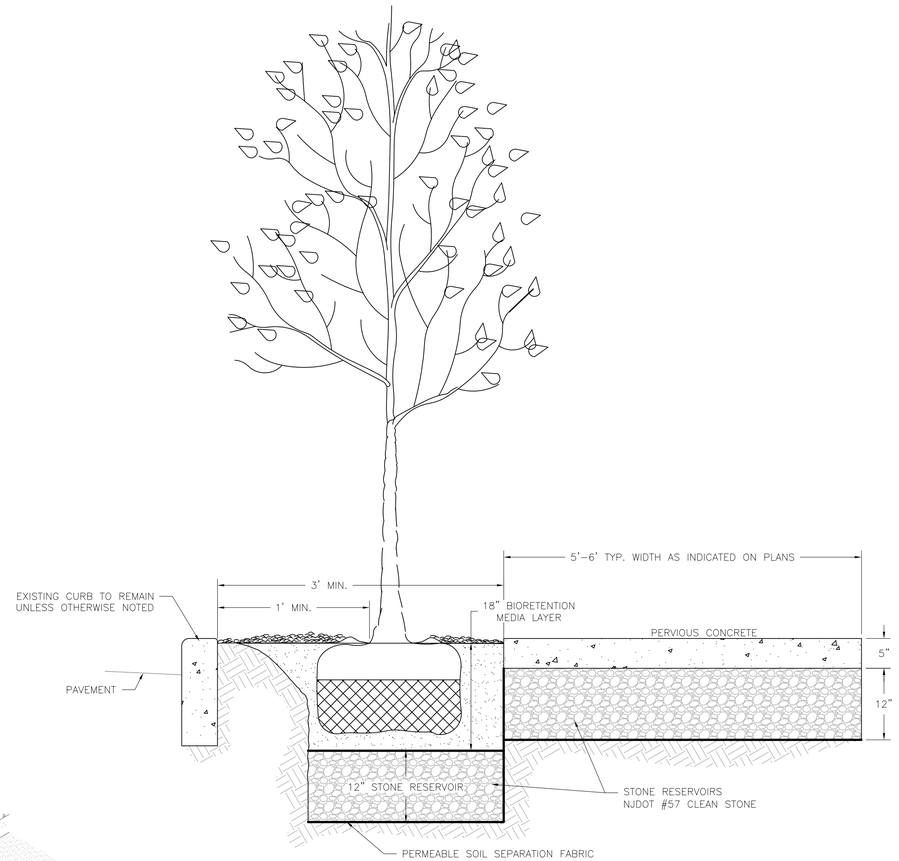

8.3 / DT-8 STREET TREE PLANTING AND PERVIOUS CONCRETE STRIP
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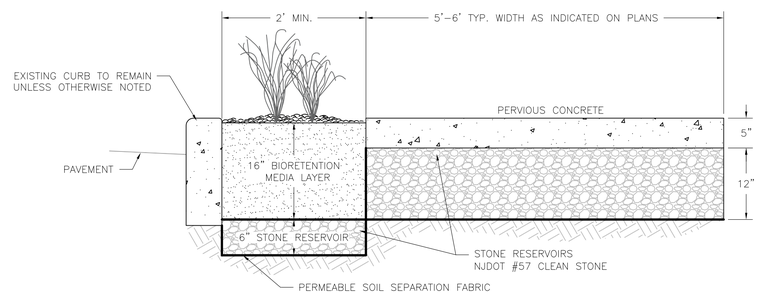

8.4 / DT-8 STREET GRASS PLANTING AND PERVIOUS CONCRETE STRIP
N.T.S.

PROFESSIONAL ENGINEER

	DRAWN	CHECKED	APPROVED	DATE
	KWS	CDO	CDO	XX/XX/XX

REVISIONS		
No.	DATE	DESCRIPTION

[PROJECT SITE NAME]
[PROJECT NAME]
[Adress, City]
[County Name] County, NJ

ENHANCED TREE PIT DETAILS

RUTGERS New Jersey Agricultural Experiment Station

SHEET #
8.0

8.5 ENHANCED TREE PIT SPECIFICATIONS

CONSTRUCTION NOTES

1. The contractor shall verify all information prior to excavation including elevations and locations of existing utilities.
2. The contractor shall notify the engineer immediately if any field conditions differ materially from those represented on these drawings and the specifications or if, in the contractor's opinion, said conditions conflict with the designs shown herein.
3. The engineer shall inspect all planting bed areas before planting to insure that adequate drainage exists. If any areas to be planted show evidence of poor drainage, the contractor shall take corrective action.
4. The contractor shall have all utilities marked before any excavation. If any utilities interfere with the project, the contractor shall notify the engineer.
5. The entire continuous tree pit and/or enhanced tree pit shall be excavated, the contractor shall dispose of any excess materials.
6. The contractor shall avoid over compacting the existing soils to avoid poor infiltration.
7. The contractor shall establish all elevations and lines as shown in the site plan for review by the engineer prior to construction.
8. The contractor shall verify that the subgrade is consistent with line, grade, and elevations as indicated in the site plan. Any areas showing erosion or potential ponding shall be regraded before subbase installation.
9. Immediately after the subgrade is approved by the engineer, the contractor shall begin subbase construction which includes all materials below the pavement and above the existing subgrade.
10. The contractor shall place geotextile fabric in compliance with manufacturer's specification. All adjacent fabric shall be overlapped by at least 16 inches. The fabric shall be secured at least four feet outside of the excavated base. The entire pit perimeter shall be lined with geotextile fabric.
11. The storage layer (No. 2) Shall be installed evenly over the existing subbgrade and permeable fabric. The storage layer aggregate shall be installed to a maximum of 95% standard proctor compaction. Permeable soil separation fabric shall be installed on top of storage layer prior to installing bioretention media.
12. The bioretention media layer shall be installed evenly over the storage layer and fabric.
13. The infiltration rate shall be at least 5-30 ft/day or 50% of the hydraulic conductivity (D2434).
14. After the subbase aggregate installation, the geotextile fabric shall be folded back along all bed edges. The fabric shall remain secure until adjacent soils establish vegetation. Any necessary measures shall be taken to prevent sediment from washing into beds.
15. Concrete shall be installed in conformance with NJDOT Standard Specifications for Road and Bridge Construction, 2007 or latest version.

SPECIFICATIONS

1. The tree gates shall be the retrofit collection grates (r-9002) from NEENAH foundry. Grates shall be 48 inches on each side with a 16-inch diameter expandable tree opening or approved alternative for continuous tree pit. For the enhanced tree pit, the grate shall be 48 - 72 inches on each side with a 16-inch diameter expandable tree opening or approved alternative. See site plan for grate dimensions for enhanced tree pits.

2. The bioretention layer shall be comprised of 70% sand and 30% compost mixture.
3. The coarse storage layer shall be comprised of No. 2 washed stone. The layer shall be compacted multiple times. All other storage layers shall be comprised of No. 57 washed stone.

Appendix C: Native and Salt Resistant Plant Species for New Jersey

Native Trees and Shrubs - Atlantic County, New Jersey			
Scientific Name	**Common Name**	**Category**	**Growth Habit**
Acer rubrum	red maple	Dicot	Tree
Alnus serrulata	hazel alder	Dicot	Tree, Shrub
Amelanchier arborea	common serviceberry	Dicot	Tree, Shrub
Amelanchier canadensis	Canadian serviceberry	Dicot	Tree, Shrub
Asimina triloba	pawpaw	Dicot	Tree, Shrub
Baccharis halimifolia	eastern baccharis	Dicot	Tree, Shrub
Betula nigra	river birch	Dicot	Tree
Betula populifolia	gray birch	Dicot	Tree
Carya alba	mockernut hickory	Dicot	Tree
Carya pallida	sand hickory	Dicot	Tree
Castanea dentata	American chestnut	Dicot	Tree
Celtis occidentalis	common hackberry	Dicot	Tree, Shrub
Celtis tenuifolia	dwarf hackberry	Dicot	Tree, Shrub
Cephalanthus occidentalis	common buttonbush	Dicot	Tree, Shrub
Chamaecyparis thyoides	Atlantic white cedar	Gymnosperm	Tree
Chionanthus virginicus	white fringetree	Dicot	Tree, Shrub
Crataegus crus-galli	cockspur hawthorn	Dicot	Tree, Shrub
Crataegus intricata	Copenhagen hawthorn	Dicot	Tree, Shrub
Crataegus pedicellata	scarlet hawthorn	Dicot	Tree, Shrub
Crataegus pruinosa	waxyfruit hawthorn	Dicot	Tree, Shrub
Crataegus uniflora	dwarf hawthorn	Dicot	Tree, Shrub
Diospyros virginiana	common persimmon	Dicot	Tree
Fagus grandifolia	American beech	Dicot	Tree
Ilex laevigata	smooth winterberry	Dicot	Tree, Shrub
Ilex opaca	American holly	Dicot	Tree, Shrub
Ilex verticillata	common winterberry	Dicot	Tree, Shrub
Juniperus virginiana	eastern redcedar	Gymnosperm	Tree
Kalmia latifolia	mountain laurel	Dicot	Tree, Shrub
Lindera benzoin	northern spicebush	Dicot	Tree, Shrub
Magnolia virginiana	sweetbay	Dicot	Tree, Shrub
Malus angustifolia	southern crab apple	Dicot	Tree, Shrub
Malus coronaria	sweet crab apple	Dicot	Tree, Shrub
Morella caroliniensis	southern bayberry	Dicot	Tree, Shrub
Morella pensylvanica	northern bayberry	Dicot	Tree, Shrub
Pinus echinata	shortleaf pine	Gymnosperm	Tree
Pinus rigida	pitch pine	Gymnosperm	Tree
Pinus strobus	eastern white pine	Gymnosperm	Tree
Pinus virginiana	Virginia pine	Gymnosperm	Tree

Populus heterophylla	swamp cottonwood	Dicot	Tree
Prunus angustifolia	Chickasaw plum	Dicot	Tree, Shrub
Prunus serotina	black cherry	Dicot	Tree, Shrub
Quercus coccinea	scarlet oak	Dicot	Tree
Quercus falcata	southern red oak	Dicot	Tree
Quercus ilicifolia	bear oak	Dicot	Tree, Shrub
Quercus marilandica	blackjack oak	Dicot	Tree, Shrub
Quercus prinoides	dwarf chinkapin oak	Dicot	Tree, Shrub
Quercus prinus	chestnut oak	Dicot	Tree
Quercus rubra	northern red oak	Dicot	Tree
Quercus stellata	post oak	Dicot	Tree
Quercus velutina	black oak	Dicot	Tree
Rhus copallinum	winged sumac	Dicot	Tree, Shrub
Robinia hispida	bristly locust	Dicot	Tree, Shrub
Robinia viscosa	clammy locust	Dicot	Tree, Shrub
Salix nigra	black willow	Dicot	Tree
Sassafras albidum	sassafras	Dicot	Tree, Shrub
Toxicodendron vernix	poison sumac	Dicot	Tree, Shrub
Viburnum dentatum	southern arrowwood	Dicot	Tree, Shrub
Viburnum nudum	possumhaw	Dicot	Tree, Shrub

Wind Resistant Plants

Large Trees - >30’ Tall

- Live Oak
- Southern Magnolia
- Baldy Cypress
- Hickory
- Persimmon
- Shumard Oak
- River Birch
- Black Gum

Small Trees – <30’ Tall

- Dogwood
- American Holly
- Yaupon
- Crape Myrtle
- Sabal Palms
- Japanese Maple
- Ironwood
- Sweet bay magnolia
- Redbud
- Fringe tree

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Cooperative Extension of Ocean County
Extension Center
1623 Whitesville Road
Toms River, NJ 08755-1199

ocean.njaes.rutgers.edu
732-349-1246 Agriculture
732-349-1245 Master Gardeners
732-505-8941 Fax

Charlene Costaris, Horticultural Consultant - March, 2013

Salt-Resistant Perennial Plants

Evergreen Trees
Ilex opaca American Holly
Juniperus virginiana eastern red cedar
Magnolia grandiflora southern magnolia
Picea pungens glauca Colorado blue spruce
Thuja occidentalis white cedar

Deciduous Trees
Amelanchier canadensis serviceberry
Betula lenta sweet birch
Betula nigra river birch 'Heritage"
Cornus racemosa gray dogwood
Celtus occidentalis hackberry
Crataegus crus-galli cockspur hawthorn
C. phaenopyrum Washington hawthorn
Koelreuteria paniculata golden rain tree
Magnolia virginiana sweetbay magnolia
Nyssa sylvatica black gum
Prunus virginiana 'Canada red'
Canada Red cherry
Quercus bicolor swamp white oak
Q. rubra red oak
Sassafras albidum sassafras
Zelkova serrata Japanese zelkova

Evergreen Shrubs
Ilex glabra inkberry
Juniperus species juniper
Morella cerifera Wax myrtle
Prunus laurocerasus Cherry laurel
Yucca filamentosa Adam's needle yucca

Deciduous Shrubs
Baccharis halimifolia Groundselbush
Caragana arborescens Siberian peashrub
Caenothus americanus New Jersey tea
Clethra alnifolia summersweet
Hamamelis virginiana witch hazel
Lonicera spp bush honeysuckle
Morella pennsylvanica bayberry
Prunus maritima beach plum
Rhus spp. sumac (and poison ivy)
Rosa rugosa rugosa rose
Shepherdia argentea silver buffaloberry
Spiraea x vanhottei Vanhoutte spirea
S. latifolia bridalwreath spirea
Vaccinium angusifolium lowbush blueberry
V. corymbosum highbush blueberry
Vitex agnus-castus chastetree

Evergreen Groundcovers
Arcostaphylos uva-ursi bearberry
Hudsonia tomentosa woolly beach heather
Ipomoea pes-caprae Beach morning glory
Juniperus conferta shore juniper
Lirope spicata creeping lilyturf
Opuntia spp. prickly pear cactus
Sedum spp. sedum

Deciduous Groundcovers
Hemerocallis (avoid H. fulva) daylily
Lathyrus maritimus Beach pea
Sibbaldiopsis tridentata shrubby fivefingers
Stachys byzantina Lamb's ear
Thymus praecox Creeping thyme

Flowering Perennials
Actaea rubra red baneberry
Agalinis purpurea purple false foxglove
Allium cernuum nodding onion
Anemone canadensis windflower
Anthemis tinctoria golden marguerite
Aquilegia canadensis columnbine
Aster novae-angliae New England aster
A. umbellatus flat-topped aster
Baptisia australis blue false indigo
Campanula americana tall bellflower
Epilobium angustifolium fireweed
Limonium carolinianum lavender thrift
Nipponanthemum nipponicum
Montauk daisy
Perovskia atriplicifolia Russian sage
Rudbeckia spp. coneflower
Santolina spp. lavender cotton
Solidago sempervirens seaside goldenrod
Veronica spicata speedwell

Ornamental Grasses
Ammophila breviligulata
American beachgrass
Calamagrostic acutiflora feather reed grass
Carex flaccosperma blue wood sedge
C. grayi gray sedge
C. volpinoidea fox sedge
Juncus effusus common rush
Muhlenbergia capillaris hairawn muhly
Panicum virgatum switchgrass
Schizachyrium scoparium little bluestem
Sorghastrum nutans indiangrass