TOWN OF NORTH BRANFORD

ROAD STANDARDS

Approved by the North Branford Town Council on March 5, 2019

TOWN OF NORTH BRANFORD
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TOWN OF NORTH BRANFORD ROAD STANDARDS

SECTION I - GENERAL REQUIREMENTS

1.01 Introduction

The following document shall be known as the Town of North Branford Road Standards. The adoption of these standards is for the purpose of promoting the public health, safety and welfare; to ensure protection of the public against the dangers of an unsafe road; to ensure protection of the use, value and enjoyment of premises adjoining roads; and to ensure the protection of the Town against costs and expenses in the repair and maintenance of roads after acceptance by the Town, which are avoidable through careful planning, appropriate design and competent construction. These standards are and have been adopted pursuant to the Road Ordinance of the Town of North Branford and pursuant to the authority conferred upon the Town Council by Section 13a-71 of the Connecticut General Statutes.

1.02 Use of Specifications

The Town of North Branford Road Standards shall govern the construction and improvements of all roads, drainage structures, storm sewers, appurtenances, and bridges presented or designed to be presented for acceptance and maintenance by the Town of North Branford. As applicable, these standards are also to be used in conjunction with work within Town right-of-ways and for work required as a result of a subdivision or site plan approved by the North Branford Planning and Zoning Commission.

1.03 General Provisions

a. No person(s) owning land within the Town shall permit same to be used by any person as a road, other than a driveway, which connects with any Town road unless he shall erect and maintain at all such intersections with a Town road either; 1) a gate or other obstruction effectively barring the public from using such roads, or 2) a conspicuous sign, facing the abutting Town road, clearly stating in bold letters that such roads is a private road and is not a public road.

b. No person shall commence construction of any road which is then intended to be opened, at any future time, to the public unless approval of the location, layout, design and construction plans therefore shall have been previously granted by the Town.

c. No person shall commence construction of any road, other than a driveway, which is not then intended to be opened to the public unless he shall:

1. Apply to the Planning and Zoning Commission for approval of said proposed road. Said application shall conform to the Planning and Zoning requirements and shall include:
    a) the name of the owner(s) of the land upon which such proposed road is to be constructed;
    b) the location and layout off such proposed road specifying any Town road or roads with which such proposed road will connect; c) that such proposed road is not intended to be opened to the public or offered for acceptance as a Town road;

2. Erect and maintain at all intersections with any Town road a conspicuous sign, facing the Town road, clearly stating in bold letters that such road is a private way.

1.04 References

The State of Connecticut, Department of Transportation's "Standard Specifications for Roads, Bridges and Incidental Construction", Form 817 issue, (or latest edition and any subsequent amendments or issues), shall be considered part of these standards.

Other references, as noted in sections of these standards are frequently utilized in design and construction in Connecticut. The listing of these references is not intended to limit the use of other acceptable design and construction methods.

1.05 Standard and Alternate Designs

a. The following standards drawings are provided in the appendix:
   1. Road cross-section layout
   2. Cul-de-sac layout

b. These Standards shall be considered to be the minimum design standards acceptable and the Town shall have the right to vary these requirements as the situation dictates.

No road constructed for private use may be presented to the Town for acceptance at any time after the effective date of these Standards, unless constructed in accordance with these Standards.
These standards are intended to provide for the best possible design and construction of public improvements in terms of service, safety, economy, and ease of long-term maintenance. The standards take into consideration the average conditions encountered within the Town. Special designs are expected to be prepared for projects where unusual or extreme conditions are encountered.

c. Alternate designs for proposed improvements may be submitted to the Town or its authorized agent. However, the Town is under no obligation to approve any variations of the design standards as set forth in these standards.

1.06 Validity

If any section, paragraph, subdivision, clause, or provision of this set of Road Standards is adjudged invalid or unconstitutional for any reason, such adjudication shall apply only to the section, paragraph, subdivision, clause, or provision upon which such adjudication is based, and the remainder of the Standards shall be deemed to be and shall continue to be valid and in full force and effect.

1.07 Enforcement

It shall be the duty of the Town Council or its duly authorized agent(s) to enforce the provisions as set forth in these Town of North Branford Road Standards.

1.08 Plan Requirements

The following plans, drawings and data shall be submitted for approval prior to the clearing or grading of any land and/or construction of any roadway or improvement:

a. The accurate layout of existing and proposed Roads, easements, or rights-of-way, including those for utilities, sanitary sewers, drainage systems, either on or off-site, with accurate bearings and distances including length, radii and central angle of all curves;

b. Accurate location of required monuments will be shown with accurate references based on traverses between United States Coast and Geodetic Survey monuments. When monuments are set, they are to have coordinates marked on final as-built drawings.

c. The location of all existing and proposed sanitary and storm water sewers, catch basins, manholes, bridges and culverts. Pipe sizes and invert elevations of all drainage structures shall be shown together with outfall into existing sewers or natural watercourses;

d. Road profiles, showing accurate existing and finished grades, cross-sections and other detailed road construction plans, including drainage structures and other utilities such as sanitary sewers, water and all other underground utility lines.

e. Watershed data and calculations for the design of drainage structures.

The above shall be prepared by a Professional Engineer and/or Land Surveyor registered in the State of Connecticut and shall be properly signed and sealed by such engineer or surveyor, as appropriate. All drawings shall be submitted for approval to the Planning and Zoning commission in the case of subdivision roads, and to the Town Manager for all other roads.

Upon final approval for the above listed submissions for any proposed roadway and auxiliary structures, a number of copies of said documents will be required for filing by the approving agency. The number and type of copies will be as directed by the approving agency.

1.09 Survey Requirements

a. General - The centerline of the traveled portion of the road shall be located in the center of the right-of-way, and shall be established in the field by a licensed land surveyor or a licensed professional engineer, and suitable construction ties shall be established at all control points. These ties shall be protected during construction so that the centerline may be re-established at any time.

b. Stations - Stations shall be established every fifty (50) feet and at all radius points (P.C and P.T.). A construction stake shall be placed at right angles to each station, clear of construction and grading. This stake will show the station, the measured distance to centerline (offset), and the cut or fill which will establish the centerline grade.

c. Bench Marks - A permanent bench mark shall be established at the beginning and end of each road and at intervals not exceeding one thousand (1,000) feet along the length of the road. These bench marks shall be referenced to the same datum shown and identified on the construction drawings for the road. Sketches showing at least three (3) ties to each bench mark, the bench mark elevation, and a description of each bench mark shall be furnished to the Town Engineer or its authorized agent(s).

d. Protection of Stakes and Bench Marks - Grade stakes and permanent bench marks shall be protected and preserved until the road construction has been approved by the Town Council. If such stakes or bench marks are disturbed, they shall be replaced immediately.

SECTION II - DEFINITIONS

General - For the purpose of these Standards, the following terms, phrases, words, and the derivations shall have the meaning given herein. When not inconsistent with the context, words used in the present tense include the future, words in the plural number include the singular number, and words in the singular number include the plural number include the singular number, and words in the singular number including the plural number. The word "shall" is always mandatory, and the words "may" and "should" are discretionary.

ADT - Average Daily Traffic, the average number of vehicle trips generated on a Road per day.

Applicant - Any person, firm corporation, partnership, association, or appointed agent who applies for approval of construction of a new roadway or improvement of an existing roadway.

Application - The application for the construction of a roadway or for improvements to an existing roadway.

As-built Plan - A construction plan that shows the improvements as actually constructed in the field.

Baled Hay - A temporary system of staked/anchored bales of hay or straw strategically located to check erosion.

Channels - A natural or artificial water course.

Commission - The North Branford Planning and Zoning Commission.

Construction Plan - A plan and profile drawing of all proposed improvements to be constructed, maintained and installed as part of the proposed roadway. Such construction plans shall include other methods of conveying the required information, including supportive documentation and calculations. All construction plans shall bear the seal of a qualified professional engineer registered in the State of Connecticut.

Cul-De-Sac - A dead-end Road with only one outlet, which terminates in a circular turnaround for safe and convenient traffic movement reversal. See subdivision regulations for cul-de-sac requirements and limitations.

Developer - Synonymous with "applicant" as defined above.

Development - Any construction or grading activities to improved or unimproved real estate.

Grubbing - Cleaning the ground of roots and stumps by digging them up.

Highway - The term "Road" shall include highway in these standards.

Hydraulic Study - Maps and computations of the total watershed area that will eventually pass through the storm sewer system. This study is for the purpose of determining storm water capacity and requirements of storm sewer pipes, culverts, drainage ditches, retention structures, etc.

Improvement - Any change or alteration to the existing conditions of the roadway site for the purpose of complying with these Standards or rendering the site more suitable for development and/or habitation.

As used in these Standards, improvements include but are not limited to: construction and installation or roadways, paved Roads, curbs, gutters, sidewalks, utilities, Road signs, monuments, shade trees, drainage facilities, erosion and sedimentation control measures, sewer and water systems, buildings, earth filling or removal, seeding, and grading, and associated items.

Inland Wetlands and Watercourses Agency - The Agency acting as the North Branford Inland Wetlands and Watercourses Agency.

Landscaping - Changing, rearranging or adding to the original vegetation or scenery of a piece of land to produce an aesthetic effect appropriate for the use to which the land is put. It may include reshaping the land by moving the earth, as well as preserving the original vegetation or adding vegetation.

Lot - The unit or units into which land is divided with the intention of offering such units for sale, lease, conveyance, or transfer; either as undeveloped or developed sites, regardless of how they are conveyed. Lot shall also mean parcel, site or any similar term.

Lot, Building - A lot capable of supporting a building and on which all utilities required for habitation, such as water supply and sewage disposal, are available to the lot or located on-site.

Maintenance Bond - A bond, furnished to the Town by the developer that guarantees all roadway improvements against defective workmanship or materials for a period of one year from date of acceptance of a road by the Town Council as a Town road.

Monument - A reinforced concrete post installed to designate the legal limits of a Road right-of-way or other boundary of Town-owned land.

Mulching - The application of plant residues or other suitable materials, not produced on the site, to the surface of the soil.

Open Space - Property within a subdivision, designated to be deeded to the Town or other approved agency by the developer, to be maintained by the owner in an undeveloped state in a manner approved by the commission, to be used for passive or active recreation; or for preservation of natural features.

Owner - The property owner of record in accordance with the Assessor's records.

Pavement Structures - The combination of subbase, base course, and surface course construction on a subgrade to support and distribute the traffic load, generally composed of the following:

1. Subgrade: The top surface of a roadbed upon which the pavement structure, shoulder and curbs are constructed.

2. Subbase: Specified or selected materials placed upon the top of cuts or upon embankments, the top surface of which supports components of pavements, shoulder and related appurtenances.

3. Base Course: The layer or layers of specified or selected material of designated thickness placed on a subbase or a subgrade to support a surface course.

4. Surface Course: One or more layers of a pavement structure designed to accommodate the traffic load, the top layer of which resists skidding, traffic abrasion, and the disintegrating effects of climate:

a. Binder Course: The lower layer of the surface course.
b. Wearing Course: The top layer of the surface course.

5. Bituminous Concrete: A designed combination of dense graded mineral aggregate filler and bituminous cement mixed in a central plant, and laid and compacted while hot.

6. Curbing: A raised pavement structure, which is usually constructed of bituminous concrete, or Portland cement concrete, that is used to control drainage, to deter vehicles from leaving the pavement, to delineate and protect the edge of pavement, to present a more finished appearance to the Road, and to assist in the orderly development of the roadside.

Performance Bond - A bond, furnished to the Town by the applicant, to be used to complete roadway improvements if the builder does not complete the improvements as promised, as required, and/or as indicated in the application.

Permanent Cover -Establishing a permanent grass or legume cover to stabilize sediment producing and/or severally eroded areas.

Plan Profiles - The drawing or drawings of the applicants' design for Road construction, drainage, and other improvements. They are referred to as "Construction Plans" in this Regulation. Roadway - The term "Road" shall include roadway in the standards.

Right-of-Way
1. The parcel of land between Road property lines, which are defined as the limits of land dedicated, secured, or reserved for public transportation uses.

2. A narrow strip of land used to gain access to a parcel of land that does not have access to a Road right-of-way. Right-of-way is usually owned in fee by the party having the right to use it.

Road - Any road, highway, avenue, land, or other public right-of-way dedicated to the movement of motor vehicles and that is shown on a subdivision plan approved by the Commission; or that is a State or Town Road as found on the most current map entitled, Town Roads, North Branford, Connecticut, Connecticut Department of Transportation, scale one inch (1") equals 1,000 feet; but private right-of-ways and discontinued, abandoned, or impassible Roads are excluded.

1. Arterial Road: a major through Road that conducts relatively high volumes of traffic between communities, and that is not intended to have a residential environment. Usually ADT range is over 3,000 trips.
2. Collector Road: a Road that conducts traffic between major arterial Roads, activity centers, and/or neighborhoods. It is a principal traffic route within residential areas and carries relatively high volumes. A collector Road ties in at one or both ends with an arterial Road. Usual ADT range is 500-3,000 trips

3. Local Road: a loop Road, or short Road that primarily provides access to abutting lots, but may also serve a connector to the local and minor Roads. Usual ADT range is 75-500 trips.
4. Minor Road: a short-dead-end or loop Road that serves only as access to abutting lots which shall number no more than twenty (20). Minor Roads do not serve as through Roads to any other Road. Usual ADT range is less than 100 trips.
5. Loop Road: a Road that intersects another Road in two (2) places, or loops back on itself in a "dead-end-loop".
6. Dead-end Road: a Road with only one intersection with another public Road.
7. Cul-De-Sac Road: a dead-end Road which terminates in a circular vehicle turning area.
8. Discontinued Road: a Road that has been removed from the Town's system of accepted Roads through formal action at a Town Meeting.
9. Abandoned Road: a Road that has been removed from the Town's system of accepted Roads through cessation of public use over a period of time.
10. Unimproved Road: a road shown as "unimproved" on the above referenced map or a road determined to be a Town Road which is passable at all times but lacks paving as specified in the Town of North Branford Road Standards, as amended.

Sediment - Any solid material, either mineral or organic, that is in suspension, is transported, or has been moved from its site of origin by erosion.

Sediment Basin - A sediment basin is created by the construction of a barrier or dam across a drainage way, or by excavating a basin, or by a combination of both, to trap and store sediment from erodible areas in order to protect properties and stream channels below the installation from excessive siltation. This specification applies only to sediment basins that are temporary in nature and will be removed upon completion of the development. This practice applies primarily to areas where land grading operations are planned or are underway. It is used as a temporary measure until areas above the installations are permanently protected against erosion by vegetative or mechanical means.

Soil - Any unconsolidated mineral and organic material of any origin.

Soil Erosion and Sediment Control Plan - A scheme that minimizes soil erosion and sedimentation resulting from development and includes but is not limited to a map and narrative.

Soil Types - The classification of soils in a development as defined and explained in the "Soil Survey of New Haven County, Connecticut", Soil Conservation Service, as amended.

Soils Map - The officially adopted soils classification of the Town of North Branford prepared by the New Haven County Soil Conservation District and the Department of Agriculture, Soil Conservation Service.

Special Flood Hazard Area - The land in the flood plain subject to a one percent (1%) or greater chance of flooding in any given year. The Special Flood Hazard Area contains all zones "A" and "Al" - "A30" as designated on the Flood Insurance Rate Maps, dated May 16, 2017, and as subsequently revised.

Stabilization - Structural or vegetative treatment applied to an area in order to prevent soil erosion.

Street Line - The limit or property lines of the Road right-of-way. Where such line has not been established it is deemed to be a line parallel to and a minimum of twenty-five (25) feet distant from the center line of the traveled section of the pavement for the purpose of these regulations.

Temporary Cover - Stabilizing sediment producing and/or severely eroded areas by establishing temporary annual grasses or small grains.

Town - The Town of North Branford, Connecticut.

Trench - An excavation, later refilled, necessary for the installation or removal of pipes, drains, end walls, tanks, catch basins, manholes, etc.

Use - The purpose or activity for which a piece of land or its building is designed, arranged or intended.

Watercourses - Watercourses are the areas identified and defined in Section 22a-38 of the General Statutes of Connecticut, as amended. "Watercourse" means rivers, streams, brooks, waterways, lakes, ponds, marshes, swamps, bogs, and all other bodies of water that are contained within, flow through, or border upon any portion of this state, whether natural, artificial, public, or private; but does not include any tidal waters.

Wetlands - Wetlands are the areas identified in Sections 22a-32 and 22a-38j of the General Statutes of Connecticut, as amended; and officially delineated by the Inland Wetlands and Watercourse Agency. "Wetland" means land that consists of any of the soil types designated as poorly drained, very poorly drained, alluvial, and flood plain by the National Cooperative Soils Survey, as amended, of the U.S.D.A. Soil Conservation Serve; and includes submerged land, but not tidal wetlands.

Work - "Work" defined in the General Statutes of Connecticut, as amended. "Work" means all physical improvements, required by the approved plan, other than the staking out of lots, and including but not limited to the construction or roads, storm drainage facilities, and water and sewer lines; the setting aside of open space and recreation areas; the installation of telephone and electric service; the planting of trees or other landscaping; and the installation of retaining walls or other structures.

SECTION III - DESIGN AND LAYOUT SPECIFICATIONS

3.01 Information to be Provided Relative to New Road Construction

When a new Road is proposed, the following information shall be supplied:

1. Plan profile drawings prepared on 24" x 36" plan profile sheets to minimum scale of 1" = 40' horizontal and 1" = 4' vertical showing:

a. The location and dimensions of existing and proposed Road rights-of-way, edges of pavement, curbs, sidewalks, piping, catch basins, manholes, end walls, bridges, utilities and utility easements, drainage easements, open channels, monuments, tops and toes of all slopes, all data required for accurate layout of roadway center lines and rights-of-way, including stationing, bearings, tangent lengths, arc lengths, radii and central angles of all curves; location of property lines intersecting the Road right-of-way lines, and the names of owners of such adjacent property; typical cross-sections of each Road, showing proposed dimensions, materials of construction, and locations of drainage piping and other underground facilities, location and description of survey bench mark;

b. Profiles of the existing and proposed center line grades, vertical curve data and stations at grade changes, intersections and at intervals of fifty (50) feet; and,

c. Profiles of all existing and proposed drainage facilities, sewers, bridges and other proposed improvements showing locations, sizes, grades and invert elevations.

2. Detail drawings, drawn to appropriate scales on 24” x 36" sheets, showing in further detail all information required for construction of all proposed improvements that cannot readily be shown on the plan profile drawings.

3. A drainage report including a drainage analysis map, basis of design, detailed design computations and an analysis of the effect of the proposed road and drainage facility construction and land development associated therewith on existing downstream facilities and properties adjacent thereto. Said report shall include the measures proposed to be taken to prevent or alleviate any potentially harmful effects on existing downstream drainage facilities and effects on existing downstream drainage facilities and adjacent property that may result from construction of the proposed road and drainage facilities and land development associated therewith. The drainage analysis map shall be drawn to an appropriate scale and shall show the following:

a. Boundaries of the drainage area tributary to each proposed drainage facility inlet;
b. Boundaries of drainage area tributary to existing downstream drainage facility inlets where such facilities may be hydraulically impacted due to proposed road and drainage facility construction and land development associated therewith;
c. Topography of the drainage area, based on the best existing topographic maps currently available, in sufficient detail to enable determination of the general slopes of existing ground and watercourses;
d. Existing and proposed roads within the drainage area;
e. Existing flowing and intermittent water courses and wetlands;
f. Existing and proposed vegetation including wooded area, open fields, lawns and the like;

Soil types, as designated by the National Cooperative Soils Survey and shown on the most currently available soils map as prepared by the U.S. Soil Conservation Service and the New Haven County Soil and Water Conservation District;

g. Existing land use and development; and,
h. Existing and proposed drainage structures and facilities, with suitable cross-reference to detailed design computations and construction drawings.

Said detailed design computations shall show the design criteria, parameters and methods used in selecting the location, configuration, type and size of all proposed drainage facilities. Such computations shall include tabulated summaries of pertinent design computations. Wherever feasible, such tabulations shall follow the most current format utilized by the Connecticut Department of Transportation, the Federal Highway Administration, the U.S. Soil Conservation Service or such format as may be acceptable to the Town Engineer.

4. A soil report showing the type, nature and extent of the various soils existing within the proposed road right-of-way and in the area where the roadway slopes extend beyond the proposed roadway right-of-way.

All soil types shall be identified as designated by the National Cooperative Soils Survey and shown on the most currently available soils maps as prepared by the U.S. Soil Conservation Service. Such report shall also include a description of the means and methods proposed to be utilized to overcome any potential soils problems.

5. A detailed plan for erosion and sedimentation control covering all proposed road and drainage facility construction, which plan shall show measures to be taken to control erosion and sedimentation both during and after construction in accordance with the recommendations and standards of the New Haven County Soil and Water Conservation District; and the Connecticut Guideline for Soil Erosion and Sedimentation Control dated 2002 or latest revision.

All plans shall include an operations and maintenance schedule identifying the person(s) responsible for maintaining erosion control measures, the frequency of inspection, anticipated start of construction and anticipated duration of construction.

6. Detailed drawings of all bridges, box culverts, retaining walls and other special drainage structures.

7. Where any road or drainage facility intersects a State Highway, a permit shall be obtained from the Connecticut Department of Transportation.

3.02 Existing Road Reconstruction/Improvements

In the event a proposed subdivision or development fronts on or has the required access to an accepted Town road, whether improved or unimproved, and said road does not contain a roadway in good condition paved with bituminous concrete to a continuous width of at least 24' (twenty-four feet) and/or does not meet the drainage and other requirements of these regulations, then the roadway and/or drainage facilities and other related pubic improvements for said Town road may be required to be improved in accordance with the North Branford Road Standards by the builder at builder(s) expense as necessary to protect the health, safety, and welfare of the neighborhood, and motoring public, as

directed by the Town.

1. All Town roads requiring improvements shall be upgraded to the design standards, requirements and procedures of the North Branford Road Standards at the expense of the builder, to limits directed by the Town.

2. When a new subdivision generates the need for improving an existing roadway and/or its related facilities, the builder shall address:

a. Roadway construction
b. Curbing
c. Side slopes
d. Storm drainage
e. Sidewalks (if required)
f. Erosion and sedimentation control plans
g. Construction plans
h. Bonding
i. Easements
j. Inspections
k. And any other measures deemed appropriate by the Town Engineer.

SECTION IV - ROAD DESIGN REQUIREMENTS

4.01 General

a. References - The following documents are required as referenced in using this specification:

1. State of Connecticut, Department of Transportation: Standard Specifications for Roads, Bridges and Incidental Construction, Form 817 and any subsequent amendments or issues.

2. "A Policy on Geometric Design of Highways and Roads" by the American Association of State Highway Official (AASHO), 2002, and any subsequent amendments or issues.

3. Town of North Branford Subdivision Regulations

4. Town of North Branford Plan of Development

b. General Requirements
Roads shall be designed and constructed in accordance with the standards and procedures specified in this Section. Higher standards may be required due to special project or site features.

c. Road Width

The following minimum dimensions shall be satisfied for the various Road classifications:

Road Classification	**Right-of-Way**	**Pavement Width***
Arterial	60'	30' minimum
Collector	50'	30'
Commercial & Industrial	50'	30'
Local & Minor	50'	24'

*measured from face of curb to face of curb

4.02 Cul-de-sac Roads

Cul-de-sac Roads, in general, shall not exceed 1,000 feet in length. Cul-de-sacs shall have a 50 foot radius at the right-of-way line for local residential roads and a 70 foot radius at the right-of-way line for commercial and industrial roads. The radius of the outer edge of the paved turn-around shall be 10' (ten feet) less than the radius of the right-of-way. Temporary cul-de-sacs may have a radius of forty feet (40') if approved by the Planning and Zoning Commission.

4.03 Intersections

The following criteria shall be adhered to in the establishment of intersections:

1. Number of Roads: no more than two (2) Roads shall intersect or meet at any one point to form a four-way intersection. The centerline of all Roads entering the intersection shall pass through a single point.

2. Spacing of intersections: Intersections of local and minor roads shall be spaced a minimum of 200' (two hundred feet) apart, measured from the points of intersection of the center lines. Intersections of arterial and collector Roads, including commercial and industrial roads shall be spaced a minimum of 500' (five hundred feet) apart, measured from points of intersection of the center lines. Roads intersecting on opposite sides of a Road shall intersect exactly opposite one another or shall have the minimum spacing required above.

3. Angle of intersection: Wherever possible, roads shall intersect at a 90 degree angle, or as close thereto as is practical. In no event; however, shall an intersection be allowed where the angle of the intersection is less than 60 degrees within 100' (one hundred feet) of the intersection.

4. Radii of intersecting Roads. The radii, at the right-of-way line, of intersecting local and minor Roads shall be a minimum of 20' (twenty feet). The radii, at the right-of-way line, of intersection with collector, shall be a minimum of 20' (twenty feet). Other intersections shall have a minimum radius of 30' (thirty feet) at the right-of-way line. The Town may require greater radii where the angle of intersection is less than 90 degrees.

5. The center lines of intersecting Roads shall be tangents within 100' (one hundred feet) of the point of intersection. Exceptions to this standard may be allowed if the intersecting Roads are local in which case the requirement may be reduced to 75' (seventy five feet); if a side Road with the required tangent intersects with the outside of a broad curve in such a way to provide safe sight distances; or if strict adherence to this requirement would result in undesirable conditions in the opinion of the Town Engineer.

6. Where a new road is being proposed to intersect an existing Road, the grading for a minimum of 50 feet in all directions from the intersection shall be shown on a drawing with a scale to 1' - 10' and a 0.1' contour interval shall be used to show the grading.

4.04 Side Slopes

1. Sloping Grading: Roads in cut or fill sections shall be provided with slopes not steeper than 2 (two feet) horizontal to 1' (one foot) vertical, unless other structural measures are provided to retain the slope. Steeper slopes may be permitted in rock cuts. At intersections, banks shall be cut back to maintain the minimum sight distance for intersections as required by these standards.

2. Guide Rails: Protective barriers, consisting of guide railing or single posts, shall be installed wherever deemed necessary to minimize the risk of personal injury or property damage resulting from vehicle departure from the right-of-way. Guide rails shall be in accordance with these standards.

3. Slope Rights: Where new Roads abut private property, necessary slope rights must be obtained by the builder when in cut or fill, and these slope rights shall be shown on the final layout and on the land records. The developer shall address the effects of fills and cuts on adjacent private property with the slope right area

4. Drainage: The applicant shall provide the Town with evidence that no drainage problems will arise on adjacent property due to cut or fill operations.

4.05 Road Cross-section

Roads shall be designed with a cross-section as shown on the Standard Detail drawings of these Standards.

4.06 Driveways

Access drives shall be constructed such that the flow of road drainage is not impeded, excessive water from the lot is not directed onto the road, safe sight line distances are achieved, and two or more vehicles may be parked off the road during all weather conditions. A plan of proposed driveway with existing and proposed grades, length, width, surfacing and drainage features shown shall be submitted with an application for a driveway permit. Additional information shall be submitted by the applicant as required by the Town Engineer. The plan shall be approved by the Town Engineer prior to issuance of the driveway permit and acceptance of the driveway bond. No driveway work shall be done by the applicant prior to issuance of the permit.

1. Grade: The apron portion, which is the section between the edge of road pavement and the Street line, shall have a maximum grade of 3% (three percent) slope, the next 10' (ten feet) shall not exceed 5% (five percent) slope, and the remainder shall not exceed 15% (fifteen percent) slope.

2. Surface: The driveway apron shall be paved with a minimum of 2" (two inches), bituminous concrete compacted depth, over four inches (4") of processed gravel or stone. Concrete pavements may be used upon approval of the Town Engineer. The remainder of the drive shall be stabilized with a suitable surface treatment to prevent erosion and siltation.

3. Surface Water: Even distribution of drive run-off onto the lot is encouraged. If run-off must drain towards the road, the water shall be retained in the roadway gutter or side swale, or picked up by the storm drainage system.

4. Sight Line: The grading and clearing at the driveway entrances shall ensure adequate sight distance for vehicles to exit the drive with minimum hazard and disruption of traffic.

5. Sidewalks: Where driveways will cross a sidewalk, the driveway apron shall be graded to meet the grade of the sidewalk, and the section of the sidewalk in the area of the driveway shall be replaced with an 8" (eight inch) thick reinforced concrete section.

SECTION V - STORM DRAINAGE DESIGN

5.01 General Requirements

1. Storm drainage systems for surface and subsurface water shall be as generally required by the Town of North Branford Subdivision Regulations; design and construction shall be in accordance with standards and procedures hereinafter specified. Higher standards may be required due to special project or site features.

2. In the design of all storm drainage systems for the construction of Roads, commercial and industrial sites, and other facilities, it is imperative that the designer apply the utmost care to protect the life and property of area residents, the traveling public, the Town and the State. All facilities shall be planned and located so as to minimize danger to such life and property.

3. Systems shall be designed and constructed such that erosion and sedimentation is controlled both during and after construction.

4. Proposed drainage facilities shall be designed to accommodate the runoff from the entire upstream drainage area with full consideration given to the effects of potential land development that could reasonably occur under the most current zoning regulations.

5.02 Design Requirements

1. Upstream drainage area: Storm drainage systems shall provide for the proper drainage of the upstream drainage area developed in accordance with the Town of North Branford "Plan of Development" and subsequent amendments.

2. Storm drain flows: Except where indicated by special design studies, storm drain pipes and culverts will be designed to flow full for the "design storm". Total allowable headwater depths on pipes and culverts should normally be restricted to less than 1.2 times the clear height of the pipe or culvert in order to preserve this condition. Pipes or culverts designed to flow under greater heads will require special studies and may require design treatment.

3. Placement of drainage structures: The first set of catch basins in a storm drain system shall be located within 300' (three hundred feet) of the Road high point. Spacing between sets of catch basins shall be located as necessary to collect runoff at a maximum distance of 300' (three hundred feet). When the distance from drainage structures to outfall pipe ends exceeds 400' (four hundred feet), manholes shall be placed to give a maximum length of pipe between structures of 400' (four hundred feet). Drainage structures shall be placed at each grade change along a storm drain and at each junction point of two or more storm drains. Inlet structures shall also be located and connected to the system to pick up low spots in shoulder areas of the right-of-way and in adjacent lots.

4. Placement of pipes: Pipes shall generally be laid on straight alignment, both horizontally and vertically, with structure providing access at all deflection points, or at a junction of two or more lines. In special cases, pipes maybe placed on curved alignments but such curvature shall not exceed the manufacturer's recommendations, and approval must be obtained from the Town Engineer.

5. Minimum Slope: All storm sewers shall be designed to provide a self-cleansing velocity of at least 2.5 feet per second when flowing full. Generally, storm sewers shall have a minimum pitch of 0.5% (one half percent). Lesser pitch may be granted by the Town Engineer, provided the self-cleansing velocity is maintained.

6. Minimum pipe size: Pipe for the main line of storm sewer systems and cross-culverts shall be a minimum of 15" (fifteen inches), inside diameter. Pipe arches of equal cross sectional area to the above noted circular pipes may be substituted.

7. Minimum cover: The minimum cover over all storm drainage within the curb lines shall be 3' (three feet). Where conflicts with other subsurface facilities require, and with the approval of the Town Engineer, pipe may have as little as 18" (eighteen inches) of cover, but in such cases, extra strength Class 5 R.C.P. shall be used.

8. Outlet structures: All storm drain systems shall be terminated with a flared end section, end wall, or other approved structure. Special energy dissipators may be required to prevent erosion.

9. Intersection drainage: inlets shall be installed to properly drain all intersections of new Roads, and of new Roads with existing Roads. Improvements to surface drainage at existing intersections may be required if the traffic of a new subdivision significantly increases the traffic volume at the intersection.

10. Discharge from drainage system: The overall drainage system shall be designed such that the runoff rate outside of the subdivision, during or after development, does not exceed the rate which existed before development. This may be accomplished by detention basins, infiltration basins, or other acceptable means. Final discharge points shall be approved by the Town Engineer. The final discharge shall be into suitable streams or rivers, or into Town drains with adequate capacity to carry the additional water.

11. Channels: The use of channels to carry storm water to natural watercourses may be allowed, then only with the approval of the approving agency and the Town Engineer. Channels shall be properly sized for design flows and stabilized according to flow velocity.

12. Underdrains: The installation of underdrains will be required beneath the edge of pavement of a proposed Road wherever the high groundwater level is not to be less than 3' (three feet) below the proposed finished grade of the Road. The Town may require underdrains to be installed where localized seeps, springs or high groundwater less than 3' (three feet) below the proposed grade of the Road are observed within the proposed grade of the Road lines during construction. The diameter of underdrains shall not be less than 6" (six inches). Outlets for underdrains shall be connected directly to drainage structures or shall be terminated with an approved outlet. Under-drains shall be placed in 2' (two foot) wide trenches, filled with 3/4" stone and lined with a filter fabric approved by the Town Engineer.

13. Special structures: Bridges, box culverts, deep manholes, non-standard end walls, and other special structures shall be designed in accordance with good engineering practices and shall be subject to the approval of the Town Engineer.

14. Surface and subsurface combined drains: Combined surface storm water and subsurface water drains may be installed only with the permission of the Town Engineer. Graded aggregate shall be used around the pipe and with the pipe and aggregate enclosed in an approved filter fabric. Combined drains shall not be used when crossing the roadway.

15. Diversion: The diversion of storm water runoff from one watershed or watercourse to another shall be avoided wherever possible. Where it is absolutely necessary to create such a diversion, special provisions shall be made to minimize the potential damages which may occur as a result of such diversion.

16. Shoulder drainage considerations: The primary consideration is to prevent seeping of water onto the pavement, with resultant freezing in the winter due to slow flow in the road gutter. Designs shall be based upon the following are suggested:

5.03 Drainage Easements and Right to Drain

1. Easements dedicated to the Town: Drainage easements for storm drains located outside of Road right-of-way lines shall be a minimum of 20' (twenty feet) wide and centered on the pipe. Easements for outlet pipes shall extend to a suitable existing storm drain or an adequate natural watercourse. Where possible, easements shall be centered on property lines. Easements shall be provided for channels and shall be of sufficient minimum width to include a 10' (ten foot) access strip in addition to the width of the channel from top of bank to top of bank. The Town shall be granted the right to enter such easements to maintain, repair and/or modify the installation(s).

2. Easements which will not be dedicated to the Town: The location and size of these easements shall be established in the same manner as easements to be dedicated to the Town. The rights and responsibilities shall be dedicated to a responsible party meeting the approval of the approving agency.

3. Rights-to-Drain: Where the discharge shall be into private property adjoining the proposed roadway development, the applicant shall secure drainage rights from the adjacent property owners, in writing. Such rights shall be noted on the final plans and shall be secured prior to final approval. The rights shall include the right for the Town to discharge stormwater and to enter and maintain existing or proposed facilities if the drainage system is to be accepted by the Town.

5.04 Calculation of Storm Water Flows

1. General

Storm water flows may be calculated by use of the Rational Method or by use of the methods described in the most current edition of the U.S. Soil Conservation Service Technical Release No. 55. Other methods of computing storm water flows may be utilized provided they conform to sound engineering practice. In general, the use of the Rational Method shall not be used for use in computing flows form drainage areas in excess of 200 (two hundred) acres or for computing
flows from 100-year storms.

2. Open Channels

a. General. Where open channel flow is required, the channel shall be properly designed to carry the design flow. Open channels shall be in the form of a trapezoid having a bottom width of at least 2' (two feet) and side slopes of not less than 2' (two feet) horizontal to 1' (one foot) vertical. The channel shall be seeded, sodded, and rip-rapped or otherwise stabilized as the flow quantities and velocities require.

b. Stabilization of Open Channels. Special attention shall be given to the stabilization of open Channels in the immediate vicinity of pipe inlets and outlets, bridges, at bends and curbs and at other critical locations as required to prevent scouring, erosion and/or siltation of watercourse and culverts and undermining of drainage structures.

c. Design Criteria. Hydraulic design of open channels and design of bed and bank stabilization shall be done in accordance with the sound engineering practice meeting the approval of the Town Engineer.

3. Design Stone Criteria: All stone drainage facilities shall be designed based on the following stone return frequency criteria:

A. Storm drainage system and minor channels - 10 years
B. Cross-culverts (minor) - 25 years
C. Minor streams (200-1,000 acres) - 50 years
D. Major streams (more than 1,000 acres) - 100 years

a. Capacity-Within Roadway. Storm drainage within the roadway, exclusive of culverts and bridges carrying flows under the road, shall be designed to safety accommodate flows resulting from storms of the maximum intensity which can be expected to occur on an average of once every ten years (10-year storm) without being surcharged. Storm drainage facilities draining a sag in the profile of a roadway, where there is no alternative escape for ponded water, shall be designed so that the peak flow of storms of the maximum intensity which can be expected to occur on an average of once in twenty-five years (25-year storm), shall not cause flooding of the roadway to a depth greater than 6" (six inches) at any location on the roadway.

b. Capacity-Under roadways. Structures, including pipes, box culverts and bridges, conveying storm water and stream flow under roadways shall be designed to accommodate the following flows:

1. For drainage areas of less than one square mile where there is no established watercourse:
    a. Peak flows resulting from storm of the maximum intensity which can be expected to occur on an average of once in twenty-five years (25-year storm). The depth of headwater pool at the structure inlet shall not exceed 1.2 times the clear opening height of the structure and shall not cause flooding of the roadway or adjacent buildings, sewage disposal systems and water supply systems or damage to the structure or roadway.
    b. Peak flows resulting from storms of the maximum intensity which can be expected to occur on an average of once in 100 (100 hundred) years (100-year storm) without causing damage to or flooding of buildings, sewage disposal systems and water supply systems or damage to the structure or roadway.

2. For drainage areas of less than one square mile in which there is an established watercourse:
    a. Peak flows resulting from storm having the maximum intensity which can be expected to occur on an average of once in fifty (50) years. The depth of the headwater pool at the structure inlet shall not exceed 1.2 times the clear opening height of the structure and shall not cause flooding of the roadway or adjacent buildings, sewage or damage to the structure or roadway.

b. Peak flows resulting from storms of the maximum intensity which can be expected to occur on an average of once in 100 (one hundred) years (100-year storm) without causing damage to the structure or roadway.

3. For drainage areas larger than one square mile and less than 10 (ten) square miles.
   a. Peak flows resulting from storms of the maximum intensity which can be expected to occur on an average of once in the one hundred years (100-year storm). The depth of the headwater pool at the structure inlet shall be one foot less than the clear opening height of the structure and shall not cause flooding of the roadway or adjacent buildings, sewage disposal systems and water supply systems, or damage to the structure or roadway.
   b. The effects of a discharge equal to the greatest flood of record passing through the proposed structure shall be investigated. Where a likelihood of danger to persons, extensive property damage or other than temporary interruption of traffic will exist under these conditions, increases in waterway or other improvements shall be provided to alleviate the danger.

4. Notwithstanding the requirements set forth in (1), (2), and (3), above, all structures shall be designed to also meet all requirements of the Federal Emergency Management Agency, or it successor agency, with respect to flood plains and flood ways.

4. Storm Water System Analysis - the design engineer shall submit a system summary sheet, similar to that shown in the Connecticut Department of Transportation (Conn. DOT) "Drainage Manual". A plan showing the watershed associated with each structure should also be submitted. A gutter flow analysis sheet, also shown in the Conn. DOT "Drainage Manual", may be required by the Town Engineer for road designs which could potentially generate high velocity surface flows.

5.05 Detention Basins

1. Requirements: Detention basins, surface or subsurface, shall be constructed for the purpose of limiting peak discharge from the storm system of the developed area where such discharge would adversely effect the peak flows on receiving streams and storm systems.

2. Storm Return Frequency: Detention basins shall be designed for a storm return frequency of not less than 2, 10, 25 and 100 years, or as otherwise directed by the Town.

3. Procedure: the procedure for computing the outflow from detention areas shall consist of the development of an inflow hydrograph and the routing of the inflow through the detention basin to develop an outflow hydrograph. The method of analyses shall meet the approval of the Town Engineer.

4. Structure Design: Types and requirements for the retention structure design shall be as appropriate for the site and be in general accordance with Conn. DOT "Drainage Manual" and good engineering practice. All designs shall be approved by the Town Engineer.

5. Maintenance Roads: Maintenance roads and easements shall be provided for all retention facilities. The roads shall be a minimum of 12' (twelve feet) wide with a surface treated, 12" (twelve inches) rolled gravel base. Grades shall not exceed 10%.

6. Fencing: Fencing shall be as prescribed by the Town and approved by the approving agency.

5.06 Sediment and Erosion Control

Permanent and/or temporary pollution control measures shall be constructed to prevent sedimentation of streams, watercourses, lakes, ponds and storm systems.

SECTION VI - ROAD MATERIAL SPECIFICATIONS AND CONSTRUCTION SPECIFICATIONS

6.01 References

The following documents are required, or suggested, as references in using this document.

1. State of Connecticut, Department of Transportation, Standard Specifications for Roads, Bridge, and Incidental Construction, Form 817 "The Standards", and any subsequent amendments or issues. Article numbers provide in material specifications refer to Article number in the Form 817.

2. Town of North Branford Subdivision Regulations.

3. Town of North Branford Plan of Development.

6.02 Material Specifications

1. Bank Run Gravel Subbase This material shall consist of bank run gravel conforming to Article M.02.02.

2. Gravel Base This material shall consist of gravel conforming too Article M.02.03.

3. Processed Aggregate Base This material shall conform to Article M.05.01, broken stone (trap rock).

4. Gravel Fill Gravel fill shall consist of bank or crushed gravel conforming to Article M.02.05.

5. Pervious Gravel Fill This material shall consist of bank or crushed gravel conforming to Article M.02.05.

6. Bituminous Concrete - Class 1 Binder Course
   The materials for the bituminous concrete mixture, sources of supply, formula for the mix, mix tolerances, and the control of the mixture shall conform to the requirements of Article M.04.01, Class 1.

7. Bituminous Concrete Class 2 Surface Course
   The materials for the bituminous concrete mixture, sources of supply, formula for the mix, mix tolerances, and the control of the mixture shall conform to the requirements of Article M.04.01, Class 2.

8. Bituminous Concrete Lip Curbing Materials for this work shall conform to the requirements of Article M.04.01, Class 3.

9. Reinforced Concrete Pipe
   1. Reinforced concrete pipe of the size indicated on the approved plans shall be Class IV, conforming to the requirements of Article M.08.01 Class V pipe shall be used in deep fills.

   2. Joints in concrete pipe shall be sealed with either, cold-applied bituminous sealer,

preformed plaster gaskets, or flexible, water-tight, rubber-type gaskets conforming to the requirements of Article M.08.01. If the temperature is above 35 degrees F, joints may be filled with Portland cement conforming to the requirements of Article M.11.04.

3. Reinforced concrete culvert ends shall conform to the requirements of Article M.08.01, paragraph 22.

10. Corrugated Polyethylene Pipe Corrugated polyethylene pipe, either corrugated interior surface (Type C) or smooth interior surface (Type S) without perforations or with perforations (Type CP or SP), shall conform to ASSHTO M252 or M294 and Article M.08.01-225.

11. Under drains
    1. Perforated R.C.P. and plastic pipe shall comply with appropriate paragraphs of Article M.08.01.

    2. Aggregate for filling the trench shall meet the requirement so Article M.08.03.

12. Catch Basins
    1. Catch basins shall be of the type specified and shall be constructed in locations shown on the approved plans.

    2. Catch basins shall have a 2' (two foot) deep sump (minimum) or as directed by the Town.

    3. Catch basin tops and sumps shall be precast units conforming to Article M.08.02, paragraph 4. Catch basins may be constructed of concrete building brick or precast masonry units conforming to Article M.08.02, paragraphs 2 and 3, respectively.

    4. Metal for grates and frames as shown in the standard details shall conform to Article M08.02,

    5. Catch basin tops shall be adjusted to meet the required finished road grade.

13. Rip-rap
    Rip-rap materials and construction methods shall conform to the applicable requirements of the State Standard Specifications for "Culvert Ends".

14. Filter Fabric
    1. Filter fabric shall conform to Article M.08.01 as applicable.

    2. The type fabric shall be appropriate for the proposed use.

15. Miscellaneous Open Channel Stabilization
    1. General. Seeding, sodding, burlap erosion protection and other methods of stabilizing beds and banks of open channel shall conform to the applicable materials and construction methods specified in the State Standard Specifications for the particular method approved for use.

2. Materials and Methods Where No State Standard. Where the State Standard Specifications do not cover the stabilization method approved for use, materials and construction methods shall conform to the most current edition of the "Connecticut Guidelines for Soil Erosion and Sediment Control".

16. Concrete Sidewalks and Sidewalks Ramps

Concrete sidewalks and ramps shall consist of 5" (five inches) of Class "C" or Class "F" concrete with a minimum compression strength of 4,000 psi on an 8" (eight inch) gravel base. The sidewalk shall be laid out with an inclination sloping toward the gutter of 1/4" (one-fourth inch) per foot. Sidewalks that cross a driveway shall consist of 8" (eight inches) of Class "C" concrete reinforced with woven wire mesh on an 8" (eight inch) gravel base. Where driveways will cross an existing 5" (five inch) thick sidewalk, the sidewalk in the area of the driveway shall be replaced with an 8" (eight inch) reinforced section.

1. Concrete shall conform to Article M.03.01 for Class "C" concrete.
2. Gravel for the base shall conform to Article M.02.01. Subbase material shall conform to Article M.02.02 for gravel subbase.
3 Air-entraining Portland cement and air-entraining admixture shall conform to Article M.03.01.
4. Wire and welded steel wire fabric for reinforcing concrete sidewalk ramps at driveway crossings shall conform to Article M.06.01.

6.03 Road Construction Specifications

All requirements of these Specifications are minimum requirements. Engineering design of road subbase, base and surface shall be prepared using current accepted practices when field conditions warrant.

a. Construction Survey

1. The centerline of the road shall be located in the center of the right-of-way and shall be run in the field, and suitable construction ties shall be established to control points. Stations shall be established at least at 50' (fifty foot) intervals and at all P.C.'s and P.T.'s.

2. Construction offset stakes shall be placed at each station and clear of all construction. The construction stake shall be marked with the station, offset to centerline and cut or fill to profile and grade.

3. Permanent bench marks shall be established throughout the length of the project at a minimum of 1,000' (one thousand foot) intervals. This information shall be noted on the construction plans. The datum for bench marks should be as noted on the plans.

b. Clearing and Grubbing

1. No areas shall be cleared or grubbed until the plans have been approved in accordance with the North Branford Subdivision Regulations in the case of a subdivision road and/or these regulations in any other circumstance.

2. Clearing: All trees, perishable matter, boulders, structures, fences and debris of whatever nature shall be cleared from the full width of the roadway section, including areas to be disturbed by cuts or fills.

3. Grubbing: All roots and stumps within the limits of the road section shall be grubbed and excavated. Where trees are cleared and grubbing is not required, the trunks shall be cut off flush to the ground if possible and in no event more than 6" (six inches) above the ground.

4. Trees: Valuable shade trees may be permitted to remain in shoulder areas, but not within 3' (three feet) of any curb line, if no substantial increase in the risk or injury or damage results by reason of its presence in the particular place where it stands. Any such tree shall be effectively protected and preserved so as to ensure that it will suffer no damage during construction operations. All tree branches overhanging the roadway pavement or shoulder areas shall be trimmed to a clearance of 12' (twelve feet) above the finished grade of the road.

5. Topsoil: Topsoil shall be stripped from all surfaces of the roadway section which will be disturbed by cut or fill operations. Topsoil so stripped shall be stockpiled on the site of the work and shall be reserved for roadway landscaping.

c. Excavation

1. All excavation shall be made in conformity with the requirements of the plans, cross-sections, or as directed by the Town Engineer.

2. The "Call Before You Dig" service shall be notified such that locations of existing utilities can be marked.

3. Unsuitable material: All unsuitable material, including material removed during clearing and grubbing and preparation of subgrade, shall be removed from within the limits of the right-of-way and disposed of lawfully at a safe location.

4. Surplus Material: Surplus suitable materials may be used to flatten fill slopes within the limits of the right-of-way and any slope easements. Surplus suitable materials that cannot be so utilized shall be disposed of lawfully.

5. When ledge is encountered, this material shall be removed to a depth of not less than 1' (one foot) below grade.

6. Blasting - If blasting is required in rock excavation, all necessary State and Town permits shall be secured. OSHA-regulations shall be complied with. Sufficient warning shall be given to all persons in the vicinity of the work before blasting. No blasting shall be done on Sunday, and on weekdays, blasting shall not be done between the hours of 5:00 pm and 7:00 am.

d. Embankments and Slopes

1. Embankments shall be constructed of earth, rock, or a mixture of earth and rock. Stumps, trees, sod, or other organic matter shall not be incorporated in embankments.

2. The depth of each layer placed shall not exceed 12” (twelve inches) before compaction.

3. Frozen material shall not be used. No embankment layer shall be deposited on surfaces of snow or ice, nor shall it be placed on frozen or unstable surfaces.

4. No stone over 5" (five inches) in its greatest dimension shall be placed within a minimum of 12" (twelve inches) below the elevation of the subgrade.

5. When embankments are to be constructed on slopes steeper than one vertical to three horizontal (1:3), the slope on which the embankment is to be placed shall be plowed deeply or cut into steps before the filling is begun.

6. The embankment shall be crowned or pitched to provide drainage at the close of each day's operation.

7. Embankments adjacent to water bodies shall be constructed to an elevation 3' (three feet) above the free water surface at the time of filling where possible, using rock or free-drainage material, or a mixture of both. Free-drainage material shall conform to the requirements of Article M02.07.

8. When the excavated material consists predominantly of rock fragments of such size that materials cannot be placed in horizontal layers of the thickness specified above, such material may be placed in the embankments in horizontal layers not exceeding 3' (three feet) in thickness. Large stones shall not be filled with spalls, fine fragments, or earth to form a solid, compact mass. No rock fill shall be placed above an elevation which is 2' (two feet below the top of the embankment).

9. The entire area of each layer shall be compacted with rollers or compactors.

10. The dry density after compaction shall not be less than 95% (ninety-five percent) of the dry density for that soil when tested in accordance the AASHO T180, Method D, except that the mold used in the test shall be 6.11 inches high.

11. Slopes shall have a uniform surface as shown on the plans. All slopes, except those in rock or ledge foundations, shall be top soiled and seeded in accordance with these specifications. This work shall be done as soon as practicable in order to prevent erosion.

e. Placement of Gravel Fill

1. Description: This material shall be used to replace unstable material in slopes, in shoulders, and elsewhere as ordered by the Town Engineer. It shall consist of gravel conforming to the requirements of these standards.

2. Construction methods: When gravel fill is used to replace unsuitable material, it shall be deposited in layers not over 6" (six inches) in depth, with each layer thoroughly compacted before the addition of other layers.

f. Subgrade

1. Description: The area of the roadbed upon which the pavement structure is placed shall be known as the subgrade. After all grading for the roadbed has been substantially completed and all drains and other underground utilities laid, the subgrade shall be brought to the lines, grades, and cross-sections shown on the plans.

2. Unsuitable material replacement: All soft and yielding material that will not compact readily when rolled, vibrated, or tamped shall be removed; and all loose rock and boulders over 6" (six inches) in size shall be removed to a depth of not less than 1' (one foot) below subgrade. Removed

material shall be replaced with compacted gravel fill conforming to requirements of these standards.

3. Construction Methods: Grading and compaction of the subgrade shall be in accordance with these standards. If the subgrade is deemed to be excessively wet by the Town Engineer, under drains shall be installed.

4. Stabilization fabric: Synthetic filter material may be utilized to stabilize the subgrade provided that a detailed design is submitted to and approved by the Town Engineer.

g. Subbase

1. Description: The base shall consist of one-course processed stone (trap rock) constructed on the prepared subbase, placed in accordance with the typical section for the designation of the Road being constructed. Materials shall conform to the requirements of these standards.

2. Construction methods: Preparation of the foundation for the base, placing the base, and compaction of the base shall be in general conformance with these standards. The use of vibratory rollers or compactors is encouraged for compactions.

h. Two-Course Bituminous Concrete Pavement

1. Description: The paved surface shall be constructed of two courses of bituminous concrete. The first course of paving which shall be placed directly on the processed aggregate base is hereinafter referred to as the "binder course". The second course of paving which shall be placed in the binder course is hereinafter referred to as the "surface course".

2. Binder course: The binder course materials shall be Class 1 Bituminous Concrete, conforming to Article M.04.01 through 4.04.03. The binder course shall be handled and placed in accordance with these standards.

3. Surface course: The surface course materials shall be Class 2 Bituminous Concrete, for minor, local and subcollector Roads and Class 1, for collector and arterial Roads, conforming to Section M.04.01 through M.04.03. The installation of the surface course shall be completed directly following the installation of the binder course, or as approved by the Town Engineer.

4. Thickness: The depth of the courses shall be as shown on the Road cross-sections.

5. Where new pavement joins existing pavements, the existing pavement shall be clean cut and the new pavement shall be tapered to create a smooth transition.

6. The contact surfaces of existing pavements, catch basins, and other structures in the pavement shall be painted thoroughly with a thin uniform coating of bitumen, specification RS-1, just before the new paving mixture is placed against them.

7. The edges of paving placed around catch basins or other structures, if necessary, shall be hand-tamped before compacting by rolling.

8. No paving shall be permitted on any day where the temperature is less than 40 degrees Fahrenheit.

i. Bituminous Concrete Lip Curbing

1. Description: Bituminous concrete lip curbing shall consist of machine-laid bituminous concrete, constructed on the pavement to the dimensions and details shown on the plans.

2. Construction methods: Construction shall conform to these standards.

j. Cut-off Date for paving

In general, no paving shall be permitted between November 15 and April 1, unless the Town or its authorized agent specifically permits an exception due to unusually mild weather conditions.

6.04 Concrete Sidewalks

a. General

1. Sidewalks shall be a minimum of 5' (five feet) in width and shall be located within the Road lines with one edge 12 (twelve) to 18 (eighteen) inches away from the property line. The location may be varied to preserve designated trees, stone walls, or other desirable features; or to match to existing walks.

2. Sidewalks shall be installed when and where directed by the Town. The location shall be shown on the approved plans.

3. Sidewalks shall be constructed of concrete.

4. Sidewalks shall include ramps for the handicapped in accordance with Local, State and Federal requirements. Sidewalk ramps shall be constructed at all pedestrian crosswalks in all new sidewalk installations and at all pedestrian crosswalk locations where an existing curb or walk is to be disturbed by construction.

b. Construction Methods

1. Construction shall generally conform to these standards.

2. All proposed walks shall be excavated 13" (thirteen inches) below and parallel to the finished grade of the walk. Excavation shall extend 3" (three inches) minimum and 6" (six inches) maximum outside the edges of the proposed walk. Ledge rock encountered within 13" (thirteen inches) of the finished walk grade shall be removed. After completion of excavation, and prior to placing of base material, the subbase shall be compacted by at least two passes of a motor driven vibratory compactor; should the subbase appear soft and yielding, this material shall be removed to firm ground with a maximum depth of 25" (twenty five inches) below finished grade as ordered by the Director of Public Works.

Subbase, if required, shall be placed in maximum 12" (twelve inches) lifts and compacted with a minimum of two passes with a motor-driven vibratory compactor.

3. The gravel base material shall be placed in an 8" (eight inch) lift, the full width of the excavation, and shall be compacted. Additional fine material shall be added to fill any voids and to bring the completed foundation to true line and cross-section 5" (five inches) below and parallel to the finished grade of the walk.

4. Transverse dummy joints, which shall be 1" (one inch) deep, shall be constructed at a longitudinal spacing equal to the width of the walk but not over 5' (five feet) apart, or to match adjoining walk. Transverse expansion joints, which shall be premolded asphalt impregnated expansion joints, shall be constructed to replace every third dummy joint, and at changes of walk thickness. Transverse expansion joints shall be 1/2" (one-half inch) thick by 5" (five inches) deep, premolded joint material.

Expansion joints, 1/2" (one-half inch) by 5" (five inches) as herein before specified, shall be used between the walk being constructed and existing concrete walks, entrance walks, building foundations, retaining walls, light poles bases, vaults, manholes and all similar structures. Utility poles, hydrants, fire alarm boxes, gate boxes and similar installations located in the walk area shall be separated from the main walk by dummy joints of suitable pattern as ordered by the Town Engineer. No transverse dummy joints, or expansion joint, shall be located within 12" (twelve inches) of any structure in the walk.

5. The concrete shall contain not less than five, nor more than seven percent entrained air at the time the concrete is deposited in the forms. Air-entrainment shall be obtained and the concrete cured in accordance with these standards. The maximum allowable sump shall be 4" (four inches).

6. The surface of the concrete shall be finished with a wood float or by other approved means. The outside edges of the slab and all joints shall be edged with 1/4" (one-quarter inch) radius edging tool. The final surface shall be broomed to provide better footing.

7. Curing shall be done with a liquid membrane forming curing compound in accordance with Article M.03.01. The rate of application shall be in accordance with the manufacturer's instructions. The curing compound shall be in accordance with the manufacturer's instructions. The curing compound shall be applied to all exposed surfaces of the concrete immediately following the disappearance of the water sheen following the final finishing and before any marked dehydration of the concrete or surface checking occurs. When the forms are removed before 7 (seven) days after the concrete has been placed, the exposed sides shall be covered with the compound at the same rate as applied to the surface. If the film is damaged by rain or in any other way before drying, the curing compound shall be reapplied to the affected areas.

6.05 Drainage Construction Specifications

a. General Requirements

1. Construction survey stakes will be established at least at 50' (fifty foot) intervals and at all structures. The construction stake shall be marked with the station, offset to the pipeline or structures, and cut to invert.

2. The backfilled trenches and any adjacent disturbed slopes shall be stabilized to prevent erosion by implementing the appropriate measures described in Section 12 and in the manual "Erosion and Sediment Control Handbook, 1988", published by the U.S. Department of Agriculture, Soil Conservation Service, Storrs, Connecticut, latest revision.

3. When excavation takes place in dry weather, reasonable precautions shall be taken by the contractor to insure that the inhabitants in the vicinity of the excavation are not unnecessarily inconvenienced by, or caused discomfort by dust raised from construction operations. Dust should be stabilized by water spray or chemical means, such as calcium chloride.

b. Trench and Other Excavations

1. Trench and other excavations shall be of sufficient width and depth at all points to allow pipe to be laid, joints to be formed, and other construction to be placed or built in the most thorough and workmanlike manner; and to allow for trench-side protection, pumping and draining, and for removing and replacing any unsuitable material.

2. Storm sewer trenches shall be of a depth necessary to cover pipe as shown on the approved plans.

3. Excavation in earth digging shall be at least 12 (twelve inches) wider than the outside dimensions of the structures they are to contain. The bottom of the pipe trench shall be excavated to lines and shapes satisfactory to the Town Engineer, and to conform to the outside of the pipe insofar as the material will permit, so that the pipe shall have a continuous and even bearing. Whenever the bottom trench or other excavation is rock or boulders, it shall be excavated 6" (six inches) below grade and refilled to grade with sand well-tamped in place. The sides of trench or other excavation in rock shall be excavated to such width that no rock shall be closer than 6" (six inches) to the pipe barrel or other structures. Excavated material may be used for bacilli, if suitable. Unsuitable material shall be replaced with bank run gravel conforming to Article M.02.01. When soft or unsuitable material is encountered, the depth of excavation shall be increased to 1' (one foot) below the pipe bottom. The excavated material shall be replaced with compacted gravel fill conforming to Article M.02.02.

c. Rock Excavation

1. Rock excavation, it is especially required that all blasting shall be executed by experienced persons in strict accordance with lawful regulations and shall be conducted with all possible so as to avoid injury to persons and property. It is further required that the rock shall be covered; that sufficient warning shall be given all persons in the vicinity of the work before blasting; that care shall be taken to avoid injury to electric and telephone lines, drains and other structures; and that caps or other exploders shall not be kept in the same place in which dynamite or other explosives are stored. The contractor shall be held responsible for all claims for damage caused by blasting.

2. The contractor, in addition to observing all laws and ordinances relating to the storage and handling of explosives, shall also comply with any further regulations which the Town Engineer may deem necessary in this respect.

d. Water Removal

1. The contractor shall remove any water which may accumulate or be found in the trench and other excavations made for drainage construction by pumping, draining, bailing, or otherwise; and shall form all sumps and build drains or other works necessary to maintain them. New masonry shall be protected from injury resulting from the dewatering process. The contractor shall at all times have upon the work site sufficient pumping machinery, as required to perform the work.

2. Water from trenches and excavations shall be properly disposed of so as to not endanger public health, public or private property, work completed or in progress, the surface of the highways, cause any interference with public use of existing highways or other traveled ways.
3. Temporary roadway drainage system shall utilize erosion checks to prevent sedimentation of any water bodies.

e. Backfilling

1. After joints of the storm pipe lines have been completed, the trench shall be backfilled with existing material or selected material if the existing material is unsuitable. The backfill around the sides of the pipe shall be deposited in 6" (six inch) layers, evenly distributed on both sides of the pipe and tamped in the place with power tampers or other suitable tools. The remaining fill above the pipe shall be compacted to the elevation of the road subgrade.

2. A sufficient number of tampers, satisfactory to the Town Engineer shall be provided for compacting the backfill around the manholes and around other appurtenant structures shall be placed and compacted as specified above for backfill around pipes.

f. Pipe Installation

1. Normally, the placement of pipes shall start at the downstream end and progress upstream. All pipe shall be carefully laid, true to the lines and grades shown on the drawings; for reinforced concrete pipe, place hubs upgrade and with the spigot ends fully entered into the adjacent hubs.

2. Jointing shall be in accordance with these standards.

3. If so ordered by the Town Engineer, any pipe not in true alignment, or showing any settlement or distortion after laying shall either be re-laid or corrected to the satisfaction of the Town Engineer.

4. Where shown on the drawings, the contractor shall connect the proposed drainage system with existing structures or pipes. This work shall be performed in workmanlike manner.

5. Culvert ends shall be placed as specified in these standards.

g. Placing Rip-rap

1. The area indicated on the drawings to be protected by rip-rap shall be accurately shaped as shown on the detail drawings.

2. Rip-rap shall be placed in accordance with these standards.

h. Constructing Catch Basins

Catch basins, manholes, and drop inlets shall be constructed in accordance with these standards.

i. Under drains

Under drains shall be constructed in accordance with these standards.

j. Filter Fabric

When filter fabric is specified, construction shall be in accordance with the manufacturer's instructions, or as directed by the Town Engineer.

k. Erosion and Sedimentation Control Structures These structures shall be constructed in accordance with the Conn. DOT "Drainage Manual"; the USDA, SCS, "Erosion and Sediment Control Handbook", or in Section 8.

6.06 Utilities other than Drainage Structures

a. Gas mains shall be laid along the south and west edges of the roadway and shall be in accordance with specifications of the Gas Company. In no case shall any pavement of roadways be begun until all gas mains and laterals are completed under the affected portion of the roadway.

b. Water

1. Water mains, whether those of a public utility or a private or a community water supply system, shall be laid along the north and east edges of the roadway and shall be in accordance with specifications of the utility. In no case shall any pavement of roadways be begun until all water mains and laterals are completed under the affected portion of the roadway.

2. Hydrants shall be installed on all roadways where water is available at such locations and in such number as the Board of Fire Commissioners directs. Cost of the provision and installation of hydrants shall be borne by the contractor or developer.

c. Sanitary Sewers. Construction, installation and maintenance of sanitary sewers shall be performed in accordance with all regulations and rules adopted therefor by the Water Pollution Control Authority of the Town of North Branford.

SECTION VII - ROAD CONSTRUCTION ADMINISTRATION REQUIREMENTS

7.01 General Requirements

1. A pre-construction conference shall be set by the road builder and shall be held with the Town Engineer, Director of Public Works, Contractor and Builder representative and project engineer present prior to construction start-up. At this time a schedule showing completion target dates for the various phases of work shall be submitted to the Town Engineer and Director of Public Works.

2. Should a construction project be required to be bonded, the bond in an amount and form approved by the appropriate agencies and commissions shall be posted prior to the commencement of construction.

3. The Town Engineer shall be provided with the following names, addresses and work and emergency phone numbers:
   a. Applicant's representative
   b. Project engineer
   c. Contractor's superintendent
   d. Contractor's foremen (for various phases of work)

4. The following information on materials shall be submitted to the Town Engineer:
   a. Pipe manufacturer's name and address
   b. Precast concrete structures manufacturer's name and address
   c. Bituminous concrete paving firm's name and address
   d. Laboratory test results for road base material
   e. Laboratory test results for road sub-base material
   f. Letter indicating that bituminous concrete plant is on "State Test"

5. When tying into an existing road, the Project Engineer shall notify the appropriate representatives to insure that existing utilities can be properly located thus reducing the chance of damaging utility lines.

6. The Town Engineer shall be notified twenty-four (24) hours in advance of placing sanitary sewers, storm drains, road base material and bituminous concrete.

7. During construction of the project, delivery slips for the following items shall be provided daily to the Town Engineer:
   a. Base material
   b. Bituminous concrete

7.02 Bonds

Roads constructed as part of new subdivisions shall be bonded as required under the Subdivision Regulations.

Roads constructed or reconstructed not as part of a subdivision shall be bonded as follows:

a. Performance Bonds: The Builder shall post a bond in an amount specified in a form approved by the Town to cover the cost of improvements shown and approved by the Town Engineer.

b. Such bond shall include an amount to cover the escalation of construction and other costs for a two-year period.

c. Prior to the release of the total amount of the bond, the applicant shall submit "as built" plans and documents to the Commission covering Roads and storm drainage constructed in accordance with the North Branford Road Specifications, as amended. Such plans shall meet A-2 level of accuracy survey standards and be signed and sealed by a registered land surveyor or professional engineer, as appropriate. All plans and maps shall be prepared on fixed line Mylar with waterproof ink. All easements, road right-of-ways or open space to be deeded to the Town shall have a written description prepared based on survey data. The bond shall be released only upon written notice by the Town Engineer that all the required improvements have been completed to his satisfaction.

d. No performance bond shall be released until such time that a maintenance bond in an amount and form has been accepted by the Town and posted with the Town of North Branford.

e. A maintenance bond of 5% of the original performance bond or total cost of improvements, whichever is greater, shall be furnished to the Town of North Branford by the applicant. The bond shall be for a minimum period of one year following the Town acceptance of the improvements. The purpose of the maintenance bond is to protect the Town against defective workmanship, materials or design of the improvements.

f. The applicant shall repair all defects in construction or operation of required improvements occurring during the period covered by the maintenance bond. The applicant's failure to perform needed repairs within a reasonable time when so requested by the Town Engineer may result in the Town's undertaking the repairs and billing the applicant for the cost of the repairs.

g. No maintenance bond shall be approved by the Town unless said bond is in a form acceptable to the Town. The Town reserves the right to add conditions to the bond which, in the opinion of the Town Engineer, are deemed necessary to indemnify against defective workmanship, materials, or design of the improvements.

h. No maintenance bond shall be released by the Town until it has been in effect for a minimum of one year's duration. The Town shall release said bond only upon receipt of a favorable written report from the Town Engineer, indicating that all improvements are free of defective workmanship, materials, or design, or that any defects have been corrected to their satisfaction.

7.03 Inspections

1. General Inspections: All required improvements shall be inspected by the Town or its agent as they are being constructed, maintained, or installed in order to assure that all procedures, design standards, and requirements of these regulations have been met during the required construction, maintenance, or installation of any improvement. It shall be the duty of the builder to notify the Town Engineer at least forty-eight (48) hours prior to the commencement of required construction, maintenance, or installation activities of the time when such activities are to be commenced. The builder shall take every reasonable measure to facilitate such inspections. The failure of the builder to so notify the town or its agency may result in the Town not approving the work performed, and could result in the delay of a bond release or other complications as stated herein.

2. Road Construction Inspections: The following inspections shall be required to be performed by the Town as outlined below:

a. The subgrade shall be inspected and approved before any subbase is placed.

b. The subbase and base courses shall be spot-checked during placement.

c. No paving work shall be done prior to receiving approval from the Town Engineer or his authorized representative or its authorized representative.

d. No pipe, catch basin, manhole, or other structure shall be backfilled until inspected and approved by the Town Engineer or his authorized agent.

e. The Town Engineer, or its duly authorized agent(s) shall have free access to the construction work at all times and shall be authorized to take material samples, cores and other tests as deemed necessary to determine compliance with the North Branford Road Standards.

f. Final inspection of roads may be by means of core samples to be taken by a Town-designated contractor upon notification to the Town by the builder that all paving has been completed. The Contractor shall be responsible for all costs of sampling.

1. Core samples shall be of a standard size and type and shall be located no more than 500' apart over the entire length of road. In addition to examining the depth of bituminous concrete, base, and subbase tests shall be performed on the samples to determine the quality of materials.

2. If results indicate an insufficient depth or quality of gravel base and/or bituminous concrete surface, additional samples may be required by the Town in the vicinity of each questionable sample area to determine the extent of the substandard condition and to insure that the Town shall not be prejudiced by an arbitrary test result. Should additional samples indicate unacceptable variances from the specifications set forth in the Town of North Branford Road Standards, the developer shall be required to take appropriate corrective measures for the length of road which the Town determines to be unacceptable on the basis of the core samples. Variance in excess of 10% from the Town of North Branford Road Standards for depth of bituminous concrete, subbase or base material is unacceptable.

3. Upon satisfactory completion of the Final Road Inspection, the builder may request in writing, a partial or full performance bond reduction. The Town, upon approval of the request, may require retaining an amount sufficient to cover public improvement installations not yet completed, based on a current revised cost estimate.

7.04 Departure from Approved Plans

The builder shall obtain prior approval from the Town Engineer for any variation from the Town Standard and/or the approved plans.

The engineering and construction in the field shall be in accordance with the plans which have been

approved by the Town, except that minor field changes may be authorized by the Town Engineer. Any variations to be approved plans must be prepared and submitted by a registered professional engineer and found by the Town Engineer to be equal to or better than the approved designs.

The Town Engineer shall submit a written report to the Town indicating whether or not all approved and required improvements have been properly installed in accordance with the approved plans and these Standards. The Town is under no obligation to approve any variations to the approved application's construction plans, and indeed may refuse such variations and require that all improvements failing to conform to the construction plans, these regulations, or the approval, be reconstructed or installed to the original specifications as approved by the Town prior to the release of any surety, further issuance of any building or zoning permits, or issuance of any certificate-of-occupancy. The builder is thereby encouraged to properly notify the Town when inspections should or are required to be made, and to install all improvements in accordance with the approved plans and these regulations.

7.05 Final Inspection of Roadways.

A final inspection of all roadway improvements and utilities will be made to determine whether work has been performed satisfactorily and is in substantial agreement with the approved final drawing and the Town standards. The general condition of the site shall also be considered.

Upon a satisfactory final inspection report and filing of "as-built" drawings, action will be taken to release the performance bond covering such improvements and utilities.

TOWN OF NORTH BRANFORD ROAD DESIGN STANDARDS

DESIGN ELEMENT	LOCAL	COLLECTOR	COMMERCIAL	ARTERIAL
1. Right-of-way Width (ft)	50	50	50	60
2. Pavement Width (ft)	24	30	30	30
3. Curb Type	Concrete	Concrete	Concrete	Concrete
4. Sidewalk Width (ft)	5	5	5	8
5. Sidewalk Offset From Curb (ft)	5	5	5	7
6. Design Speed (mph)	30	30	35	40
7. Stopping Sight Distance (ft)	200	200	300	400
8. Grade (%)				1
Minimum	1	1	1	
Maximum	10	10	8	8
9. Minimum Centerline Radius (ft)	200	300	500	800
10. Minimum Tangent (ft)	50	100	100	100
11. Max. Length of Cul-de-sac	1,000	n/a	n/a	n/a
12. Min. Pavement Structure (in)				
Bituminous Concrete	3 1/2	4	4	4 1/2
9. (in)				8
Bituminous Concrete	3	6	8	
Base Coarse	6			
Subbase	8	8	8	10
13. Driveways				
Min. Width (ft)	10	10	10	10
Radius (ft)	5	5	5	5
Max. Grade		See Section		