

# CONSTRUCTION STANDARDS & SPECIFICATIONS



**TOWN OF BROOKHAVEN**  
**SUFFOLK COUNTY, NEW YORK**  
JULY 2017

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**(A) DRAINAGE DESIGN CRITERIA**

All storm water collection systems shall be designed in accordance with the following minimum standards and shall be submitted on design sheets to be reviewed by the Town Engineer.

1) Rational Method:

**Q = Aci**

Q = Discharge in cubic feet per second (c.f.s.)

A = Tributary drainage area in acres within the subdivision and shall include areas outside the subdivision

c = Coefficient of runoff of drainage area

The following values of "c" shall be used:

<u>Type of Surface</u>	<u>Flat</u>
Roofs	1.00
Roads Concrete or Asphalt Pavement	1.00
Wooded/Lawn/Landscaped	0.15

Where:

"i" is the rainfall intensity in inches per hour, shall be determined by the following formula:

$$i = \frac{120}{t+20}$$

Where:

"t" is the time of concentration in minutes at the point of design.

Time of Concentration can be calculated by using Table 31.2 Equations for Overland Flow Travel Time (The Civil Engineering Handbook, W.F. Chen, 1995).

Maximum time of concentration (t) shall be 28 minutes.

2) Manning's Formula:

Closed conduits and open channels shall be designed using Manning's Formula:

a) 
$$V = \frac{1.486 R^{2/3} S^{1/2}}{n}$$

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Where: V = velocity in feet per second  
R = hydraulic radius in feet  
S = Slope in ft. The slope (S) shall generally be considered to be the slope of the pipe invert except that such slope shall be checked against the available hydraulic gradient wherever the system discharges against an existing hydraulic head.

Where: n = 0.015 for reinforced concrete pipe 18" or less  
0.013 for reinforced concrete pipe 24" or larger  
0.013 for smooth plastic pipe  
0.021 for corrugated metal pipe  
0.025 for earth ditches  
0.013 for paved ditches

b) Design velocities to be limited to 2 ft./sec. minimum and 10 ft./sec. maximum, unless the Town Engineer grants special approval for unusual conditions.

c) Minimum pipe diameter to be 18" for collection system and 15" crossover from single inlet for catch basins and leaching basins. Minimum pipe size for residential downspouts shall be 4"; all other shall be 6".

d) Minimum pipe cover from finished pavement or ground surface to be two (2) feet.

3) Manhole Installation:

Maximum spacing distance between manholes shall be 350 feet. Manholes shall be provided where there are changes in pipe alignment or gradients. Manhole diameter shall be determined by engineer's design and verified by Town Engineer.

4) Catch Basin Installation:

Spacing of catch basins shall be governed by the following: The maximum overland flow rate to a single catch basin shall not exceed three (3) c.f.s. The maximum distance of flow in the roadway gutter, before a catch basin is required shall not exceed 350 feet.

5) Drywells/Leaching Pool:

Individual plot grading studies shall be made from map data submitted and where required, in the opinion of the Town Engineer, drywells for house leaders, driveways, or yard drains shall be installed as directed according to the following (conditional release to SWPPP granted - 2" total storage) and (SWPPP 5" total storage with 3" ponding). Minimum separation between drainage pools is 1 ½ times the diameter of the leaching pool.

6) Recharge Basins - Subdivision with Public Road(S)

Recharge basins shall be provided where there is no available outlet for storm water or where in the opinion of the Town Engineer, a potential drainage problem exists. In general, a tributary area of approximately 5 acres, or 28,000 cubic feet of storage requirement or more, for a 5" storm shall be deemed to necessitate a storm water

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recharge basin utilizing .30 average coefficient of runoff over the tributary area. In areas between 5 acres and 2 ½ acre contributory area or less than 28,000 c.f. of storage requirement, for a 5" storm, the drainage facilities shall be installed as directed by the Town Engineer, such as retention areas, leaching pools or a combination thereof. For contributory areas of approximately 2 ½ acres or less a 2" rainfall will be allowed instead of the 5" requirement with the installation in leaching pools. The above are the minimum drainage requirements necessary except where SWPPP requirements require additional storage.

Storm water recharge basins shall be designed in accordance with the drawing details and the following:

- a) All storm water recharge basins shall provide storage capacity for 5" of rainfall on the total tributary area multiplied by a weighted runoff coefficient (minimum  $c = 0.30$ ). Where an appropriate overflow of the recharge basins is not provided, the storage capacity shall be increased using 8" of rainfall. Final design shall require actual coefficient for surface areas as specified in this section or as determined by Town Engineer. An appropriate overflow must be reviewed and approved by the Town Engineer.
- b) Maximum depth of storage capacity shall be ten (10) feet, high water mark to upper bottom. This measurement is to be two (2) feet below the elevation of the berm, or elevation of grate in the inlet basin at the low point in system, whichever is the lowest.
- c) Maximum height of side slope shall be twenty-two (22) feet unless a shelf is provided. A ten (10) feet wide level shelf shall be installed at twenty-two (22) feet of above the lower bottom, if required.
- d) If feasible, the area of the recharge basin shall be cleared of trees, only where excavation is required and that a natural tree screening remain along the perimeter of the basin.
- e) Asphalt gutters will be required around the perimeter of the recharge basin where possible erosion from upland runoff may occur. Additional area shall be provided between the high point of the berm and the fence curb or asphalt gutter for landscaping.
- f) Maximum discharge velocity of the outfall pipe shall not exceed 10 f.p.s.
- g) Excavation shall be carried down through good leaching material. A test hole shall be required at the bottom elevation of the recharge basin and shall indicate at least six (6) feet of good leaching material, below the basin bottom. Should any doubt exist as to the adequacy of the leaching material, soil tests or percolation tests will be required as determined by the Town Engineer. The minimum bottom of the basin shall be two (2) feet above the highest recorded high water and four (4) feet above the mean ground water, whichever is higher.
- h) Fencing complete with gate shall be constructed before starting excavation.
- i) Diffusion well will be required when determined by the Town Engineer by soil analysis or percolation test.

j) If internal access to drainage structures is not accessible directly by roadway, a minimum aisle width of ten (10) feet with provisions of landscape shall be provided.

k) Recharge basin site shall remain secure from trespassers at all times.

l)  $V_c = A R C$

Where:  $V_c$  = volumetric capacity in cubic feet  
 $A$  = tributary drainage area in square feet within the subdivision and shall include areas outside the subdivision  
 $R$  = 2"  
 $C$  = weighted coefficient for runoff of the drainage area (minimum  $c = 0.30$ )

7) Landscaping of Recharge Basins:

Topsoil shall be placed 4" deep on the surface of the bank around the recharge basin extending from the inside of the fence to six (6) feet above the lower pad. All topsoil areas shall be limed, fertilized and seeded. The area around the fence shall have screen planting parallel to, inside and outside the fence around the entire recharge basins, except at the gates.

a) Topsoil

The topsoil shall consist of natural loam, horticulture soil, free of refuse, clods and stones larger than 1" in diameter, weeds or any other objectionable loam material. It shall contain not less than 5% and not more than 20% organic matter as determined by loss on ignition of moisture free samples dried at 100 degrees. The pH shall be between 5.5 and 7.6. Topsoil shall be placed 4" deep. The surface shall be smoothly graded to meet established elevations and adjacent ground levels.

b) Liming

Limestone shall be agricultural ground limestone with a total carbonate content of not less than 80% or 44.8% calcium oxide equivalent, for the purposes of calculations. Total carbonates shall be considered as calcium carbonate. Limestone shall be evenly distributed at the rate of 50 lbs. per 1,000 square feet and worked into the top 3" of the soil.



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c) Fertilizing

The application of limestone and commercial fertilizer organic type (10-6-4) shall be evenly distributed at the rate of 20 lbs. per 1,000 square feet and worked into the top 3" of the soil.

d) Hydroseeding - Grass seed shall be applied as follows at a rate of 125 lbs per acre:

Per Acre: 10 pounds Switch Grass  
10 pounds Indian Grass  
25 pounds Little Blue Stem  
25 pounds Big Blue Stem  
25 pounds Tall Fescue  
30 pounds Annual Rye

The seed producer's certificate of analysis shall be available for inspection.

Minimum seed germination shall be 80%. Inert matter and weed seeds shall not exceed 8%. The seed producer's certificate of analysis shall be available for inspection. Grass seed shall be sown evenly at the rate of 3 lbs. per 1,000 square feet. The seed shall be covered to a proper depth by raking or other suitable means.

A 100% wood fiber mulch binder should be incorporated into the seed mixture at a rate of 1,000 pounds per 125 pounds of seed. The 100% wood cellulose fiber mulch binder should meet the following requirements:

Organic Matter	98%±.2%
Ash Content	1.4%
PH	6±.2
Water Holding Capacity	90% minimum

Grass seeding shall be done between April 1st and June 15th or between August 15th and October 15th and shall not be accepted unless there is a uniform growth evident over all seeded areas.

e) Manual Seeding - Grass seed shall be applied as follows at a rate of 125 lbs per acre:

Per Acre: 10 pounds Switch Grass  
10 pounds Indian Grass  
25 pounds Little Blue Stem  
25 pounds Big Blue Stem  
25 pounds Tall Fescue  
30 pounds Annual Rye

Minimum seed germination shall be 80%. Inert matter and weed seeds shall not exceed 8%. The seed producer's certificate of analysis shall be available for inspection. Grass seed shall be sown evenly at the rate of 3 lbs. per 1,000 square feet. The seed shall be covered to a proper depth by raking or other suitable means. After seeding and raking, the surface shall be rolled with an approved roller weight of at least 100 lbs.

Grass seeding shall be done between April 1st and June 15th or between August 15th and October 15th and shall not be accepted unless there is a uniform growth evident over all seeded areas.

f) Recharge Basin Screen Planting

Evergreens shall be placed 5 feet apart and 5 feet from and parallel to the fence in a staggered pattern in the interior of the fence on all sides and rear of recharge basin, and on the exterior of the fence in the front of the recharge basin. The minimum height shall be 6' and the minimum spread shall be 2 feet. All trees shall be nursery grown and shall be normal columnar or narrowly pyramid habit of growth typically characteristic of the particular variety. Only the following species and varieties are acceptable however other species may be selected by the Town Landscape Architect.

Trees

White Pine (Pine strobes)  
Eastern Red Cedar (Juniperus virginiana)  
Pine Pine (Pinus rigida)  
American Holly (Ilex opaca)

Shrubs

Bay Berry (Myrica pensylvanica)  
Red Twig Dogwood (Corinus stolonifera)  
Highbush Cranberry (Viburnum dentatum)  
Arrowwood Viburnum (Viburnum dentatum)  
Inkberry (Ilex glabra)  
Witchazel (Hammelis virginiana)

All evergreen trees shall be transplanted with a burlap and tied with a good grade of hay lop or heavy twine. The size of ball for all specified evergreen trees shall be in conformance with 2004 American Standard for Nursery Stock. All evergreen trees shall be set plumb at such a level that after settlement they bear the same relationship to the elevation of the surrounding ground as they bore to the ground from which they were dug. All trees shall be planted and the holes backfilled and tamped with topsoil. The screen planting shall be maintained and all dead or dying trees replaced by the developer until such time as the recharge basin has been accepted for dedication by the Town.

8) Natural/Man-Made Retention Basin:

Under special conditions, retention basins may be used in exchange for a recharge basin. The following design criteria for retention basins shall be used:

Retention basins shall be provided where there is no available outlet for storm water or where in the opinion of the Town Engineer, a potential drainage problem exists. In general, a tributary area of approximately 5 acres, or 28,000 cubic feet of storage requirement or more, for a 5" storm shall be deemed to necessitate a storm water recharge basin utilizing .30 average coefficient of runoff over the tributary area. In areas between 5 acres and 2 ½ acre contributory area or less than 28,000 c.f. of storage requirement, for a 5" storm, the drainage facilities shall be installed as directed by the Town Engineer, such as retention areas, leaching pools or a combination thereof. For contributory areas of approximately 2 ½ acres or less a 2" rainfall will be allowed instead of the 5" requirement with the installation in leaching pools. The above are the minimum drainage requirements necessary except where SWPPP requirements require additional storage.

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Storm water retention basins shall be designed in accordance with the drawing details and the following:

a) All storm water retention basins shall provide storage capacity for 5" of rainfall on the total tributary area multiplied by a weighted runoff coefficient (minimum  $c = 0.30$ ). Where an appropriate overflow of the retention basins is not provided, the storage capacity shall be increased using 8" of rainfall. Final design shall require actual coefficient for surface areas as specified in this section or as determined by Town Engineer.

b) Maximum depth of storage capacity shall be four (4) feet, high water mark to upper bottom.

c) If feasible, the area of the retention basin shall be protected to preserve as many trees, shrubs, etc as practical and, only excavate when required to provide storage capacity needed.

d) Maximum discharge velocity of the outfall pipe shall not exceed 10 f.p.s.

e) Excavation shall be carried down through good leaching material. A test hole shall be required at the bottom elevation of the retention basin and shall indicate at least six (6) feet of good leaching material, below the basin bottom. Should any doubt exist as to the adequacy of the leaching material, soil tests or percolation tests will be required as determined by the Town Engineer. The minimum bottom of the basin shall be two (2) feet above the highest recorded high water and four (4) feet above the mean ground water whichever is higher.

f) All drainage structures inside retention basin shall be secured to prevent pedestrian access (i.e. grates, fences, lock castings and etc.)

g) Diffusion well will be required when determined by the Town Engineer by soil analysis or percolation test.

h) If internal access to drainage structures is not accessible directly by roadway, a minimum aisle width of ten (10) feet with provisions of landscape shall be provided at a maximum 12% slope.

i) Retention basin site shall remain secure from trespassers at all times.

j) Drainage leaching pools and catch basins collecting storm water prior to entering retention basins shall store a minimum of 1" of the total storage requirement.

k)  $V_c = A R C$

Where:  $V_c$  = volumetric capacity in cubic feet  
 $A$  = tributary drainage area in square feet within the subdivision and shall include areas outside the subdivision  
 $R$  = 2"  
 $C$  = weighted coefficient for runoff of the drainage area (minimum  $c = 0.30$ )

9) Valley Gutters:

Valley Gutters will be permitted at "T" intersections where they will be parallel to the centerline of the through road and shall be installed only after design approval by the Town Engineer. In general, the crown of the intersecting road shall be gradually eliminated starting from a point about thirty (30) feet back from the flow line of the through street. At other than 'T' intersections, valley gutters will be permitted only when warranted by limited traffic use as approved by the Town Engineer.

**10) Site Plans and Private Roads/Communities**

a) Tributary areas of 10 acres or less

For projects with tributary areas of 10 acres or less, site plans and private roads/communities shall be generally designed to provide storage capacity for 5" rainfall including 2" within leaching structures and 3" in ponding or a combination thereof. All stormwater retention areas shall be located for proper percolation and shall comply with Town and SWPPP Standards, unless approved otherwise due to site limitations by the Town Engineer and/or Planning Board.

b) Tributary areas of 10 acres or greater

i) For projects with tributary areas of 10 acres or greater, site plans and private roads/communities shall be deemed to necessitate a storm water recharge basin(s) designed to provide storage capacity for 5" rainfall. Where an appropriate overflow of the recharge basins is not provided, the storage capacity shall be increased using 8" of rainfall. The above minimum drainage requirements are necessary except where SWPPP requirements require additional storage. Design, construction and fencing of recharge basins shall be in accordance with the subdivision recharge basin standards herein.

ii) Green Infrastructure Incentive - provided that it can be demonstrated that the project site has soils adequate for proper percolation and upon recommendation from the Commissioner, Green Infrastructure techniques (as described in the New York State Stormwater Management Design Manual, dated January 2015 or as revised) in combination with leaching structures can be utilized in place of a recharge basin provided that a minimum 5 inch storm stormwater retention shall be provided in leaching structures and additional retention shall be provided in green infrastructure techniques. Typical Green Infrastructure techniques included but are not limited to rain gardens, vegetated swales bio-retention areas and rain catchment systems.

iii) All stormwater retention areas shall be located for proper percolation and shall comply with Town and SWPPP Standards, unless approved otherwise due to site limitations by the Town Engineer and/or Planning Board.

**(B) HORIZONTAL ALIGNMENT CRITERIA**

- 1) Horizontal alignment curves: The recommended minimum centerline radius curvature shall be 200 feet for local street and 400 feet for collector streets.
- 2) A tangent distance of at least 50 feet shall be provided between reverse curves.
- 3) Minimum radius at a corner shall be 25 feet at the property line except that a larger radius shall be provided at major intersections.
- 4) Adequate sight distance must be provided at all intersections in accordance with the New York State Manual of Uniform Traffic Control Devices (MUTCD), 2001 edition.

**(C) VERTICAL ALIGNMENT CRITERIA**

- 1) All street gradients shall conform as much as possible to the natural terrain, minimizing excessive cuts and fills.
- 2) Minimum road gradients shall be 1.0%. Maximum road gradients shall be as follows:

Collector streets – 5%  
Minor streets – 10%  
Driveways – 15%

- 3) Gradients approaching intersections shall not exceed 2.5%, commencing at a point at least fifty (50) feet from the nearest intersecting right-of-way line as measured along its centerline. Intersections of roads and curbs having a minimum gradient shall be detailed sufficiently to insure proper surface drainage.
- 4) Gutter line gradients of cul-de-sacs shall be a minimum of 0.5%.
- 5) All changes in grade of 1.0% or more shall be connected with a vertical curve.

6) Sag and Crest Vertical Curves:

The following formula shall be used in the design of street profiles:

a)  $L=KA$

Where: L = length in feet of a vertical curve in  
K = constant equaling 28 for minor streets and 50 for collector streets.  
A = algebraic difference in percent of grade.

**(D). GENERAL INSTRUCTIONS**

- 1) Schedule of Operations:

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The Division of Engineering, Engineering Inspector or Town Highway Department, and the Developer shall together review the Schedule of Operations prior to the start of construction to insure the orderly procedure of the work.

2) Traffic Maintenance:

The flow of traffic and the safety thereof on any public street or highway within the Town shall not be restricted or endangered in any way by construction operations, equipment, vehicles or materials connected with the construction or sales operations of a subdivision. The Developer shall provide for off-street parking space for all vehicles used in construction or sales operations. Equipment or materials shall not be stored within the right-of-way lines of any public street or highway.

3) Temporary Roads:

All roads within a development which are used by the contractors or others and which have not been surfaced shall be suitably treated with calcium chloride or other material, which have dust-laying qualities.

4) Protection of New Drainage Facilities:

All drainage facilities during construction operations shall be cleared of lumber, debris, dirt and other objectionable material after completion and shall be maintained in a clean condition until time for use as directed by the Town Engineer.

5) Developer's Responsibility:

The Developer is responsible for keeping Town roads, streets and private property free of debris and damage caused by construction operations or by storm water run off from the Development site. The Developer at his own expense shall immediately repair any damage so caused. If, after due notice by the Town Engineer the Developer does not proceed within 72 hours to make the necessary repairs or to remove the debris caused by his operations, the Town Engineer is empowered to notify The Highway Department, take necessary corrective measures and the costs shall be paid by the Developer.

6) Decision of Town Engineer Final:

It shall be mandatory upon the Developer that the work proceed in accordance with the best construction practice and that all necessary measures be taken for the protection of the Public Health, Safety and Welfare. The decision of the Town Engineer shall be final and binding in these matters.

7) Pre-construction Meeting:

A pre-construction meeting will be required prior to the start of any work. After review of the approved plans the owner will be granted permission to proceed. The Engineering Inspector shall be notified 48 hours in advance prior to the start of any work. In order to obtain a building permit for any commercial or industrial site plan, a pre-construction meeting must have been scheduled with the Engineering Inspector. All pre-construction meetings will occur in the conference room of the Planning Department.

**(E) ROADWAY CONSTRUCTION SPECIFICATIONS**

1) Stabilized Soil Base:

Depending on the character of the soils encountered all or part of the soil base areas where directed by the Engineer shall be improved with added material from the excavation. The Contractor shall stockpile, during the excavation process as directed by the Engineer, sufficient selected materials for this purpose. Suitable loamy or sandy soils shall be added and incorporated to form a stable base, a minimum of six (6) inches in compacted thickness. The areas to be treated in cuts shall be excavated to a depth of three (3) inches below subgrade, a layer of suitable material between three (3) and six (6) inches loose measure shall be spread over the roadway area. The added material shall be thoroughly mixed to a depth of six (6) inches by scarifying or by other methods approved by the Engineer. This operation shall continue until the soil is thoroughly mixed. If, in the opinion of the Engineer, soft, yielding or unsuitable material is encountered at subgrade level, it shall be removed to a depth of eighteen (18") inches or as directed by the Engineer and backfilled with suitable materials compacted in layers of six (6) inches.

The soil base shall then be shaped and compacted to the finished line and grade with a roller weighing a minimum of ten (10) tons. Shaping, filling and rolling shall continue until the soil base is thoroughly compacted to a depth of six (6) inches. When required, water shall be added to the soil mixture to obtain the optimum moisture content for compacting to the maximum density. The prepared finished soil base shall be kept free from ruts, depressions and properly drained. Upon completion of the soil base, the contractor shall request an inspection by the Engineer and shall not proceed with further roadway work until the inspection has been made and the work approved.

2) Dense Graded Aggregate Base Course:

a) Description:

Upon the stabilized soil base a dense graded aggregate base course shall be uniformly placed so that, after thorough rolling and compacting, a minimum depth of 6" for industrial roads is achieved.

b) Materials:

The base course blend shall consist of well graded crushed stone or New York state DOT approved recycled concrete aggregate (RCA). RCA shall not exceed more than 5% erroneous material such as brick, ceramics, metals, wood, gypsum, or other organic material. The base course blend shall have the following mechanical gradation:

<u>Screen Size</u>	<u>% Passing</u>
1-1/2"	100%
1"	90-100%
1/2"	65-85%
3/8"	55-75%
#4	40-55%
#8	30-45%
#30	16-27%
#200	0-10%

The material shall also achieve a maximum dry density of not less than 145 pounds per cubic foot at optimum moisture content when tested in accordance with ASTM Designation 01557 - Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort, Latest.

Roadway shoulder grading must be satisfactory prior to 1<sup>st</sup> asphalt lift, performed and recorded, on as-constructed surveys.

c) Method of Construction:

The stabilized soil base shall be smooth parallel to and at the required depth below the dense graded base surface. The soil base shall not be in a muddy or frozen condition. The dense graded base material shall be deposited on the stabilized base by means of a dump truck spreader tailgate or any other approved method of depositing.

The spreading of the material shall be by means of approved self-propelled spreader equipment. No segregation of large or fine particles will be allowed, and the material as spread shall be well graded. After the base course has been laid loose, it shall be thoroughly rolled with an approved roller weighing not less than 10 ton static or 8 ton static plus 12 ton vibratory. Rolling must begin at the sides and continue toward the center, and shall continue until there is no movement of the course ahead of the roller.

The base course shall be kept in a moist condition to allow compaction to maximum density. Six (6) percent moisture shall be a guideline for the optimum moisture content, unless specific moisture density report on the base course material reveals otherwise.

In lieu of the above method of finishing rolling, the contractor may, at his option, use a vibratory method as follows: After the material is spread evenly, so that it will have the required thickness after compaction, the entire area shall be compacted by an approved vibratory compactor. Vibration shall continue until the material is keyed sufficiently to permit rolling with an approved roller without displacement of the material. For breakdown rolling, a pneumatic roller must be used.



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Care shall be exercised to see that the voids in the base course are completely filled, but the operation of vibratory compaction shall not be such as to cause floating of the coarse aggregate.

The entire area shall then be rolled with an approved roller weighing not less than ten tons. Rolling shall begin at the sides and continue toward the center, and shall continue until there is no movement of the course ahead of the roller.

Excavate soft spots, unsatisfactory soils, and areas of excessive pumping or rutting, as determined by the Inspector, and replaced with properly compacted backfill or fill as directed.

d) Testing:

The thickness of the base course shall be determined by the method directed by the Engineer, and a sieve analysis shall be performed as directed by the Engineer.

Upon completion of the aggregate base course the contractor shall cease all future road work and request an inspection by the Engineer. Upon inspection approval of the base course and as-constructed survey, the asphalt paving work can continue.

3. As-constructed survey:

As-constructed surveys shall be submitted at time of curbs completion prior to asphalt pavement. The survey will verify drainage, curbs, elevations, setbacks, utilities, cleared vegetation (i.e. over clearing), and the recharge basin status – approval or not for house construction (excavated or not, fence). The survey will include proposed and existing top of curb grades less than 1% pitch every 50 feet or at 100 feet intervals, manholes, catch basins, pipe sizes and types, inverts, recharge basin headwall and pan, recharge basin grades, curb and fence. As-constructed surveys for roads and site plans must be approved by the town prior to asphalt paving. As-constructed surveys must be signed and sealed by a licensed surveyor or licensed surveyor and professional engineer.

4. Shop Drawings:

Contractor shall submit shop drawings for approval prior to construction when applicable or requested by the engineer.

5. Asphalt Base Course

The asphalt base course shall meet the requirements of the New York State Department of Transportation Standard Specification Section 403 Hot Mix Asphalt (HMA) Pavements for Municipalities - Type 1 Base Course and shall be a minimum thickness of 3 inches for residential, commercial, and industrial roads.

6. Asphalt Binder Course

The asphalt binder course shall meet the requirements of the New York State Department of Transportation Standard Specification Section 403 Hot Mix Asphalt (HMA) Pavements for Municipalities - Type 3 Binder Course and shall be a minimum thickness of 3-1/2 inches for residential, commercial, and industrial roads.

7. Asphalt Top Wearing Course

The asphalt top course shall meet the requirements of the New York State Department of Transportation Standard Specification Section 403 – Hot Mix Asphalt (HMA) Pavements for Municipalities - Type 6F Top Course and shall be a minimum thickness of 1-1/2 inches for residential, commercial, and industrial roads.

8. Project Conditions

Do not apply asphalt materials if sub grade has frost, is wet or excessively damp, if rain is imminent or expected before time required for adequate cure, or if the following conditions are not met:

1. Tack Coat: Minimum surface temperature of 50 deg F.
2. Asphalt Base Course: Minimum surface temperature of 40 deg F and rising at time of placement.
3. Asphalt Surface Course: Minimum surface temperature of 50 deg F at time of placement.
4. Truck dumps temperature minimum 200 deg F.
5. Required period for paving is April 15 to November 15 otherwise written permission was requested and approved by the Town Engineer.

9. Aggregates

Course Aggregate: ASTM D 692 sound, angular crushed stone, or gravel.

Fine Aggregate: ASTM D 1073 or AASHTO M 29, sharp-edged natural sand or sand prepared from stone, gravel, cured blast-furnace slag, or combinations thereof.

10. Tack Coat

Apply uniformly to vertical surfaces abutting or projecting into new, hot-mix asphalt paving at a rate of 0.05 to 0.15 gal/sq. yd. Allow tack coat to cure undisturbed before applying hot-mix asphalt paving.

11. Compaction

Begin compaction as soon as placed hot-mixed paving will bear roller weight without excessive displacement. Compact hot-mixed paving with hot, hand tampers or with vibratory-plate compactors in areas inaccessible to rollers. Complete compaction before mix temperature cools to 185 deg F. After final rolling, do not permit vehicular traffic on pavement until it has cooled and hardened. Rollers must be minimum 10-ton static or 8-ton static plus 12 ton vibratory and must have functional water spray at time of use.

1. Average Density: 96 percent of reference laboratory density according to ASTM D 6927 or AASHTO T 245, but not less than 94 percent nor greater than 100 percent.
2. Average Density: 92 percent of reference maximum theoretical density according to ASTM D 2041, but not less than 90 percent nor greater than 96 percent.

12. Joints

Construct joints to ensure a continuous bond between adjoining paving sections, free of depressions, with same texture and smoothness as other sections of hot-mix asphalt course.

Joint Sealant: ASTM D 6690 or AASHTO M 324, Type II or III, hot-applied, single-component, polymer-modified bituminous sealant.

**(F) TESTING OF PAVEMENT MATERIALS**

The following tests shall be performed by a reliable testing laboratory, approval of the laboratory and additional test required shall be approved by the Town Engineer, at the developer's expense.

1) Dense Graded Aggregate Base Course: The base course material may be subject to laboratory test for particle size analysis for conformance with specifications.

2) Cores: One (1) core from the finished pavement will be taken for each 200 linear feet or 10,000 s.f. of roadway or part thereof. A minimum of two (2) cores per project shall be provided, which may be increased at the inspector's discretion.

3) Witness testing of subgrade and/or RCA base density testing must be performed by an independent testing laboratory in the presence of the Town Inspector prior to approval being granted for paving. As-constructed surveys are required prior to paving and will provide sufficient down time for testing and coordination. There shall be a minimum one inch top coat on any resurfacing.

**(G) MATERIALS OF CONSTRUCTION**

1) Concrete

Materials used to produce concrete and testing thereof shall comply with the applicable standards listed in the New York State Building Code, Chapter 19 Concrete.

- a) *Forms*. Forms shall be free from warp and of such construction that there will be no interference to inspection for grade and alignment. All forms shall extend to the full curb depth and be secured so no displacement will occur during the placement of concrete.
- b) *Expansion Joints*. Expansion joints shall be 11/16 inches wide and contain Premoulded Resilient Joint Filler. The filler shall be cut to conform to the cross section of the curb.
- c) *Curing Covers*. Use quilted covers, plastic fiber blankets, or poly ethylene curing covers. Do not use covers with tears or holes. Cover all exposed surfaces and extend the covers a minimum of 12 inches beyond the forms. Secure the covers to keep them in contact with the entire surface and maintain overlap.
- d) *Cold Weather Curing*. Apply the insulating material to prevent newly placed concrete from being exposed to air temperatures below 40 degrees F for the curing period. Secure the insulation tight to the concrete surface to prevent air intrusion beneath the insulation.

2) Piping

a) Smooth Wall Plastic Pipe:

Unless otherwise specified, all drainage piping shall be smooth wall corrugated plastic in accordance with the requirements of the New York State Department of Transportation Standard Specification Section 706-12 - Smooth Interior Corrugated Polyethylene Pipe.

1. Pipe and fittings shall meet the requirements of A.A.S.H.T.O. M294 for Type S and Type SP.
2. The smoothness of the interior liner shall not deviate more than 1/4" per foot when checked with a straight edge.

b) Reinforced Concrete Pipe:

Under certain conditions, reinforced concrete pipe may be used. It shall be installed in accordance with the requirements of the New York State Department of Transportation Standard Specification Section 706-02 - Reinforced Concrete Pipe. Design considerations shall be approved by the Town Engineer prior to installation.

1. Pipe shall meet the requirements of A.A.S.H.T.O. M 170M.
2. Elastomeric gaskets shall be used at pipe joints.

**(H) FINAL SURVEYS**

Final As-Constructed Surveys must be submitted for all Subdivision road pavement construction and Site Plans. For Subdivision Roads provide the following: all drainage, curbs, utilities, hydrants, vegetation lines, Recharge Basin - fence, plantings, headwalls and pad elevations, all survey monuments, street trees – planted, aprons and type of material. Plans shall be prepared on 24x36 size sheets, with a legend, of a standard scale, and include tax lot numbers of all parcels and new building lots. All fences shall be located and shown and labeled. All open space parcels and buffers identified. All top and bottom of curb and centerline grades, if less than 1% pitch, every 50 feet or at 100 feet intervals and intersections at point of curvature, point of tangency, drainage structures, and handicap ramps, and valley gutters.

All rim elevations at all drainage and utility manholes, street lights, water valves, gas valves, and etc. All pipe sizes and types, and inverts. All recharge basin headwall and pad, curb and fence, gates, grades, and plantings. All street trees and required plantings. If applicable, all leaching pools, to be shown and identified by diameter and depth. If applicable, all excess material removed shall be verified with volume calculations. If applicable, all drainage and utility easements shall be shown and dimensioned.

For Site Plans provide the following: The same information as provided above including all buildings, structures, retaining walls, slopes, site lighting, utilities, signage, parking stalls, pavement markings, handicap signs, parking, loading zones, railings, fences, gates, buildings entrances, garage doors, and fire access roads. Final surveys shall be no older than six months from time of submission.

## **RECOMMENDATIONS FOR DESIGN OF LANDSCAPE/PLANTING PLAN**

### **I. GENERAL NOTES:**

1. Plan to be designed and sealed by an appropriately licensed design professional.
2. All plant material shall meet the latest American Association of Nursery and Standards for Nursery Stock.
3. Plants in a group shall be homogeneous.
4. It is recommended that the planting plan designer use high species diversity along with native plant materials to encourage ecological stability. In addition, one should avoid the use of highly aggressive plants with the exception of pioneer species used to provide temporary soil cover.
5. Existing vegetation within required buffer area and/or exterior planting strip should be, if suitable be retained and incorporated into the planting design.
6. Required notes on plan:
  - A. All plants and trees shall be guaranteed by the planting contractor to be in a vigorous growing condition. Provision shall be made for a growth guarantee of at least one year after bond for all plant material. Replacements shall be made at the beginning of the first succeeding planting season. The contractor shall continue to make replacements until a plant shows vigorous and healthy growth for a period of one year from date of acceptance.
  - B. Required periods for planting are March 1 to June 15 and August 15 to December 1 unless otherwise written permission is approved.
  - C. Specifications shall follow Cornell Cooperative Extension Publication – Information Bulletin 24 - "Suggested Practices for Planting and Maintaining Trees and Shrubs".
  - D. The removal and control of sediment within the recharge basin and stabilization of topsoil in all planting areas during construction and during the plant guarantee period shall be the responsibility of the developer.
7. Square foot area of each planting category is to be noted on the plan.
8. Planting plan to conform to configuration of recharge basin as shown on drainage plans.

## CHAIN LINK FENCE SPECIFICATIONS

1. All Chain Link Fencing shall be installed in accordance with ASTM Standard Designation F567-84 for "Installation of Chain link Fence", except where additional requirements are specified herein.
2. Fence fabric including gate filler, shall be in accordance with ASTM standard Specification F668-88 for "PVC coated Steel Chain Link Fence Fabric". Core Wire shall be number 9 gauge. Color shall be black. Mesh shall be 2" diamond shaped. PVC coating shall be Class 2A.
3. Selvage shall be knuckled at top and twisted at the bottom. Braces and truss rods are required at all end and corner posts.
4. Posts and Rails shall be in conformance with ASTM Standard F669-81 (1985) "Specification for strength Requirements of Metal Posts, Rails for Industrial Chain Link Fence" Group IA or IC for Heavy Industrial Fence.

Sizes shall be as follows:

	<u>Trade Size</u>	<u>Nominal Pipe Size</u>	<u>Actual Outside Dia.</u>	<u>Weight #/L.F. IA</u>	<u>Weight #/L.F. IC</u>
Rails & Braces	1-5/8	1-1/4	1.660"	2.27	1.40
Line Posts	2-1/2	2	375"	3.65	3.12
End/Corner Posts	3	2-1/2	2.875"	5.97	4.64

5. Gates shall be in conformance with ASTM Standard F900-84 "Specification for Industrial' Commercial Swing Gates".
6. Gate hinges shall be designed to provide a full 180 degree swing outward.
7. Gate shall be provided with a double gate latch with padlock and keepers.
8. Coil spring wire shall be in accordance with ASTM Standard 1\82486 for "Metallic Coated Steel Marcellled Tension Wire for Use with Chain Link Fence" for Type II, Class 2.1, and shall be attached to the fabric with minimum of 12 gauge steel ties no further than 24" apart. .
9. All fence fittings including rail and brace ends, tie wires and clips, tension and brace bands, and barb arms, are to be in conformance with ASTM Standard F626-89a "Specification for Fence Fittings".
10. All posts, rails, braces and fittings shall be PVC coated in accordance with the specifications for fence fabric, except that PVC shall be Class 2B, and thickness of PVC coating shall be 10 to 14 mils.