Town of Durham
ROAD CONSTRUCTION REGULATIONS

SECTION 1: Authority and Purpose

Pursuant to the authority vested in the Planning Board by the legislative body of the Town of Durham and in accordance with the provisions of RSA 674:35 and 674:43 of the New Hampshire Revised Statutes Annotated, as amended, the Planning Board adopts the following regulations governing the development of roads as part of a subdivision of land or site plan application in the Town of Durham, New Hampshire.

These regulations are designed to accomplish the purposes set forth in RSA 674:36 and 674:44 and for the purposes of protecting the health, safety, convenience, and economic and general welfare of our citizens.

These regulations supersede the Subdivision Regulations and Site Plan Review Regulations, Town of Durham, New Hampshire, adopted December 12, 1990, as amended prior hereto, and such prior regulations are hereby rescinded.

SECTION 2: Title

These regulations shall be known and cited as the ROAD CONSTRUCTION REGULATIONS OF TOWN OF DURHAM, NEW HAMPSHIRE.

SECTION 3: GENERAL STANDARDS

3.01) STREET LAYOUT, PLAN, AND CONSTRUCTION

The layout of all proposed streets shall provide for the continuation of the principal streets in an adjoining subdivision, if applicable. When the adjoining property is undeveloped, proper consideration of future development potential shall be given with respect to future continuous alignments. Safe access to all abutting lots shall be provided. Due consideration to topography, drainage and other natural features shall be given when laying out streets. The general street development plan shall be approved prior to the construction of any phase of the plan. The proposed street plan shall show all work necessary to connect and complete improvements and utilities between the proposed street(s) and any non-improved connecting street in an existing subdivision. All streets and related improvements shall be constructed in conformance with the standards described herein. Typical roadway sections, based on expected average daily traffic volume (ADT), are illustrated in *Figure One*. Typical geometric and structural guidelines based on ADT, are illustrated in *Figure One*.

3.02) BOUNDARY MARKER

A permanent reinforced concrete or stone marker, as shown in *Figure Two*, shall be placed at the edge of each roadway boundary on the periphery and at all curves and arc points.

3.03) BENCHMARKS

At least one benchmark shall be set as part of any new road construction. All Benchmarks shall be placed in reference to a permanent U.S.G.S. point location.

3.04) STREET NAMES

Proposed street names shall not duplicate any existing street names within the Town. The Police and Fire Department shall grant preliminary approval to any proposed Street name. Street names shall be subject to Planning Board approval. Upon completion of a street, the names shall be posted by the developer on a sign of a type approved by the Dept. of Public Works.

3.05) TRAFFIC CONTROL SIGNS

All streets shall have such street signs as are necessary and approved by the Department of Public Works to provide for safe and efficient movement of all vehicles. The cost of all traffic control signs shall be the responsibility of the developer.

3.06) CUL-DE-SACS

Cul-de-Sacs shall not service more than 10 single family houses or 5 duplexes. Cul-de-Sacs shall not be linked such that more than 10 houses or 5 duplexes are serviced by a single point of entry from the adjoining street. When undeveloped parcels adjoin roads ending in a Cul-de-Sac, a reserve strip shall be provided for possible future expansion, provided that such expansion could be accomplished in conformance with these and all other currently applicable regulations. Any reserve strip shall be depicted on the approved plan and deeded in a manner that may permit the future extension of the road network. Cul-de-Sacs shall comply with the specifications listed in items 4.11 and 4.12 of these standards. The length of a Cul-de-Sac shall be measured along the center line of the street from its point of intersection with the adjoining street to the most distant edge of the terminating Cul-de-Sac or hammerhead. The center line of all Cul-de-Sacs shall be aligned with the center line of the street. These standards are illustrated in *Figure Three*. A landscaped island in the center of the Cul-de-Sac may be required at the discretion of the Planning Board. When required, said island shall be sized to provide a street width of no less than 20' around the island and adequate drainage shall be installed. Hammerhead turnarounds on dead-end streets may be permitted at the discretion of the Planning Board. When proposed, the design of these facilities will be subject to the approval of the Public Works Department and the Fire Department. [Revised December 10, 2003]

3.07) BRIDGES

On stream crossings spanning ten (10) or more feet, the bridge structure shall be designed to HS-25 loading (AASHTO specifications, hereby incorporated into these regulations by reference). All bridge designs shall include a hydraulic and hydrologic analysis. The minimum roadway width on bridges shall be 24 feet. Greater street widths, depending on the volume of traffic anticipated, may be required at the discretion of the Planning Board. Bridge railing shall be required in accordance with NHDOT standards.

3.08) ALLEY WAYS

Alley ways shall not be permitted.

3.09) SIDEWALKS, PEDESTRIAN WAYS, AND BICYCLE PATHS

Sidewalks, pedestrian ways, and bicycle paths may be required at the discretion of the Planning Board. When required, sidewalks shall be constructed in accordance with the specifications listed herein. Proposed designs of pedestrian ways and bicycle paths will be subject to the approval of the Planning Board. Sidewalks are defined as those walkways adjacent to traveled roadways. Pedestrian ways and bicycle paths may or may not be adjacent to traveled roadways.

3.10) CURBS AND GUTTERS

Street curbing and gutters shall be required in areas serviced by the municipal storm water collection system and elsewhere at the discretion of the Dept. of Public Works. When required, curbing shall be constructed in accordance with the specifications listed herein unless otherwise agreed to by the Planning Board.

3.11) DRIVEWAYS AND OTHER ACCESSES

Driveways and other accesses to the local street network or proposed streets shall be constructed in accordance with the "State of New Hampshire Department of Transportation Policy and Procedure for Driveways and Other Accesses to the State Highway System", NHDOT 1992. The grade of all driveways shall not exceed 6 percent for a distance sufficient to accommodate expected vehicle storage. Driveways shall be defined in accordance with the definitions given in the Institute of Transportation Engineers Guidelines for Driveway Design and Location, 1985. Both of these documents are hereby incorporated into these regulations by reference.

3.12) UTILITIES

Utility poles shall be within the roadway Right of Way (ROW) line and in no case shall be placed in the ditch line. Utility poles shall always be placed at least eight (8) feet back of a curb. When possible, water and sewer mains, storm drains and other underground utilities shall be constructed outside the road surface area and preferably, outside the ditch line, but within the Right of Way (ROW). All underground utilities shall be installed in accordance with the New Hampshire Dept. of Environmental Services Standards for Sewer construction, Storm Water Construction, and Water System Construction. All other utilities shall be installed in compliance with the applicable industry standards in place at the time of construction.

3.13) FUTURE UTILITIES

A feasible layout for all future utilities within the subdivision and on adjacent land (when applicable), relative to natural features, shall be provided by the developer.

3.14) CLEARING AND GRUBBING

All trees and brush, stumps, large roots, loam, forest litter, sod, muck, silt or other unacceptable material within the improved road bed area (slope line to slope line), whichever is farthest from the center line of the street, shall be removed. Under no circumstances shall any wood, brush, or any other unsuitable material be placed under or allowed to remain within the limits of the subgrade area.

3.15) CUT AND FILL IN STREET CONSTRUCTION

Excavation of roadbeds shall consist of removing earth or ledge to a depth of 2' below the finished roadbed grade (subgrade) shown on the final profile; i.e., below the required road base. Filled roadbeds shall be formed by spreading successive layers of fill material not greater than 12" in depth. Fill standards set forth in section 209 of the "Standard Specifications for Road and Bridge Construction" NHDOT, 1990 are adopted by reference. Each layer shall be compacted to a density of at least 95% of maximum density before another layer is begun. The maximum density determination will be made as specified in AASHTO T 99 (Standard Proctor Test). Material containing loam, organic soil, forest litter, wood, roots, or other substances that will not provide a stable bed or embankment will not be acceptable for the construction of fills. Broken ledge may be used in layers in fills over 4' in thickness. The voids in each layer shall be filled with earth or spalls. Broken ledge shall not be placed within 2' below the finished subgrade. Ledge fragments, or boulders larger than 1/8 cubic yard shall not be used within 2' of the finished subgrade. The subgrade shall be at least two (2) feet above the estimated Seasonal High Water Table.

Side slopes cut in soil above the finished roadway shall not exceed a ratio of 3' horizontal to 1' vertical and shall be graded, loamed (4" compacted), and seeded in conformance with " Standard Specifications for Roadway and Bridge Construction, NHDOT, 1990", Section 644. Side slopes in ledge above the finished roadway shall not exceed a ration of 1' horizontal to 2' vertical. Embankment slopes away from the edge of the finished roadway shall not be constructed at a ratio steeper than 4' horizontal to 1' vertical unless the length of the grade is greater than 10'. If the horizontal length of the grade exceeds 10', a ratio of 3' horizontal to 1' vertical may be used. W beam guard rail may be required by the Dept. of Public Works.

3.16) ROADWAY GRADES

Roadway grades shall be constructed in conformance with the standards provided herein (see items 4.05 and 4.06).

3.17) GRADE STAKES

The design engineer shall be responsible for placing grade stakes at 50' intervals adjacent to the road course where there are abrupt changes in grade and at 100' intervals where a more level contour is present. Each stake shall be securely placed where it will not be disturbed by construction. Each stake will indicate a station number, its offset from the center line of the street, and the extent of cut or fill to the finished center line grade. Grade stakes shall be preserved until the completion of the roadway. If grade stakes are removed or damaged to the extent that they

cannot be read by the appropriate Town official or agent, it will be the responsibility of the design engineer to replace them.

3.18) EROSION CONTROL

All construction and/or development activities shall incorporate design standards for erosion and sedimentation control which, at a minimum, reflect the recommendations of the publication "Stormwater Management and Erosion and Sediment Control Handbook for Urban and Developing Areas in New Hampshire "by the Rockingham County Conservation District, prepared for the Department of Environmental Services in cooperation with the USDA Soil Conservation Service, August, 1992. The proposed Erosion and Sediment Control plans shall be included as part of the Road Construction Plans.

3.19) DRAINAGE

All drainage systems will be designed based on a pre and post construction runoff analysis. All streets shall be provided with drainage facilities (closed storm drain system, where appropriate, or culverts and ditches) to allow for the removal of storm water and prevent flooding of the pavement and erosion of adjacent surfaces. Construction of such facilities shall be in accordance with "Standard specifications for Roadway and Bridge Construction, NHDOT, 1990", Sections 603, 604, and 605 hereby incorporated into these regulations by reference. No water from adjacent lots shall be allowed to run across street surfaces, but shall be directed into catch basins or ditches and piped underground in a pipe of a size approved by the Dept. of Public Works. Standing water in ditches, culverts, or catch basins shall not be permitted.

3.20) LANDSCAPING

Upon completion of any development or development phase, all esplanade or planting strip areas adjacent to streets shall receive at least 4" of compacted high-quality top-soil (loam) free of stones over one inch in diameter, clay, and sod. At a minimum, these areas shall be seeded with a high quality grass seed in conformance with " Standard Specifications for Roadway and Bridge Construction, NHDOT, 1990", Section 644 -658.

3.21) CLEAN-UP

Before acceptance, a street shall be cleaned up, by whatever means necessary, so that it is left in a neat and presentable condition. Construction related debris of all kinds, both natural and man-made shall be completely removed from the ROW. All work shall be performed in compliance with Article 9, Landscaping, Durham Zoning Ordinance and any conditions established by the Planning Board.

3.22) INSPECTIONS

In order to ensure that streets are constructed in accordance with the standards prescribed herein, the Public Works Department reserves the right to inspect any aspect of street construction at any time during the construction process and prior to acceptance of the roadway. At a minimum, streets will

be inspected by the Public Works Department prior to placement of subgrade materials, after compaction of subgrade material (density or compaction testing shall be provided by the developer), after the installation of drainage improvements, during placement of base course materials, during the installation of binder and wear course of pavement. All underground utilities shall be inspected and approved prior to paving. Cut or fill slopes shall also be subject to inspection and approval.

The developer will be responsible for notifying the Public Works Department or designated agent at each of the construction phases. Failure of the developer to notify the Town official or agent at each of these construction phases will result in a delay of the release of the financial surety posted to cover such work. The developer shall request Town inspection of street construction at the appropriate times during the construction phase, as outlined in the inspection schedule listed below. Requests must be made at least seven working days prior to the desired inspection. All costs for inspections will be borne by the developer. No work beyond the phase to be inspected shall be performed prior to that inspection and approval by the Public Works Department

The Town official or agent responsible for street inspection shall establish and maintain a record of each inspection. Copies of these records shall be forwarded to the Planning Board so that it is able to monitor the progress. These records shall contain, but are not limited to, the date of inspection, the street or street segment inspected, identified by station, lot line or other reasonable means, conditions found, and action taken (approval or disapproval). Reasons for disapproval must be supplied to the developer, in writing, within 72 hours of the inspection.

The following inspection schedule shall be used to insure that all phases of construction are performed to Town standards:

- ⇒ Clearing and Grubbing
- ⇒ Subgrade
- ⇒ Drainage
- ⇒ Gravel Base
- ⇒ Paving:
  - Binder course
  - Wear course
- ⇒ Monumentation and Signage

3.23) SAFETY

The Planning Board reserves the right to modify proposed street plans for the purpose of enhancing the safety of the traveled way. Potential modifications include, but are not limited to, removing obstructions, adding W beam guard rails in areas where steep slopes exist (greater than 3' horizontal to 1' vertical) or are created, and requiring additional warning signs. The appropriate Town official or agent may act for the Planning Board under this paragraph.

3.24) TRAFFIC IMPACT STUDIES

Traffic Impact Studies may be required as part of any development application, at the discretion of the Planning Board. The information presented in these studies shall be in accordance with the

"Strafford Regional Planning Commission's Guidelines for Traffic Impact Analysis, 1986", hereby incorporated into these regulations by reference. The Planning Board reserves the right to retain the services of an outside agency for the purposes of reviewing any traffic impact analysis submitted. All cost for additional studies shall be borne by the applicant.

3.25) ACCEPTANCE

No road shall be accepted by the Town until it has been inspected by the appropriate Town official or agent and found to be constructed in accordance with the specifications prescribed herein or additionally prescribed or agreed to by the Planning Board and approved by the Town Council.

SECTION 4: STREET CONSTRUCTION STANDARDS

ITEM		ESTIMATED AVG. DAILY TRAFFIC VOLUME 1-200vpd/201-1000vpd/1000vpd +		
4.01)	Minimum right of way width:	50'	60'	60'
4.02)	Minimum pavement width:	20'	22'	24'
4.03)	Minimum shoulder width:	4'	6'	6'
4.04)	Center of street to ditch line:	18'	22'	24'
4.05)	Minimum grade:	0.5%	0.5%	0.5%
4.06)	Maximum grade:	8%	8%	8%
4.07)	Base course depth: (traveled way and shoulders)			
	gravel	12"	14"	18"
	crushed gravel	4"	6"	6"
	TOTAL base depth	18"	20"	24"
4.08)	Paving, roads and shoulders: (if paved shoulders required) Hot bituminous pavement			
	base (binder course)	2"	2.5"	2.5"
	top (wearing course)	1"	1.5"	1.5"
4.09)	Shoulder type:	gravel	paved	paved
4.10)	Road crown:	1/4”to3/8”/1'	1/4”to3/8”/1'	1/4”to3/8”/1'
4.11)	Maximum Cul-de-Sac length:	1000'	1000'	1000'
4.12)	Minimum Cul-de-Sac diameter:			
	pavement diameter to center line	100'	100'	100'
	property line diameter	138'	138'	138'
4.13)	Minimum tangent length between reverse curves:	75'	150'	200'
4.14)	Vertical curves (minimum length):			

The minimum vertical curve length required shall be governed by the design speed of the proposed roadway and determined by multiplying the algebraic difference in the two tangent grades times the "K" factors listed below (AASHTO specifications, hereby incorporated into these regulations by reference). The result of this calculation is expressed in feet. This calculation is illustrated in *Figure Five*.

		DESIGN SPEED (MPH)						
		20	**25**	**30**	**35**	**40**	**45**	**50**
4.15)	"K" factor for crest:	10	20	30	50	80	120	160
	"K" factor for sag:	20	30	40	50	70	90	110
4.16)	Minimum street sight distance:	250'	325'	390'	455'	520'	585'	650'
4.17)	Minimum center line curve radii: (no super-elevation)	180'	280'	430'	580'	720'	1100'	1400'

4.18) Curb type: per DEPT. OF PUBLIC WORKS

4.19) Gutter width: 12" to 18", added to minimum pavement width required in item 4.02)

4.20) Sidewalk construction width: 6’ minimum

4.21) Minimum sidewalk distance from curb face: 6'

4.22) Street lighting:

Upon the recommendation of Dept. Of Public Works, the Planning Board may require street lighting at every intersection and commercial and industrial driveway. Mid-block lighting, lighting on curves and lighting of residential driveways may also be required as deemed necessary or appropriate by the Planning Board. All street lighting will be installed in conformance with the standards developed by the Illuminating Engineering Society of North America, hereby incorporated into these regulations by reference.

SECTION 5: RESIDENTIAL STREET INTERSECTION CONSTRUCTION STANDARDS

5.01) Maximum grade (vertical alignment) on intersection approach:
3% within 50' of intersection

5.02) Maximum grade (vertical alignment) within intersection area: 2%

5.03) Minimum angle of intersections: 70 degrees

5.04) Intersection control:
Intersections shall be controlled in accordance with the standards specified in the State of New Hampshire Manual on Traffic Control Standards, Statutes, and Policies, 1992, hereby incorporated into these regulations by reference.

5.05) Minimum center line offset of adjacent (T-Type) intersections: 200'

5.06) Minimum tangent length approaching intersection: 50' (on local road approaches)

5.07) Minimum property line radii at intersection: 15'

5.08) Minimum curb radius: 30'

5.09) Minimum intersection sight distance
Intersections where the minor approach is controlled by a stop sign shall be provided a minimum sight distance (onto the street intersected) relative to the speed of the major 2 street intersected. Standards for these relationships are as follows:

REQUIRED SIGHT DISTANCE FROM MINOR APPROACH

	Posted Speed (mph)*						
	20	25	30	35	40	45	50
2-Lane Street	250'	325'	390'	455'	520'	585'	650'

*In cases where over 25% of the expected average daily traffic is projected to be large semi-trucks, these distances may be increased by approximately 30%.

Intersections that are stop-controlled on all approaches or signalized shall be provided with adequate stopping sight distance (on each approach) relative to the speed allowed on the approach. These standards are identical to those shown in item 4.16 and 5.09 of these standards.