

# Construction Specifications for Residential Roadways

**SECTION 1 - Required Improvements:** New Streets, sidewalks, and bicycle paths shall be graded and improved with pavement, curbs and gutters, storm drainage facilities, water mains, sanitary sewers (where applicable), street lights and signs, street trees and fire hydrants, except where waivers are granted by the Planning Board

**SECTION 2 - Conformance with NH DOT and Utility Standards:** Roadway construction, material specifications, design standards, inspection requirements, and other applicable roadway construction features and procedures shall, at a minimum, meet the latest edition of the NH Department of Transportation's Standard Specifications for Road & Bridge Construction (hereinafter referred to as NH DOT Standards), as well as the standards of all utility companies with jurisdiction.

**SECTION 3 - The Arrangement of Streets** in a subdivision shall provide for the continuation to adjoining subdivisions in order to facilitate fire protection, movement of traffic and the construction or extension of needed utilities and public services. In the case of dead-end streets, the Planning Board may require the reservation of a twenty-foot-wide easement to provide for continuation of pedestrian traffic, bicycle traffic, and utilities to nearby streets or to public water bodies.

**SECTION 4 - Dead-end Streets:** In general, dead-end streets shall not exceed 1,500 feet in length, and shall be equipped with a turn-around at the closed end with a minimum radius of 80 feet from the center to the outside edge of the right-of-way, and a minimum radius of 68 feet to the outside edge of the pavement.

## **SECTION 5 - Intersections With Existing Roads:**

**A) Proximity to Other Intersections:** Local or secondary street openings onto the same side of major arterial roads shall be at least 400 feet apart.

**B) Alignment:** Intersections on opposite sides of major roads shall be aligned where possible. Where alignment is not possible, a 125 foot separation between intersecting center lines shall be established.

**C) Construction Debris & Sediment:** A Stabilized Construction Entrance, at least 6" deep, 75' long, and as wide as the road (comprised of crushed stone) shall be installed prior to the construction of a new roadway. All roads shall be cleaned of debris and sediment on a daily basis.

**SECTION 6 - Angle of Intersection:** Streets shall join each other so that for a distance of at least 100 feet the street from the intersection is approximately at right angles to the street it joins. No street shall intersect another street at an angle of less than 60 degrees. Street right-of-way lines at intersections shall be rounded by curves of at least 30 foot radius.

**SECTION 7 - Visibility at Intersections:** In order to provide adequate visibility, lots at the corner of intersecting streets shall be kept cleared of growth in excess of 3 feet high (except isolated trees), within 20 feet of the roadway pavement, for a distance along each street of 100 feet from the roadway intersection.

**SECTION 8 - Storm Sewers, Drains & Appurtenances:** All areas of the subdivision shall be graded to prevent erosion and unintentional ponding of water. Storm sewers and other drainage appurtenances shall be constructed throughout the entire subdivision, in accordance with good engineering and planning practices.

**A) Design Storm:** The drainage system shall be designed to handle a 25-year/24-hour storm event.

**B) Above-ground drainage** is preferable to underground systems. Above-ground drainage infrastructure shall be installed wherever such installation is practical.

**C) Drainage Swales** shall be situated at least one foot below the grade of the finished roadway, and their design shall be subject to the approval of the Town Engineer. Culverts for driveway crossing shall be of a size that is adequate to ensure proper flow without impedance.

**D) Cover:** There shall be a minimum cover of three feet over all roadway pipes and culverts.

**E) Material:** Culverts shall be Reinforced Concrete Pipe or Asphalt Coated Corrugated Metal Pipe (ACCMP) which meet NH DOT Standards. Culvert headwalls and endwalls shall be of either concrete or mortar rubble masonry. Drains shall be Reinforced Concrete Pipe, Asphalt Coated Corrugated Metal Pipe (ACCMP), or Polyvinylchloride Type SDR35.

**F) Erosion protection** for ditches shall be provided where warranted by soil conditions or water velocity. Erosion protection shall be provided for all pipe outlets.

## SECTION 9 - Utilities:

**A) Underground:** All utility lines shall be placed underground in the street right-of-way or in dedicated easements.

**B) Grassy Areas:** Wherever possible, underground services will be placed under grassed areas rather than paved areas.

**C) Conduit Duct System:** The Primary Electrical and Communication Duct System shall be made up of four, 4-inch, schedule 40, PVC conduit, buried to a depth of not less than 36 inches.

1) For electrical conduits, the duct system shall, at a minimum, meet the standards set forth in Public Service Company of New Hampshire's Construction Specifications for Underground Conduit Systems, Revision 2/8/96, as well as the standards detailed in these regulations. The stricter standard(s) shall govern.

2) Conduit installed under road pavement, and within six feet of the road pavement edge, shall be encased with a minimum of three inches of concrete. All other conduit shall be embedded in six inches of select compacted sand. See attached drawing.

3) Pull rope shall be installed in all conduit for future pulls. Pull rope shall be nylon rope having a minimum tensile strength of 300 lbs. A minimum of 24 inches of rope slack shall remain at the end of each duct.

4) All conduit terminations shall be capped to prevent debris from entering conduit.

5) The Secondary Electrical and Communication Duct System shall be made up of three, 4-inch, schedule 40, PVC conduit and shall be extended to each buildable lot prior to road surfaces being put in place. Conduit shall be extended onto each lot no less than 10 feet.

6) Reinforced concrete handholes of appropriate size (typically 4=x4=x4=) with labeled manhole covers shall be used where deemed appropriate by the local power, telephone, and cable companies, subject to final approval by the Planning Board e.g., at telephone and cable distribution pedestals. Handholes shall not be located in paved areas.

7) Conduit spacing: Power conduit shall be spaced a minimum of six inches from other conduit or as the National Electric Safety Code permits, whichever is greater. Conduit shall be supported in place using pipe support stanchions spaced every five feet. Conduit termination locations shall be clearly marked at the site and on as-built/record drawings.

8) Conduit shall be installed with a maximum of 180 degrees of bends between pull points, or as approved by the local utility companies.

9) An electrical and communication duct system plan shall be approved by the local power, cable, and telephone companies prior to submission to the Planning Board.

**D) Street Light Service Enclosures:** At locations where the requirement for street light installation is waived by the Planning Board, service enclosures shall be installed along the underground electric system in order to facilitate the installation of street lights in the future.

**E) Water Service** shall be extended to each buildable lot prior to road surfaces being put in place.

**SECTION 10 - Street Widths:** Each street right-of-way shall be a minimum of 50 feet wide. The width of the paved area shall be a minimum of 26 feet, and such additional width as may be required by the Planning Board. The centerline of the paved area shall coincide with the centerline of the ROW. (See sections 17 & 18 re: location of roadway crowns and striping.)

**SECTION 11 - Shoulders:** Each roadway shoulder shall be at least 5 feet wide.

**SECTION 12 - Compaction:** Backfill in trenches and fill for roadbeds shall be thoroughly compacted to 95% of optimum density, unless specified otherwise in the approval specifications. All compaction is subject to testing by the Town Engineer.

**SECTION 13 - Grades:** No local street grade shall be in excess of 10% or less than .5%, nor greater than 3% within 75 feet of its point of intersection with any other street. Grades of streets shall conform as closely as possible to the original topography.

**SECTION 14 - Site Clearance:** The entire right-of-way of each street shall be cleared of all stumps, brush, roots, boulders, and all trees not intended for preservation. None of the preceding shall be used for fill. All loam, soft clay, and other yielding material shall be removed to a depth that is specified by the Town Engineer. Loam shall be removed and stockpiled for re-use. The Town Engineer shall inspect and approve the sub-grade prior to placement of roadway construction materials.

**SECTION 15 - Ledge:** Ledge must be cleared to a minimum depth of 18 inches below the finished surface. Ledge occurring in pipe trenches must be cleared so as to allow a bedding material of at least 1 foot below and on both sides of the pipe.

## SECTION 16 - Gravel Base

**A) The depth** of the gravel base shall be a minimum of 12 inches. In areas with excessive clay or water, the depth of the base shall be greater than 12 inches, said depth to meet the approval of the Town Engineer. This base shall be of bank run gravel and shall not contain stones over 4 inches in diameter.

**B) Crushed Gravel Course:** Four inches of crushed gravel shall be placed and rolled atop the gravel base described above. It is preferred that the crushed gravel be supplemented with reprocessed bituminous concrete.

**C) Weather:** The gravel base and crushed gravel course shall not be constructed during freezing weather or on a wet or frozen subgrade.

**D) Blading and rolling** shall be required in order to provide a smooth, even and uniformly compacted material true to cross section and grade.

**E) Compaction:** Compaction shall attain 95% of maximum density at optimum moisture content. Portions of the base course material which are not accessible to means of proper compaction with rolling equipment shall be compacted thoroughly by methods satisfactory to the Town Engineer.

**F) The minimum cross-slope** of the finished gravel base and the crushed gravel course shall be 1/4 inch per foot. The roadway crown shall be located between motor vehicle travel lanes.

**G) Erosion:** At all times during construction, the subgrade and all ditches shall be constructed and maintained so that erosion will be minimized and contained.

**H) Material:** Prior to their placement, samples of all materials to be used in the project shall be submitted to and be subject to the approval of the Town Engineer.

**SECTION 17 - Paving** shall be accomplished by placing a 1.5 inch thick binder course of hot asphalt concrete, followed by a second or finish course of at least one inch. All paving activities shall adhere to the following:

**A) Pavement Content:** The hot asphalt concrete shall meet NH DOT Standards.

**B) Compaction:** Pavement shall be placed with a self-propelled mechanical spreader and compacted in accordance with NH DOT Standards.

**C) Weather:** Paving shall only be conducted between April 15 and November 15, and shall only be applied if the temperature in the shade is above 40 degrees Fahrenheit and the mixture delivered to the spreader has a temperature above 250 degrees Fahrenheit. Pavement shall not be placed on wet or frozen roadbeds.

**D) Delay Between the Application of Courses:** At least one full winter season shall elapse between the placement of the binder course and the finish course.

**E) DOT Standards:** Unless otherwise specified in these regulations, paving requirements shall meet NH DOT Standards.

**F) Striping:** A five foot wide pedestrian/bicycle lane shall be delineated by striping along one side of the paved roadway. At the end of cul-de-sacs, this lane shall extend the length of the outer edge of the circle. Other paved areas shall be marked and striped as the Planning Board deems appropriate.

**SECTION 18 - Side Slopes** shall not exceed one-foot vertical rise for every four feet of horizontal length. Steeper slopes require the installation of guard rails. If the depth of fill is over five feet, the contractor may be required by the Town Engineer to take appropriate measures to ensure that major settlement will not occur prior to continuing construction.

**SECTION 19 - Curbs:** Vertical granite curbs shall be installed along all new streets. Expansion joints shall be provided at predetermined locations and shall have a curb height of 6 inches from finish grade at the curb.

**SECTION 20 - Shade Trees** shall be planted at intervals of 100 feet along the roadway. The species and planting locations shall be recommended by the Newington Conservation Commission, and are subject to approval by the Planning Board.

**SECTION 21 - Reference Monuments:** The developer shall provide permanent monuments along the sides of street right-of-ways and reference pins along the sides of other easements and property lines.

**A) Permanent Monuments** shall be of stone or reinforced concrete, at least 6" X 6" X 54", with a drillhole in the center. If they are made of concrete, the mix shall be Class A.

**B) Reference Pins** shall be of ferrous metal, 5/8 inch in diameter or larger and a minimum of 36" in length. The pin shall be driven into the ground and shall not protrude above the ground surface more than 6" inches.

**C) Benchmarks:** A permanent marker, fabricated as described in section A above, shall be placed near a major roadway, and shall indicate the elevation in reference to the U.S.G.S. survey.

**SECTION 22 - Sidewalk Standards** shall meet NH DOT Standards, except where stricter standards are set forth in this section. Sidewalks shall be of bituminous concrete, portland cement concrete, or other material that is approved by the Planning Board. Sidewalks that are part of the roadway shall be constructed to Roadway Standards. Sidewalks that are not part of the roadway shall be constructed to the following standards:

<b>Bituminous Sidewalks</b>	Gravel Base	8 inches
	Crushed Gravel	4 inches
	Binder Course	1 inch
	Finish Course	1 inch
<b>Portland Cement Sidewalks</b>	Gravel Base	8 inches
	Crushed Gravel	4 inches
	Wire Mesh	6 x 6 (W2.9 x W2.9)
	Thickness	4 inches
	Expansion Joints	pre-formed expansion joint filler
<b>All Sidewalks</b>	Width	5 feet
	Slope to the sides	1/8 inch per foot

**SECTION 23 - Bicycle Path Standards:** Bicycle paths are subject to the same performance standards required by these regulations for roadways in regards to compaction, erosion, weather, site clearance, excavation of unstable material, drainage, striping, and the quality of building materials. At a minimum, all bicycle paths shall be constructed to the following standards:

<b>Feature</b>	<b>Material</b>	<b>Minimum Dimension</b>
Gravel Base	Bank Run Gravel	8 inches
Crushed Gravel	Crushed Gravel	4 inches
Pavement Width		6 feet
Width of Graded Shoulder		1 foot on each side
Binder	Bituminous Concrete	1.5 inches
Finish Course	Bituminous Concrete	1 inch
Cross Slope Grade		.25 inches per foot

## SECTION 24 - Summary of Dimensional Standards for Residential Roadways

<b>Feature</b>	<b>Minimum</b>	<b>Maximum</b>
Length of Dead-End Streets		1,500 feet
Openings onto Major Roads	400 feet	
Intersections on Opposite Side	125 feet apart	
Curve of ROW at Intersections	30 foot radius	
Obstructions at Corners		3 feet high
ROW Width	50 feet	
Design Storm	25 year - 24 hour	
Cover Over Pipes & Culverts	3 feet	
Removal of Ledge	18" below lowest work installed	
Removal of Unstable Material	20" below finished grade	
Base Course (bank run gravel)	12 inches	
Crushed Gravel Course	4 inches	
Compaction	95% maximum density	
Width of Graded Shoulder	4 feet	
Roadway Pavement Width	26 feet	
Binder (bituminous concrete)	1.5 inches	
Finish Course (bituminous concrete)	1 inch	
Temperature (in shade) During Paving	40 degrees F.	
Delay Between Binder & Finish Course	one full winter	
Cross Slope Grade	.25 inches per foot	
Finished Lineal Grade	.5%	10%
Grade within 75' of an Intersection	.5%	3%