

TOWN OF JEFFERSON, NEW HAMPSHIRE

SUBDIVISION PROCEDURES
AND REGULATIONS

Appendix A

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STREET DESIGN AND CONSTRUCTION STANDARDS

ADOPTED May 14, 2019

TABLE OF CONTENTS

SECTION 1: AUTHORITY AND PURPOSE

SECTION 2: APPLICATION OF STANDARDS

SECTION 3: DEFINITIONS

SECTION 4: ACCESS

SECTION 5: PROCEDURE

SECTION 6: GENERAL STREET CHARACTERISTICS

SECTION 7: TRAFFIC

SECTION 8: GEOMETRIC STANDARDS

SECTION 9: DRAINAGE

SECTION 10: EROSION CONTROL

SECTION 11: UTILITIES

SECTION 12: MATERIAL STANDARDS

SECTION 13: CONSTRUCTION/INSTALLATION STANDARDS

SECTION 14: PHASED CONSTRUCTION

SECTION 15: CONSTRUCTION OBSERVATION/DOCUMENTATION

SECTION 16: EASEMENTS

SECTION 17: STREET MONUMENTATION

SECTION 18: STREET SIGNS

SECTION 19: PERFORMANCE GUARANTEE

SECTION 20: ACCEPTANCE AND MAINTENANCE BOND

EXHIBITS

 EXHIBIT A – TYPICAL CUL-DE-SAC

 EXHIBIT B - TYPICAL DRIVEWAY LAYOUT

 EXHIBIT C1 – STANDARD STREET CROSS-SECTION

 EXHIBIT C2 – HILLSIDE STREET CROSS-SECTION

 EXHIBIT D – CULVERT TRENCH

 EXHIBIT E – CULVERT OUTLET

 EXHIBIT F – LEVEL SPREADER

 EXHIBIT G – CULVERT HEADWALL

 EXHIBIT H – SIDEWALKS

SECTION 1: AUTHORITY AND PURPOSE

1.1 Authority

This regulation is issued pursuant to Chapter 231, et. seq., New Hampshire Revised Statutes Annotated, as amended.

1.2 Purpose

The purpose of these minimum standards is to:

- Promote safe traffic movement under normal conditions
- Allow reasonable access to properties by emergency vehicles
- Minimize road maintenance and the associated costs
- Provide uniform requirements
- Minimum disturbance of existing terrain and natural features
- Encourage recreational uses such as bicycle paths and multiuse trails with an emphasis on safety

SECTION 2: APPLICATION OF STANDARDS

2.1 Subsequent to the adoption of these standards, all proposed or new Streets and driveways, or existing Roads and driveways requiring modification, shall be constructed, extended, and modified to comply with these minimum standards.

2.2 When a proposed change to the traffic characteristics (e.g, increased traffic, increase in truck traffic, etc.) of an existing substandard (regardless when it was originally constructed) is proposed, the Board may require the upgrading of said Road generally in compliance with these standards. This refers to an existing road becoming part of a new proposal for a subdivision or off-site improvement of a road which would lead to a large new development.

2.3 Application of these minimum standards does not relieve the applicant from complying with other industry standards such as those issued by the American Association of State Highway and Transportation Officials (AASHTO), the New Hampshire Department of Transportation (NHDOT), Institute of Traffic Engineers (ITE), etc.

SECTION 3: DEFINITIONS

3.1 “Board” means the town of Jefferson planning board.

3.2 “Driveway” means a limited vehicular way connecting adjacent properties to Streets and Roads complying with the access requirements indicated in Section 4 ACCESS.

3.3 “Hillside Terrain” means where the natural slope of the land exceeds 8%.

3.4 “Road” used in these *Street Design and Construction Regulations* shall mean vehicular travel way or roadway, either public or private which may not meet the standards as outlined in this draft. For example, a logging road, a gravel road barely wide enough for two vehicles, etc. A “Street” would have a 50’ right-of-way with appropriate culverts, ditching, etc. which meets town road standards

3.5 “Street” used in these *Street Design and Construction Regulations* shall mean a proposed or

existing road, either public or private, that is approved by the Board, including the right-of-way.

3.6 Other definitions: Refer to definitions contained in the Town of Jefferson's *Subdivision Procedures and Regulations* and *Land Use Ordinance*.

SECTION 4: ACCESS

4.1 Residential Driveways may serve a maximum of:

- 1.1 two lots;
- 1.2 two single-family Dwellings plus two associated Accessory Dwelling Units;
- 1.3 two two-family; or
- 1.4 one multi-family building containing no more than four Dwelling Units.

All other Driveways shall be considered Commercial.

4.2 Commercial Driveways shall comply with the Street standards except that no right-of-way is required if it is wholly on the parcel that it is providing access.

4.3 Where warranted, the town may require that a Driveway be shared. Rights of passage over and across such Driveways shall be established by easement for each of the lots/Dwelling Units so served and recorded with the plat plan.

4.4 The owner of proposed new or modified Streets that are, or will be, served by a state highway shall provide written evidence from the New Hampshire Department of Transportation (NHDOT) stating that the Street access and construction is permitted. Modification of Streets includes, but is not limited to, situations where the use will intensify and/or change from its previously permitted design.

SECTION 5: PROCEDURE

5.1 Before proceeding with the construction of any road, drainage work, utility installation, or other improvements associated with the construction and use of Streets, four sets of plans showing the proposed construction and/or improvements and a proposed construction schedule shall be submitted to the Board for review and approval.

5.2 Plans shall be prepared on 22-inch by 34-inch sheets and shall show:

- 2.1** Design parameters including average daily traffic (ADT) , design speed, and required stopping sight distance.
- 2.2** Plan view(s), scaled at 1"=50' to 1"=20,' including the following existing and proposed elements:
- Title block containing naming of Street(s), name of owner, name of engineer, engineer's seal, date of plan, and latest revision date.
 - Contours (5-foot interval).
 - Special flood hazard areas (100-year floodplain and floodway).
 - Jurisdictional wetlands.
 - Soil types including classifications, depth to seasonal highwater table, and depth to bedrock based on test pits or borings spaced no less than 200 feet and to a depth of at least 5 feet below the finished road surface or existing grade, whichever is deeper.
 - Benchmarks spaced no further apart than 500 feet.
 - Right-of-way lines and markers with dimensions.
 - Tax map and lot numbers along Street.
 - Street names.
 - Horizontal alignment with centerline tangent data (length and bearing) and curve data (radius, length, delta, and stopping sight distance).
 - Edge of traveled way, shoulder lines, and curbing.
 - Intersections including deflection angle to main road, pavement edge radii, and sight distance.
 - Cul-de-sac layouts.
 - Driveways, portion within the right-of-way, including grading and proposed centerline spot elevations at the edge of the Street, low point, other grade breaks, and r-o-w line.
 - Street and Driveway culvert locations, sizes, materials, invert elevations, and end-treatments.
 - Drainage ditches/swales.
 - Underdrain locations and outlets.
 - Construction sequence.
 - Erosion and sediment control measures.
 - Utilities including: power and communications lines, poles, conduits, vaults; water lines, valves and hydrants; sewer lines, manholes, and pumping stations; gas lines, vaults; etc.
 - Drainage, slope, and utility easements.
 - Other items such as bridges, sidewalks, bicycle and pedestrian lanes and paths
- 2.3** Profile(s), scaled 1"=50' to 1"=20 horizontally and 1"=10' to 1"=2' vertically, including the following existing and proposed elements:
- Vertical alignment including centerline vertical curve data (VC length, PVI station, PVI elevation, K value, and stopping sight distance) and tangent grades.
 - Centerline elevations at 50-foot stations.
 - Culvert crossings.
 - Underdrains.
 - Water lines, sewer lines, and manholes.
 - Test pit/boring locations with ledge/refusal, bottom, and seasonal high groundwater

- levels.
 - Other items such as bridges, etc.
- 2.4** Typical Street cross-section, scaled at 1"=5', including the following elements:
- Right-of-way, travel-way, shoulder, curbing, and fill extension widths.
 - Cross-slopes and side slopes.
 - Ditch dimensions.
 - Pavement, aggregate base courses, and fill specifications and depths.
 - Geotextile specifications and depths.
 - Underdrain depth and location.
 - Typical locations and depths of utility lines.
 - Groundcover treatment.
 - Other items such as sidewalks where appropriate.
- 2.5** Street cross-sections every 50 feet and at superelevation transition points (banked turns), scaled at 1"=5', with the elevations given at all surface grade break points such as at the centerline, edge of pavement/travel way, edge of shoulder, top and bottom of slopes, etc.
- 2.6** Typical construction/installation details for all items to be constructed.

5.3 In addition, the following shall be submitted:

- 3.1** An engineer-prepared opinion of probable construction cost, including 10% contingency.
- 3.2** **Written list identifying of known discrepancies between proposed design plans and the town's standards. Where discrepancies are discovered after the Street design is approved, and not identified in writing, it is the applicant's full responsibility to implement corrective measures as directed by the town.**

SECTION 6: GENERAL STREET CHARACTERISTICS

6.1 These standards were prepared for the Streets of the following characteristics:

- 1.1 Serving residential subdivisions or neighborhoods with less than 250 residential units, and;
- 1.2 With an average daily traffic (ADT) of less than 2000, and;
- 1.3 With a design speed of 40 miles per hour (mph) or less, and;
- 1.4 Free of truck traffic, other than local construction and service vehicles.

6.2 For Streets not of the applicable characteristics indicated in this section, refer to the "General References" provided in the "Geometric, Material, and Construction/Installation Standards" herein, or other industry-recognized standards approved by the town or their representatives.

SECTION 7: TRAFFIC

7.1 All dead-end Streets or looped Streets without through-traffic shall be designed for the estimated traffic volume generated from the maximum number of buildable residential units that the Street could serve. All other Streets shall be designed for the anticipated traffic volume 20 years from the time of the start of the Street construction.

7.2 Where traffic will adversely impact nearby roads or intersections, provisions shall be made for

the mitigation of said impacts.

SECTION 8: GEOMETRIC STANDARDS

8.1 General References:

Except where modified herein, the geometric standards shall conform with the latest edition of the following references:

- 1.1 For design of Streets with an ADT of less than 400: “Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT< 400)” by AASHTO.
 - 1.1.1 For existing Streets and non-lapsed approved Street plans: Comply with the approved plans.
 - 1.1.2 For new Streets and existing Roads where additional traffic is proposed: Comply with these *Street Design and Construction Standards*.
- 1.2 For design of Streets with an ADT of greater than 400: “Geometric Design of Highway and Streets” by AASHTO.

8.2 General Design:

- 2.1 Streets shall be continuous and in alignment with existing roads as far as possible. Where continuity is not provided, Streets shall be looped or, where not feasible, a cul-de-sac or a hammerhead shall be provided at the terminus of all dead-end Streets.
- 2.2 Proposed Streets shall be designed and constructed to accommodate proposed traffic and afford satisfactory access for police, fire-fighting and other emergency equipment, snow removal, sanitation, and road maintenance equipment. (NFPA - National Fire Protection Association - Standards)
- 2.3 The arrangement and character of the Streets shall conform with the town’s Master Plan, Subdivision Regulations, and all other town regulations, and shall compose a safe and convenient system in relation to other existing and planned roads, to topographic conditions, and to the proposed uses of land to be served by the Street.
- 2.4 Streets shall be designed to minimize environmental impacts.
- 2.5 Existing stonewalls shall be retained where possible or relocated and restored as required by the Board.

8.3 Right-of-Way:

The minimum Street right-of-way width shall be 50 feet, except at cul-de-sac where the right-of-way shall be according to *Exhibits A1 Rectangular Cul-De Sac* and *A2 Circular Cul-De Sac*. Where construction extends beyond the right-of-way limits, easements shall be provided as indicated in the “Easement” section of these standards.

8.4 Special Flood Hazard Areas:

- 4.1 In addition to the requirements of the town’s zoning ordinance pertaining to Areas of Special Flood Hazard:
 - 4.1.1 No new Streets shall be located within the Regulatory Floodway referenced in the town’s Floodplain Development Ordinance.
 - 4.1.2 All new Streets that will be located within an Area of Special Flood Hazard are to be

elevated above the Base Flood elevation if such new Streets are to provide access to residential dwellings, commercial development, or other regularly-occupied facilities.

4.1.3 All new Streets to be located within an Area of Special Flood Hazard shall not prevent floodwaters from accessing the floodplain.

8.5 Design Speed:

The minimum design speed shall be 25 mph.

8.6 Stopping Site Distance (SSD): (amended 12/18/2006)

6.1 The following minimum stopping site distances shall be provided along all Streets as well as at all intersections:

Design Speed (mph)	Stopping Site Distance (feet)			
	25	30	35	40
ADT<400	125	165	205	250
ADT>400	155	200	250	305

6.2 For vehicles traveling down grades of 3 percent or more, the stopping sight distance shall be increased by multiplying it by the following factor:

Longitudinal Grade (%)	3%	6%	9%	12%
	SSD adjustment factor	1.03	1.05	1.16

6.3 For horizontal and vertical curves, the height of the driver’s eye shall be 3.5 feet and the height of object 2.0 feet.

6.4 For intersection design, the driver’s eye approaching from the minor road shall be located 10 feet from the edge of the traveled way of the major road. Both driver’s eye and the object (on the major road) shall be 3.5 feet high measured at the centerline. For residential Driveways, the driver’s eye approaching the major road may be located 10 feet from the edge of the traveled way of the major road.

8.7 Horizontal Alignment:

7.1 The centerline of the traveled way shall coincide with the centerline of the right-of-way.

7.2 All curves on Streets with an ADT of 400 or greater shall be superelevated at a rate of 4% to 6%. Streets with an ADT less than 400 may or may not be superelevated.

7.3 Sudden changes in alignment, such as adjacent curves with widely different (+/-50%) radii or between long tangents and sharp curves, shall be avoided.

7.4 The minimum centerline radius for Streets shall be as follows.

Design Speed (mph)	Minimum Centerline Radius (feet)			
	25	30	35	40
ADT<400, no superelevation	125	225	375	600
ADT<400, superelevated	125	225	300	425
ADT>400, superelevated	175	250	375	550

7.5 If the Street is superelevated, the minimum length of tangent between horizontal curves shall be 100 feet.

8.8 Vertical Alignment:

8.1 The minimum longitudinal grade of Streets shall be 1%. The longitudinal grade is in the

direction of the yellow line down the center of the road. This grade allows for better ditching along the road a allows for better drainage.

- 8.2 The maximum longitudinal grade of Streets, not in proximity to intersections, shall be 8%. Refer to the “Intersections” paragraph for maximum grades in proximity to intersections. The maximum length of grades in excess of 8% shall be 1,000 feet and in excess of 10% shall be 500 feet. However, such sections of Street shall be separated by a minimum length of 400 feet at a grade of 8% or less.
- 8.3 Parabolic vertical curves shall be provided where the algebraic difference in grades of the profile tangents is greater than 1%. The minimum length of a vertical curve shall be 50 feet.
- 8.4 Roads should be as straight as possible. If there is a steeper grade with more curves, erosion down the road becomes more of a problem.

8.9 **Intersections:**

- 9.1 All intersections shall be controlled with stop signs, yields signs, or traffic signals.
- 9.2 The centerline of adjacent intersections shall be separated at least 125 feet, and at least 50 feet from cul-de-sacs.
- 9.3 Streets shall intersect at an angle as close as practical to 90 degrees but not more or less than 15 degrees off 90, except where it is right turn only.
- 9.4 The minimum tangent length between intersections and horizontal curves shall be 50 feet, measured from the centerline intersection.
- 9.5 Grades in proximity to intersections:
 - The maximum centerline grade of proposed Streets (both cross-Streets and through-Streets) shall be 3% within 100 feet of the centerline intersection of the Streets.
 - Proposed Streets shall intersect existing Roads only where the centerline grade of the existing Road is 6% or less within 150 feet of the intersection.
- 9.6 The edge of traveled way radius shall be a minimum of 25 feet. Where vehicles with a wheel-base greater than 20 feet are anticipated, the intersection shall be designed to accommodate such vehicles.

8.10 **Multiple Access Requirements:**

- 10.1 Where any new Street will serve more than 15 dwelling units, it shall have two connections to a Class V or better road (maintained and opened all year around). [vs. current 500' limit]
- 10.2 Where any new Street extension or spur will be built off an existing single-access road already serving 15 or more dwelling units, the new extension(s) or spur(s) shall have at least two connections to a Class V or better Road (maintained and opened all year around).
- 10.3 Where any new Street extension or spur will cause an existing single-access Road to serve more than 15 dwelling units, at least two connections to a Class V or better Road (maintained and opened all year around) shall be required such that no more than 25 dwelling units are served by a single-access Road.

8.11 **Cul-de-sacs:**

Cul-de-sacs shall comply with Exhibit A “TYPICAL CUL-DE-SAC”.

8.12 **Driveways:**

Comply with Exhibit B “TYPICAL DRIVEWAY LAYOUT”. The town shall enforce regulations when permitting driveways on town roads.

8.13 **Guard Rail:**

13.1 Guard rail shall be avoided where adequate safety can be provided by flattening slopes and removing objects, provided that such flattening/removing does not result in “excessive” site clearing/disturbance. The need to extend the grade outside of the Street right-of-way would be considered “excessive”.

13.2 Guard rails shall be laid out comply with AASHTO and NHDOT standards. Of special consideration, guard rail ends shall be designed and located complying with AASHTO’s “Roadside Design Guide”.

8.14 **Curbing:**

Except along the edge of a sidewalk, curbing shall not be allowed.

8.15 **Typical Street Cross-sections:**

Comply with Exhibit C1 “STANDARD STREET CROSS-SECTION” or Exhibit C2 “HILLSIDE STREET CROSS-SECTION” as appropriate.

SECTION 9: DRAINAGE

9.1 **General:**

- 1.1 Storm water systems shall be designed by a professional engineer licensed in the state of New Hampshire.
- 1.2 Maintain natural flow paths and avoid concentrating the flow at the property lines.
- 1.3 Drainage calculations shall be provided and reflect the potential development on abutting land, as well as the Street construction.
- 1.4 All storm water systems shall be designed to accommodate the proposed runoff from at least the 50-year design event, except for Driveway culverts parallel to the Street, which may be designed for at least the 10-year design event. Calculations shall be performed using the USDA Natural Resource Conservation Service’s TR-55 or TR-20 methodology, except for Driveway culverts, for which the Rational Method may also be used.
- 1.5 Where runoff is being calculated for compacted gravel surfaces such as unpaved Streets and Driveways, the calculations shall reflect paved surfaces to so that the storm drainage system will accommodate the site if these surfaces are paved in the future.
- 1.6 All Driveway culverts shall be designed, including sizing calculations, locations, and invert elevations.

9.2 **Culverts:**

- 2.1 Maximum spacing: The maximum spacing of culverts shall be the lesser of:
 - 300 feet measured along the roadside ditch flowing to it
 - the spacing such that maximum flow to each is less than 10 cubic feet per second (cfs), except where existing natural channels make this impossible
- 2.2 Diameter: As determined by drainage calculations, but 15-inch minimum for Street and 12-inch minimum for Driveways.
- 2.3 Slope/Velocity: The minimum slope shall be 0.4% and minimum velocity 2 feet per second (fps) when flowing one-third full.
- 2.4 Inlets: Concrete or masonry headwalls shall be used at the inlet to all culverts except that metal end-sections may be used on Driveway culverts less than 18 inches in diameter. Refer to EXHIBIT G: CULVERT HEADWALL.
- 2.5 Outlets: A suitably designed stone-apron, plunge-pool, or other erosion protection measures shall be provided at the outlet of all culverts with outflow velocities exceeding 3 fps. In addition, measures to dissipate concentrated runoff, such as a level spreader, shall be provided. Refer to EXHIBIT D: CULVERT OUTLET and EXHIBIT E: LEVEL SPREADER.

9.3 **Closed Storm Drainage:**

- 3.1 Catch basins shall not be allowed within the Street rights-of-way. Catch basins are commonly found in the right-of-way covered with a grating so vehicles can travel over them if necessary.
- 3.2 Drainage manholes (with solid cover and no sump) shall be installed where three or pipes join, where there is an abrupt bend (e.g., 45° or greater bend) or tee, and such that the length of pipe does not exceed 300 feet.

9.4 **Ditches/Swales:**

- 4.1 Ditches shall be designed along all Streets where the aggregate subbase course would not otherwise drain to daylight.
- 4.2 Roadside ditches/swales and their linings shall be designed to resist erosion, demonstrated by calculations.

9.5 **Underdrains:**

Underdrains shall be constructed under all ditches where the seasonal high groundwater table is less than 1.5 feet below the ditch invert.

SECTION 10: EROSION CONTROL

10.1 **General:**

- 1.1 Streets and associated construction shall include erosion control and sediment control measures, prepared by a professional engineer licensed in New Hampshire or a Certified Professional in Erosion and Sediment Control (CPESC), complying with the following:
 - 1.1.1 Design to minimize erosion first and capture potential sediment second.

- 1.1.2 Limit the total area of disturbance to the least required to complete the projects.
- 1.1.3 Limit the exposed and unstabilized area to the least practical at any one time.
- 1.1.4 Stabilized flow channels and ponds prior to diverting runoff to them.
- 1.1.5 Provide a construction sequence on the plans.
- 1.1.6 New Hampshire Erosion and Sediment Control Handbook, latest edition.

10.2 **Specific Requirements (Minimum):**

- 2.1 Runoff shall be diverted around the proposed work areas before exposing the soil. Diversion may include constructing stabilized channels (lined ditches, pipes, etc.) through the work area.
- 2.2 Permanently stabilize all areas that are not to be hard-surfaced (pavement, gravel, stone, etc.) by applying loam, seed, and mulch as required to establish permanent and dense groundcover.
- 2.3 Permanently stabilize all slopes steeper than 3 horizontal to 1 vertical with suitable jute erosion control fabric or riprap.
- 2.4 Silt fence shall be temporarily installed along the down-hill side of construction areas where wetlands or other sensitive areas exist within 100 feet, and where the down-hill land-slope exceeds 8%.
- 2.5 Sediment barriers such a silt fence, check dams, or fiber logs shall be temporarily installed around catch basin, culvert, and other drainage inlets.
- 2.6 Sediment barriers and/or erosion control fabric shall be temporarily installed along all drainage channels that are not lined with stone, pavement, or other hard-surfacing.
- 2.7 Temporary berms and slope drains shall be used at the top of new slopes that are steeper than 5H:1V and are more greater than 4 vertical feet tall.
- 2.8 All disturbed work areas shall be stabilized prior to October 15. Unless compacted gravel or pavement has been applied, stabilization shall include the following best management practices at a minimum:
 - 2.8.1 Where the land slopes from 0% to 10%: seed, mulch, and tackifier.
 - 2.8.2 Where the land slopes from 10% to 3H:1V: seed, mulch, clinching/tracking, & tackifier.
 - 2.8.3 Where the land slope is steeper than 3H:1V: seed and jute erosion control fabric, plus additional sediment traps immediately below the such work areas.

SECTION 11: UTILITIES:

- 11.1 Buried utilities shall be located outside of the travel lanes and shoulders, except where is it necessary for the buried utility to cross the Street, such as for house services.
- 11.2 Above-grade utilities, such as utilities poles, guy-wires, anchors, pedestals, pads, shall be located at least seven feet outside of the travel lane and shoulder.

SECTION 12: MATERIAL STANDARDS

12.1 **General References:**

1.1 Except where modified herein, comply with the latest edition of: “Standard Specifications for Road and Bridge Construction” and “Standard Plans for Road and Bridge Construction”, both by the NHDOT.

12.2 **Geotextiles:**

2.1 Geotextiles shall be selected based on the site-specific conditions (e.g., soil gradation, expected water flow, etc.). However, the geotextiles shall have the following properties unless it is demonstrated that the properties will be detrimental to their function.

2.2 Woven Geotextile:

- 2.2.1 Puncture strength (ASTM D4833): 145 lbs minimum.
- 2.2.2 Grab tensile strength (ASTM D4632): 315 lbs minimum.
- 2.2.3 Flow rate (ASTM D4491): 4 gal/min/sf minimum.
- 2.2.4 Weight (ASTM D5261): 6 oz/sy minimum

2.3 Non-Woven Geotextile:

- 2.3.1 Puncture strength (ASTM D4833): 65 lbs minimum.
- 2.3.2 Grab tensile strength (ASTM D4632): 120 lbs minimum.
- 2.3.3 Flow rate (ASTM D4491): 135 gal/min/sf minimum.
- 2.3.4 Weight (ASTM D5261): 4 oz/sy minimum

12.3 **Fill material and Aggregate Base and Subbase Courses:**

3.1 Fill material: Fill material below the aggregate subbase course and used for construction of road embankments shall be soil free of frost, stumps/roots, organic matter, foreign debris, clay pockets, trash, or other deleterious materials. Fill generated from on-site cut sections (common borrow) shall contain less than 40 percent fines (#200 sieve). Imported fill shall contain less than 30% fines. Within 4 feet of the road surface, the fill material shall be free of rocks greater than 12 inches in any dimension. Rocks greater than 12 inches may be used outside of the road shoulder or greater than 4 feet below the road surface provided that they are spaced to allow compaction around them.

3.2 Aggregate Subbase Coarse: Shall be gravel complying with NHDOT Standard Spec. Item 304.2.

3.3 Aggregate Base Coarse: Shall be crushed gravel complying with NHDOT Standard Spec. Item 304.3.

12.4 **Wearing Surface:**

4.1 Hot bituminous pavement: Comply with NHDOT Standard Spec. Section 401 and use the following mixtures:

- 4.1.1.1 Single-Course: Type D.
- 4.1.2 Base Course: Type B.
- 4.1.3 Wearing Course; Type E.

4.2 Gravel wearing surface: Comply with NHDOT Standard Spec. Section 304.33, Crushed Aggregates for Shoulders.

12.5 **Culverts:**

5.1 Material: Any of the following shall be used:

- 5.1.1 Smooth-wall SDR-35 PVC (ASTM 3034).
 - 5.1.2 Corrugated exterior, smooth-wall interior HDPE pipe complying with AASHTO M294, Type S.
 - 5.1.3 Reinforced concrete pipe, Class III or higher, complying with NHDOT Standard Spec. Section 603.
- 5.2 Blanket material: NHDOT Standard Spec. Item 304.1 (Sand) modified such that 100% passes a 1-inch sieve.
- 5.3 Bedding material: Either of the following:
- 5.3.1 ¾-inch bedding stone complying with NHDOT Standard Spec. Section 703 course-graded aggregate, standard size #67. Wrap stone with non-woven geotextile if the seasonal high groundwater table is above the bottom of the bedding.
 - 5.3.2 1 ½-inch crushed gravel complying with NHDOT Standard Spec. Item 304.33.
- 12.6 **Underdrains:**
- 6.1 Pipe: Perforated pipe/tube, either smooth-wall SDR-35 PVC (ASTM 3034), or corrugated HDPE (AASHTO M252 or M294, Type S). Minimum 6-inch diameter.
 - 6.2 Aggregate: ¾-inch bedding stone (NHDOT Standard Spec. Section 703 course-graded aggregate, standard size #67).
 - 6.3 Geotextile: Non-woven geotextile specified in these regulations.
 - 6.4 Outlet: Last 20 feet of pipe to be non-perforated and to be provided with permanent rodent guard.
- 12.7 **Guard Rail:**
Comply with AASHTO and NHDOT standards.
- 12.8 **Curbing:**
- 8.1 Curbing, where allowed, shall be vertical granite complying with NHDOT Standard Spec. Section 609.

SECTION 13: CONSTRUCTION/INSTALLATION STANDARDS

13.1 General References:

- 1.1 Except where modified herein, comply with the latest edition of: “Standard Specifications for Road and Bridge Construction” and “Standard Plans for Road and Bridge Construction” (NHDOT Standard Specs), both by the NHDOT.

13.2 General Earthwork:

- 2.1 Clearing and Grubbing: The entire area from the toe of the fill/fore-slope to the top of the cut/back-slope, shall be cleared and grubbed of all stumps, brush, roots, like materials, and all trees not intended for preservation. The clearing and grubbing materials shall not be used for fill or buried within the Street right-of-way.
- 2.2 Below Subgrade Preparation:

- 2.2.1 All loam shall be removed from within the limits of the roadway, and under all sidewalks/pathways outside of the roadway. All ledge or rocks greater than 12 inches within 36 inches of finished grade, and all humus, clay, and other yielding material must be removed below all wearing surfaces (pavement or gravel) and below all island and sidewalks/pathways.
- 2.2.2 The stripped ground shall be pre-graded such that its cross-slope is parallel to the proposed road surface cross-slope.
- 2.2.3 Proof roll the pre-graded surface, compacting it to the same limits specified for the material to be placed above it.
- 2.3 **Placement of Fill (Including Aggregate Base/Subbase Course):**
 - 2.3.1 All fill materials shall be unfrozen and shall be placed on unfrozen materials.
 - 2.3.2 Place fill in nearly horizontal lifts not exceeding 12 inches thick.
 - 2.3.3 Compact each lift to 95-percent of its maximum density, as determined by AASHTO T-180, before placing the next lift.
 - 2.3.4 The bottom of each aggregate base/subbase course shall be graded such that its cross-slope is parallel to the surface cross-slope.
 - 2.3.5 The aggregate base/subbase courses shall extended to the ditch line and surface of fill embankment (less the loam or stone-surfacing thickness) to facilitate drainage of the road section.
- 13.3 **Geotextile Placement:**
 - 3.1 Where geotextile is specified, it shall be placed the full width of the roadway, overlapping each sheet at least 12 inches, and complying with the geotextile manufacturer's installation instructions.
- 13.4 **Underdrains:**

Where underdrains are specified, they shall be installed prior to placing aggregate base/subbase courses.
- 13.5 **Placement of Paved Wearing Surfaces:**
 - 5.1 Hot bituminous pavement shall be applied as specified in Section 403 of the NHDOT Standard Specs.
 - 5.2 The pavement wearing course shall not be placed until all earthwork within the roadway has been completed and allowed to consolidate during one winter and spring season.
- 13.6 **Culvert and Utility Pipe Installation:**
 - 6.1 All loam, humus, clay, and other yielding material shall be removed from below the culvert trench.
 - 6.2 Ledge or rock occurring in pipe trenches must be removed to a clearance of at least 6 inches below the pipe and 12 inches both sides of it.
 - 6.3 The pipe envelope (6 inch below, 12 inches both side, and 12 inches above the pipe) shall be compacted 95-percent of its maximum density, as determined by AASHTO T-180, before placing the next lift.
 - 6.4 When the pipe is bedded in free-draining material such as crushed stone, the stone shall

be enclosed in a non-woven geotextile, trench dams shall be installed, and provisions made for preventing excessive build-up of groundwater behind the dams.

13.7 **Guard Railing:**

Complying with AASHTO and NHDOT Standards.

13.8 **Curbing:**

Curbing shall be installed complying with NHDOT standards. In addition, a concrete ballast shall be installed adjacent to the bottom of the curb.

SECTION 14: PHASED CONSTRUCTION

14.1 Each phase of construction shall independently comply with these standards, without relying on future phases.

14.2 An interim cul-de-sac (as specified in these regulations) shall be constructed at the terminus of each phase.

SECTION 15: CONSTRUCTION OBSERVATION/DOCUMENTATION

15.1 **Layout:**

After the Street is cleared, but before earthwork commences, all proposed Street centerlines shall be laid out by a land surveyor licensed in New Hampshire and a letter certifying this shall be provided to the Board from said surveyor. Layout shall include centerline stakes and centerline offset stakes at 50-foot intervals and at points of curvature and tangency, and benchmarks within 50 feet of the centerline spaced no greater than 500 along the centerline.

15.2 **Observation and testing:**

All Street construction shall be inspected and/or tested by the town or the town's designated representatives as described below. The results of the inspections will be used to apprise the applicant of the work required to bring the Road into compliance with these regulations. The cost of all testing and inspection/observation shall be paid by the applicant.

2.1 **Proposed new Streets:** Meetings and/or construction observations will be required at the following stages of construction. In addition, the town may require soil gradation analysis, compaction testing, pavement temperature monitoring, and other material testing or quality documentation.

2.1.1 Pre-construction meeting to be held after the Street is cleared, laid out, and temporary erosion control measures installed, but prior to the start of earthwork.

2.1.2 Observation of stripped and grubbed roadway.

2.1.3 Observation of road brought to subgrade including cuts and fills.

2.1.4 Observation of drainage and utility installations.

2.1.5 Observation of placed aggregate subbase course.

2.1.6 Observation of placed aggregate base course.

2.1.7 Observation of placed pavement.

- 2.1.8 Observation of completed landscaping and site stabilization.
 - 2.1.9 Post-construction meeting.
 - 2.2 **Existing Streets:** If the Street was satisfactorily inspected at the time of construction and conditions have not changed significantly, only a surface inspection plus as-builts (as described in these regulations) will be required. If the existing Road was not satisfactorily inspected, then the following shall be provided by the applicant:
 - 2.2.1 Borings or test pits (witnessed by the town), extending to a depth of at least 5 feet below the road surface and spaced no greater than every 200 feet along the Road centerline, with a report indicating the depth and condition of pavement, depth and gradation of aggregate base and subbase courses, classification of material below subgrade, depth to seasonal high groundwater and bedrock (if any), and presence of organics or other deleterious material (if any).
 - 2.2.2 Surface inspection with report indicating the condition of the storm drainage system(s), slopes, vegetation, and general roadside features.
 - 2.2.3 As-builts as described in these regulations.
 - 2.2.4 List of items that deviate from these standards with proposal to bring the items into compliance. Provide written justification for items, if any, that are not proposed to be brought into compliance, subject to the Board's decision to approve or deny.
- 15.3 **As-Builts (Record Drawings):**
- 3.1 The applicant shall provide as-built drawings of all newly constructed or reconstructed Streets. As-built drawings shall be prepared and stamped by a land surveyor or professional engineer licensed in New Hampshire and shall include:
 - 3.1.1 Pavement and aggregate base depths and material specifications.
 - 3.1.2 Right-of-way monumentation.
 - 3.1.3 Road centerline alignment and profile.
 - 3.1.4 Edge of traveled way radii.
 - 3.1.5 Storm-water pipes, ditches, and pond locations, invert elevations, and materials.
 - 3.1.6 Power, communication, water, and gas utility locations, depths, and materials..
 - 3.1.7 Sanitary sewer locations, invert elevations, and materials.
 - 3.1.8 Metes and bounds description of rights-of-way and easements to be conveyed to the town.
 - 3.1.9 Other road construction elements if deemed necessary by the town.

SECTION 16: EASEMENTS

- 16.1 All easements shall include the right to construct, repair, and maintain the system and shall be recorded at the Coos County Registry of Deeds.
- 16.2 Drainage easements shall be required where concentrated runoff will flow off-site or through proposed lots, where flow in existing channels will be increased, and where off-site drainage measures are required. Easements shall extend to public waterbody or drainage system, or until the existing flow conditions have be restored.

- 16.3 Slope easements shall be required where the cut/fill slopes extend outside of the Street right-of-way.
- 16.4 Utility easements shall be required where utility mains/collectors extend outside of the Street right-of-way.

SECTION 17: STREET MONUMENTATION

- 17.1 Stone bounds shall be installed at each point of curvature (PC), point of tangent (PT), and all other changes in direction of the Street right-of-way lines. Stone bounds shall consist of concrete or cut stone, not less than 36 inches long, not less than four inches square or five inches in diameter, and marked on top with a cross, brass plug, iron rod, or other durable material that is securely embedded.
- 17.2 Iron pipe or stone bounds shall be installed where all property lines intersect the right-of-way lines. Iron pipes shall be at least 36 inches long and 5/8 inches in diameter.

SECTION 18: STREET SIGNS

- 18.1 Street-name signs complying with the town of Jefferson's standard shall be installed at each end of each Street bearing the approved names of the Street on each face of the sign.
- 18.2 Traffic-control signs (e.g., stop, speed limit, dead-end, etc.) and other devices, where warranted, shall be installed and shall conform with the *Manual of Uniform Traffic Control Devices*, latest edition, as published by the Federal Highway Administration.

SECTION 19: PERFORMANCE GUARANTEE

- 19.1 No Street construction shall begin until a performance bond for the full amount of the construction cost plus 10-percent contingency, based on an engineer's opinion of construction cost or other suitable estimate, is submitted and approved by the town of Jefferson. As a substitute for the performance bond, money for the full amount of the construction cost may be deposited in escrow in a savings account entitled as such. As an alternative to both of the above, the owner may build the Street for its full length, complying with these standards, before any lots are sold, provided that a performance bond or funds to be held in escrow is submitted and approved, equal to the value of permanently stabilizing the site, including erosion and sediment control, should the construction stop at any point during construction. There is a two year limit to the substantial start of construction.
- 19.2 Release of the security posted will be at the sole discretion of the Board. The Board may make any other administrative arrangements, which equally guarantee the satisfactory construction of Streets.

SECTION 20 ACCEPTANCE AND MAINTENANCE BOND

- 20.1 Subject to the provisions contained herein, Street owners may petition the town to accept the Street. Said petition shall be signed by at least 25 registered town of Jefferson voters.
- 20.2 No Street will be accepted by the town unless the Street complies with the approved plans and these Street standards (except where a waiver to the standards have been identified and approved). In addition, the following conditions shall be met prior to Board recommending a Street for acceptance:
- 2.1 Evidence is submitted showing that the Street complies with these standards as determined by the procedures described in the Construction Observation/Documentation section of these standards.
 - 2.2 At least 60-percent of all buildings to be built on lots fronting along the Street are constructed and ready for occupancy.
 - 2.3 The Street construction shall be completed for at least 18 months.
 - 2.4 The Street is accessible via a town or state Street.
 - 2.5 Evidence is provided that the title is clear and the grantor, if a corporation, has authority to grant, shall be provided.
- 20.3 Acceptance of Street shall also be contingent upon granting of authority to accept a deed to the right-of-way by vote of the town pursuant to an article in the town warrant at a town meeting.
- 20.4 Prior to acceptance, the following shall be submitted to the town:
- 4.1 A fee simple deed.
 - 4.2 A metes and bounds description, prepared by a New Hampshire licensed surveyor.
 - 4.3 A certification by the Owner's surveyor that the right-of-way bounds have been set at the locations shown on the Street plan(s).
- 20.5 Upon acceptance of the Street, a maintenance bond shall be provided to reserve funds to repair or reconstruct Streets, which have become damaged due to latent defects in the Street construction. The maintenance bond shall remain in effect until two (2) years after acceptance and the bond value shall generally be twenty dollars (\$20) per linear foot of roadway accepted. The bond value is intended to approximately equal 10 percent of the cost to fully reconstruct the Street.

EXHIBITS

The exhibits listed in the Table of Contents are integral to these standards.