



STANDARD SPECIFICATIONS FOR
ROAD CONSTRUCTION

Berlin Public Works Department and Berlin Planning Department

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By the Berlin Planning Board

CITY OF BERLIN, NEW HAMPSHIRE

STANDARD SPECIFICATIONS FOR ROAD CONSTRUCTION
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1. ROAD PLAN – A road plan shall be submitted to the Berlin Public Works Department and shall include but not necessarily be limited to the following: the location of the proposed street, abutting property owners, typical cross-sections at 50’ intervals and profiles along the proposed centerline, 2’ topographic contour lines with suitable benchmarks (USGS datum) and all proposed utilities. Scales shall be 1” = 4’ vertical and 1” = 40’ horizontal. This plan shall be submitted prior to the start of construction, and shall be developed under the direct supervision of a land surveyor or civil engineer registered in the State of New Hampshire.
2. STREET LAYOUT – Streets shall be laid out to intersect at right angles, as nearly as possible, and no street shall intersect another at less than 60 degrees. Property lines at street intersections shall reserve sufficient area to provide for a 20-foot (20’) curb radius. Streets shall be continuous and in alignment with existing streets as far as possible.
3. DEAD END STREETS – Dead end streets, shall not be longer than 1000’ and shall be provided with a turn-around having an outside roadway diameter of at least 120’. Subdivisions, which are constructed in phases, leaving a temporary dead end street, shall provide a turn-around having an outside diameter of at least 100’ on such dead end streets, for facilitating snow removal. The Planning Board will allow the option of a hammerhead as an alternative to a cul-de-sac. The hammerhead shall be constructed as shown in attachments A and B. This determination will be made at the discretion of the Planning Board with input from the Public Works Director.
4. RIGHT-OF-WAY- The minimum width of a right-of-way shall be as follows:

Local residential streets	50’
Collector streets	50’
Arterial streets	70’

The Public Works Director or his/her designee shall determine the street classification(s) based on generally accepted engineering principles using estimated traffic volumes.

On-street parking requirements may dictate wider rights-of-way, to be determined by the Berlin Planning Board.

5. STREET NAMES – All streets shall be named without duplication with other streets in the city and in accordance with E-911 practices. A minimum of two (2)

street name signs, of an approved type, shall be installed on every street at locations designated by the Public Works Director or his/her designee. The City Council shall have final approval over any street name at the time it accepts said proposed street.

6. ALIGNMENT – No streets shall be constructed with a curvature of less than 250' radius (22.9 degrees) unless authorized by the Public Works Director or his/her designee.

7. GRADES – Maximum profile street grades shall not be less than 0.5% and shall not exceed the following:

Local residential streets	10%
Collector streets	8%
Arterial streets	7%

Maximum profile grades on curves shall not be less than 4%.

Maximum grades at intersection shall be preferably less than 3%, and shall in no case exceed 6%.

8. STOPPING SIGHT DISTANCE – The minimum stopping sight distance shall be 275'.

9. SOIL DATA – Soil borings or test pits shall be required at every 200' along the centerline of the proposed street to determine soil types, strata elevations, depth to refusal, and water table elevations. Boring logs shall be submitted with the site plans and shall bear the name of the soil scientist/engineer who supervised the borings, the date of each boring, equipment used and method(s) of sampling. Boring locations shall be indicated on the site plans.

10. DRAINAGE – Surface water shall be disposed of by means of culverts of sufficient capacity at watercourses as determined by standard hydraulic design methods and by construction of a longitudinal storm drainage system whenever required to relieve water in the ditch sections. Design shall be in accordance with the NHDOT Manual on Drainage Design for Highways, latest edition. Construction shall be in accordance with NHDOT Standard Specifications for Road and Bridge Construction, 2002 (or latest edition), Sections 603 and 604. Design storms shall be as follows:

Storm drains	25-year flood
Culvert	50-year flood
Retention ponds	100-year flood

11. EROSION CONTROL – Erosion shall be controlled, in a manner acceptable to the Public Works Director or his/her designee, on all surfaces where there is a

danger of eroded material being carried to the roadway area, adjacent waterways, or adjacent properties.

12. UTILITIES – Utility poles, fire pull boxes, cable television, telephone and electric junction or service boxes, and all other utilities boxes, piers, etc. shall be placed as closely as possible to the edge of the right-of-way line, in no case closer than the ditch line and a minimum of 10' behind the curb or from the edge of pavement. Warning tapes shall be required over all buried utilities, including sewer and water lines. Water and sewer mains shall be preferably constructed in the gravel shoulders, and in all cases within the right-of-way. Sanitary sewers and service shall be in accordance with Chapter 16 of the Codified Ordinances of the City of Berlin, and shall be constructed in accordance with “Standards for Sanitary Sewer Construction,” latest edition as developed by the Berlin Public Works Department. Water mains and services shall be constructed in accordance with the “Standards for Water Line Construction,” latest addition, as developed by the Berlin Water Works, whichever is stricter.
13. CONSTRUCTION SUPERVISION - Construction of the roadway, drainage facilities, utilities, and all other elements of the highway must be done under supervision of and with the approval of the Public Works Director or his/her, designee.
14. CLEARING – The entire area of each street shall be cleared of all stumps, brush, roots, boulders and like material, and all trees not intended for preservation.
15. SUBBASE - All loam and other yielding material shall be removed from the roadway and replaced with suitable fill material. All boulders and ledge shall be removed to a uniform cross sectional depth of not less than 12” below the subbase and replaced with sand or gravel. The subbase shall be shaped and compacted full width to 90% Proctor density in accordance with ASTM 1557-D or the prevailing regulation, and the ditch shall be cut and shaped prior to placement of the gravel base course. Density tests shall be by an independent soils laboratory and shall be performed at 200' intervals along the roadway and over any utility trenches (if they exist). Test results shall be submitted to the Public Works Director or his/her designee for review prior to the placement of the gravel base.
16. SUBBASE DRAINAGE – Underdrains, filter fabric, or other measurers may be required if the presence of water in the subbase dictates their installation to protect the integrity of the asphalt pavement and gravel base courses.
17. GRAVEL BASE – All streets shall be constructed with a minimum of 12” of gravel base (in 6” maximum lifts) per NHDOT Standard Specifications for Road and Bridge Construction, 2002, Section 304 (the current edition of this manual shall prevail). Gravel base shall be compacted to 95% Proctor density in accordance with ASTM 1557-D or the prevailing regulation. Density tests shall

be performed by an independent soils laboratory and shall be performed at 200' intervals along the roadway at random distances from the centerline. Test results shall be submitted to the Public Works Director or his/her designee for review prior to the placement of the asphalt surface.

18. ASPHALT SURFACE – All streets shall be constructed with a hot bituminous pavement surface in accordance with Section 403 of NHDOT Standard Specifications for Road and Bridge Construction, 2002 (the current edition of this manual shall prevail). Pavement thickness shall be as follows:

	Base Course (<u>3/4" aggregate</u>)	Binder Course (<u>1/2" aggregate</u>)	Wearing Course (<u>1/2" aggregate</u>)
Local Residential Streets	2"	--	1"
Connector Streets	2"	1"	1"
Arterial Streets	2"	2"	1"

Minimum pavement widths shall be as follows:

Local residential streets	24'
Connector streets	24'
Arterial streets	24'

A minimum of 90 days shall be allowed for settlement of the roadway prior to placement of the wearing course. If any settlement occurs by the end of this 90-day period, all damaged pavement shall be removed and repaired, and a shim or leveling course shall be placed prior to installation of the final wearing course.

All underground utilities, including sewer and water service lines shall be installed prior to the beginning of the 90-day settlement period, and prior to the installation of the base course of pavement as determined by the Public Works Director.

19. GRAVEL SHOULDER – Gravel shoulders equal to the base course depth shall be constructed adjacent to all asphalt surfaces. Minimum shoulder width shall be 4' in "cut" sections and 6' in "fill" sections. Cross slopes and construction details shall conform to the following:

Required Shoulder Cross-Slopes:

	<u>No Curb:</u>	<u>With Curb:</u>
Paved	3/8 to 5/8"/ft	1/4"/ft
Gravel	1/2" to 3/4"/ft	1/4 to 1/2"/ft
Turf	1"/ft	3/8 to 1/2"/ft

Required Shoulder Treatments for Various Gradients:

<u>Gradient</u>	<u>Treatment</u>
0 – 2%	gravel or turf
2 – 5%.	asphalt penetration surface treatment or paving
>5%	bituminous paving

Gravel shoulders shall be compacted to 95% Proctor density in accordance with the testing requirements outlined for the gravel base. A minimum of one (1) density test per 1000' of roadway shall be required for the gravel shoulders,

20. SIDEWALKS – Concrete sidewalks, 4000 psi min. with 10/10 6x6 WWF, on a 6: gravel base and not less than 6' in width and 5' in depth, shall be constructed on one or both sides of the street when in the opinion of the Public Works Director or his/her designee and the Berlin Planning Board, such sidewalks are necessary. The construction of new asphalt sidewalks shall be only at the discretion of the Public Works Director or his/her designee and the Berlin Planning Board. All new sidewalks shall conform to the standards established in "The Architectural Barrier Free Design Code for the State of New Hampshire," latest edition. The Planning Board will consider bituminous sidewalk construction in residential areas as an alternative to concrete sidewalks when appropriate.
21. SAFETY – Safety is an important factor on all roadway improvements. It may not be possible or practical in all cases to obtain obstacle-free roadsides, but every effort should be made to provide clear areas within the maintenance limits. Side slopes of 2:1 in cut sections and 3:1 in fill sections shall be considered maximum allowable. Guardrails, warning signs and other traffic control devices may be required in certain instances as determined by the Public Works Director or his/her designee, or the Berlin Planning Board, and shall be in accordance with the USDOT "Manual on Uniform Traffic Control Devices," latest edition.
22. BRIDGES – on stream crossings of 10' or more span, the structure shall be designed to AASHTO specifications, loadings to be determined by the Public Works Director or his/her designee. The minimum roadway width shall be 24', except for arterial streets, where the minimum width shall be 32'.
23. RAILROAD CROSSINGS – Design and construction of railroad crossings shall first meet the approval of the State of New Hampshire Department of Transportation, and the affected railroad company. After those approvals have been obtained, the Public Works Director or his/her designee shall advise the Planning Board of all determinations. Detailed plans must be submitted and approved by all parties prior to the start of construction.
24. HYDRANTS – Fire hydrants shall be installed in those areas serviced by the Berlin Water Works, at locations designated by the Berlin Fire Department, but in

no case more than 500' apart. Hydrants shall be located 6' from the edge of pavement, or as directed by the Public Works Director or his/her designee, the Berlin Fire Department or Berlin Water Works.

25. DITCHES AND CULVERTS – Ditches shall be constructed where required to the following minimum standards:

Required Ditch Treatment for Various Gradients

<u>Gradient</u>	<u>Max. Allowed Water Velocity</u>	<u>Treatment</u>
0 – 2%	4fps	gravel or sod
2-5%	8fps	sod or grouted riprap
>5%	15fps	bituminous paving

Culverts, including driveway culverts, shall be 12" minimum diameter, or as calculated in the drainage design, whichever is greater, and shall be capable of withstanding the roadway loadings. Culverts shall extend a minimum of 10' beyond the edge of the pavement. Driveway culverts shall be a minimum of 30' in length and shall be located a minimum of 10' from the edge of the pavement. Minimum cover over culverts under the pavement shall be 4'.

26. STREETLIGHTS – Streetlights, if required by the Berlin Planning Board, shall be High Pressure Sodium luminaries and shall be designed in accordance with the standards established in the US Department of Transportation's "Roadway Lighting Handbook", latest edition. Lamp sizes, spacing, heights, etc., shall be reviewed by the Public Works Director or his/her designee prior to installation. The City has established a lighting design standard, which we would encourage developers to follow when practical.
27. POSTAL BOXES – Rural delivery postal boxes shall be located and designed in accordance with US Postal Service regulations.
28. TREES, SHRUBS, FENCES, RETAINING WALLS – Trees, shrubs, fences and retaining walls shall be located a minimum of 6" outside of the right-of-way. In a residential zone, between the lines of intersecting street and a line joining points on such lines twenty (20) feet distant from their point of the intersection, or in the case of a rounded street corner, the point of intersection of their tangents, no building or structure may be erected and no vegetation may be maintained above a height of three (3) feet above the plane through their curb grades. The purpose of this provision is to enhance visibility at intersections for pedestrian and vehicular traffic and to ensure public safety at intersections.
29. AS-BUILT DRAWINGS – Upon completion of construction, final as-built drawings shall be submitted by the developer to be permanently filed in the Public Works Director's or his/her designee's office. Drawings shall be prepared on reproducible mylars no larger than 24X36, and shall show the final location of

streets, utilities, drainage easements, etc. Drawings shall also be submitted digitally in a format acceptable to both the Planning and Public Works Departments for inclusion into the City's GIS mapping program.

30. MONUMENTS – Highway bounds, of a type approved by the Public Works Director or his/her designee, shall be installed at all intersections of streets, at all points of change in direction, at any other points the Director may deem necessary to designate street lines.
31. EASEMENTS, DEEDS – The developer shall provide all permanent easements and quitclaim deeds for the roadway utilities as required by the Public Works Director. A sample warranty deed is attached. These shall be provided prior to final acceptance by the City of Berlin.
32. COST OF CONSTRUCTION - All costs, except those specifically approved by the City Council, associated with the development of proposed City streets shall be borne by the developer. The developer shall be required to provide security, as required in the City's Subdivision Standards, to cover the costs of completing the construction if the developer fails to do so. The amount of the security shall be determined by the Public Works Director and/or the City Manager.
33. OUTSIDE ENGINEERING SERVICES – if it is determined, it is necessary to retain the services of an outside engineering firm; the cost shall be borne by the developer.
34. STREET CONSTRUCTION – All new subdivisions proposing new roads or improvements to existing roads that are either public or private shall be built or improved to the City of Berlin Standard Specifications for Road Construction.
35. PROCESS FOR ALTERNATIVE STREET CONSTRUCTION – The City of Berlin will allow road construction and improvements to be made minus pavement with the following conditions to be negotiated with the Planning Board and Engineering/Public Works, with final approval from the Mayor and City Council:
 - a. The construction or improvement of a road will be allowed to be built and not paved only until fifty-one percent (51%) of the subdivision lots have been sold. Once this threshold has been reached, the developer shall notify the City through the Planning & Engineering/Public Works Departments that it is time to begin paving of the road.
 - b. The City will issue building permits for any lots sold by developer that are under the 51% threshold once the road has been either constructed or improved but not paved. Once the developer sells lots beyond the 51% threshold, the City will not issue any further building permits until the road paving is completed and the street is accepted by the City.

- c. Maintenance costs and responsibilities for the road after it has been constructed or improved, but not paved will be the responsibility of the developer. This will be in effect until the street has been approved by the Public Works Director and accepted by the City Council.
 - d. If five years has passed since the subdivision was approved by the Planning Board and the road has not been paved either due the fact that less than 51% of the lots have been sold or the developer has abandoned the project, the City will then pave the street and pass on the cost of the project to the original developer.
 - e. The developer will provide the City with security as required in the City's Subdivision Standards acceptable to the City's attorney in amount of ten percent of the cost of paving at the time of subdivision approval. This money will be released upon final approval of the street construction by the Public Works Director or his/her designee and accepted by the City Council.
 - f. When a lot is sold in the subdivision before the street is paved and accepted, the buyer will receive a copy of these standards, and sign a waiver indicating they are aware that they will not receive City services until the street is accepted. This waiver will be recorded at the Registry of Deeds per RSA 674:41 I (d) 3.
 - g. When the street has been finished and final approval from Public Works Director has been granted, and the City Council has accepted the street, the developer shall provide the City with a warranty deed for the street (sample is attached).
36. APPEALS - Any appeals regarding this process shall be made directly to the City Council. The Planning Board, Planning Department, and the Public Works Department will all be notified and given a chance to comment on all appeals.
37. STATEMENT OF INTENT – No part of these specifications shall be construed as superseding any other applicable federal, state, or local regulations or ordinances. In the event of a disparity between these and other regulations or ordinances, the stricter of the two shall apply. The developer is responsible for obtaining all required permits. Meeting these standards does not necessarily fulfill the requirements for any required permits, but meeting these standards shall be a condition of acceptance of the roadway as a City right-of-way.

SUGGESTED FORM FOR CONVEYANCE OF HIGHWAYS TO
THE CITY OF BERLIN, NH

WARRANTY DEED

KNOW ALL MEN BY THESE PRESENTS, that _____ (the owner of the land on which the highway is located), for consideration paid, the amount of \$5.00 (five dollars and no cents), grant (s) to the City of Berlin, a municipal corporation located in Coos County, New Hampshire, with WARRANTYCOVENANTS, for highway purposes, the following described real property located in Berlin, New Hampshire:

A certain parcel of land on which _____ (the name of the highway) as shown on a plan entitled _____ (name of the plan), more particularly described as follows:

(Please use either a course and distance description of the perimeter of the parcel on which the highway is located or, in the alternative, a described centerline with a specific designation of the width).

There are hereby conveyed the following easements as appurtenant to the parcel of land on which (name highway) is located; namely, the right to drain and flow surface water from the culverts shown and said plan on lots (insert number or other description of the subdivision parcels affected by drainage easements), with the right to enter upon said lots on which the drainage easements are located for the purpose of maintaining and repairing said easements and also including, if applicable, maintaining, repairing and replacing the culverts located in said highway.

Meaning and intending hereby to describe and convey a portion of the premises conveyed by the Grantor by (insert the specific deed references for sources of title). It is intended by the parties that the delivery of this deed by the Grantors and its acceptance by the City of Berlin, will constitute the creation of a public highway by dedication and acceptance according to New Hampshire law, and that at any time in the future, should the public highway hereby created by legally discontinued, the City of Berlin shall have no further interest in the above described premises and title shall be held by adjoining land owners subject to any implied private rights and easements under the common law of New Hampshire.

DATED this ____ day of _____, 20__.

GRANTOR

(Insert usual acknowledgement clause.)

The within conveyance for highway purpose is hereby accepted by the Berlin City Council, pursuant to a vote of acceptance at the Council meeting held on _____, 20__, and is authorized to be recorded in the Coos County Registry of Deeds.

DATED this ____ day of _____, 20__.

City of Berlin:

Witness

Mayor

Date

Date