



**Board of Commissioners
Village District of Eidelweiss
P. O. Box 299
Madison, New Hampshire
603-367-9022**

Road Design, Construction and Maintenance Standards

Introduction

These standards have been prepared by the Eidelweiss Board of Commissioners in order to provide the Village with the basis of road design, construction of new roads and maintenance of existing roads. The guidelines contained herein apply to all the roads within Eidelweiss that are classified as Class V or lower. However, it is acknowledged that some of the existing roads may not conform to the standards described herein and it may be impractical to improve such roads to the standard. In such cases the prudent best practices will be used, but any improvements to drainage will comply the standards described herein. The Owner/developer shall make application in writing for acceptance of the street or road to the Eidelweiss Board of Commissioners. Names of streets shall be approved by the Commissioners and shall not duplicate or bear phonetic resemblance to other existing streets in the Town of Madison. Any future reference to the Commissioners shall mean the Eidelweiss Board of Commissioners.

The developer shall make application to the NHDES for a Site Specific permit if disturbing greater than 100,000 square foot of area. The developer shall complete a Storm Water Pollution Prevention Plan, submit a copy to the Commission, and file a Notice of Intent to the USEPA if greater than one acre (43,560 sq. ft.) is proposed to be disturbed.

All Class VI roads will be defined as new roads and will be required to meet the standards described herein before they can be reclassified as a Class V road.

PART I - DESIGN

Right-of-Way

No right-of-way shall be less than 50 (fifty) feet in width. When construction excavation or fill extends beyond the right-of-way limits, an easement for maintenance of slopes shall be granted to the town by the abutting land owner. Right-of-way for streets which have an average daily traffic (ADT) in excess of 400 vehicles per day may require greater than 50 (fifty) feet of width and shall be considered individually by the Commissioners or their appointed engineer.

Design Traffic Volumes

Roadways shall be designed for specific traffic volumes by accepted current

engineering practice. The average daily traffic (ADT) projected for a period of 10 years after the date of construction completion shall be the basis for design. To determine the design traffic volume, use 8 vehicle trips per day per household for the projected number of households in the design year.

Design Speed

Design speed shall be selected for the appropriate type of terrain and ADT as shown below.

Table 1 Design Speeds vs. Average Daily Traffic (trips per day)

Design Speed (MPH)

Type of Terrain	ADT 0 - 50 trips	ADT 50 - 250 trips	ADT 50 - 400 trips	ADT 400 - up trips
Level	40	40	50	50
Rolling	30	30	40	40
Mountainous	20	20	30	30

Level terrain is that which is generally flat and sight distance is generally long or could be made so without construction difficulty or major expense.

Rolling terrain is that where the natural slope of the ground consistently rises and falls and where occasional steep slopes offer some restriction to normal alignment and sight distance.

Mountainous terrain is that where changes in elevation are abrupt and where the roadbed is obtained by frequent benching and side hill excavation.

Sight Distance

Minimum stopping and passing sight distance shall be as shown in Table 2 below. Criteria for measuring both vertical and horizontal sight distance are as follows: stopping sight distance (SSD), height of driver's eye, 3.50 feet and height of object 0.5 feet, passing sight distance (PSD) height of eye 3.50 feet height of object 4.25feet.

Table 2 Sight Distance in feet

Design Speed, MPH	20	30	40	50	60
Stopping Sight Distance	150	200	275	350	475
Passing Sight Distance		1,100	1,500	1,800	2,100
Minimum K value * crest vertical curves		16	28	55	

* K is a coefficient determined by dividing the length of curve by the algebraic difference in the grade in minus grade out. ie: for a 200' crest vertical curve with tangents of 4% and -2% $K = 200' / (4.0 - (-2.0)) = 200 / 6.0 = 33.33$

In design of subdivision roads, stopping sight distance will generally govern since passing is generally discouraged in residential areas. Efforts should be made to obtain greater than minimum sight distance.

Grades

Minimum grade shall be not less than 0.5%. Maximum grade shall be as shown in Table 3 below. A maximum grade of 2% will be allowed within 100 feet of an intersection to provide safe and adequate landing area.

Table 3 Maximum Grades in percent

Design Speed (MPH)	20	30	40	50	60
Terrain					
Flat	7	7	7	6	5
Rolling	10	9	8	7	6
Mountainous	12	10	10	9	

No grade shall exceed 12%.

Alignment

Alignment shall be to as high a standard as is commensurate with topography, terrain, and design traffic. Sudden changes between curves of widely different radii or long tangents and sharp curves should be avoided. Where crest vertical curves and horizontal curves occur at the same location, there should be above minimum sight distance to assure that the horizontal curve is visible as the drivers approach.

A maximum rate of superelevation of 0.06 feet/ foot (3/4 inches/foot) will be allowed on curves. The maximum curvature for different design speeds is to be as shown in Table 4 on the following page.

Table 4 Maximum Radius and Degree of Curvature

Design Speed MPH	Minimum Radius	Maximum Degree of Curve
20	115	50.0
30	510	21.0
40	275	11.5
50	830	7.0
60	1,260	4.5

Intersections

Streets entering opposite sides of another street shall be laid out either directly opposite or with a minimum offset distance of 125 feet between their centerlines. Streets shall intersect at 90 degrees where ever possible. At no time shall streets intersect at less than 60 degrees.

Dead End Streets

Dead end streets shall not exceed 900 feet in length from the edge of the existing street to the center of the cul-de-sac. Cul-de-sacs shall be required to have a minimum outside radius of 60 feet, and a paved circle of 80 feet in diameter, or a traveled way of 24 feet around the circle.

Elements of the Typical Cross Section

The elements of the typical cross section shall be as shown in the appendix. Modification in the typical cross section will be allowed when based on sound engineering design. The Eidelweiss Board of Commissioners or their appointed engineer must approve

any modification.

Drainage and Erosion Control

The peak flow rate for drainage area of 200 acres or less shall be determined by the Rational Formula ($Q=CIA$) or the Soils Conservation Service TR-55 method. For drainage areas in excess of 200 acres, flow shall be determined by the New England Hill and Lowland Adirondack White Mountain Main Woods method or the Soils Conservation Service TR-55 or TR-20 method.

Culverts and drainage structure sizes shall be computed by a generally accepted hydraulic design method such as those developed by the Federal Highway Administration (formerly the Bureau of Public Roads). The Talbot formula for sizing the culverts will not be allowed.

Culverts

Culverts under driveways shall be installed and maintained by the property owner, subject to supervision and inspection of the representative of the Eidelweiss Board of Commissioners. All driveway culverts shall be reinforced concrete pipe or HDPE polyethylene smooth invert pipe with soil tight joints. Driveway culverts shall have stone headwalls on the inlet and the outlet, and be a minimum of 18" below the driveway grade at all times.

All roadway culverts shall be reinforced concrete pipe or HDPE polyethylene smooth invert pipe with soil tight joints. Pipes shall be bedded in $\frac{3}{4}$ " crushed stone up to the spring line, and have a layer of geotextile fabric placed over the stone before placing sand to one foot over the top of the pipe. All roadway culverts shall have a mortar rubble or pre-cast concrete headwall on the inlet and the outlet.

Minimum culvert size shall be 15" diameter for driveways and 18" diameter for cross culverts. Additional culverts will be required on long grades, with 300 ft. maximum distance between culverts on these grades. Culverts and Drainage Structures shall be designed for a 10-year return period. On all larger structures (over 36" diameter), analysis of headwater or backwater shall be made for a 25 year return period to see if damage will result to adjacent property. If the possibility of such damage exists, the 25-year return period shall govern the design. There will be 95% compaction for culverts. In addition, under drains will be required where deemed necessary, subject to the discretion of the Commissioners or their appointed engineer.

Erosion control shall be provided in roadside ditches and at drainage structure outlets. Such erosion control shall be based on an acceptable design method and shall be sod, small stones, or large cobbles as the design dictates. No paved gutters or outlets will be allowed. All slopes shall be seeded and mulched.

Drainage flows from new roads shall not be allowed to flow out onto existing roadways at intersections. Flows shall be directed into the ditches or the new road sloped away from the intersection.

The Village of Eidelweiss will use the following guidelines in deciding what ditch lining treatment might be appropriate.

1. 0% - 4%: Use an erosion control blanket and seeding.
2. 4% - 5%: Use sod or an erosion control blanket.
3. >5%: Use plain riprap or NHDOT Class C erosion stone ditch protection.

Catch Basins, Drop Inlets and Manholes

Catch basins Drop Inlets and Manholes shall conform to the NHDOT Road and Bridge Specifications Section 604.

Aggregates

Gravels, crushed gravels and sand material shall comply with the NHDOT Road and Bridge Specifications Section 304.

Pavement

Pavement shall conform to the NHDOT Road and Bridge Specifications Section 403.

Traffic Control Devices and Signing

Traffic control devices or signs shall be placed at locations where conflicting traffic movements will exist or where large traffic volume indicates necessity. Generally, stop signs will be provided at intersections where the street or lesser traffic volume enters that of higher traffic volume. The Eidelweiss Board of Commissioners shall approve traffic signage prior to acceptance of the road. All signs and control devices shall conform to those standards set forth in the Manual of Uniform Traffic Control Devices.

Submission of Road Design

Road design shall be submitted (4 sets of prints) on a separate sheet of plan and profile paper 24" x 36" in size and having horizontal scale of 1" = 40' and a vertical scale of 1" = 10' to the Board of Commissioners for review and approval. In the case of a road, which is part of a subdivision, subdivision approval will not be granted until a satisfactory street design is approved.

The plan(s) submitted shall show the following:

1. Title, showing the name of the subdivision, name of street, and name of owner, date

(day, month, year), scale, name and seal of an engineer licensed in the State of New Hampshire.

2. Right-of-way lines.
3. Slope and drainage easements.
4. All centerline data (tangent lengths and bearings, curve data, and stationing).
5. Edges of pavement lines.
6. Proposed contours and grading in the plan view.
7. Typical cross section.
8. Cross sections of the roadway at 100' intervals
9. Ditch treatments if other than loam & seed shown on plan view.
10. Existing grade at 50 foot intervals (on profile).
11. Proposed grade at each 50' intervals (on profile).
12. Length of vertical curves and data (on profile).
13. Sight distance or K values on horizontal and vertical curves.
14. Design Speed.
15. Type of terrain considered controlling design (level, rolling, or mountainous).
16. Average Daily Traffic (ADT).
17. Design Year.
18. Drainage structure location and inverts in and out rim elevation, station, skew from centerline, length, slope and end treatment.
19. Bench marks not more than 500' apart.
20. Utility locations such as power, water, telephone, and CATV.
21. Specific material specifications or reference to NHDOT specifications.

The Eidelweiss Board of Commissioners will have the ultimate responsibility to interpret and determine the type or classification of terrain as defined in these Standards.

A detailed engineer's estimate of construction cost shall be filed with the street plans when submitted for approval

PART 11 — CONSTRUCTION

Bond or Escrow

No street or road construction shall begin until a performance bond for the full amount of the construction cost, based on the engineer's estimate, is submitted to the town. 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 road for its full length, in accordance with these standards; to be accepted by the Eidelweiss Board of Commissioners before construction of any homes begins. Any defects in the road or its appurtenances, which occur within one year of acceptance, shall be corrected by the applicant, at no cost to the Village District of Eidelweiss.

Grubbing

All trees, tree stumps, topsoil, rubbish and other foreign matter shall be removed from the roadway on a 1/1 off the finished shoulder. Loam may be stockpiled on site with a ring of silt fencing, or hauled off site. Peat, stumps, clay and muck shall be hauled off site.

Inspections

There shall be inspections made as deemed necessary by the Commissioners or their appointed engineer. The initial inspection shall take place upon the submission of the proposed road plans. The Commissioners shall notify the owner of the date of inspection, and it shall be the responsibility of the owner to see that the road is laid out and described sufficiently on the ground.

Inspection shall take place periodically during construction. It shall be the responsibility of the owner to notify the Selectman at least 48 hours in advance of any covering of laid pipes, placing of gravel and grading, and paving operations. The owner shall furnish sufficient information, such as survey field notes or marked up profile, to the Commissioners to prove that the gravel base course is at grade before paving begins.

The final inspection shall take place after the Presentation of "as built plans" and before final acceptance of the road by the Commissioners.

If at any time during construction the Commissioners feel that it is necessary to have more extensive inspection or engineering than they are capable of providing the cost of such inspection shall be paid by the town and reimbursed in full by the owner.

Materials

Construction material specifications shall generally be those shown in Standard Specifications for Road and Bridge Construction by the New Hampshire Department of Public Works and Highways, approved and adopted in 2002.

All fill will be shaped and rolled, as well as all gravel. Two feet of gravel is required and 6 inches of crushed gravel on all roads shaped and rolled.

Special specifications or those, which differ from the State Standard, will be spelled out and stated specifically in the initial submission of the design plans. The Commissioners or their appointed engineer prior to their use in construction must make approval of materials. The Owner shall provide a letter of certification that all material meets specifications, specifically gravel, pipe, and pavement materials.

Layout

It shall be the responsibility of the owner to provide all layout necessary to assure that construction takes place on the line and grade established during design. This shall be related to but not limited to the following: center line stakes, limit at clearing stakes, rough grade stakes, edge of pavement stakes, fine grade stakes, and drainage structure grade stake.

As Built or Record Plan

Before the final inspection and acceptance of the road by the Commissioners, the owner shall have prepared a final "As Built or Record Plan". This plan should show as built locations and elevations in a contrasting color (preferably red ink) on a print of the original road design. It should show the following: as built centerline of street elevations, as built culvert invert elevations, as built manhole invert and rim elevations, as built guard rail and sign locations. In addition to the as built plan, a metes and bounds legal description shall be furnished by the owner (prepared by a surveyor, licensed in New Hampshire) of that portion of the road to be deeded to the Village District of Eidelweiss. Accompanying the legal description shall be a certification by the owner's surveyor that the right-of-way bounds have been set at the locations shown on the plans.

Part III - PRIVATE ROADS

Private roads (should generally) conform to these standards since it is believed by the Commissioners that the residents on private roads, as taxpayers, are entitled to the same quality as a town accepted road. The assumption is also made that at some future date the taxpayers would petition the Commissioners for acceptance of the road.

It will be the responsibility of the owner of a private road to furnish the Commissioners with a notarized letter fixing the legal responsibility for construction and maintenance of any private road. Such responsibility can be a legally established corporation or owners' association.

Any private road constructed within the Village of Eidelweiss with the concurrence of the owner, will be checked periodically during construction by the Commissioners or their appointed representative/engineer. The purpose of such periodic checking shall be to provide the Commissioners and the owner, upon completion of the road, a written evaluation of the road. Such evaluation would:

- (1) Appraise the Commissioners and the owner of deviation(s) from the minimum standards of road design and construction as adopted by the Village District of Eidelweiss, on (date).
- (2) Provide the Commissioners and the owner with a base from which to start in

determination of work which would be required to bring such a road up to minimum design and construction standards should such road ever be considered for acceptance as a town road.

No private road will, be considered for acceptance as a town road unless its design and construction meets, as a minimum, the road design and construction standards for the Village District of Eidelweiss as herein described.

BIBLIOGRAPHY

Geometric Design Guides for Local Roads and Streets, Part I Rural. By American Association of State Highway and Transportation Officials, 341 National Press Building, Washington, D. C. 20045, October 1969.

A Policy on Geometric Design of Rural Highways, Ibid., 1965.

A Policy on Design of Urban Highways and Arterial Streets, Ibid., 1973.

Standard Specifications for Road and Bridge Construction, State of New Hampshire Department of Public Works and Highways, Concord, N. H., 2002.

Approved August 13, 2004 following a Public Hearing on August 6th, 2004.

Ralph Lutjen
Thomas J. Catino
Gloria B. Aspinall

Board of Commissioners