

GUIDELINES FOR ROUTINE MAINTENANCE OF GRAVEL ROADS IN HANCOCK, NH



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Any quotes in **dark gray are a directly from American Association of State Highway and Transportation Officials *Guidelines for Geometric Design of Very Low-volume Local Roads* (ADT <400), 2001 (AASHTO). Any quotes in **light gray** are from the Milford book on *Infrastructure Design and Construction*.*

How This Document Came About

In the summer of 2018, when the area around Flagstones on Old Dublin Road was being graded by the recently hired DPW road crew, residents and the Select Board became concerned that the grading and ditching were too aggressive, that the work resulted in the widening of the road. This work represented a significant change from how the road had been graded and maintained in the past.

After a large number of trees and boulders on Old Dublin Road were marked for removal by the DPW, public meetings were scheduled where many residents expressed concern that the scenic beauty of the road was being irrevocably damaged. All of the work done was described as “routine maintenance” by the DPW.

It was agreed by the citizens and the Select Board that a Hancock Road Committee should be formed in order to address these concerns and to produce a set of guidelines for the routine maintenance of gravel roads. The vision statement of the committee reads:

“In an ever-changing, fast paced world, our vision is to preserve the tranquility and beauty that our back roads provide, not only as a way of life, but also as cultural icons that have disappeared in many rural parts of our state.”

A mission statement was also developed:

“To preserve and protect the rural character of Hancock’s roads for today and all generations to follow. Maintenance of the roads should focus on the history, wildlife, and vegetation of Hancock that brings enjoyment to drivers, walkers, bicycles and horses. The committee will identify features and qualities that contribute to the rural character of Hancock’s roads, gather input from residents and non-resident property owners throughout the town, assess traffic volume and recreational uses of the roads and recommend guidelines for maintenance that balance the preservation of rural character with effective road maintenance.”

A town wide survey was conducted in order to gather input from citizens. The survey was completed in February 2019, and the results presented at an open meeting on February 21, 2019. The surveys themselves and the compiled results can be read at the town offices. 87% of respondents said it was “very important” or “important” to maintain the scenic beauty and rural characteristics of Hancock’s roads.

The results of the second part of the mission statement (to recommend guidelines for road maintenance) are gathered in this document.

Who is this document for?

This document is for anyone with an interest in balancing the safety and upkeep of Hancock's gravel roads with their scenic beauty and rural quality: new heads of DPW, new Select Board members, and residents of Hancock and nearby towns. We recognize that for some readers (those with extensive knowledge of roads and road maintenance) this document contains a smaller amount of new information and for others (new Select Board members, residents) there will be perhaps too much technical information.

One thing the survey results made clear is that Hancock residents are involved citizens who expect and appreciate more, rather than less, communication from the DPW. Hopefully this document will foster greater communication and trust between elected or appointed officials and residents, and miscommunication problems will be kept to a minimum.

This document is meant to be a living document to which regular additions and edits are made to keep the document current and helpful.

Philosophy

According to the survey results, residents want the rural quality of the town to be reflected in its roads. While different roads need to be treated differently according to volume and surface, residents want to avoid a suburban or overly manicured feeling to the roadsides. As much as possible, on the sides of the roads there should be natural woodland growth and not mown grass.

In preservation circles, there is often the dilemma of which documented era do you preserve to: when the house/road/wall was originally built, the way the present generation finds it, or some historical period in between? Roads are an important part of the historic character of our town. As such, changes to the roads should be considered carefully before alterations are made.

In the nineteenth century Hancock looked very different from today: there was much less forest and woodlands (all of Mt. Skatutakee was cleared for sheep grazing). We are not recommending that the roadsides be taken back to how they looked two hundred years ago. The goal of these guidelines is to preserve the scenic quality of the roads as they exist today, in 2019.

What does this mean exactly? According to the survey results, the scenic and rural roadside qualities residents are most interested in preserving are (in order of importance): tranquility, indigenous flora/fauna, stone walls, tree-lined, minimum signage, tree canopy, dirt/gravel, winding, boulders.

It is important to remember that Hancock's gravel roads are used not just for transportation, but also for recreation by town residents. Nearly all the survey responders used the gravel roads for (in order of popularity): walking, biking, dog walking, pleasure driving, and horseback riding. The survey responders five favorite roads, in order of preference, were Old Dublin, Eaton, Jacquith, Kings Highway, Depot. In terms of reconstruction/improvements to Hancock's gravel roads, we adopt the philosophy of the American Association of State Highway and Transportation Officials *Guidelines for Geometric Design of Very Low-volume Local Roads* (ADT <400) (AASHTO). * "The design guidelines enable designers for projects on very low-volume local roads to apply design criteria that are less restrictive than those generally used on higher volume roads. The risk assessment on which the guidelines are based shows that these less restrictive design criteria can be applied on very low-volume local roads without compromising safety."

"The guidelines discourage widening of lanes and shoulders, changes in horizontal and vertical alignment, and roadside improvements except in situations where such improvements are likely to provide substantial safety benefits. Thus, projects designed in accordance with these guidelines are less likely to negatively impact the environment, roadway and roadside aesthetics, existing development, historic and archaeological sites, and endangered species. In reviewing the geometric design for sections of existing roadway, designers should strive for consistency of design between that particular section and its adjoining roadway sections." (pg. 2)

Summing up the philosophy for how Hancock's scenic and gravel roads should be preserved and maintained: gravel roads should not be widened or straightened unless there is a verifiable reason to do so and the Select Board has given its approval. Road equipment (snow plows, etc.) should be purchased to accommodate the roads rather than changing the roads to accommodate the equipment. We want our grandchildren and their grandchildren to be able to experience the sense of tranquility and other physical features so important to the survey respondents and residents, features which are disappearing in many parts of New Hampshire.

Brief Hancock Road History

Currently there are 58 roads in Hancock that cover 48 miles: 24 are paved, 22 are gravel, and 12 a combination of gravel and paved, These roads reflect our shared history and culture. For instance, Kings Highway was named after the British King George and the center of town was originally located there.

The town maintains and plows all Class V roads, both paved and gravel. The state maintains and plows Rt 123 (including Main St), Rt 137, Rt 202 and Forest Rd. Nine of Hancock's roads are designated "scenic" under RSA 231, the 1971 NH Scenic Roads Act, and these scenic roads are both paved and gravel: Depot, Eaton, Fairfield, Jacquith, Kings Highway, Middle, Old Dublin, Old Hancock/Pickering Farm, Willard Pond).

All the town maintained roads were dirt/gravel until the mid-1950's. The state started paving state maintained roads after the 1937 hurricane. All the paved roads were originally made using a cold asphalt method. Oil was sprayed down double rows of *gravel* and then mixed in place like a cake. Certain roads, like Prospect Hill, have an even less standardized road bed than this.

In 1961 the 202 Bypass was added in order to divert traffic from Main Street. At the time there was significantly more traffic on Main Street than there is today, much of it due to logging practices at the time which required that the mill was driven to the site instead of the trees being transported to the mill. There was enough traffic in those days to support three gas stations in town.

In 2019 the Southwest Regional Planning Board completed an assessment and plan for maintenance of the town's paved roads. They are currently conducting a similar document for the culverts and catch basins in town.

Definitions

Brush - Any woody plant with less than a 15" circumference or 5" in diameter (measured at chest height). Brush needs to be kept trimmed back from the ditch line to the right of way (for instance, a stone wall). Landowners should be notified first. Cut trees/saplings are to be removed by the DPW within 72 hours. If trees/saplings remain in right of way after 72 hours, they may be taken for property owner's personal use. Property owners/residents may request DPW leave cuttings or chips for property owner's use.

Catch basin - A storm drain inlet or a curb inlet that typically includes a grate where storm water enters the catch basin, either concrete or barrel block. There are less than fifty in town.

Clear Zone - the area from edge of travel way to nearest obstacle. Can be the shoulder or could be 12' in to a stone wall.

Comprehensive gravel policy - a town wide policy where gravel is added to the top of the road at regularly scheduled intervals. 20% of Hancock's roads get gravel added every year in a scheduled plan.

Cross culvert - a culvert under the road that carries water from one side of road to the other, made of stone, concrete, metal or plastic.

Crowning - describes the cross sectional shape of a road surface. The steeper the hill the more crowning you need (you want the water to run off the side of the road not down the hill in order to prevent erosion).

Cuffing or “buffing” – a process done in the spring to give shape to the road because there’s too much mud. The road surface is dragged at a depth of not more than 1” to re-establish the crown.

Curvature - regular bends in roads to bring a gradual change in direction. There are different types of curvature: horizontal curve, sag curve, crest curve.

Design Speed — A tool used to determine geometric features of a road: travel width, horizontal and vertical curvature, safe stopping distance. Not to be confused with safe maximum speed or speed limit.

Ditching - Maintenance ditching beside the roads should be utilized to remove leaves, sticks and stones from the existing ditch/shoulder, but should not entail the removal of virgin ground. Ditching work should be done as needed but at the least it should be done on a yearly basis. Either a grader or a back hoe can be used, although a grader is more efficient. In autumn leaves are blown out and hauled away, and in spring ditches are cleaned out so the summer begins with clean ditches. Alternatively, in spring a grader or back hoe is used to rough shape the ditch, then the road is reshaped, ditch materials are sorted out, the junk is hauled away, the ditch is cleaned, and grading is done immediately.

Drainage - way to convey water away from road to prevent erosion and the degradation of the road. Most of Hancock’s roads have open drainage, meaning an open ditch beside road without under drains, French drains, or underground culverts. Parts of Norway, Antrim, Evergreen Hill, most of Main, are closed drainage. There are catch basins on Prospect Hill.

Fine - the material that packs and binds the road together. It’s the dust in the road you see behind car (which is basically the road bed blowing away). Replacement formula is 1” per year per 100 cars a day.

Fines Retention - A liquid top coat is used to seal the gravel and reduce the dust, keeping the road from disintegrating. A gravel road not treated with a top coat loses 1” of gravel per year per 100 cars a day, which has a significant impact on the town’s operating budget.

Frost Heave - caused by the differential between mud, gravel, and other materials which freeze at different rates. Naturally occurring clay bars across the road can also cause frost heaves. Due to exposure, the frost goes much deeper on a road than in the adjoining woods.

Grading - Put crown back in road, reshaping to eliminate potholes etc, remaking afterwards. Eliminating potholes, washboards (horizontal and makes your teeth chatter), and rutting (ruts running parallel to road). Done on travel portion only. Chuck: “You’re mixing the road back together because it unravelled.”

Improvements and Reconstruction - Routine maintenance is anything done on a regular schedule, with no changes made to the basic structure of the road. There is a fine line between improvements and reconstruction. Reconstruction nearly always need a warrant article at town meeting. Improvements may also need a warrant article as well, depending on the scope and cost. More material is used for a reconstruction than for an improvement; you are taking material out and adding more back in.

Milling - Grinding down of the road when the road surface is too high.

Minimum Road Standard — for sight distances, travel width, horizontal and vertical curvature (which is up and over a hill). In nearly all cases, triggers are needed (increased traffic, accidents or multiple near accidents, subdivisions). Can't be activated without Select Board approval.

Pothole - Potholes form because the road doesn't have enough crown on it to direct the water off the road. Cars driving over standing water in the road cause potholes.



Road Bed - foundational structure on which a road is built. This includes travel portion plus shoulder, ditches, and anything the DPW maintains. The road bed by definition is wider than the travel width/portion. Only the travel portion should be graded, not the entire road bed.

Road Improvements - Can include changes in grade, curvature, widths, and may involve removal of trees, ledge, and substantial improvements in drainage, which includes ditches, culverts and under drains, and catch basins. These improvements are

usually dealt with through the budgeting or warrant article process and generally a prior public hearing is recommended.

Road Reconstruction - Always needs Select Board approval. Road reconstruction should occur for qualifying events which include significant increase in traffic counts, documented need for safety improvement, a land planning event, or as part of a hazard mitigation project.

Road Width - the travel portion of a roadway. It varies for different roads. While 18' including shoulders has been suggested as the standard, many gravel roads in Hancock do not conform to this and should not be made to conform. The width of the road is not measured from the middle of the road because the road meanders within the 50' right of way due to natural obstacles such as boulders, large trees, etc.

Routine Maintenance - Performed regularly and consistently on a semi-annual, annual or as-needed basis to maintain the travel surface of the existing roadway. Includes maintaining existing ditch lines without significantly improving the depth and width of the ditch line. Routine maintenance includes brush clearing, re-graveling, failed culvert replacements, and drainage work as needed.

Shoulder - soft shoulder is an unpaved area at side of road where emergency vehicles are allowed to stop or, in the case of a narrow section of road, where one can move out of the way of oncoming traffic.

Sight Distances - the length of roadway visible to a driver, not to be confused with safe sight distance, which includes reaction time of driver. For safe sight distance calculations, refer to AASHTO pg 35-36.

Safety counts – The daily traffic on all roads in Hancock should be counted every four years, which means that 25% of the roads, grouped by sector, should be done yearly. The data is collected by the Hancock Police Department in order to identify accident numbers.

Speed Limit - Hancock does not have a town wide ordinance regarding speed limits. The town uses the state guideline of 35mph unless otherwise noted. To post a road at 25mph requires an engineering and traffic study. School zones are 20mph.

Travel Portion - The section of road that is intended to be driven on; it is narrower than the road bed and lays on top of the road bed.

Types of Roads - for the purposes of these guidelines Hancock's town roads have been divided into three types:

- Through - a road which goes from one town to another, such as Middle Road
- Collector - a road which allows the driver to get to other roads, such as Prospect Hill
- Residential - primarily dead end roads

Vehicle Counts - data collection of number of vehicles traveling on town roads is collected on 25% of roads every 4-5 years. Roads are grouped in sections to maximize efficiency and decrease labor/time. If a singular event occurs on a specific road that is not part of the sector being monitored, vehicle count would/could be done separately to allow evaluation of cause of event and whether the road itself was a factor in the event.

Road Counts

The non-state, local gravel roads in Hancock, will be divided into three categories for the purposes of the Guidelines for Routine Road Maintenance.

1. roads which get, on average, 275 - 400 cars per day
2. roads which get, on average, 150 - 275
3. roads which get, on average, less than 150 cars per day (AASHTO, pg 10)

If a road exceeds the 400 cars per day limit, such as Middle Road, please refer to the AASHTO 2018 Geometric Design of Highways and Streets - the Green Book (or latest edition).

Road counts need to be updated every three to five years in order to see if a road's vehicle volume has increased or decreased enough to move it up or down a category. Certain roads need to be counted twice a year as they have significant seasonal variance. These roads are:

- Kings Highway near Harris Center during July
- Kings Highway on way to Nubanusit Lake landing during July or August
- Longview Rd when Seven Maples Camp Ground is busy
- Middle Rd when Well School is in session
- Willard Pond Rd
- Tannery Hill Rd

Routine Maintenance

Gravel roads require a lot of time, labor, and materials to maintain. In the long run it's more expensive to maintain a gravel road than a paved road. However there is a much higher initial cost to build a paved road or convert a gravel one to paved (currently about \$250-\$300K a mile). Gravel roads go from fair to poor much quicker than asphalt.

- Gravel replenishment - should be done according to the schedule established in the Hancock Gravel Replacement document.
- Grading - depends on weather but at a minimum all gravel roads should be graded twice a year. Some roads, such as Kimball, Orchard and the dump road may be graded more frequently depending on conditions. Grading should be done a few times

in April and early May by cuffing or buffing it to get the crown back. Final grading should be mid-May right after ditching (when it is not too damp but also not too dry to stay put). If 3/4" gravel is used, the grading doesn't have to be done as deeply (about 6") as when larger 1.5" stones are used.

- Top coat - in the past either magnesium or calcium chloride was put down to hold moisture in road and makes it less dusty. The DPW currently uses a product called "Safe Bind," which provides both stabilization and dust control. See saferoadservices.com.
- Ditching - once a year on average (should blow in fall and ditch in spring)
- Cleaning swails & catch basins - should be done twice a year (Evergreen Hill needs more than this)
- Order of work should be: ditching, grading, crowning, treat for fines retention

Reconstruction

There's a fine line between road reconstruction and improvement (see definitions). Reconstruction needs a qualifying event and Select Board Approval. More material is used in reconstruction than in an improvement because you are removing and replacing material. Need examples like we have under Improvements.

less than 150 vehicles per day - on these extremely low-volume roads, town policy is to continue with routine maintenance but with no changes to travel width, curvature, sight distances, unless there's a substantiated risk (documented accident, multiple near misses, significant changes in traffic volume).

150 - 275 - for town policy on sight distances, road width, vertical and horizontal curvature, safe stopping distance, refer to AASHTO section on 35 mph design speed on pages 35-36.

275 - 400 - see AASHTO pages 35-36 for minimum standards.

Improvements

For an improvement to be made to a gravel road, there needs to be a qualifying event such as crash data, or increased traffic. Plans for improvements should be addressed during the annual budget development process or as a warrant article to be addressed at the town's annual meeting.

Best Practices

DPW, in advance, should inform residents about upcoming routine road maintenance, either by moveable signage, emails, flyers in mailboxes or on town cork boards. Also, all work should be posted in advance on the town's website.

Tree branches hanging over the road must be cut to a height of 14'6" above the road; the measurement is done at the edge of the road. Trees and bushes at the edge of the road must be cut back to ensure safe sight lines.

Boom mower is used for mowing either horizontally or vertically and saves labor costs. A boom mower can cut up to 3 year old saplings (approximately 4" in circumference or about 1" in diameter). Boom mowing should be scheduled to be done every 3-4 years but mowing needs to be done every year. Best practice is for deck mower to go first and then the boom mower. Roadside mowing should be conducted every year, it costs about \$50/mile but if you wait three or four years it costs the town \$500/mile.

Grass which is growing onto road needs to be removed regularly, both to ensure the road won't need repair or rebuilding, and also to avoid residents' perception that the road is being widened.

Residents should be informed as to how to maintain the ditches in front of their properties: do not rake leaves into ditches.

When driving to Willard Pond, drive DOWN Davenport Rd but leave by driving UP Willard Pond Road. This practice will save the town the cost of a few gradings a year because constant driving up the hill on Davenport in automatic transmission vehicles causes excessive washboarding.

When clearing and grubbing, clear undergrowth and deadwood without excavating topsoil and subsoil. (Milford, p. 21) Same applies to ditching. Care should be taken to protect root systems from damage due to excavation or compaction. (Milford "Infrastructure ..." p. 19)

When excavation through roots is necessary or has occurred accidentally, perform work by hand (Town of Milford "Infrastructure, Design, Construction & Administration Standards" p. 24) and cut roots carefully and cleanly (Milford, p. 20).

Prune trees in accordance with standard horticultural practice. Do not cut tree leaders. Repair and paint tree wounds in accordance with standard horticultural practice. (Milford, p. 20)

If the bottom of a culvert is out, the culvert needs immediate replacement or the culvert will collapse.

Oversight

The head of the DPW needs to check regularly the work being done by department personnel to make sure all work is being done to specifications, not overly zealous, and is sensitive to the existing natural landscape.

The ultimate oversight rests with the Select Board, who needs to assess whether work being done is achieving the desired balance between efficient road maintenance and preservation of the scenic beauty and rural characteristics of our roads.



Conclusion

The Guidelines for Routine Maintenance of Gravel Roads in Hancock has been created after the survey of residents and extensive work by this committee (Eleanor Briggs, Neal Cass, Sarah Garland-Hoch, Kurt Grassett, Mollie Miller/chair, Alison Rossiter, Henry Sanders, Chuck Willard, and initially Bill Ruoff). It reflects residents desire for the rural character of the town to be reflected in its roads, to assure roads are an important part of the historic preservation in town, and the knowledge that roads are used for recreational purposes as well as for vehicles, and must be maintained in a way consistent with the desires of the community. These guidelines should be reviewed every three years and appropriate updates made.

Consistent yearly maintenance needs to be done both to maintain the quality of the roads and to ensure that more aggressive reconstruction work is not needed at a future time. All routine maintenance should be done with an eye towards preserving the scenic beauty and rural qualities of our roads.

Maintaining the quality of our roads AND preserving their scenic beauty and rural characteristics may require more time and patience in planning and carrying out future road work. As one comment from the town wide survey put it, "All roads need to be maintained, but scenic roads should be handled with a more gentle touch."

Bibliography & Footnotes

American Association of State Highway and Transportation Officials. *Guidelines for Geometric Design of Very Low-volume Local Roads* (ADT <400), 2001

* The guidelines for geometric design of very low-volume roads are the result of a research and development process initiated by AASHTO in 1996. These guidelines were initially developed through two projects of the National Cooperative Highway Research Program (NCHRP), which is jointly sponsored by AASHTO and FHWA. After completion of the NCHRP research, these guidelines went through the normal AASHTO review process. During the development process, representatives of other interested organizations such as the National Association of County Engineers, the American Society of Civil Engineers, the U.S. Forest Service, the American Public Works Association, and the National League of Cities have participated in review of the guidelines.

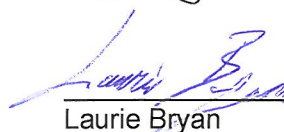
Town of Milford NH Infrastructure Design, Construction, & Administration Standards, April 5, 2010

T-Squared - all or part of the definitions came from this resource

Adopted by:

Date: October 21, 2019


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