

Basics of a Good Gravel Road

Within 30 miles of our road is one of 52 Local Technical Assistance Program (LTAP) Centers established by the Federal Highway Administration across the country. Sponsored by the FHA and the NYS Department of Transportation, with additional funding from Cornell University, the Cornell Local Roads Program provides training and technical assistance to local highway and public works officials in NYS. Why were these centers established? The FHA recognized that without technical training, local highway officials often lacked the critical information that was available to identify and apply the best practices to consistently maintain the local road infrastructure of the country.

As a result, Cornell and other universities across the country developed dozens of workshop topics to provide good technical advice and practices for folks charged with the responsibilities of road maintenance (in our case within NYS). In August of 2015 we were fortunate to have the David Orr, Director and Senior Engineer for the Cornell Local Roads Program visit Honoco and spend a half day with us discussing and evaluating our road. He provided analysis of the present condition of the road and offered numerous suggestions on steps to focus on in order to begin recovering the road in an attempt to avoid very costly remediation strategies (such as digging it all up and starting over).

Dr. Orr made extensive reference to the workshop materials available from schools like Cornell and Penn State to help in our efforts. We have included here some of the essential Cornell Roads Program information on gravel road maintenance basics. The information is directly excerpted from an 85-page technical workshop in 2014 by Paul Male, PE, then the City Engineer for Saratoga Springs. As you read through his information, we would ask that you think about his recommendations relative to our current and past maintenance practices. What follows are his introductory workshop comments:

If you are connected in some way to road maintenance, there are a lot of things to think about....To get you started, here are excerpts from Male's "Ten Commandments of a Good Road" for you to consider:

1. Get water away from the road

The importance of drainage cannot be overemphasized... Water affects the entire serviceability of a road. Too much water in the base and subgrade materials weakens the road. Water allowed to remain on top of a road weakens the surface, and, combined with traffic, causes potholes and cracking...Whether it is mud in the spring or frost heaves in the winter, the presence of excess water in a road is nothing but trouble.

A good surface drainage system is the best way to lessen water damage on a road...A surface drainage system has four main components, the **road crown**, and the superelevation of the road surface, allow surface water to run into the side ditches, **shoulders**, which are extension of the road surface and allow for the passage of surface water to the ditches, **ditches**, which are used to carry water away from the roadway...water left in a ditch can sometimes leak back into the base and subgrade. Water collected and carried to the ditch has to be directed away from the road at frequent intervals, sometimes using **culverts**, which channel water from one side of the road to the other, helping to control the flow of water and slowing it down to reduce erosion.

Highway superintendents are guided by the principles that:

- Water runs downhill

- Water needs outlets at the bottom of all grades
- Puddles mean problems

...water is the highway superintendent's worst enemy

2. Build on a firm foundation

A highway wears out from the top, but falls apart from the bottom. This is another way of saying that the road base determines the service life of a road. The base supports everything above it, including traffic. Without adequate support, the road will deteriorate rapidly. A good road requires a suitable foundation composed of stable material. A road material is stable if it has little change in strength with a change in moisture content, and does not deform excessively under repeated loads whether the material is wet or dry.

3. Use the best materials available

...The quality of soils used by a highway superintendent often depends on local availability and budget. In deciding what to use, consider the long-term consequences of using lower quality material. Using inferior base material may require excessive maintenance during the road's life and perhaps extensive rehabilitation. The adage "pay me now or pay me later" applies to road building.

4. Compact all materials well

The more dense the material is, the stronger it is. When soil is improperly compacted, future traffic loads or changes in moisture content can cause deformation and failure of the roadway.

5. Design for winter maintenance

In areas that receive substantial snowfall, roads that are designed for winter maintenance will be adequate for the rest of the year...if the ditches and roadside areas are wide enough to store snow, chances are they will accommodate spring thaws and heavy water flows.

6. Build for traffic loads and traffic volumes

...a road built to serve residential traffic will break down when it starts carrying a number of large trucks. Roads, like bridges, should be designed with the expected future traffic type and volume in mind. A rule of thumb is to design a road to accommodate the largest vehicle that will use the road under normal conditions.

Highway superintendents can get information and guidance from the NYS DOT or the Cornell Local Roads Program on the type and thickness of pavement mixes to apply to a gravel road. Generally speaking, a low volume road with some truck traffic may provide good service with a chip seal (surface)...

7. Pave roads only when they are ready

Some highway officials make the mistake of paving over a road that is not properly prepared in their haste to get rid of a dusty gravel road. The result may be a complete waste of money. Paving will not cure the other problems the gravel road may have. It must be built of well-compacted layers of free-draining soil, be able to carry expected traffic loads, and drain well. The cost of rebuilding a mistake is

much more than doing it right the first time. Generally the gravels used for the surface of a road are NOT good for use as a road base. Most surface gravels hold too much water to be used as a base, due to their higher fines content.

8. Build from the bottom up

A road that has a poor base and poor drainage cannot be adequately improved with a top dressing of new gravel or new pavement. It may be necessary in some cases to dig out the old road, put in new materials, and build up the road in layers. Before doing anything to correct a road surface problem, highway superintendents should take into consideration what is causing the problem underneath. Insufficient drainage, insufficient depth of base, or poor quality materials may be the culprits. These should be corrected before spending money on the surface.

9. Protect your investment

Roads and bridges need regular maintenance to keep them from deteriorating. Increased weight and frequency of traffic on roads combined with adverse weather conditions means an increased rate of road and street deterioration. Regular road and bridge maintenance preserves your road investment and prevents costly major rehabilitation later on.

10. Keep good records

Highway superintendents know their roads like the back of their hands. Most of them are walking history books when it comes to the roads they manage every day. This knowledge is of little use, however, when the highway superintendent is ill, moves, or retires.

Good record keeping makes roadwork much easier for everybody. It will be easier to draw up budgets and to show citizens plans for roadwork. Recording what type of work was done on roads or bridges, when, and what materials were used can help a lot in making decisions later on. Towns can start by doing an inventory of all roads and bridges, listing length, width, surface types, culverts, problem areas, and other items. Placing these items on a map helps. Next comes listing and prioritizing needed improvements, putting a price tag on them, and taking care of a few problems each year.

Observations

Evident in Male's comments is that there is no mention of directly addressing either the road surface or potholes as part of a good road plan. In practically all of the dozens of workshops and other information available in addition to Male's comments, potholes and other road surface problems are always considered a symptom rather than a source of road difficulties. They cannot be managed away without addressing the underlying causes which create them. In many cases these issues are much harder maintenance choices because it is obviously easier to make a pothole temporarily go away than it is to invest in the plans and resources necessary to make it permanently stay away. From Male's comments, paving and filling potholes with stone likely won't get us too far down a good road recovery plan.

An equally important takeaway inferred in Male's last suggestion is the need for information and planning. A very important part of everyone's expectations from the Association should be a detailed Annual Road Plan and an Annual Budget which reflects that plan. Both should be distributed to the membership well in advance of the Annual Meeting and both should mirror the best road practices mentioned in Male's comments. It's your road, and it is up to you. Thanks.

