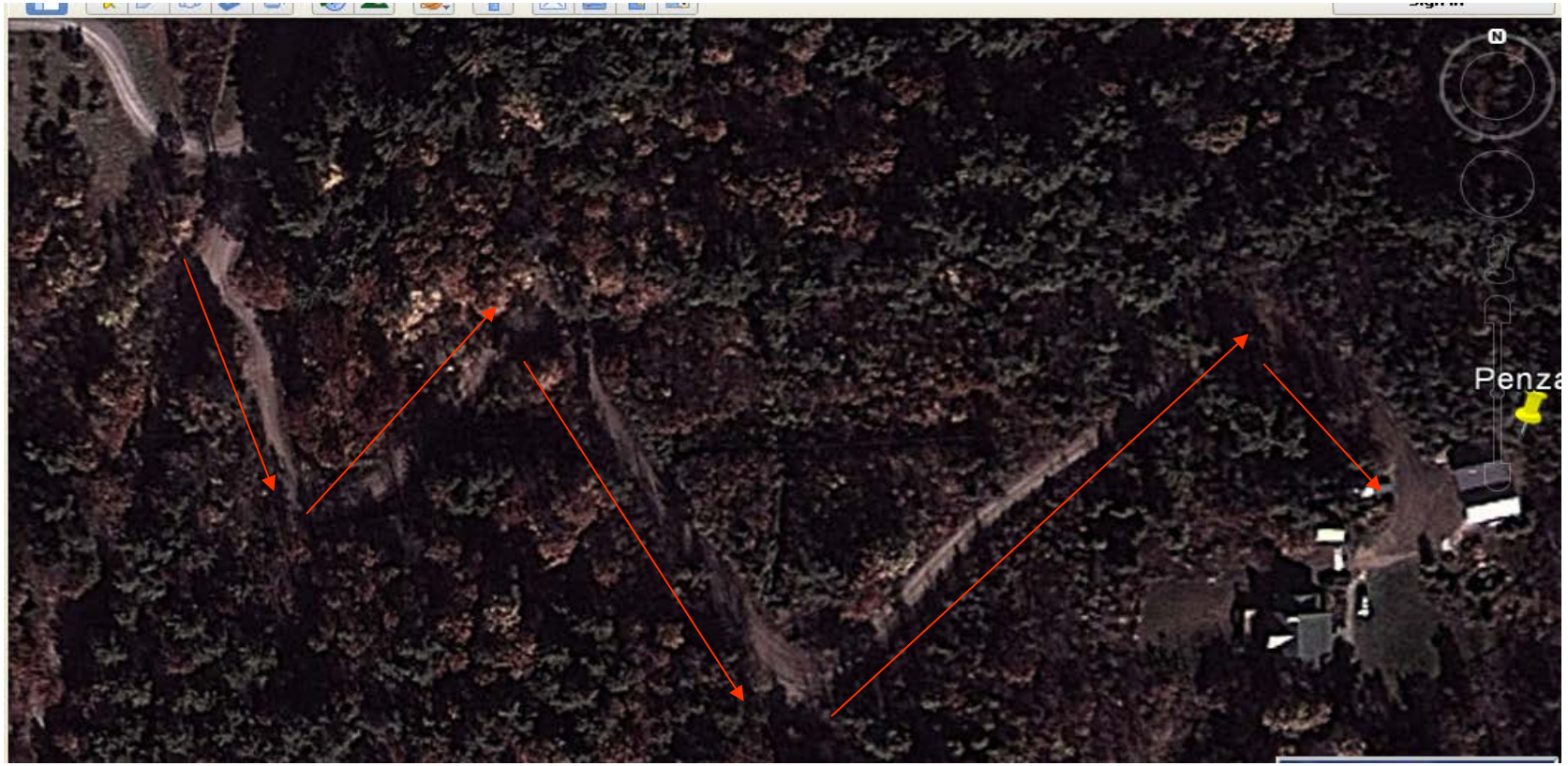
A Ditch In Time

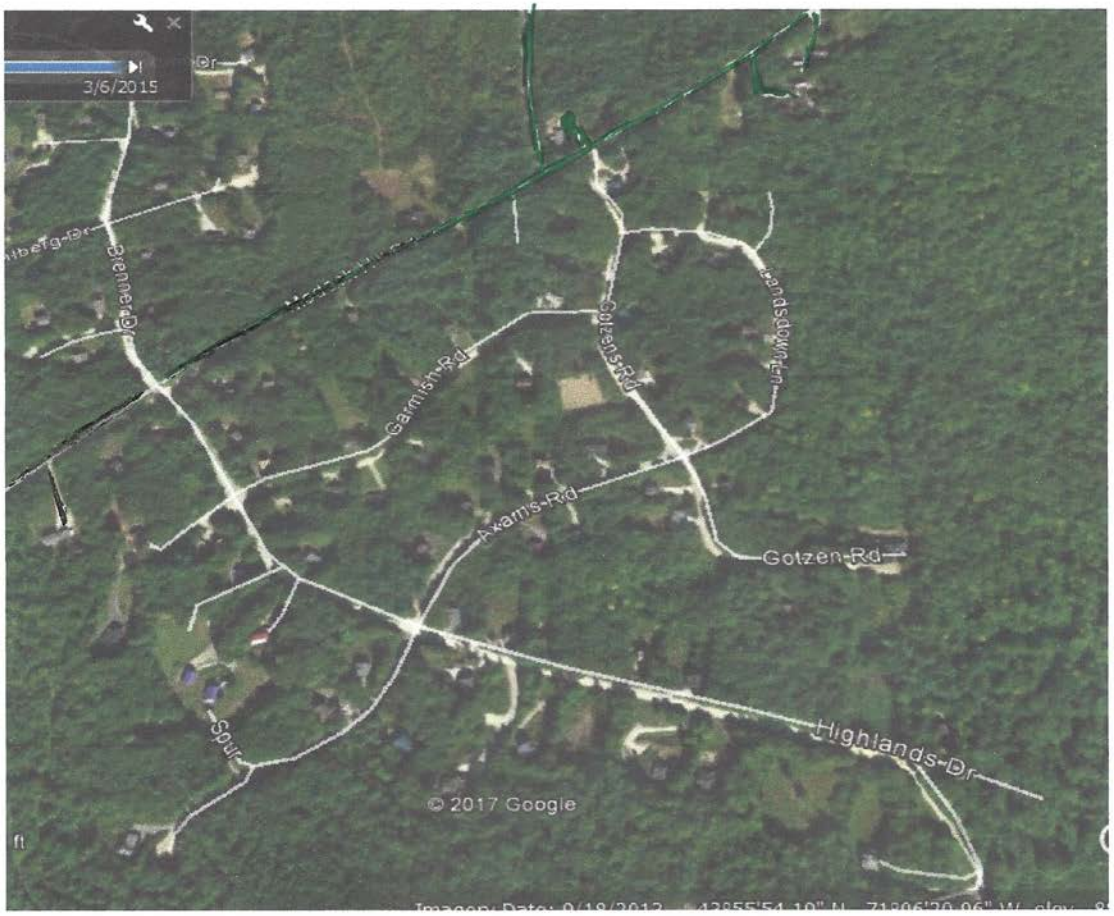
Gravel Roads Maintenance Workshop

So you think you've got a wicked driveway

1600’ driveway with four switchbacks and 175’ of elevation change (11% grade)



Rockhouse Development, Conway




PINKHAM
603-356-5425
LOTS

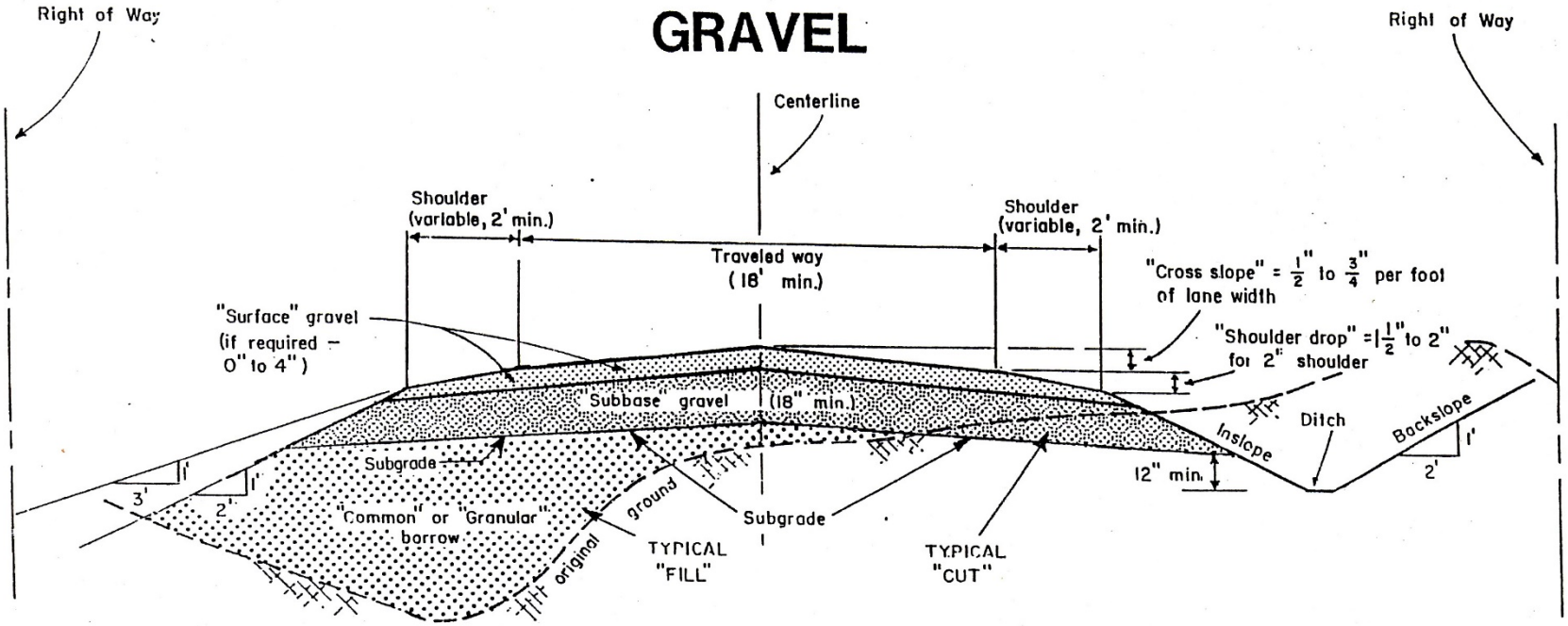
Swift River (left) through National Forest into Saco River that drains the MWV Valley's developments

The best material starts as solid rock that is drilled & blasted…

Then crushed into smaller pieces and screened to produce specific size aggregate

How strong should it be?

One big truck = 10,000 cars!



DESIRABLE MINIMUM DIMENSIONS
OF A LOW–VOLUME GRAVEL ROAD

Developed by
MAINE LOCAL ROADS CENTE
M.D.O.T.
1989

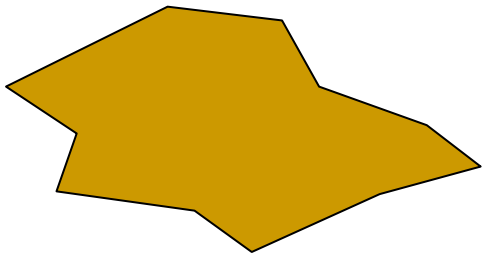
FIGURE 5-1

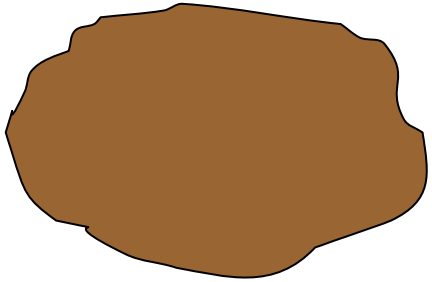
3

The road surface…

- **Lots of small aggregate** (stones) to provide strength with a **shape** that will lock stones together to support wheels
- **Sufficient "fines**," the binder that will lock the stones together, to keep the stones from moving around

- The stone: hard and uniform in size and more angular than that made just from screening bank run gravel





- A proper combination of correctly sized broken rock, sand and silt/clay soil materials will produce a road surface that hardens into a strong and stable crust that forms a reasonably impervious “roof” to our road
- **An improper balance- a surface that is loose, soft & greasy when wet, or excessively dusty when dry**

  (see samples)

One way to judge whether gravel will pack or not…

Here’s another way…

Or:
The VeryFine test
The sticky palm test

As shown in the Camp Roads manual

- **“Dirty” gravel *packs* but does not *drain***
- **“Clean” gravel *drains* but does not *pack***

Other road surfacing materials:

- Rotten Rock- traditional surfacing material in the Mt Washington Valley and a few other places; packs hard, but breaks down under heavy traffic
- Crushed concrete- now available locally
- Recycled asphalt pavement- RAP-

  (see samples)

RAP (recycled aspalt pavement)

- Pavement is made of clean ¾” and smaller material with no fines
- Hot asphalt provides the “glue” that holds it together instead of fines
- Asphalt starts at the plant at 360 degrees, is laid down at 275 degrees
- Works well for low volume, flat areas

  or as base material

  DOES NOT USUALLY PACK

The three most important rules to remember when designing, building, and maintaining a road:

#1. **Drainage**: keep the water out of the base of the road

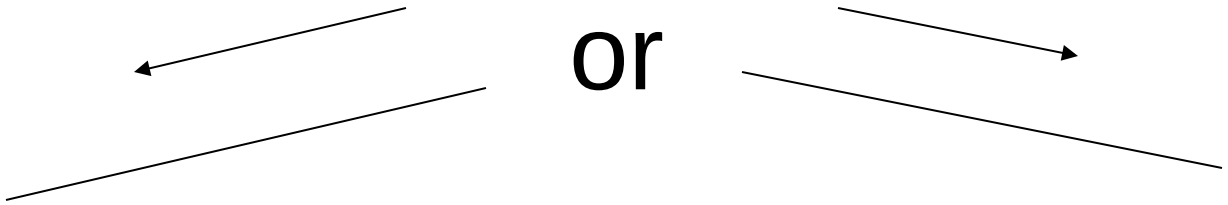
#2. **Drainag**e: get the water off the surface of the road

#3. **Drainage**: get the water safely away from the road

Water is the enemy of the road!

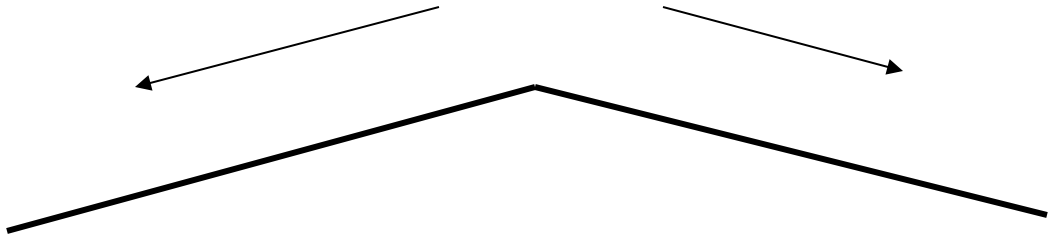
The technique we use to get water off the surface of the road:

Slope the surface of the road to one side or the other so that water cannot ***sit*** on it and soak ***into*** it



or slope to *both* sides…

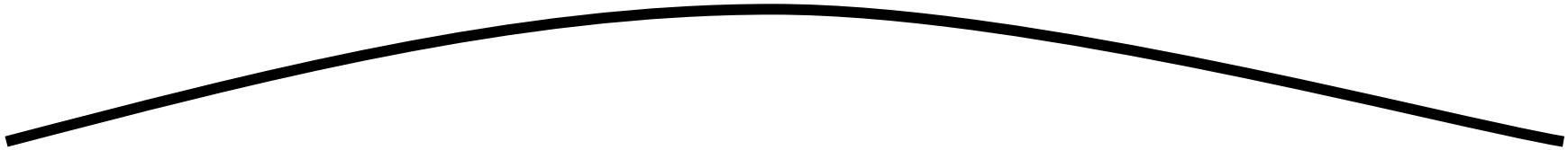
Forming a shape known as a..



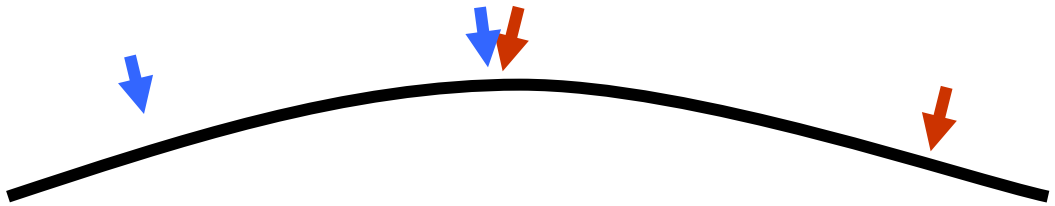
“crown”

Where water is forced from the surface of the road to the ditch line (if there is one) on each side of the road

But doesn’t a crown usually look like:



Yup! But that doesn't make it right!



A rounded crown leads to a problem with the center of the road because it's the **only part of the road not pitched** to one side or the other. And it often gets more traffic than either side! (2x as much

Here's what happens to a road with a rounded crown:

Another example…

How much slope should there be for a proper crown?

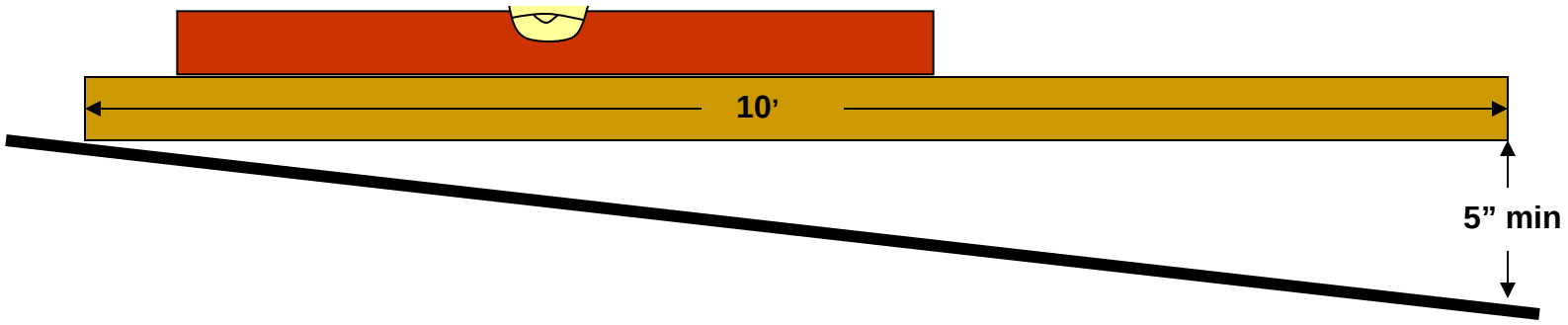
½” to ¾” per foot

Put another way, this is 5” to 7½”

per 10’ of lane width

To measure this:

carpenter’s level and 10’ straight stick



Example of proper crown slope at left only and flat at right; same road, different slope on each side

6.0 TOOLS AND TECHNIQUES

Getting rid of the ruts, bumps & potholes and restoring crown…

How it came to be:
It started with an old Gravely tractor

Progressed to a skid- steer loader (often referred to as a Bobcat)

Note that in each case the attachments go IN FRONT of the operator rather than behind!

And so was born …

DEP > Land & Water > Watershed > Training > Front Runner Program

Search Go

Front Runner

Home

Workshops

Maine Front Runner Gravel Road Maintenance Program

Introduction. Gravel roads and the associated sediment that may runoff them are currently the biggest threat to Maine's lake water quality. Road maintenance is key in preventing gravel roads from potentially eroding into streams and lakes. The Front Runner is a tool which can be used to achieve this goal. Proper road grading has been shown to be a significant portion (20-30%) of annual camp road maintenance and repair expenses.

The equipment. The Front Runner is a grader/rake attachment that fits onto the front of pick-up trucks utilizing a snowplow mount. It consists of a row of heavy-duty, flexible, spring steel tines individually bolted to a rugged, welded steel frame. A set of adjustable gauge wheels is attached to this frame in front of the tines for support. It is controlled by the truck's snowplow hydraulic hoist.

Please visit the Front Runner Homepage where the developer of the Front Runner describes the equipment in greater detail. (Rural Home Technology) (off-site)

The program. There are 6 front runners available for use across the state through a program being run by the state soil and water conservation districts. The program began in 2001 supported by federal funding (Clean Water Act, Section 319) with the assistance of Maine DEP. After a training session an individual is permitted to borrow (for a small maintenance fee) the front runner to do maintenance work on their gravel road.

Workshops for 2005. Gravel Roads Maintenance & Construction Workshops with Front Runner Training Sessions are being held in counties across the state.

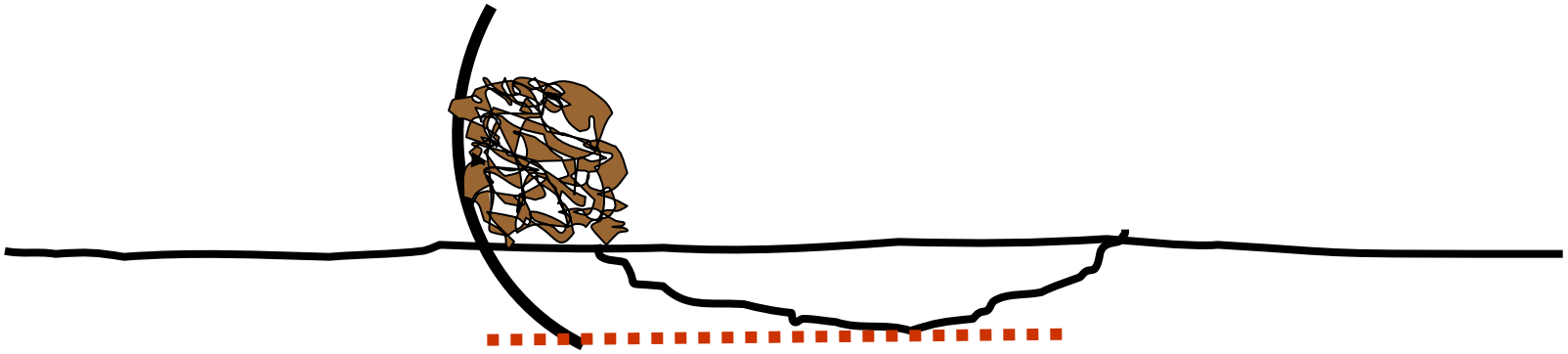
Front mounting = Big advantage in performance

- Improvement in operator visibility,
- Enhanced digging action helps cut into the road to rework the surface

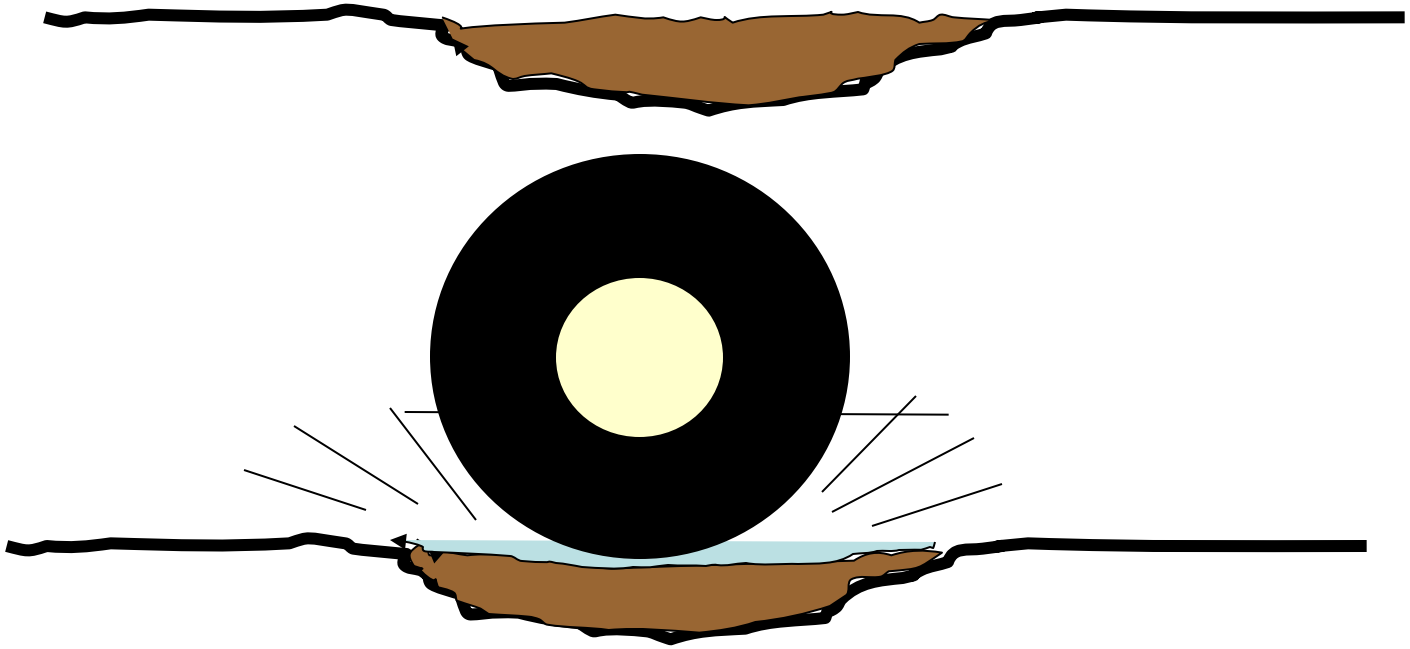
  see push-pull demonstration

But why the need to cut into the road surface?

To get the best results from regrading, it is necessary to cut into the surface, ideally to the **bottom of the deepest ruts or potholes**

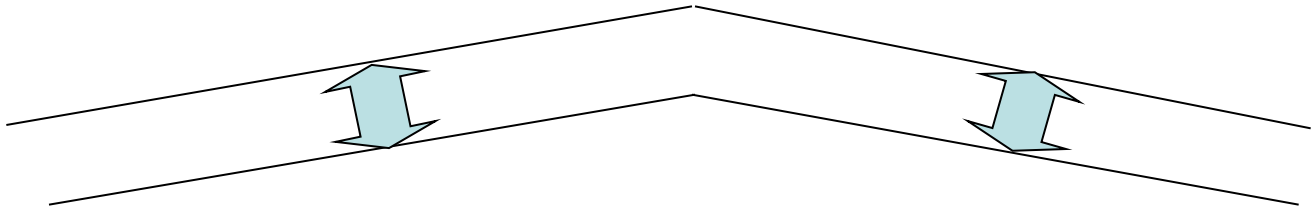


When a rut or pothole is filled in with loose material, the new material soon compacts down and fills with water in the next rain



Passing traffic splashes water and soil out to reopen the pothole

This loosened material is spread and shaped in an even layer (just as new gravel would be)



This helps prevent potholes and ruts from coming right back by eliminating them

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7.0 DOING THE DIRTY WORK

Starting to grade

Preparing the worksite

Use the raking action to clear leaves and debris


GOOSSEN INDUSTRIES
GOOSSEN

Start in the middle of the road

to cut out those potholes first

rather than fill them with material from the sides.

After the center is loosened

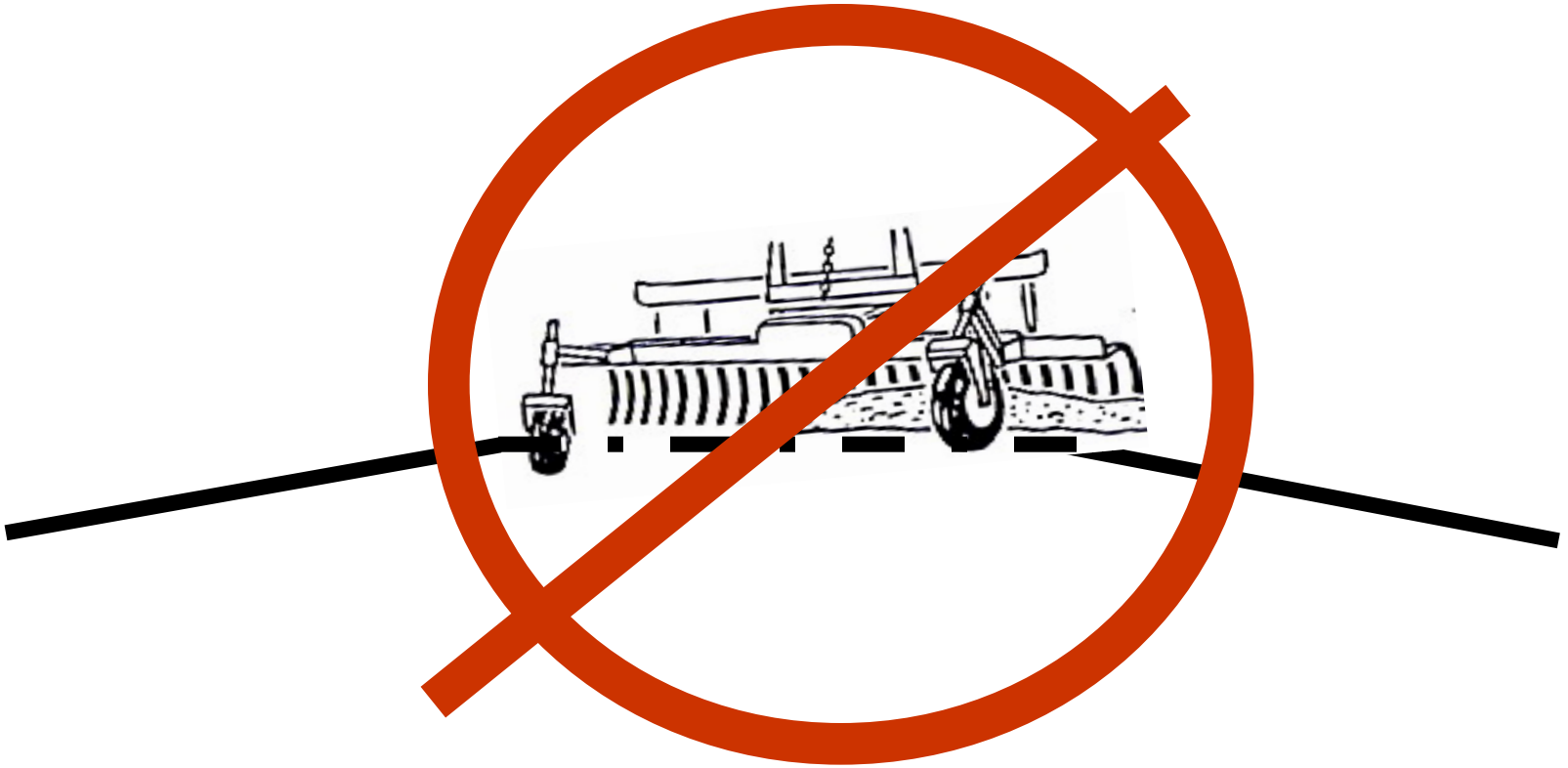
start bringing in material from the sides. Most prefer to work on the **left side of the road** for visibility up the ditch line.

After working the edges of the road, switch sides while still bringing material to the center

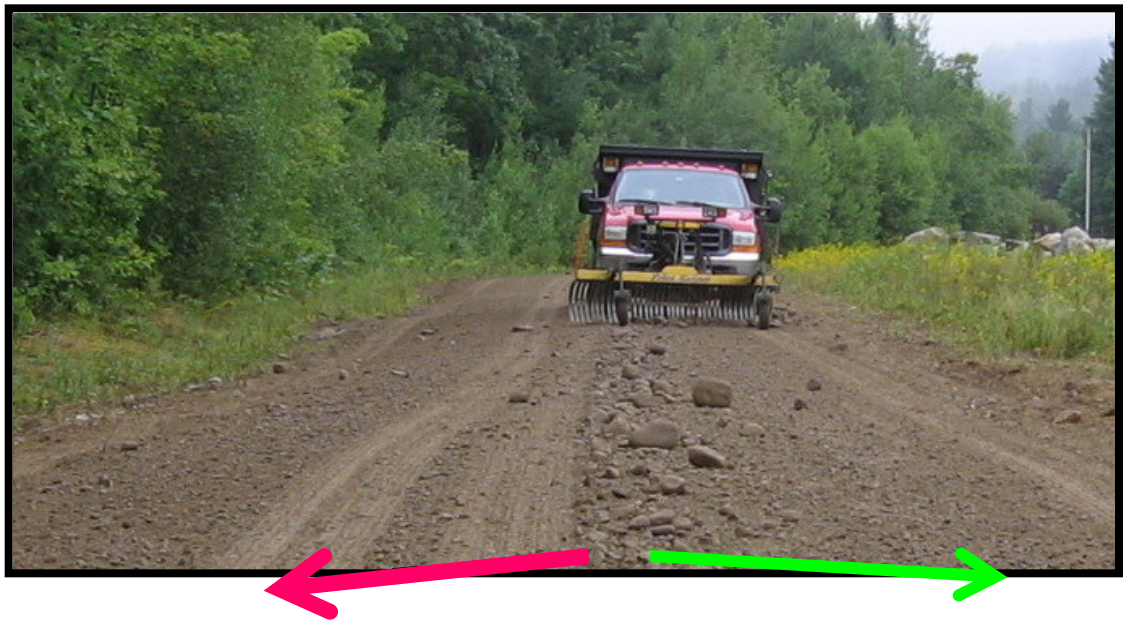
But still be careful of those soft shoulders, especially in early Spring

Sort debris from reclaimed material and rebuild crown

Crossing the centerline will scrape off the crown!!!!



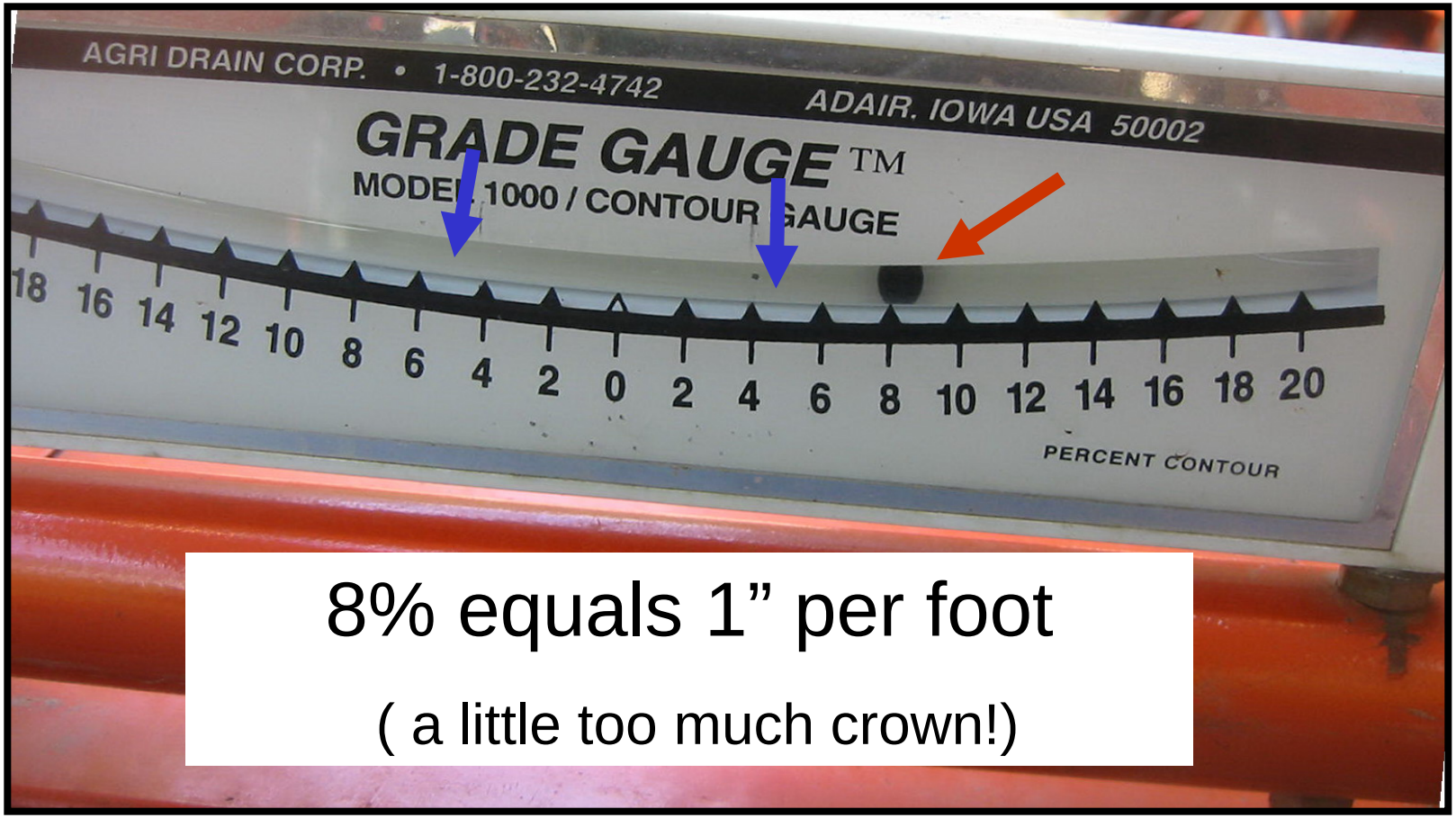
Keeping to each side will also place a truck wheel in the middle of the road to help compact the newly placed material on the crown.



Treat each side as an entirely different drainage surface!

Hard to keep this from cutting crown on most camp roads

Here's a convenient way to determine degree or percent of slope when constructing the crown



8% equals 1" per foot

(a little too much crown!)

Speaking of compaction.. It's essential to road stability

Steel drum vibratory roller: optimum for good compaction,

- especially when reworking several inches of the road surface
- laying down a heavy layer of new processed gravel
- preparing for paving.

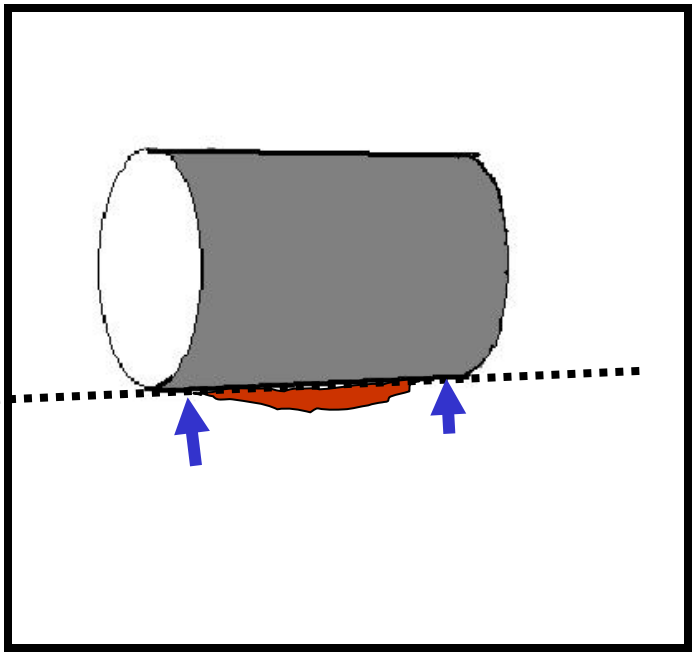
- will compact 6” to 8” deep where wheel traffic only compacts 3” to 4”

Because most of us have limited access to such equipment

- Wheel (traffic) compaction: reasonably effective, especially if the road is moist
- Any compaction is better than none.

- Rolling with truck wheels may be more effective that rolling with a drum for regular maintenance on driveways…

A steel drum roller can “bridge” a filled in pothole or low spot, where a truck wheel will compact these spots more effectively



Beware of “grader berms”!

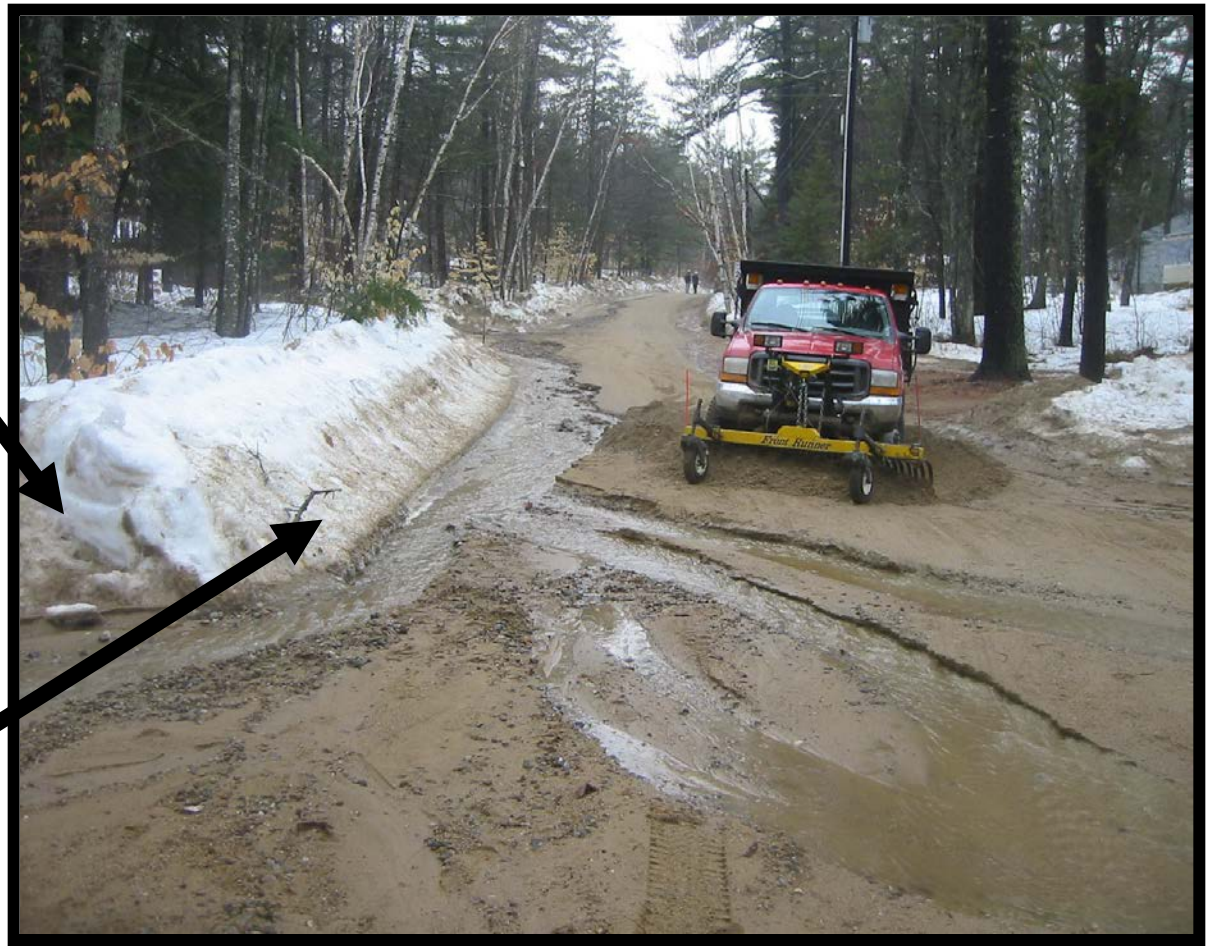
Don’t leave them at all, if possible, especially on hills

The results can be the same as with the ice dams that form at the sides of the roads during icy winters.

And even worse when Spring rains are more intense than usual (4/05)

Road ditch under snow

Ice dam



Impact of increased development on existing road system

- Fewer places to safely dispose of water
- More water to dispose of

- One inch of rain on one acre = over 27,000 gallons of water
- Roofs and blacktop drives heat up in sun, transfer heat to rainwater
- Fish don’t like hot water

In conclusion:

- Good gravel with stone for strength and binder to help it pack

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- “A” shaped (or superelevated) crown to shed water to side(s)

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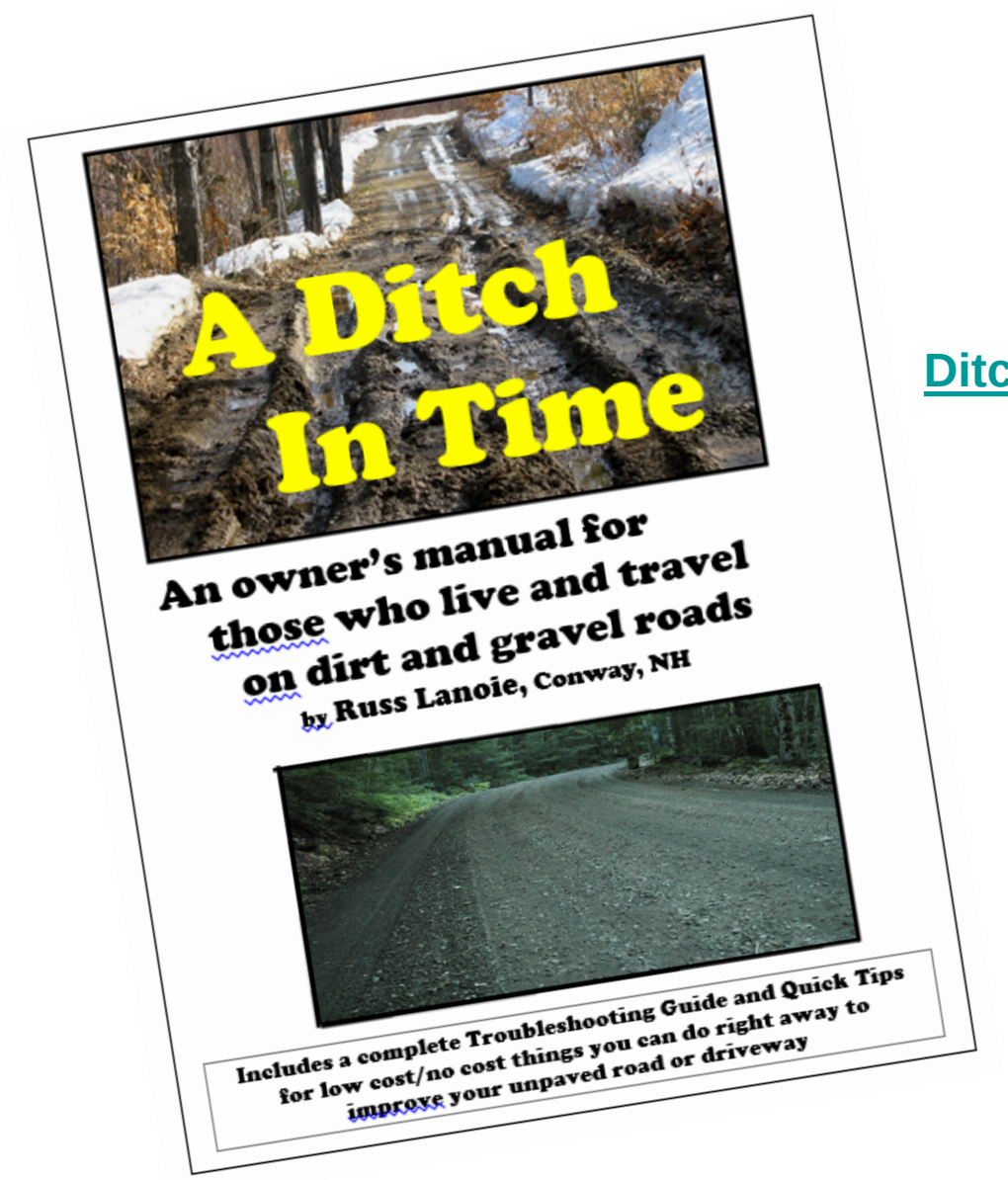
- “A” shaped (or superelevated) crown to shed water to side(s)
- Smooth surface from crown to ditch so water ***sheets*** to sides



https://tinyurl.com/Ditch-in-Time-Road-Manual

QUICK TIPS: THINGS THAT CAN BE DONE NOW TO IMPROVE YOUR GRAVEL ROAD OR DRIVEWAY

Every private road should have a steward, someone to watch out for the things that can cause greater problems if not taken care of NOW! If it's your own driveway, YOU are the steward. Knowing when to take action yourself or to notify whoever can take action might save a road or driveway from disappearing needlessly.

As a steward you should watch:

Water drainage patterns on the surface of the road. If water is beginning to flow where it should not, even a hasty scratch mark with a hoe, shovel, stick or heel of a boot to redirect water to where it *should* go might divert disaster. Catching this in time is the key. Hence the title of A Ditch In Time.

Culvert inlets and outlets as well as ditches to be sure they are not blocked. A stick or two across a culvert or a ditch can dam water flow just like a beaver dam, especially if other debris snags on and builds up. The dammed water will find another path across or out into the road, most likely causing a washout. When you are out for a walk, throw those errant branches back into the woods.

Water bars (sometimes known as "rolling dips.") Be sure they are not losing their shape due to mechanical damage from snowplows or normal wear and tear and therefore allowing water to jump over and run down the wheel tracks in the road. A little handwork can often make them serviceable once again.

Water turnouts and grader berms. Keep turnouts open and look for areas where more turnouts might be added. Cut slots through grader or snowplow berms to let water off the roadbed, especially on hills. This is true even for paved roads with regards to snowplow berms.

The Perfect Crown