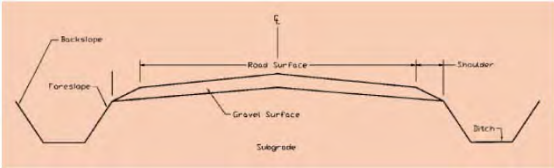


# Section 1 Materials



## Good Material vs. Poor Material



- Good x-section
- 4%
- Good crust of worked in gravel
- Good ditches



- Good Material (chop a hole to see it)
- Poor Material



- This material is loose because it is unstable due to lack of "fines"
- Needs silt or till to be mixed in

## What Material Types do You Have Available?

- Silt - weakest
- Clay - weak
- Till - stronger
- Coarse Sand – can be used in place of gravel if limited material or funding
- Poor Gravel
- Good Gravel







## Type of Stabilization Available

- Silt
- Clay
- Till
- Calcium Chloride
- Potash Tailings
- Lignosulphonates



## Sort and Prioritize Roads for Type and Amount of Gravel

- Low usage/slow speed 
- Intermediate usage 
- Farm access 
- Grid/super grid 

## Low Usage/Slow Speed

- Allow to “grass in”
- Utilize coarse sand in place of gravel, processing cost is loading only = \$0.50/cu. Yd (\$0.065/cu. m)
- Spot gravelling only
- Sign for dry weather access only

## Intermediate Usage

- Pit run gravel, processing cost is loading only = \$0.50/cu. Yd (\$0.65/ cu. m)
- Screened gravel, \$1.25/cu. Yd (\$1.63/cu. m)
- Spot gravelling only



## Remaining two road systems should have crushed gravel, but...

- Must be sufficient coarse fraction (rock) available
- Closely monitor and control the gradation
- No use applying this expensive processed gravel if road surface is not properly prepared

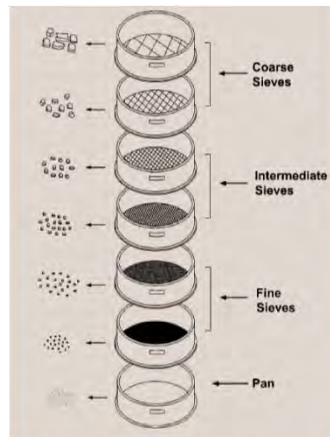


Figure 9. Stack of sieves used for testing the gradation of aggregate.

## Farm Access

- Crushed gravel, \$2.25/cu. Yd (\$2.93/cu. m)
- Spot gravelling with full application every 2 years if needed

## Grid/Super Grid

- Coarser specification crushed gravel, \$2.75/cu. Yd (\$3.58/cu. m)
- Annual application, but half application at a time
- Apply second half application only if needed

## Install a Slope-Meter and Check Existing Surface for X-Slope

If cross section is too flat i.e. ponding water



- Salvage existing gravel and place as windrow “over the side”
- True up x-slope to 4%

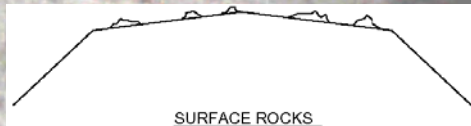


Price: \$230



## Check Existing Surface for Protruding Rock

If rock removal needed



- Salvage existing gravel and place as windrow “over the side”
- Scarify
- Rock picking
- Re-compact
- Ensure 4% x-slope
- If unable to remove protruding rock, ensure good cover

## Check Existing Surface for Unstable Material or Low Strength Sub-grade

If surface material is unstable this creates “piles” between the wheel paths



- Salvage existing gravel and place as windrow “over the side”
- Loosen enough sub-grade material to “dirty-up” windrowed gravel, and mix into windrow
- True up x-slope to 4%
- Re-lay the mix of salvaged gravel and sub-grade material
- Add minimal new gravel, allow to “mud in” with one or two rains, then spot gravel if needed

## Check for Low Strength Sub-grade

If sub-grade is unstable this creates “ruts”

- Salvage existing gravel and place as windrow “over the side”
- Cap the road with till
- True up x-slope to 4%
- Replace salvaged gravel
- Add minimal new gravel, allow to “mud in” with one or two rains, then spot gravel if needed



## Application and Rate

What application rates do you use?

Low usage/slow speed

- 50 cu. yds/mile (40.4 cu. m/km)
- Spot gravel
- Every 10 years

Intermediate usage

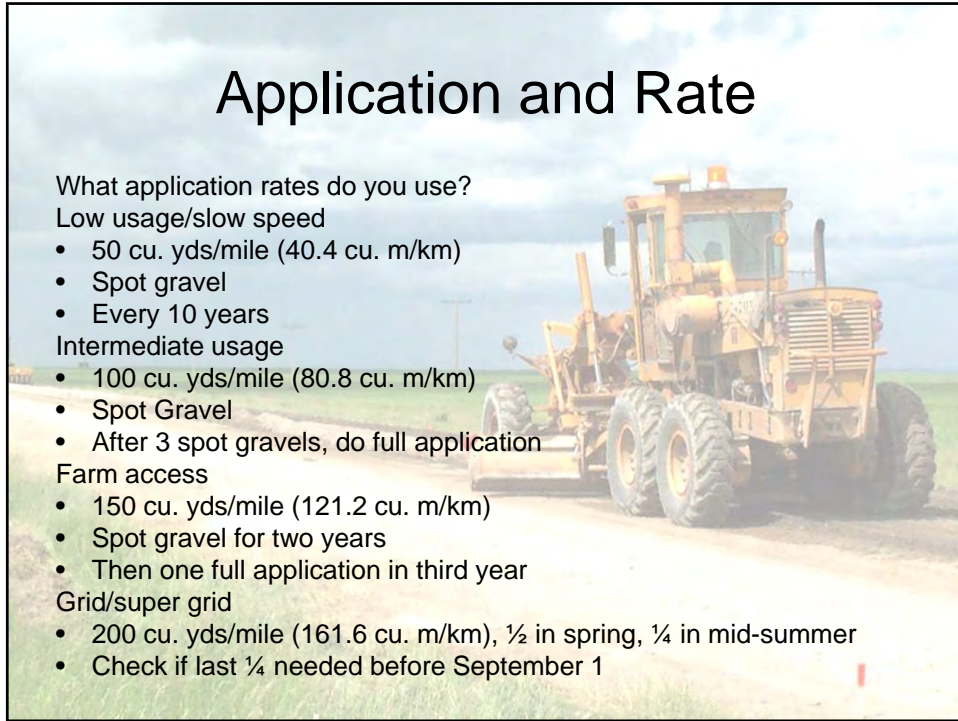
- 100 cu. yds/mile (80.8 cu. m/km)
- Spot Gravel
- After 3 spot gravels, do full application

Farm access

- 150 cu. yds/mile (121.2 cu. m/km)
- Spot gravel for two years
- Then one full application in third year

Grid/super grid

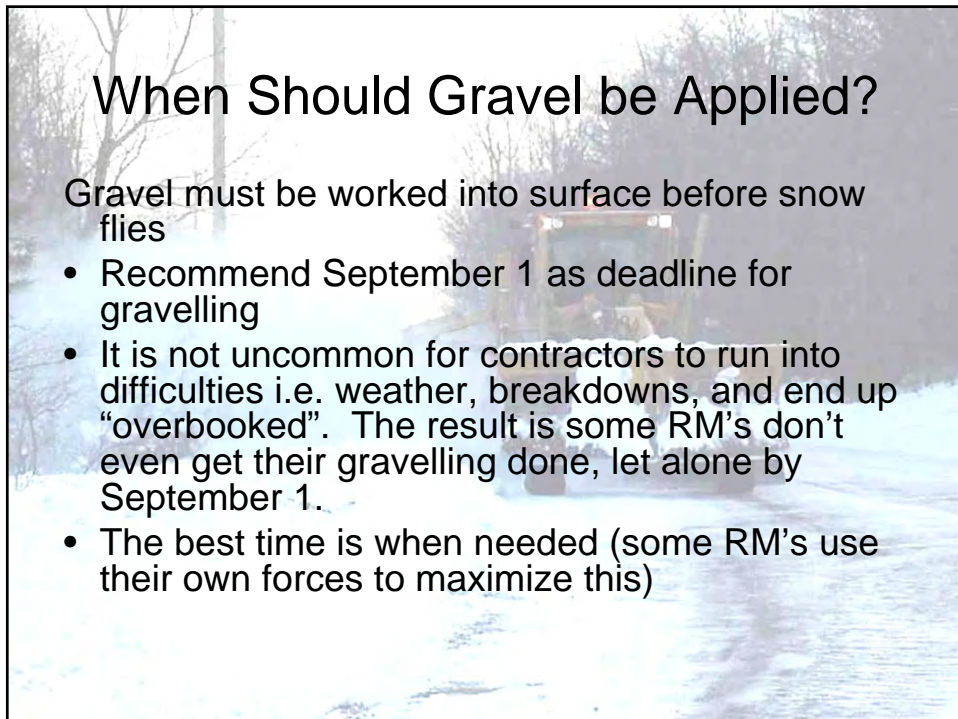
- 200 cu. yds/mile (161.6 cu. m/km),  $\frac{1}{2}$  in spring,  $\frac{1}{4}$  in mid-summer
- Check if last  $\frac{1}{4}$  needed before September 1



## When Should Gravel be Applied?

Gravel must be worked into surface before snow flies

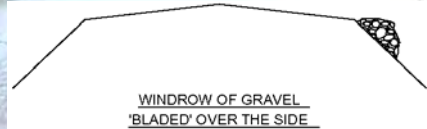
- Recommend September 1 as deadline for gravelling
- It is not uncommon for contractors to run into difficulties i.e. weather, breakdowns, and end up "overbooked". The result is some RM's don't even get their gravelling done, let alone by September 1.
- The best time is when needed (some RM's use their own forces to maximize this)





## Preventing Loss of Gravel During Winter Snow Removal

Some RM's practice blading windrow of gravel "over the side"



- Ensure enough snow left on surface so as to minimize gravel loss during snow removal



## Is Calcium Chloride Economically Viable

Without CaCl

- Significant dust problem on high volume roads
- Gravel tends to be "blown off" surface
- Regular grading required

With CaCl

- Dust problem reduced
- Reduction in loss of gravel
- Less grading required

