“All Roads are Not Paved With…” Winter Maintenance of Gravel & Surface Treated Roads.

The “forgotten” roads?

So how do we maintain these roads that have a sub standard supporting underlying structure in an uncompromising seasonal environment?

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2018 Michigan Winter Operations Conference

Gravel / Surface Treated Roads
A Quick Introduction

Municipality of Port Hope

A mixture of urban and rural roads, 700Lkm (450Lmiles)

2 Works Yards, Population of 25,000

Served by 8 Combo Tandems

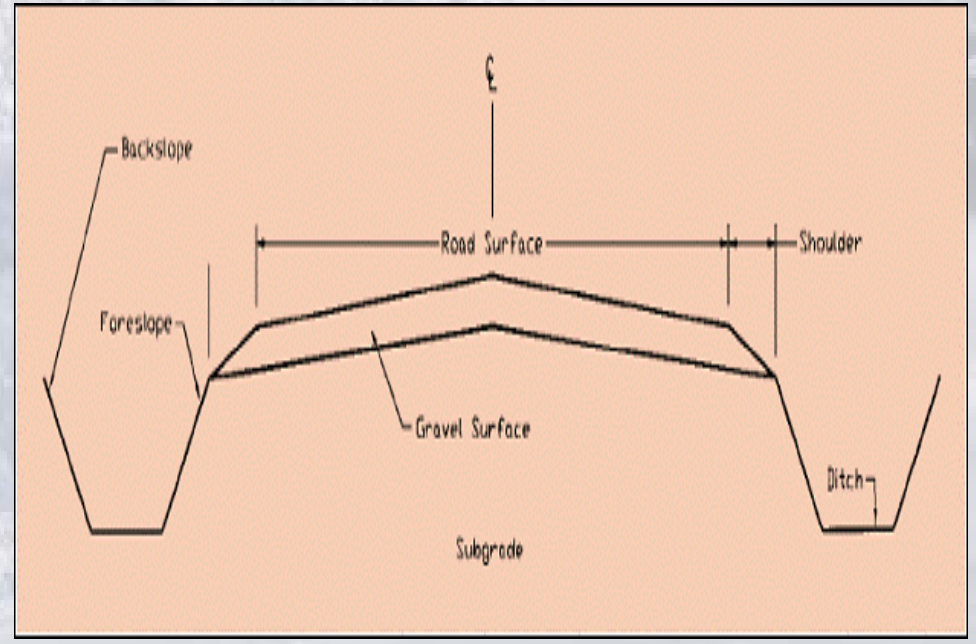
approx. 100km – (62 miles east of Toronto)

Situated on Lake Ontario - on the Hwy 401 corridor.

Gravel/Surface Treated – Rural Roads Objectives
What do we want to accomplish?

Snow Removal?	Not really; incomplete
Snow Plowing?	Better; still not complete
Snow & Ice Control	Best!

"To be aware that the roads surface structure is constructed of different materials, which in turn, under varying weather conditions will react with many different behaviors."



Winter Maintenance
Gravel Roads

Generally, rural gravel and surface treated roads require more maintenance, meaning equipment suitability, financial commitment and staff training

Winter Maintenance
Gravel Roads

Excessive plowing and placing abrasives (sand) may physically change the road's crown, shoulders and compromise the load bearing capacity.

Thus, creating an unstable and damage prone road.

Recommended Practices: Materials

1. Avoid excessive sanding
   - o adding too many fine soil materials will create a "greasy" condition during wet weather
   - o adding too many coarse materials , i.e. gravels, will create a loose surface that won't compact well and won't provide the desired traction
   - o General industry rates for Gravel Roads, range from 250kgs/2Lkm to 570kgs/2Lkm at a 5% salt blend, (or 800lbs/2Lm to 2,000lbs/2Lm).

Recommended Practices: Materials

2. Avoid excessive sanding cont'd
   - In either case, potholes, wash boarding, soil erosion, shoulder berming, ditch/culvert clogging and outfall sedimentation will increase

Recommended Practices: Materials

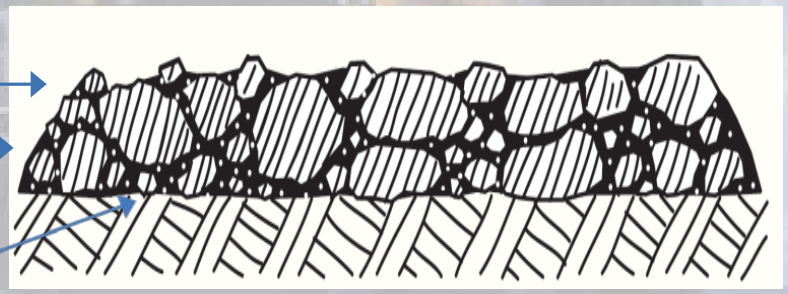
3. General industry rates for Surface Treated Roads range from 200kg/2Lkm to 450kg/2Lkm with mix ranges from 5% salt blend to 50%

Chip Seal

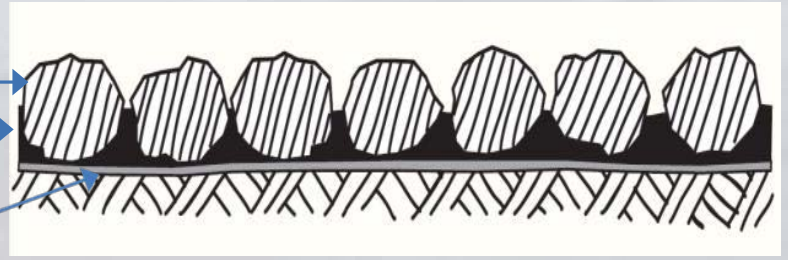
Gravel Seal

Recommended Practices: Know Your Surfaces

- Gravel Seals
  - ➢ Graded-aggregates, Low viscosity binders
  - ➢ Medium setting, Priming not always required



- Chip Seal
  - ➢ Chippings, High viscosity binders
  - ➢ Rapid setting, Priming required



Recommended Practices: Know Your Surfaces

- Although Surface Treated roads provide a seal like material, and provide minimal protection from the detrimental effects of salt, all negative impacts (same as a gravel road) will eventually be noticed.

Recommended Practices: Know Your Surfaces

- Surface Treated roads under normal seasonal conditions will only provide a life expectancy of around 10 years.

Recommended Practices: Plowing

- Keep the gravel road clear during the first snow by plowing above the level of the ground and listen to the plow for scraping if too low

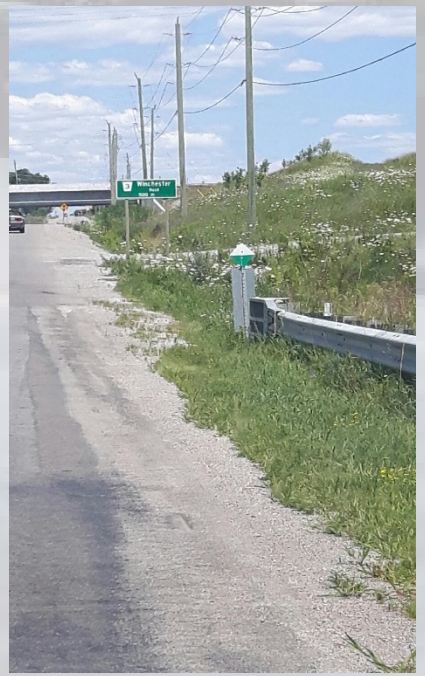
Recommended Practices: Plowing

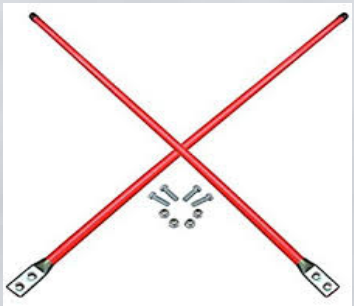
- Plow to the road width
  - Keep as much of the road width open as possible. The freeze – thaw cycles will quickly narrow the travelled portion
  - In open areas, bench back to reduce back to surface snow creep

Recommended Practices: Plowing

The rural road environment also requires us to be vigilant about obstructions…

- Post and Wire (Cable Guide systems) or Guiderails (W channels)





Recommended Practices: Plowing

The rural road environment also requires us to be vigilant about obstructions…

- No shoulder drop off areas
- Parked vehicles, pedestrians and Mailboxes…

Recommended Practices: Plowing

- Pre-season reviews should include all known obstacles, e.g. mailboxes, guiderails, bridges / abutments and especially culverts and areas prone to flooding.

Recommended Practices: Plowing

- Let the snow accumulate to a minimum of 2” or 50mm before plowing. During the early seasonal operations, leave a small amount of snow on top of the gravel
- Use your applicable Level of Service or the MMS, as per snow accumulation, roads at this level will likely be Class 4 and 5 or your lower serviced road networks

Recommended Practices: Plowing

- If plow hook up allows, tilt back the front blade back slightly more than the hard surface norm 55^0 (observed as an aggressive approach)
- Consider the use of blade skid shoes on both front and wing blades

Recommended Practices: Plowing

- By providing this buffer, winter sand mix will be able to create a footing, yielding better traction

Recommended Practices: Plowing

- As weather conditions permit, the newly formed layer of snow or ice should freeze and provide a hard surface to plow, as well as provide a surface to hold any abrasives applied longer

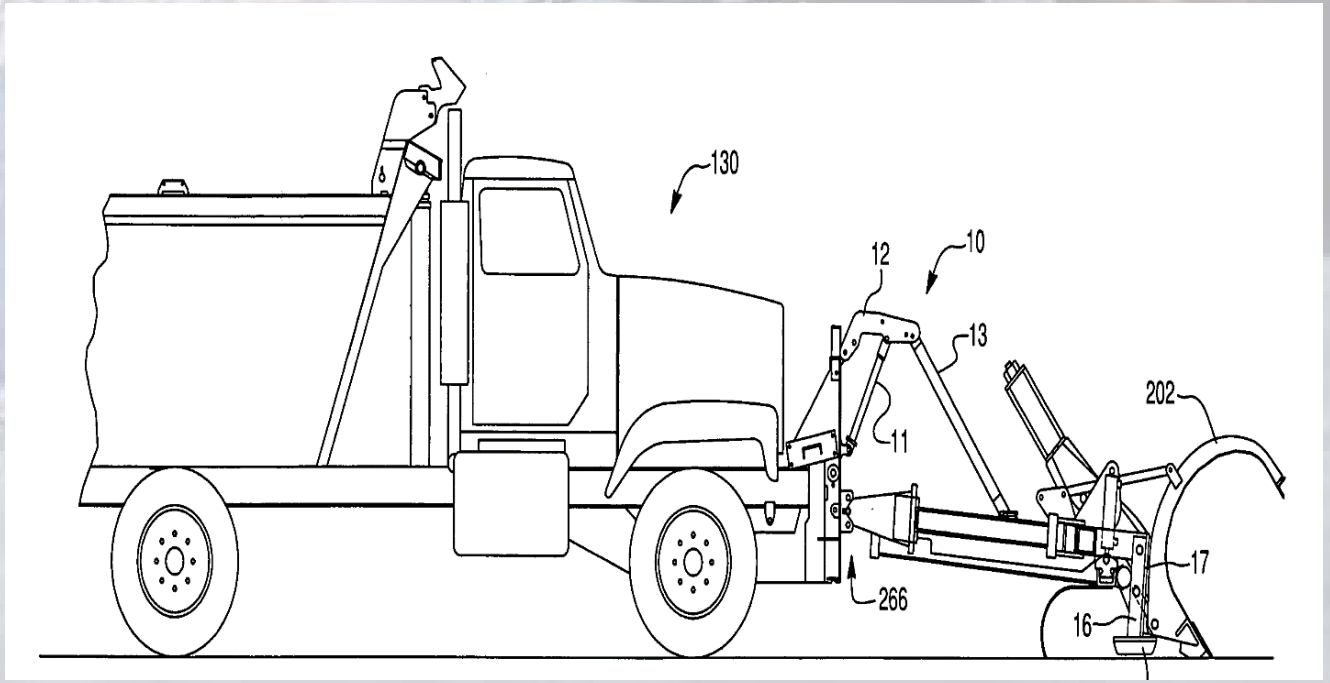
Recommended Practices: Plowing

- Surface Treated and Gravel roads will require a similar approach however;
- Recommended plow blade angle for gravel surfaced roads is suggested as 40 to 45^0 (it's more of an observant approach and less aggressive should be considered).

  - Keep in mind whether gravel or sealed, the supporting sub-base has limited strength and its properties will fluctuate with ground temperatures / climate

Recommended Practices: Plowing

The recommendation when plowing rural roads, is lift and tilt the plow blade back to an angle of 40 to 45^0, less intrusive to a gravel and surface treated roads.



Recommended Practices: Plowing

- Topographical, elevation and environmental conditions vary from place to place, use of appropriate materials, spread rates and timing will have the most impact

Plowing Incidents:

Recommended Practices: Plowing Incidents

Recommended Practices: Plowing

- Open areas and the effects of wind and sunshine *(as noted in the Blowing Snow Control Best Practices) may lead to the considering of other methods of operation*

Recommended Practices: Operations

- Understand how the road surface is reacting to climate and your operations
- Sunshine on a surface treated (i.e chip seal) versus loose top (i.e gravel) will respond differently

- Surface treated roads will absorb and hold heat longer than a loose surface

Recommended Practices: Equipment

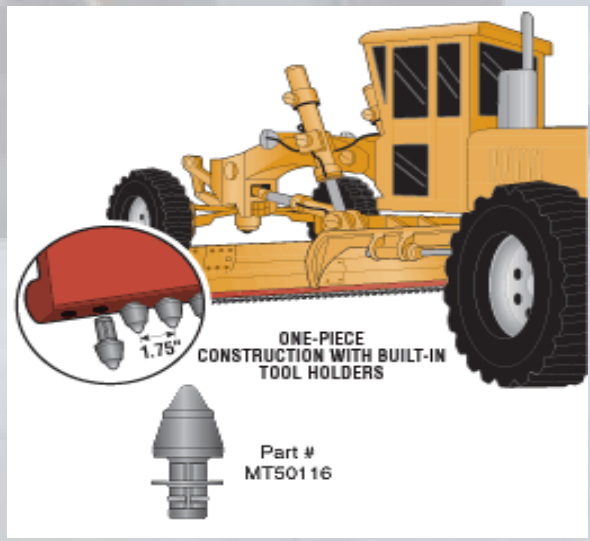
- In areas prone to extreme icing and/or sheltered locations, tire chains should be considered
- More traditional practices promote the use of graders as these units will provide a less intrusive plowing burden to the gravel surface.
- Mid-body and rear blades

  are more easily adjusted to

  meet the surface conditions

Recommended Practices: Equipment

- Ice blading (graders) has benefits when there is excessive snow and/ice build up. Especially useful on sharp curves and steep hills



Recommended Practices: Equipment

- Ice Scrapping, instead of leaving a sanded smooth surface, provide a surface that will retain materials longer by adding grooves in the ice's surface.
- This will also allow warmer temperatures and sunlight to penetrate and keep workable.

Recommended Practices: Winter Woes

1. Gravel road snowplow damage

   - Exercise caution when plowing; have pre-arrangements for "not plowing" under certain conditions, or plow with front / side mounted "ice busters" instead of a conventional plow.

   - Remember common (hard top surface) plows with trip edge blades are designed to cut under the snow.

Recommended Practices: Winter Woes

2. Gravel road snowplow damage
   - Methods of ice control, while not damaging the surface.

Recommended Practices: Equipment

- Tandem and Tri-Axle combination units, due to length of routes and material capacity are also efficient. However an allowance for narrower roads and utilizing single axle units also become an asset in confined locations

Recommended Practices: Winter Woes

3. Gravel Road Damage caused by improper snowplow blade position,

- Plow at angles that create evenly dispersed windrows.
- Operating down the middle of a gravel road will compromise the crown,
- Most gravel roads are 2 lanes, aiming for about a 2 to 3 degree cross fall slope on each lane.

Recommended Practices: Summary

Use the right sand mix…

**straight salt and liquids should not be used*

Listen to your blades

Know your surroundings,

your equipment / resources AND your area's micro climate characteristics

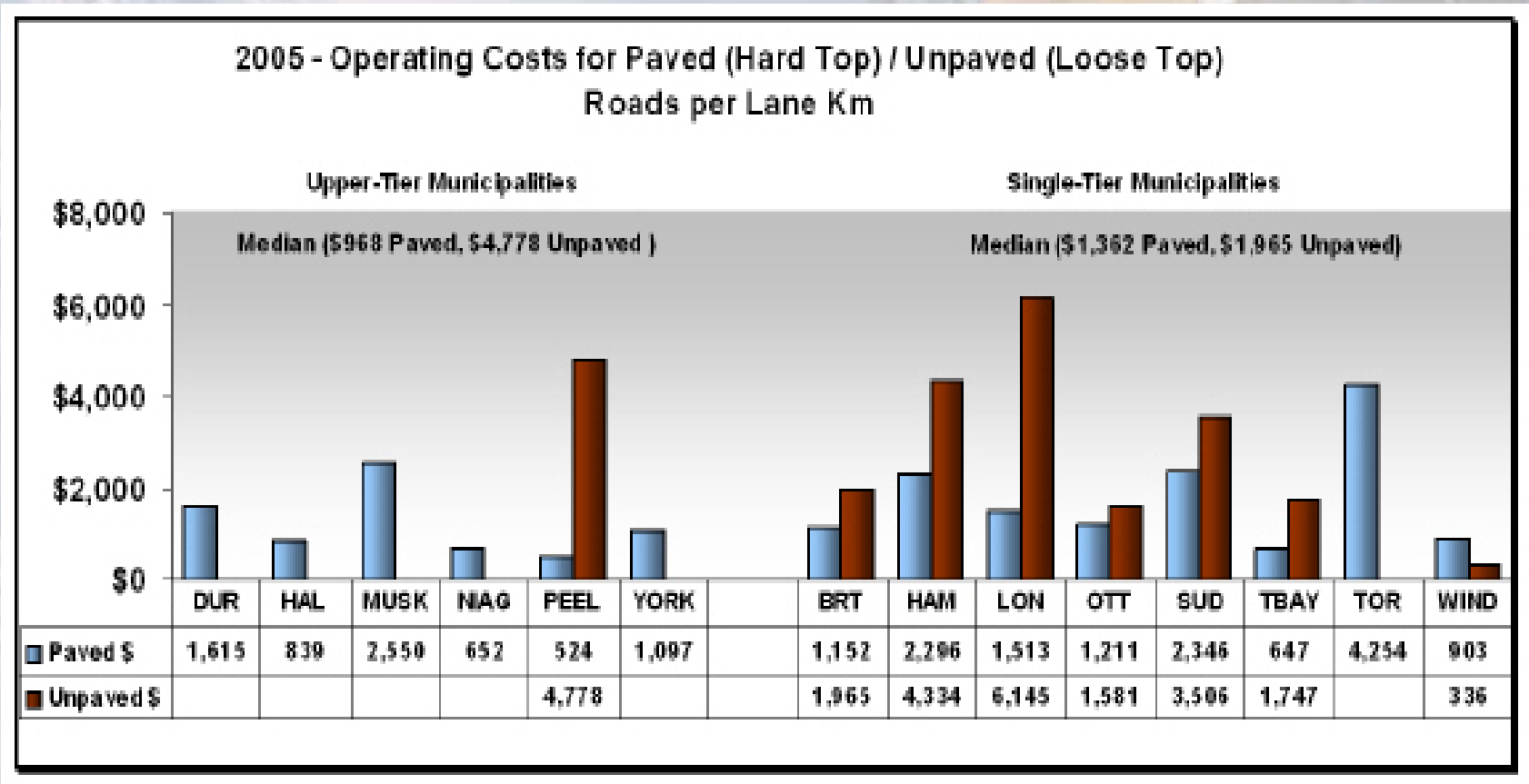
Communicate Pre, During and Post events to all staff about on-going issues,

"Knowledge Transfer"

Recommended Practices: Summary

Reality Check !

So what is the Financial comparison ?



	DUR	HAL	MUSK	NIAG	PEEL	YORK		BRT	HAM	LON	OTT	SUD	TBAY	TOR	WIND
Paved $	1,615	839	2,550	652	524	1,097		1,152	2,296	1,513	1,211	2,346	647	4,254	903
Unpaved $					4,778			1,965	4,334	6,145	1,581	3,586	1,747		336

Conclusion…

Know what your rural road demands are and what resources you have to address it with.

Thank you
Questions ?

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