

Gravel Road Maintenance

Why our infrastructure is failing

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Saskatchewan Gravel Roads

- Statistics Canada estimates Saskatchewan to have:
 - 198,700 Kilometers of gravel roads
 - 107,289 Miles of gravel roads
 - 81.7% of our roads are unpaved

Gravel roads are much different than paved roads.

The cross section is the same, however the wear surface is different.



History of our Gravel Roads



Why Gravel Roads Rut So Easily

1. In the 50s and 60s many of the gravel roads in our province, when they were first made, were not constructed well.
2. The weight and the volume of traffic has increased tremendously since they were built.





History of our Gravel Roads



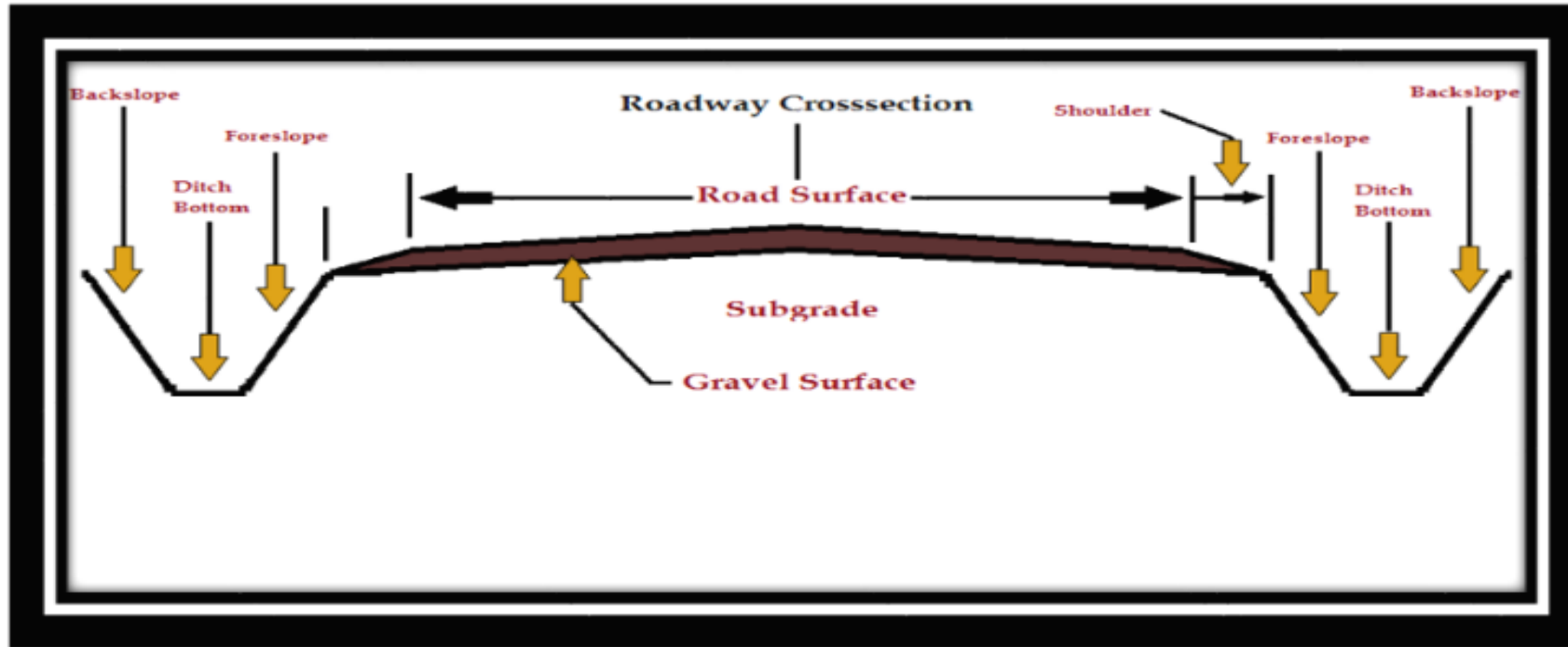
Why Gravel Roads Rut So Easily (cont'd)

3. The quality of the road building material was poor.





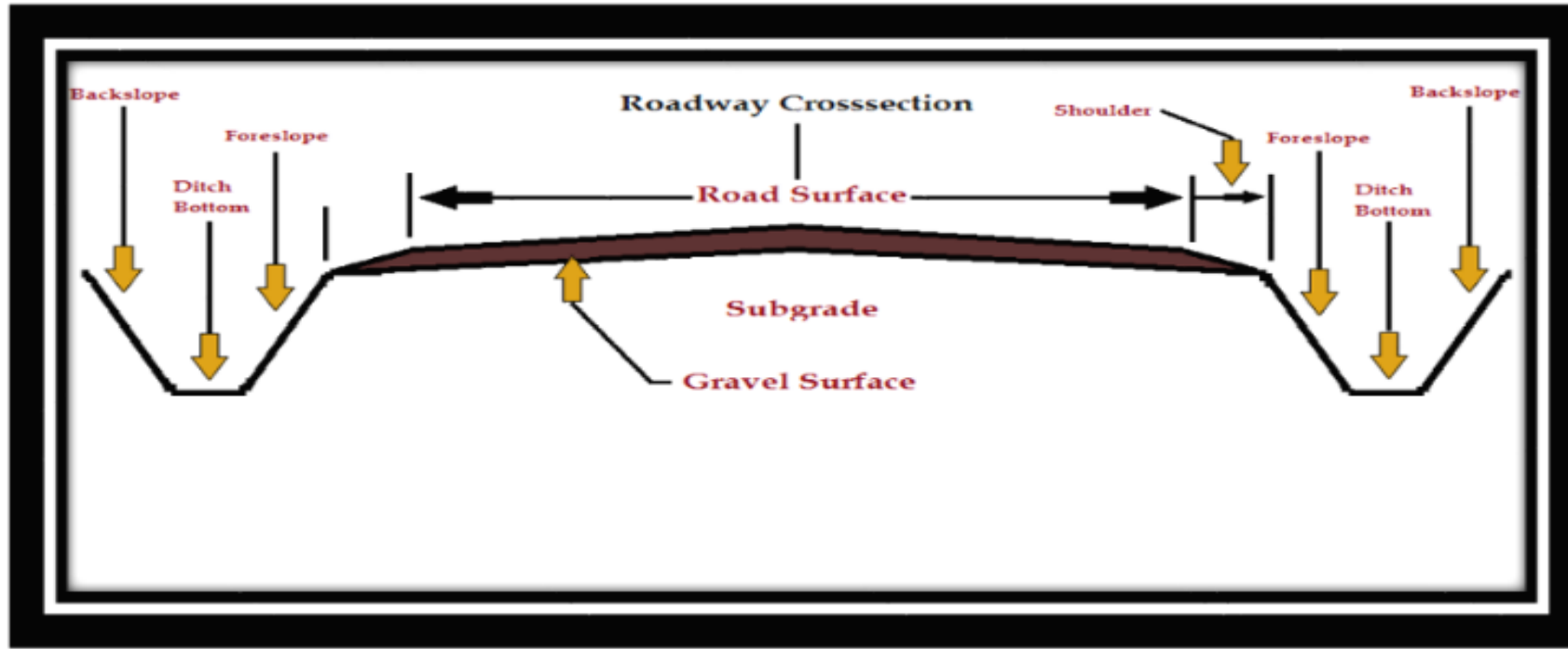
Cross Section of a Road



- 2 travel ways
- Shoulder on each side
- Gravel (wear surface)



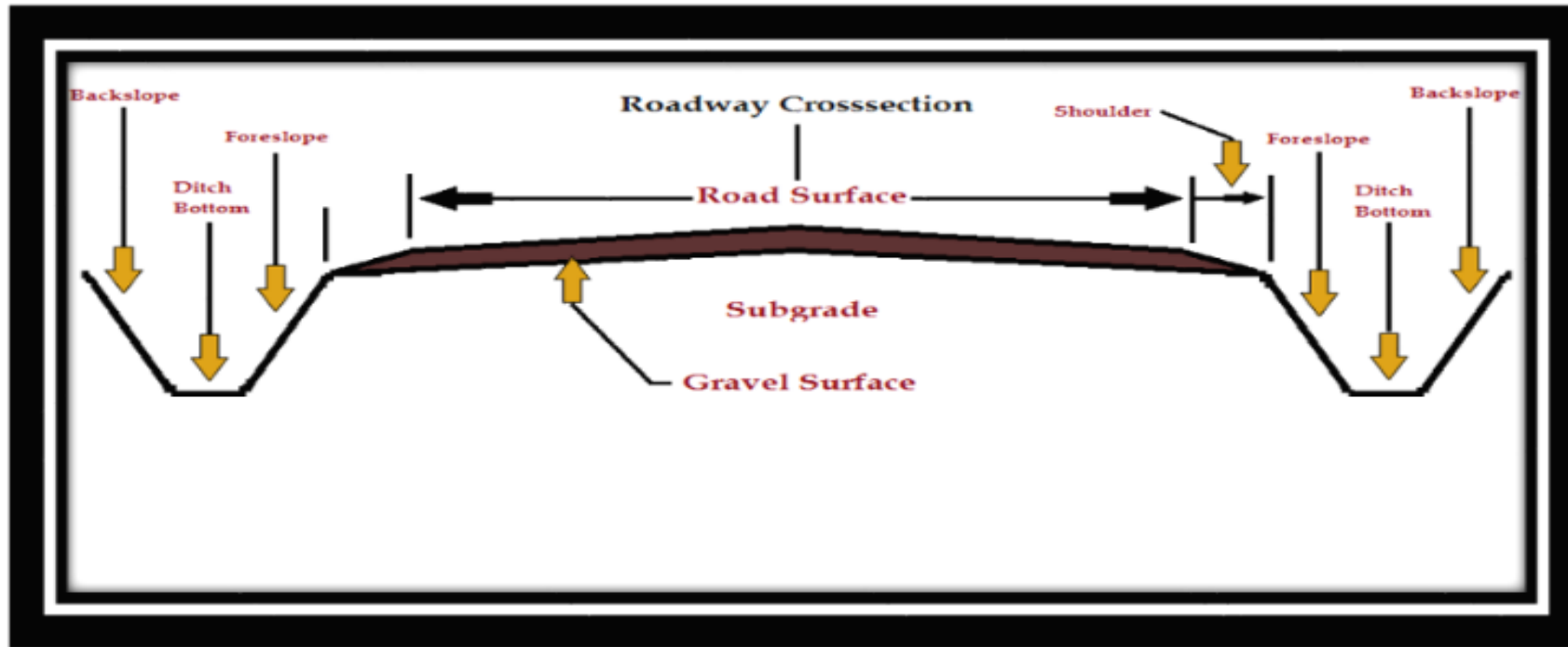
Cross Section of a Road



- Subgrade that consists of stable building materials
- Fore slope (road slope)



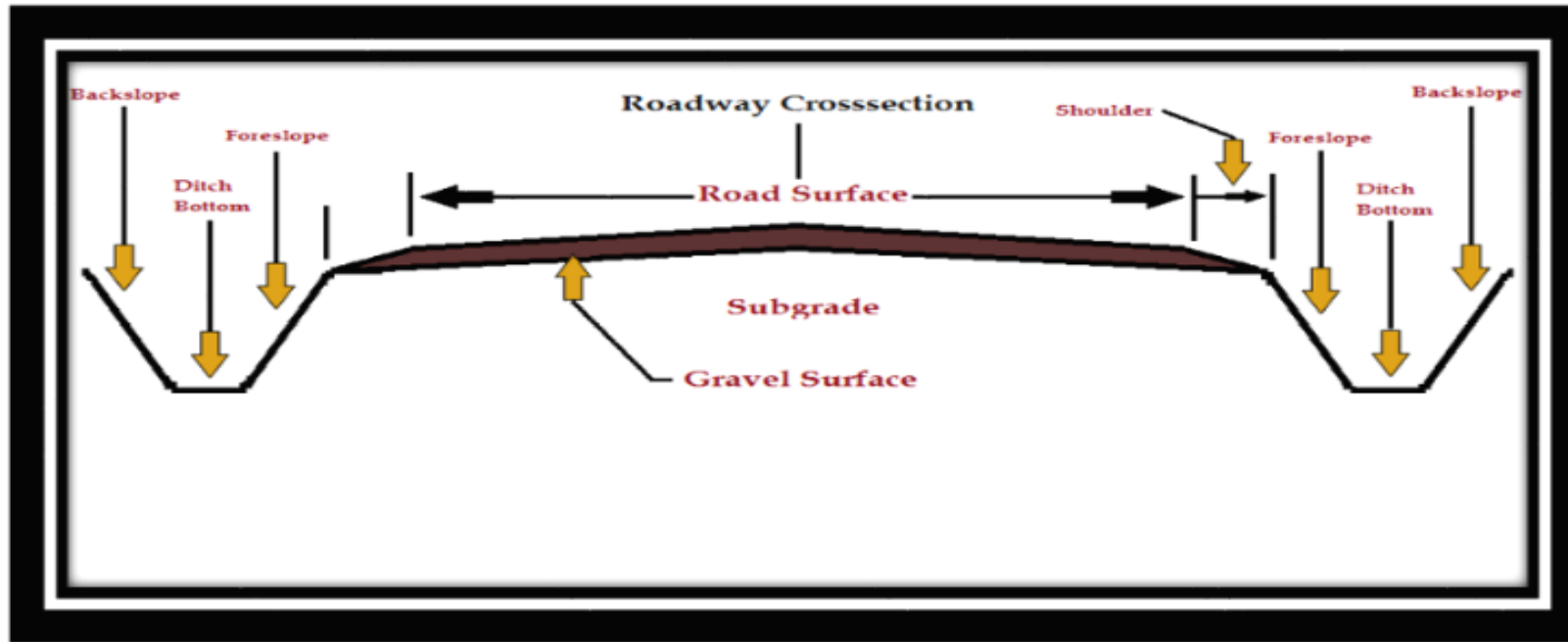
Cross Section of a Road



- Ditch bottom sloped away from the road
- Back slope – can be minimal to nonexistent depending on the terrain



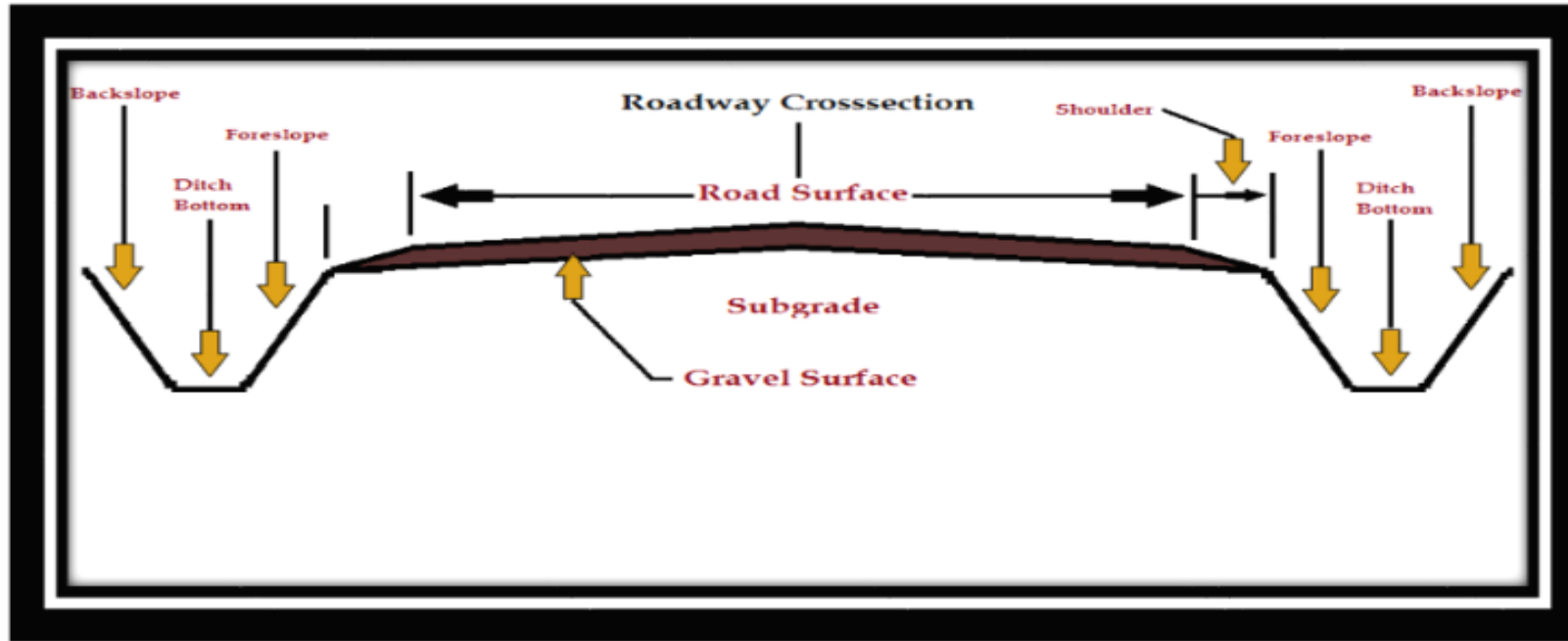
Cross Section of a Road



- Cross sections should be designed so that water:
 - Stays off the road
 - Stays out of the road
 - Stays away from the road



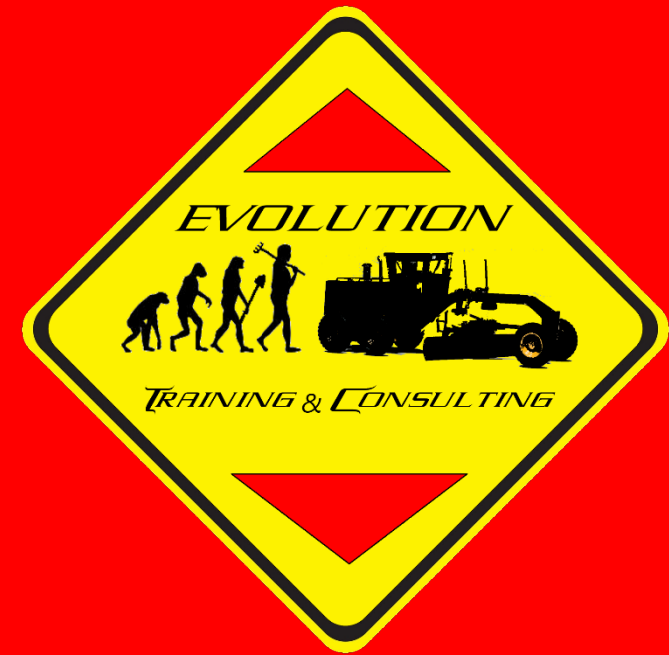
Cross Section of a Road



Water sitting at any place within the cross section (including the ditch) is one of the major reasons for problems and failures of our gravel roads.

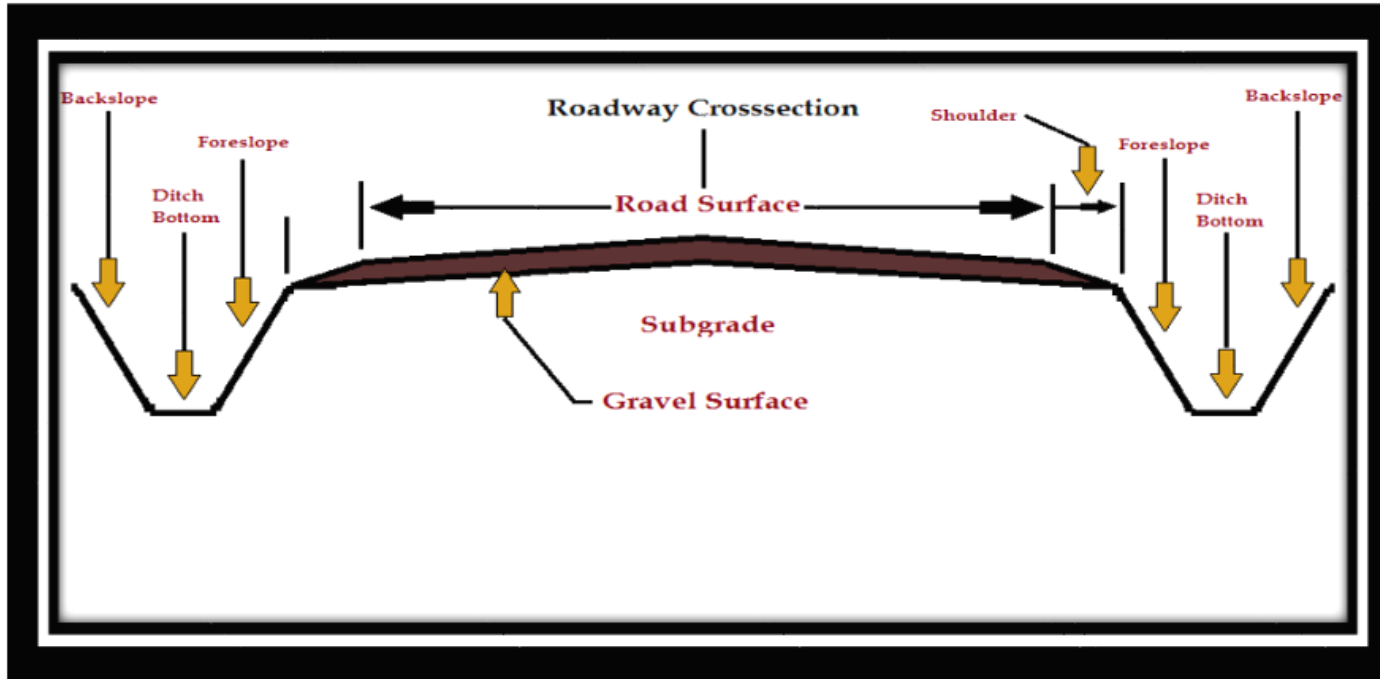
Crown

Why crown is important





Proper crown



- Proper crown is 4% drop from center to shoulder of road.
- Crown should be anywhere from 2% to 6%.



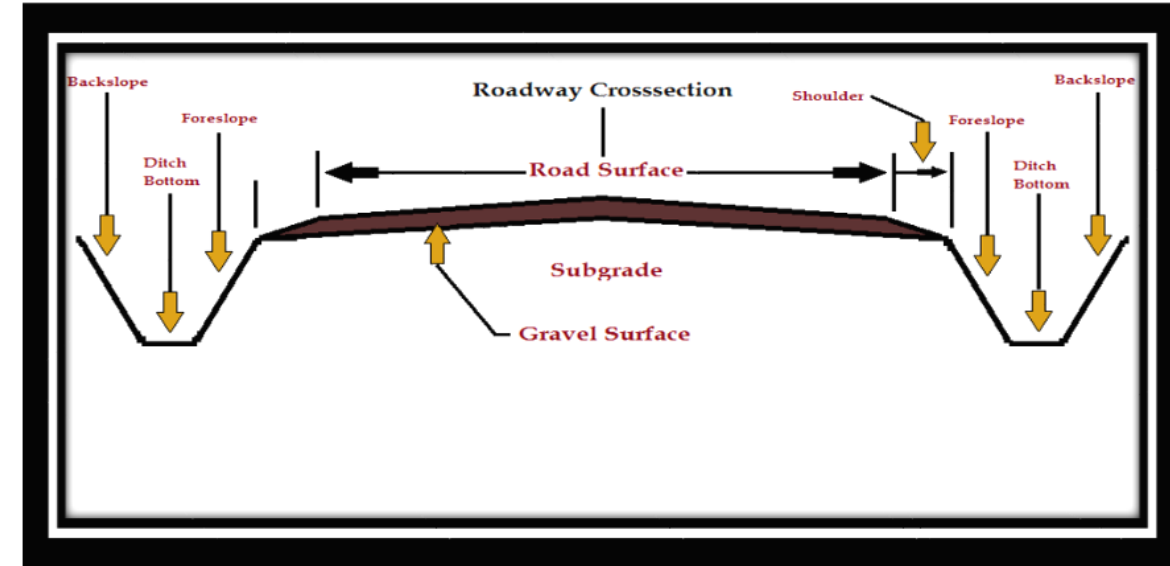
Proper crown (cont'd)

- **Under 2% crown**

- Water can't drain properly off the road causing potholes and ruts to form.

- **Over 6% crown**

- You lose a lot of important gravel fines and stones that will wash off the road and onto the fore slope and ditch.
- Traffic will not stay to the proper side of the road. Drivers don't feel safe!

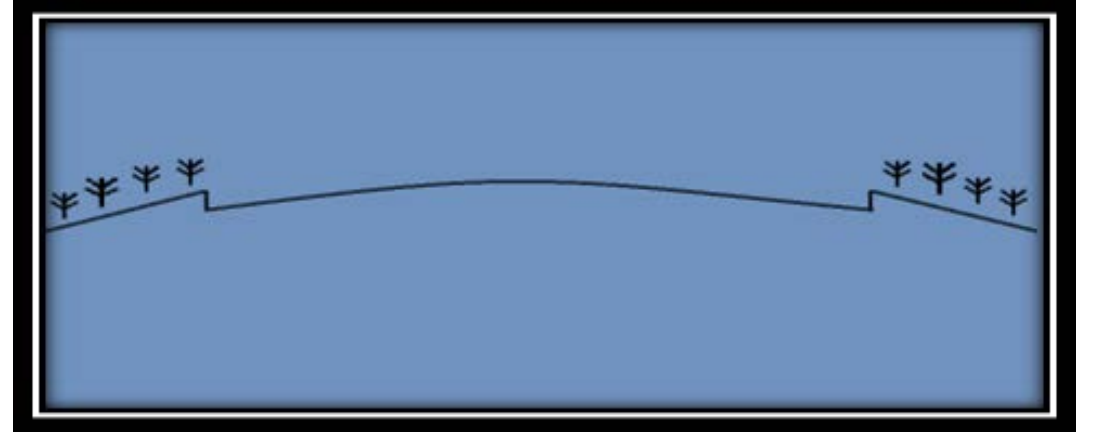


REMEMBER...Drainage, Drainage, Drainage!

The purpose of crown is to drain water off the road to the shoulder and down the fore slope to the ditch.



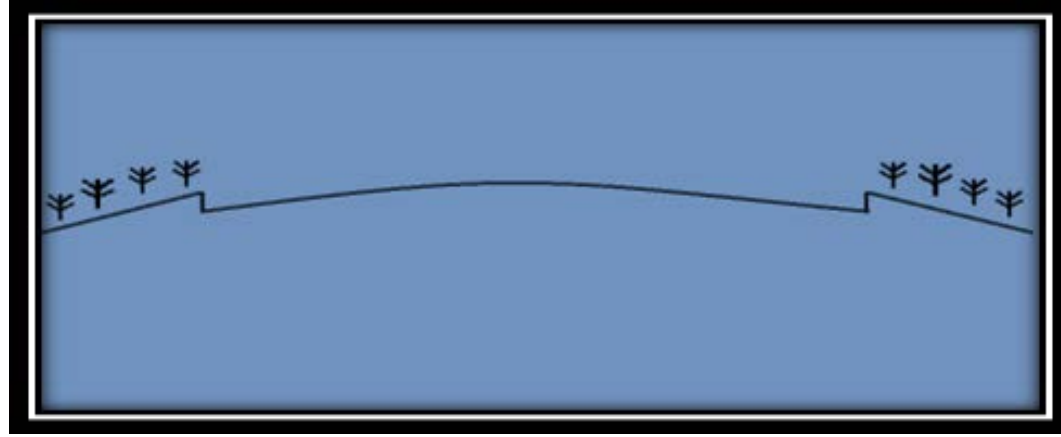
Parabolic crown (improper crown)



- A parabolic crown is a rounded crown.
- 1/3 of the road is still flat.
- Drainage is poor due to:
 - water not being able to run down the road to the shoulder and down the fore slope, due to a lip stopping it.



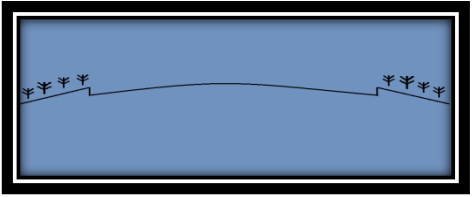
Parabolic crown (improper crown)



- Road sides are usually over the 6% allowance for safety, making them unsafe.
- A road can still register at 4% on the *Slope Meter* because the center is higher than the sides making it seem that there is a proper crown. However, the road is still flat in the middle.
- The shape of the crown is what is most important!

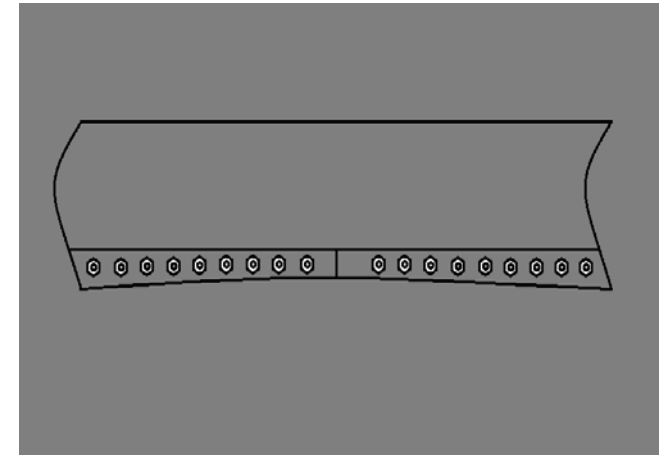


How Parabolic crown forms



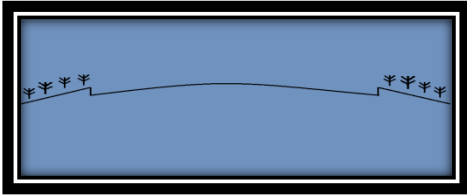
- Rounded over time
 - improper maintenance techniques
 - using metal blades

Roadway with parabolic crown. The outer edge of the road slopes too much. Gouging causes high shoulder, and center 1/3 of the road tends to be flat.



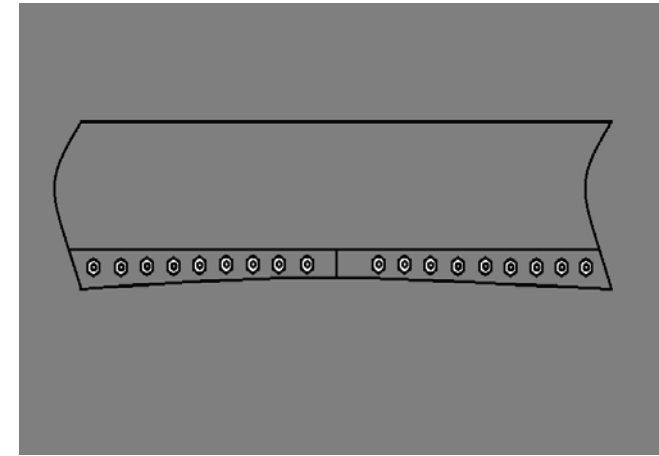


How Parabolic crown forms



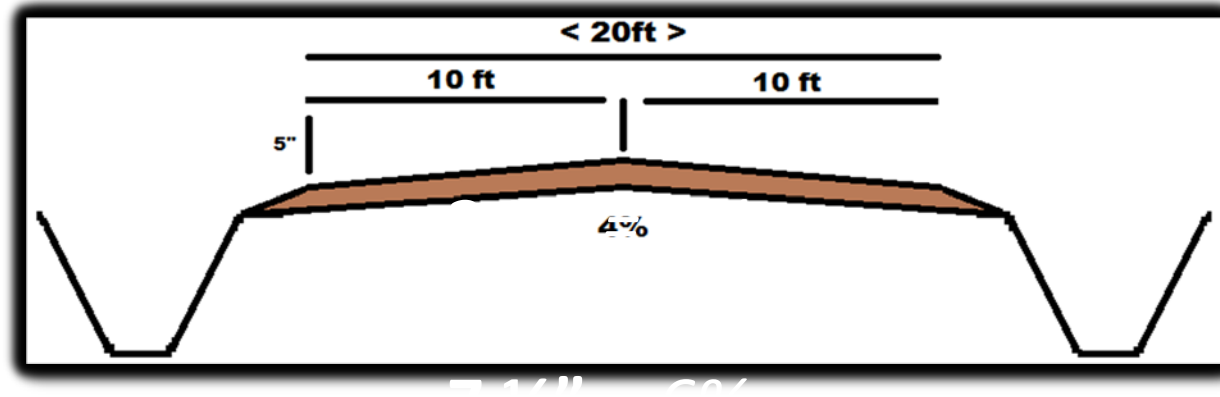
- Wheel tracks, road width, and type of gravel can add to the center wear on these blades.
- center wear on metal blades is normal it can be the greatest cause of parabolic crown.
- Roadways will match the shape of your blades regardless of the many blading techniques used for road maintenance. Carbide tipped or carbide insert blades will retain or correct crown on our roads.

Roadway with parabolic crown. The outer edge of the road slopes too much. Gouging causes high shoulder, and center 1/3 of the road tends to be flat.





Proper crown



- How do you measure crown?
- Tape measure, long straight board and a level.

A straight line from the center of the road to the inside shoulder line that drops 1/2 inch per foot (approximately 4%).



Slope meter: How it works?

- Slope meter #2
- It's used as a guide!!!!
- It reads what you've done.
- It goes by what your back tires are feeling.



Crowning techniques

Why crown is important





Crowning techniques

- There are many techniques that can be used.
- Machine placement is very important.
- If the machine takes up the whole road when blading, it is very difficult to put crown in a road.
- You should never have your machine placed down the middle of the road
- The machine should be on either side of the road.
- There are 2 travel ways.
- Without proper placement on the road-top, it doesn't matter how many different techniques you use, it will be hard to crown a road



Moldboard length

- Moldboard lengths can be a big factor
- Most graders come standard with a 14ft moldboard but most municipalities use a 2ft extension making it a 16ft or 2 2ft extensions making it an 18ft moldboard
- A very narrow road is next to impossible to maintain with an 18ft moldboard



Windrow Placement

- Windrow placement is also important too
- Where you place your windrow can factor into where and how you place your machine on the road.
- Road size(width) is a big factor in windrow placement
- Placing a windrow in the center of the road can be difficult to take off.
- All different widths of roads can be a factor when maintaining a gravel road.

Common Problems with Gravel Roads





Washboard



Grader hop!!!
Grading at too high
of speed



Surface
washboard.
Poor gravel
quality.

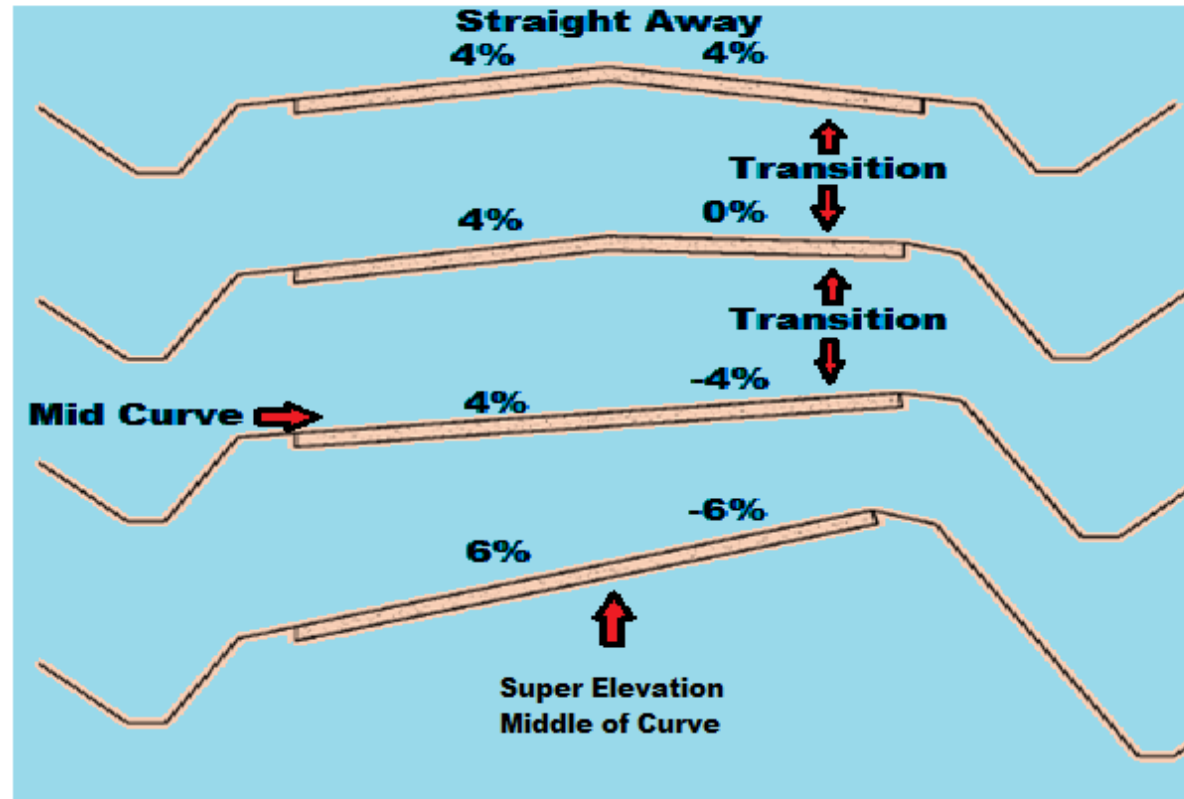


Imbedded washboard.

Curves

Super elevation

- NO curve should have a crown
- Crowned curves are dangerous
- Length of curve will determine the super-elevation





Future. How roads will be better.

- Spending time and money on getting proper gravel will improve the wear surface of the road
- Proper maintenance will save gravel and important fines
- Getting the cross section back to the shape it was built.
- Proper Practical training will save money.
- Water that drains off, out, and away from the road will be a more stable road.
- Using proper cutting edges
- Roads will last longer doing all of the above things



Any questions?

