Motor-Grader Maintenance Presentation

NDACE Convention
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Knowledge You Will Acquire – Classroom Session

- Operation/maintenance costs
- Road shape/shoulders
- Cutting edges
- Grading techniques
- Percentage of slopes/check
Knowledge You Will Acquire – Classroom Session

- When to reshape
- Compaction
- Good gravel
Knowledge You Will Acquire – Classroom Session

- Materials & testing
- Stock piles
- Quantities and spreads
- Why water is important
- Soil composition
- Attachments
Hands On

Check wear components and edges

Mark circle @ 12’

Pull center pin for changing edges and vertical grading

2 pass Straight blade with no windrows for bits

2 pass Blade down for float on road with good crown and shoulders

2 pass feather to crown for road with high traffic pounding down crown
Hands On

4 pass down and up to cut out washboards, mix gravel

5 pass to equalize lanes for uniform %

4 or more passes for spot repairs

4 or more to repair segregation or placing gravel (windrow and leave 1” each pass)
Hands On

- Blade position for windrow inside tandems down to 2’ pass
- Repair a super, high shoulder, or ditch
- If your newer, we will focus on machine control
Proper Shape
When and when not to have a crown

The primary road should retain its crown

Figure 3: Proper shape of a controlled intersection. Notice through-road retains crown; side roads which have stop or yield signs are shaped to match the edge of through road.
1.6 million miles of unpaved roads in the US (53%)

1 vehicle
1 year
1 ton dust per mile

Each mile with 100 cars per day
= 100 tons of fines per year!

Segregation/float
4 pass – try it for cutting out and mixing gravel

Road better last at least twice as long as 2 pass method

Never blade down middle (unless?)
Compare equipment with your road width design

Notch circle at 12’
No windrows with bits

If you have a windrow, you have cut through too much crust!

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**Blade Angle**

To help determine proper blade angle, here are a few rules of thumb that apply:

- Use the widest pass width.

- Increase the blade angle if material begins to flow around the leading edge of the moldboard.

- Use a 10 percent blade angle when using a Grader Bit System or serrated blade edge.
Use magnetic protractor
2% for future pave 4% for unpaved

2% is $\frac{1}{4}$” per foot  4% is $\frac{1}{2}$” per foot

Gravel at or near 4%
Use Slope Meter
High shoulders
“berms”
“curbs”
The engineering term is “secondary ditch”
Recovering & Spreading

If there is little or no vegetation on the shoulder, simply extend the moldboard out into the shoulder material and begin to pull it onto the roadway.

The material recovered is often good gravel that needs to be returned to the roadway surface.
5280 \times 0.6 \times 16 / 27 \times 1.2 = 2,253 \text{cy} \\
@ \$10 / \text{cy} = \$22,253 \text{ per mile!}
Wrong time of year
Use shoulder disc 1st
When to do Gravel Road Rehabilitation

• Spring is the best time for this as there is minimal vegetative growth and moisture is present.

• The use of a roller for compaction will greatly improve the finished surface.

• This will leave a denser, stronger, smoother surface that will be easier to maintain.
What is Good Gravel?

The answer to this question will vary depending on the region.

Local sources of aggregate available and other factors.

Some regions of the country do not have good sources of gravel.

No gravel surface will perform like pavement! $ controls quality!
Reasons for testing

You get what you pay for!

I will sell you reject gravel

Single gradation test $135

Do not accept gradations from piles

#4, #200
These two roads show remarkable contrast in surface condition due to the quality of gravel.

The bottom photo shows a road surface that has too much stone and sand in proportion to the fine material.

The gravel remains loose and is hard to maintain.
5 point proctor
Silt and clay is #200
Silt = dusty or slimy

- Sand: 2.00-0.05 mm
- Silt: 0.05-0.002 mm
- Clay: Less than 0.002 mm
The use of a shouldering disk helps mulch up the sod and vegetation before it is pulled onto the roadway either to be removed or recycled on the road as reusable gravel.
Apply what we learn!
Questions?

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