Maintaining Gravel Roads

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a joint program between MaineDOT & FHWA

What's wrong here???

How about this one?

problem??


Too many “fines”, poor drainage, no crown

and here?

A grader “driver” has been here

where's the snowbank?

What's happening here?


Loose aggregate
The “fines” that bind

What makes a Good Road?

- Proper drainage
- Proper maintenance
- Good materials
- A good base

Anyone who maintains a gravel road MUST:

- Maintain the road and ditches to the proper shape and surface condition to promote:
  - ✓rideability,
  - ✓good drainage, and
  - ✓low maintenance cost, and
- take care of the grading equipment
- or hire someone who knows what they're doing

For those of you who are managers or foremen:

- You need to always remember the fundamental concepts of proper gravel road maintenance
- You need to make sure that you are getting your money's worth

Does your Grader operator know:

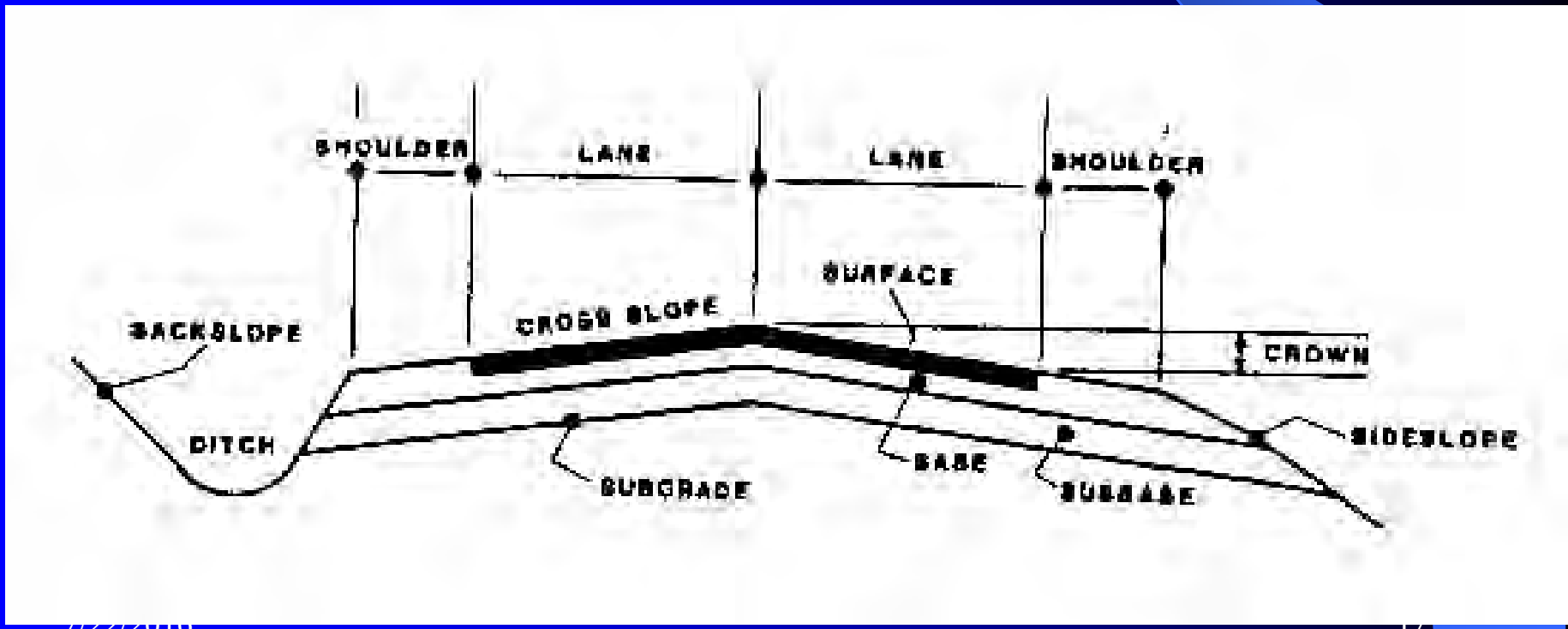
- Principles of proper shaping
- How to ditch
- Not to operate too fast

The three most important elements to maintaining a good road are:

- Drainage
- Drainage
- Drainage

To maintain good drainage, a road needs:

Proper cross section



WITHOUT proper drainage

No road can survive


POTHOLE LANE


'00 5 12


02 6 16

WITH proper drainage

- You can maintain a stable base
- Keep a proper cross section
- Have shoulders and slopes and ditches which will drain properly
- and…..you'll have better surface conditions

Practice good habits and your time will be well spent

The "parts" of a road

wearing surface

base gravel

} same on a gravel road

subbase "bank run"

subgrade "mother earth"

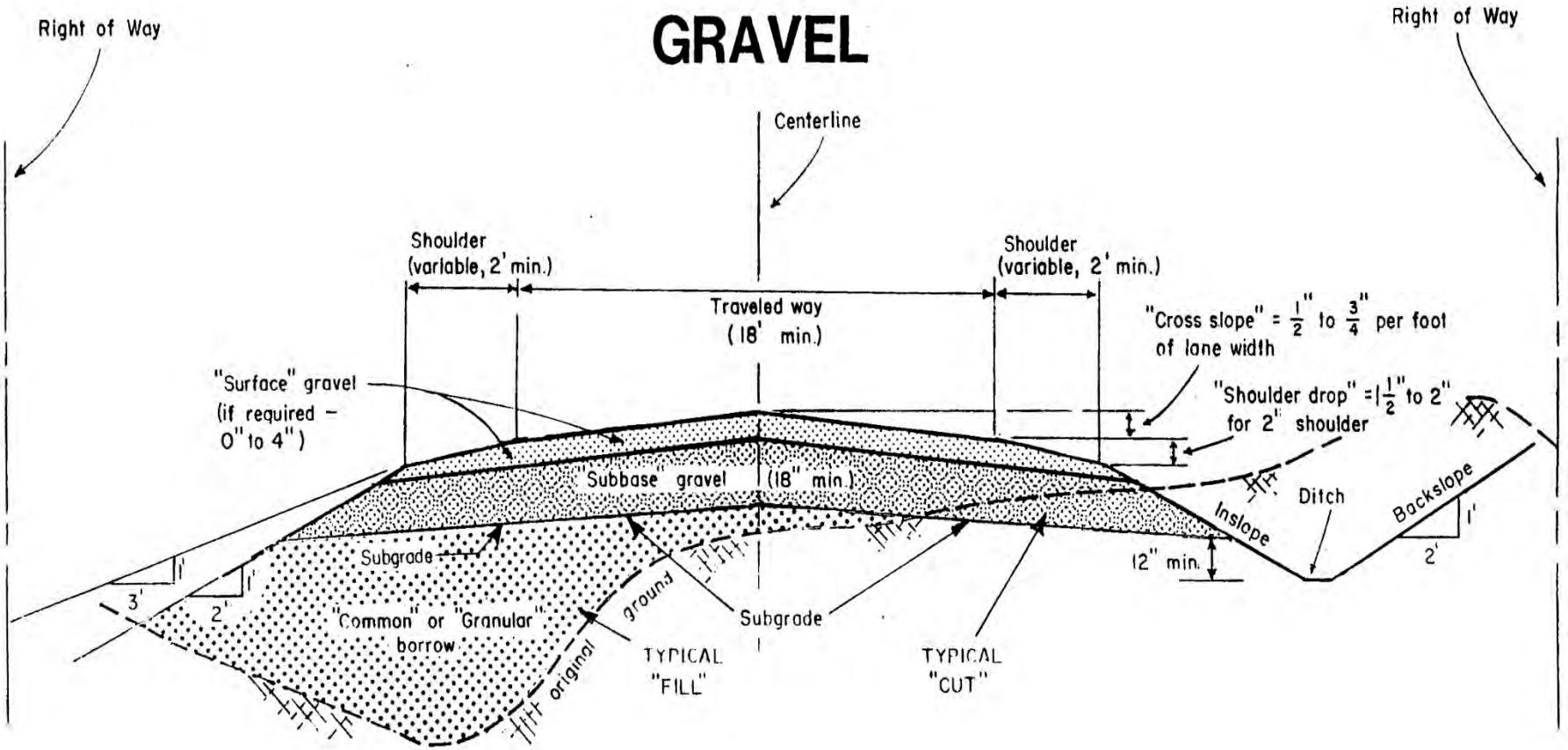

Wearing course
Base
Subbase
Subgrade

Paved Roads

Cross slope should be **¼ in.** per ft of lane (2%)

Gravel Roads

Cross slope should be **½ in.** per ft. of lane (4%)



DESIRABLE MINIMUM DIMENSIONS
OF A LOW–VOLUME GRAVEL ROAD

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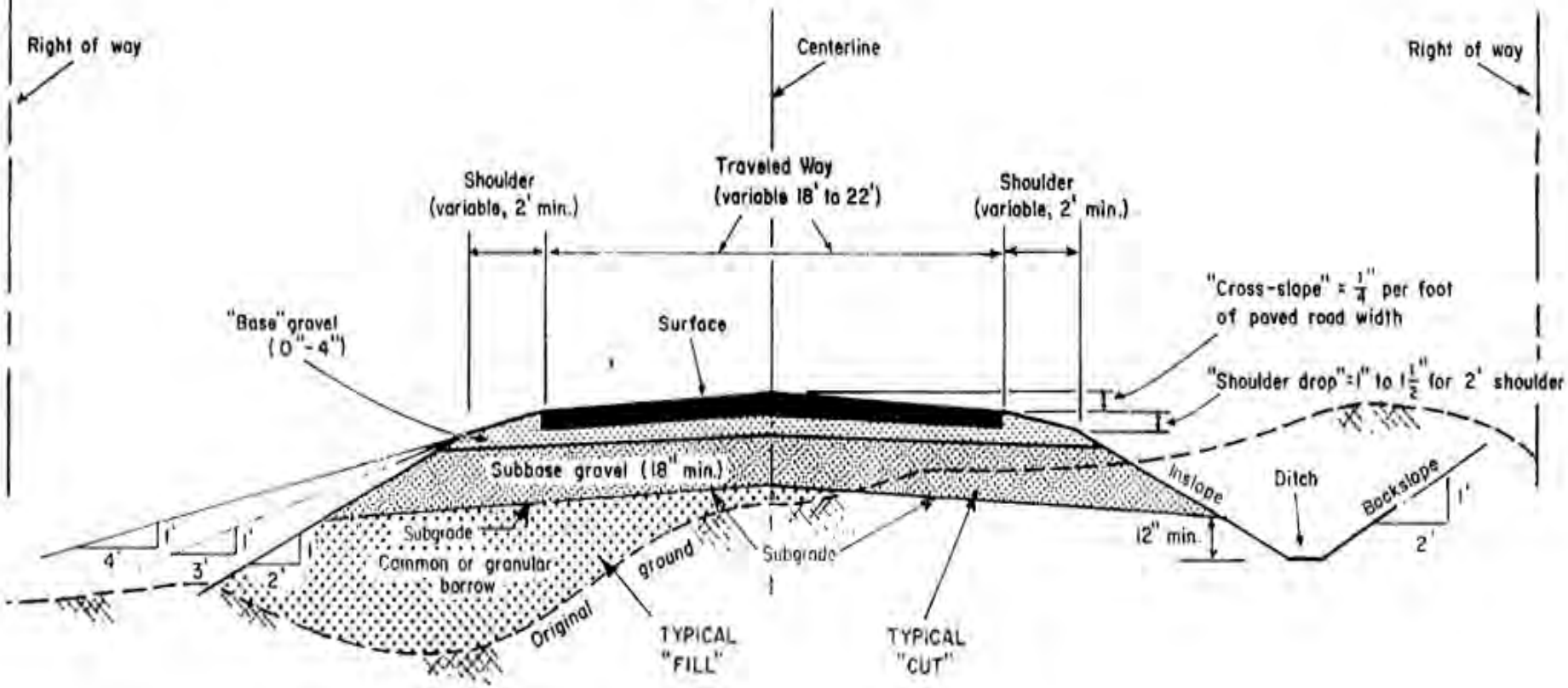
Figure 2 - 1

PAVED



DESIRABLE MINIMUM DIMENSIONS
OF A LOW-VOLUME PAVED ROAD

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Figure 2 - 2

Gravel
"good versus bad"

- Surface gravel must:
  - ✓have more "fines" than base gravel
    (7% to 12% passing #200 sieve)
  - ✓be strong enough to carry loads
  - ✓be stable against volume change as water content varies
  - ✓"pack" well and be stable against rutting

Appendix A

Gravel
"good versus bad"

- Base gravel must:
  - ✓have less "fines" than surface gravel
    (0 % to 7% passing the #200 sieve)
  - ✓have larger stone for strength
  - ✓have a variety of stone sizes to remain stable
  - ✓be stable against volume change as water content varies

Gravel
“good versus bad”

- A good gravel:

•has particle sizes from specks as fine as flour ……to particles as large as 1 to 2 inch.

•has angular shaped stones rather than rounded shapes so that the pieces fit closely and “lock” together

•has enough….but not too many…… “fines” so that dust and mud is avoided

Gravel
"good versus bad"

- A bad gravel:

•has particle sizes which are uniform or all one size

•has rounded stones rather than angular ones so that the pieces shift and don't "pack" well

•has too many "fines" so that it's dusty in the summer and muddy in the spring

Gravel
"good versus bad"

- How to tell if you have good gravel:

1) Check it yourself – are the stones angular or rounded? Is there a variety of particle size? When wet, does it get sticky, lumpy, or noncohesive?

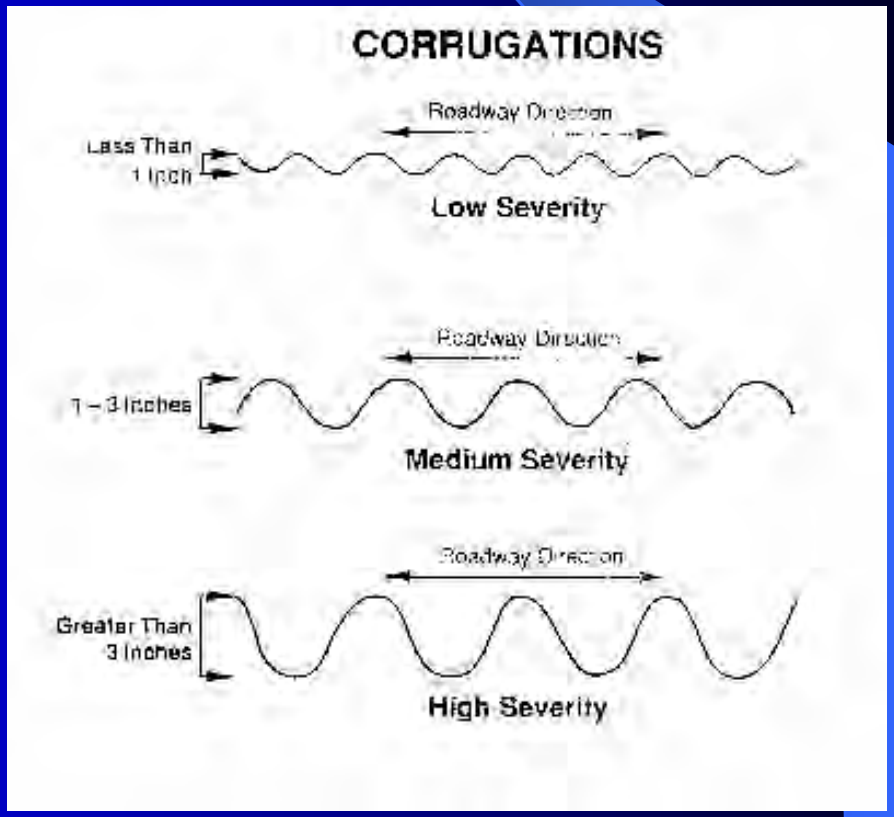
2) Have someone with road building experience check it

3) Take samples and send it to the lab for a "sieve analysis"

Typical gravel road probs

- MUD
- WASHBOARD
- DUST
- RUTTING
- POTHOLES

“Washboarding”


CORRUGATIONS
Roadway Direction
Less Than
1 Inch
Low Severity
Roadway Direction
1 – 3 Inches
Medium Severity
Roadway Direction
Greater Than
3 Inches
High Severity

“Washboarding”

- Usually caused by traffic volume & speed and loose aggregate
- Usually form on hills, curves, areas of acceleration/deceleration, or where road is soft or potholed
- Can be formed by driving a grader too fast (over 3-4 mph)

“Washboarding”

- usually can be prevented by:
  - ✓ slowing the grader down
  - ✓ using stable gravel that “packs” well
  - ✓ “crowning” the surface properly
  - ✓ using a stabilizer (ie calcium chloride)

“Washboarding”

How to Correct???

- For “light” problem – routine blading
- For “medium to severe” problem –
  - ✓ Do not just fill them in !
  - ✓ Scarify to 7 to 10 cm, add binder or gravel, and mix and reshape

Dust & Mud Control

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Dust Control

- Water
- Petroleum based (oil, emulsion, etc)
- Lignosulfonate (organic/pulp making process)
- Magnesium chloride
- Calcium chloride


Freshly applied liquid CaCl2

Dust Control

- Dust is the binder or "glue" which holds road gravel together.
- If you have clouds of dust, you are losing the "glue"
- Stabilizing the gravel saves gravel and money !

Dust Control

- Chemicals, such as calcium chloride, are VERY effective for stabilization
- Saves up to 80% of "lost" gravel
- Saves up to 50% of grading costs
- Reduces frequency and magnitude of grading
- Reduces roadside ditch cleaning
- Saves on operating costs, fuel, and downtime
- REDUCES runoff to the lake/pond

Dust Control

- If an average road loses 1 inch of gravel through dust every year, that's about 300 cu. yds. each year for <u>each</u> mile

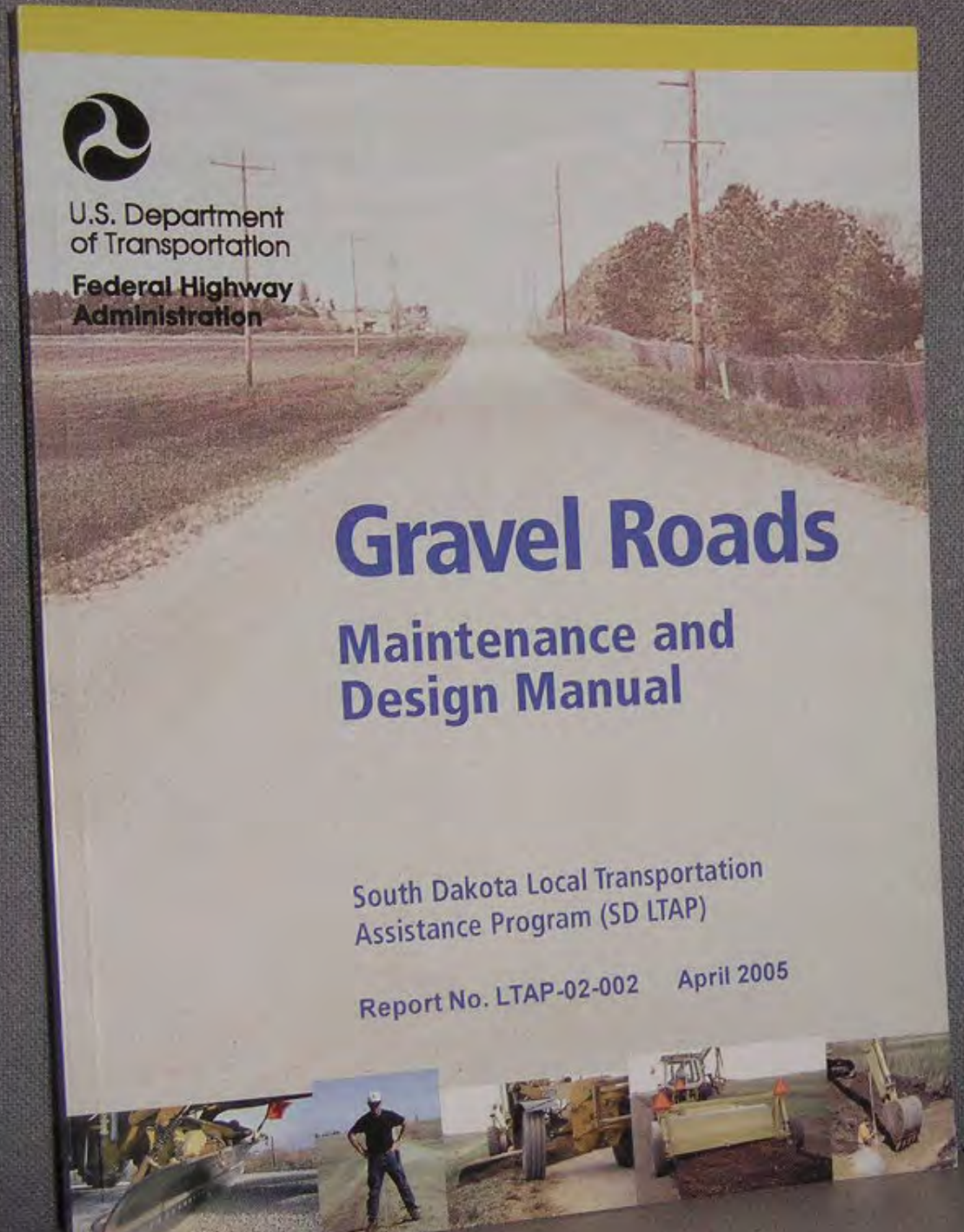
And how much do you pay for a cu. yd. of gravel??

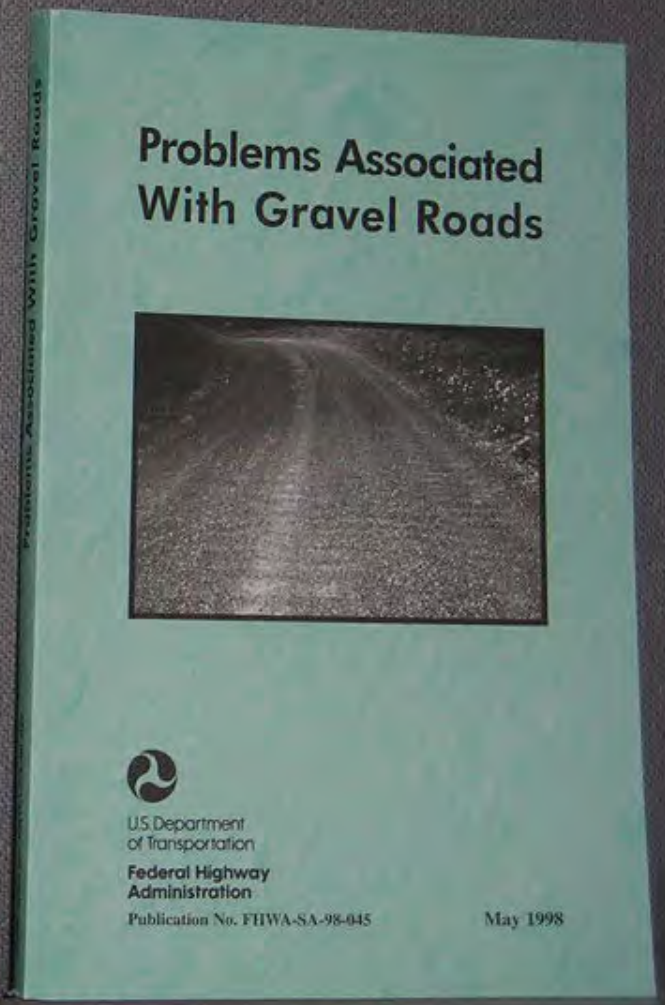

Best solution= geotextile + GOOD gravel

Culverts

- Make sure they are sized properly
- Compaction, compaction, compaction
- Many materials:
  - ✓Concrete
  - ✓Galvanized corrugated steel
  - ✓Aluminum/zinc corrugated steel
  - ✓Aluminum corrugated
  - ✓Plastic

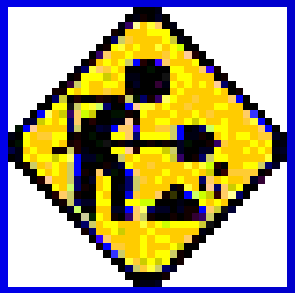
FREE upon request





"Dig Safe"

Title 23, § 3360-A



Members

8-1-1 or

3 days before !!

1-888-DIGSAFE or www.digsafe.com

Nonmembers

1-866-OKTODIG

www.OKTODIG.com

For public roads, you still have to call DS and other nonmembers. The call is good for 1 year and you have to provide notice to PUC.

For private roads, you don't have to call but have to follow 2 conditions and go no lower than 6"

The End