

**SAFETY IMPROVEMENTS
for
UNPAVED ROADS**

**Northern Rocky Mountain Region Rural
Transportation Conference**

Rapid City, SD

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Unpaved Road Safety Issues

- **Roadway Geometry**
- **Surface Aggregate Specification**
- **Driver Expectations**

Geometry



Clear indication of no crown on traveled way. Serious distress with potholes and bad surface drainage.

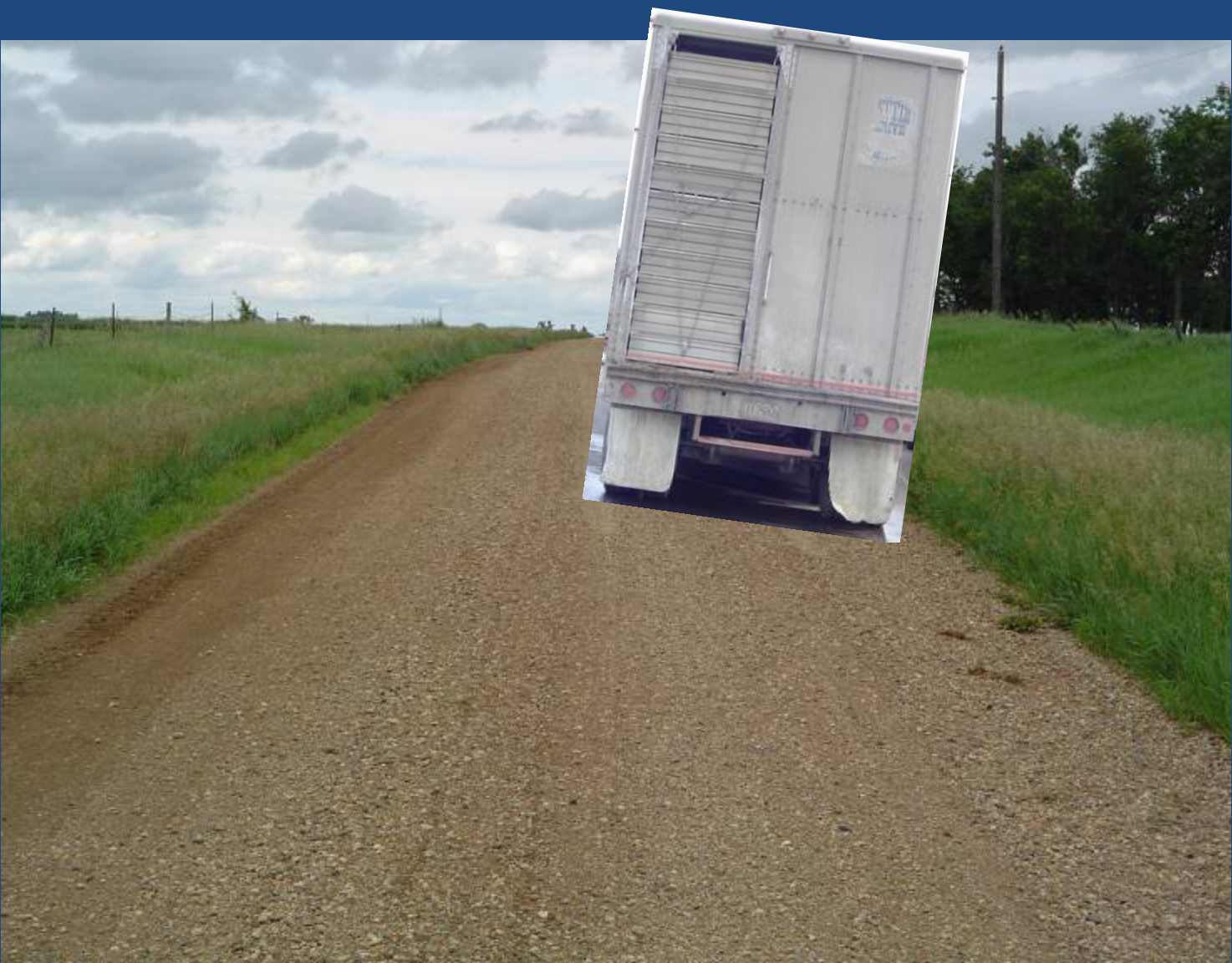


Another example of lack of crown illustrated by very poor surface drainage.



Some roads have too little crown, this one has too much. This brings liability risk to the agency. Crown at or near 4% is recommended.





Imagine a cattle trailer on this road.

Another Geometry Problem – A High Shoulder



High Shoulder and Trees in R-O-W



Despite a very confined R-O-W, this is an outstanding example of good maintenance



Another very good example from SD.



What's wrong with this picture???



The Next Challenge – Understanding Surface Aggregate Specification



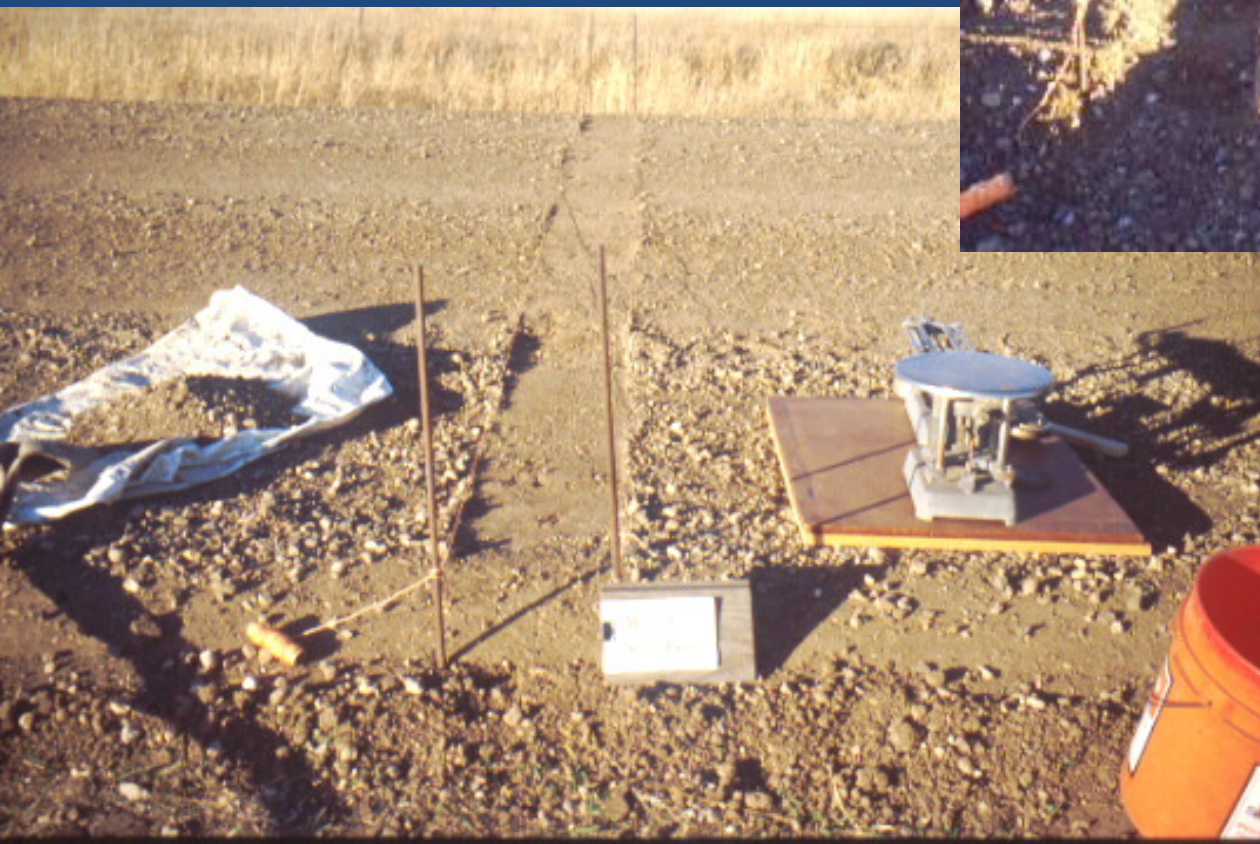
Too much unbound aggregate and corrugation



Dramatic difference in surface conditions on two roads, but the only real difference is the quality of the surface gravel.



**Dramatic difference in
two surface aggregates in
test done in Hand County,
SD in 2002 & 2003**



Unfortunately, this is not a test!



Driver Expectations – What Reasonable?

- Ride similar to pavement?
- No loose aggregate?
- No high shoulders?
- Reasonable warning of maintenance activities being done on road?



Routine blade maintenance is commonly done in much of the US without warning signs.

Always have a flashing amber warning light!



The SMV sign is mandatory on graders, loaders, mower tractors, etc., but not primary warning.



**This is not routine maintenance!
Warning signs are needed!**

A Critical Look at Condition vs Driver Expectations







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Driver education is the only answer here??

