

- WISE ROADS 2020 -

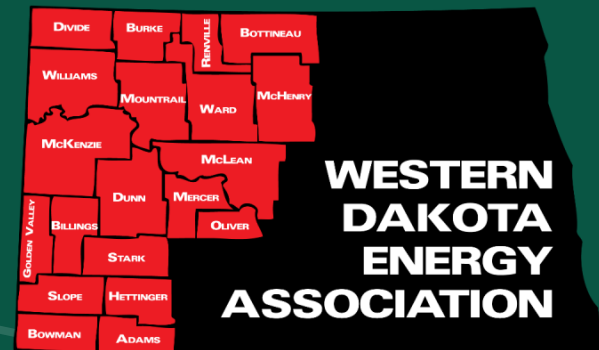
Gravel Road Research



Tuesday, December 15, 2020
Advisory Board Annual Meeting

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Research conducted by the North Dakota Local Technical Assistance Program (NDLTAP), a Program of the Upper Great Plains Transportation Institute, in partnership with the Western Dakota Energy Association (WDEA) and the North Dakota Department of Transportation (NDDOT).

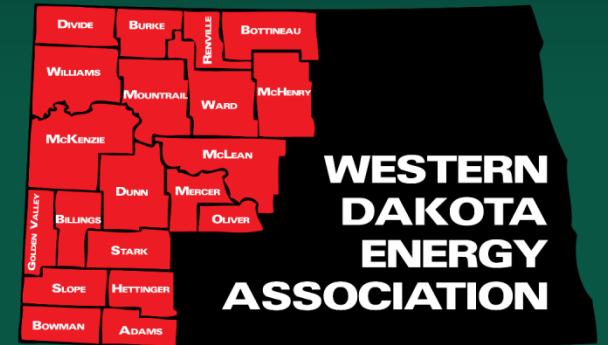


NDSU

UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE
NORTH DAKOTA LOCAL TECHNICAL ASSISTANCE PROGRAM

Wise Roads

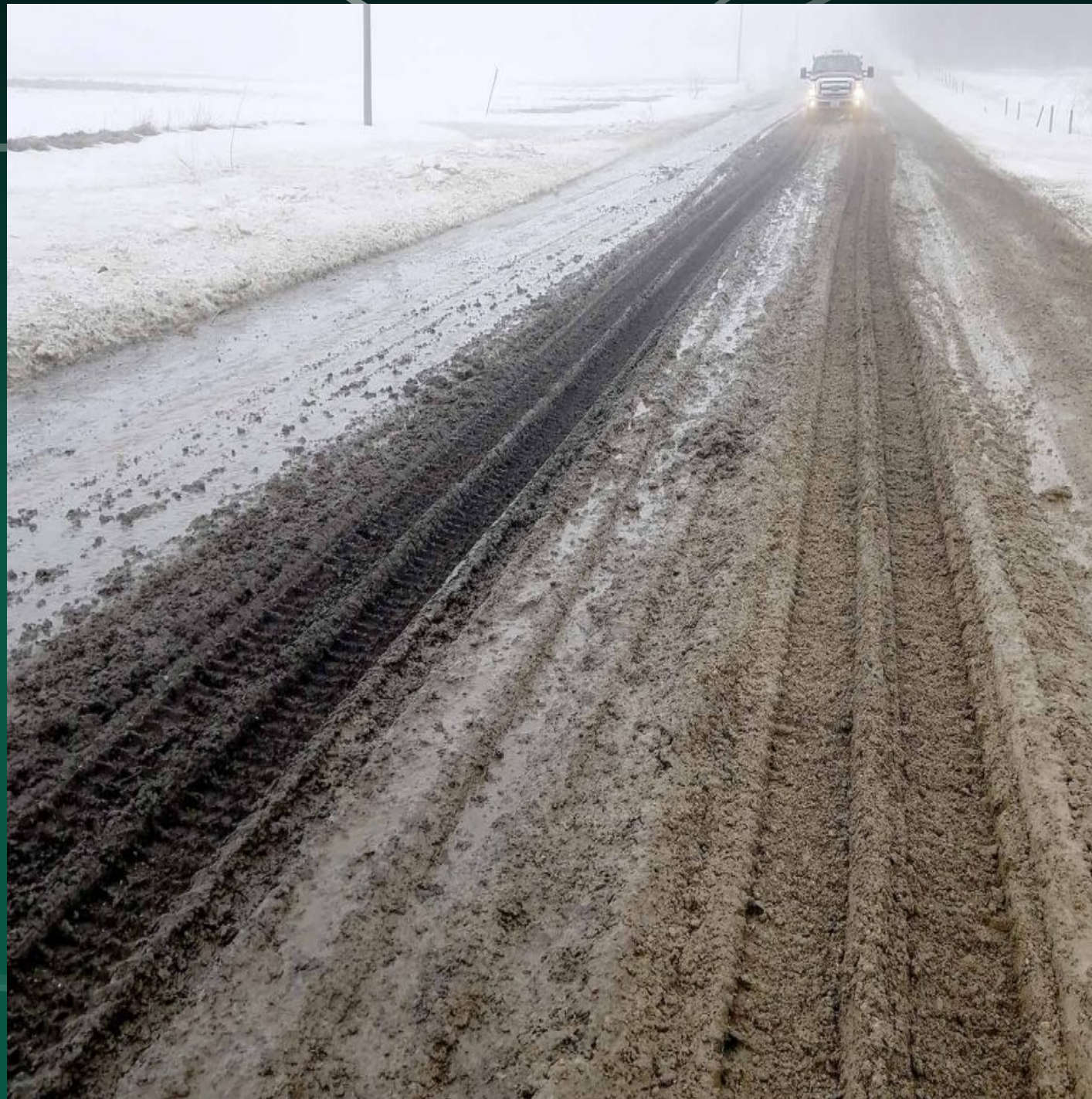
*'Weather Information System to Effectively
Reduce Oilfield Delays and Disruptions'*



Problem:

Muddy Gravel Roads Can't Carry Loads

When inclement weather strikes, local governments impose weight restrictions on gravel roads that prohibit the movement of oilfield truck traffic until road conditions improve.

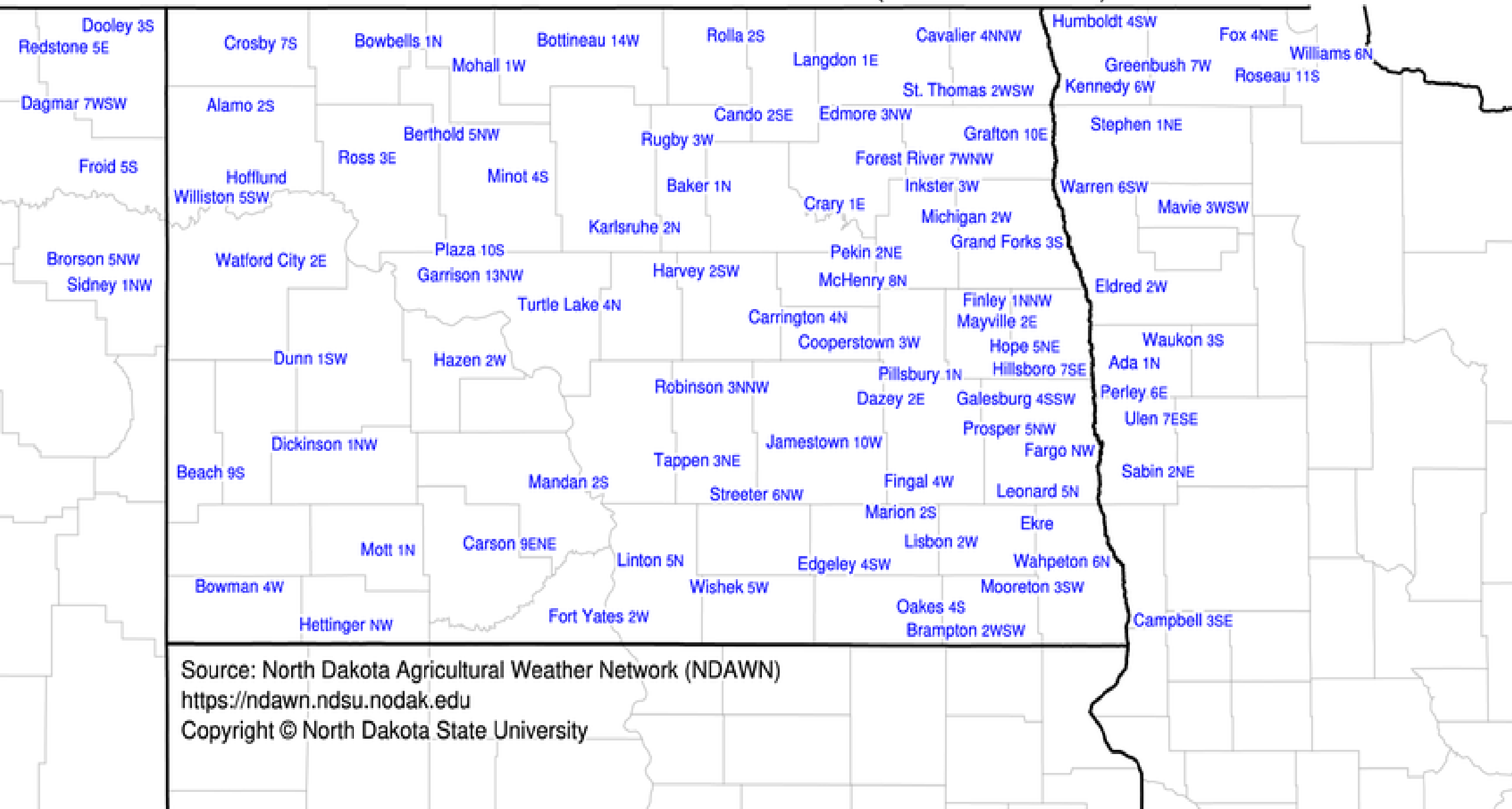


How can
technology turn
this into a
**Smart
Road?**





NDAWN Station Locations (2019-07-02)



Source: North Dakota Agricultural Weather Network (NDAWN)

<https://ndawn.ndsu.nodak.edu>

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Wise Roads Project

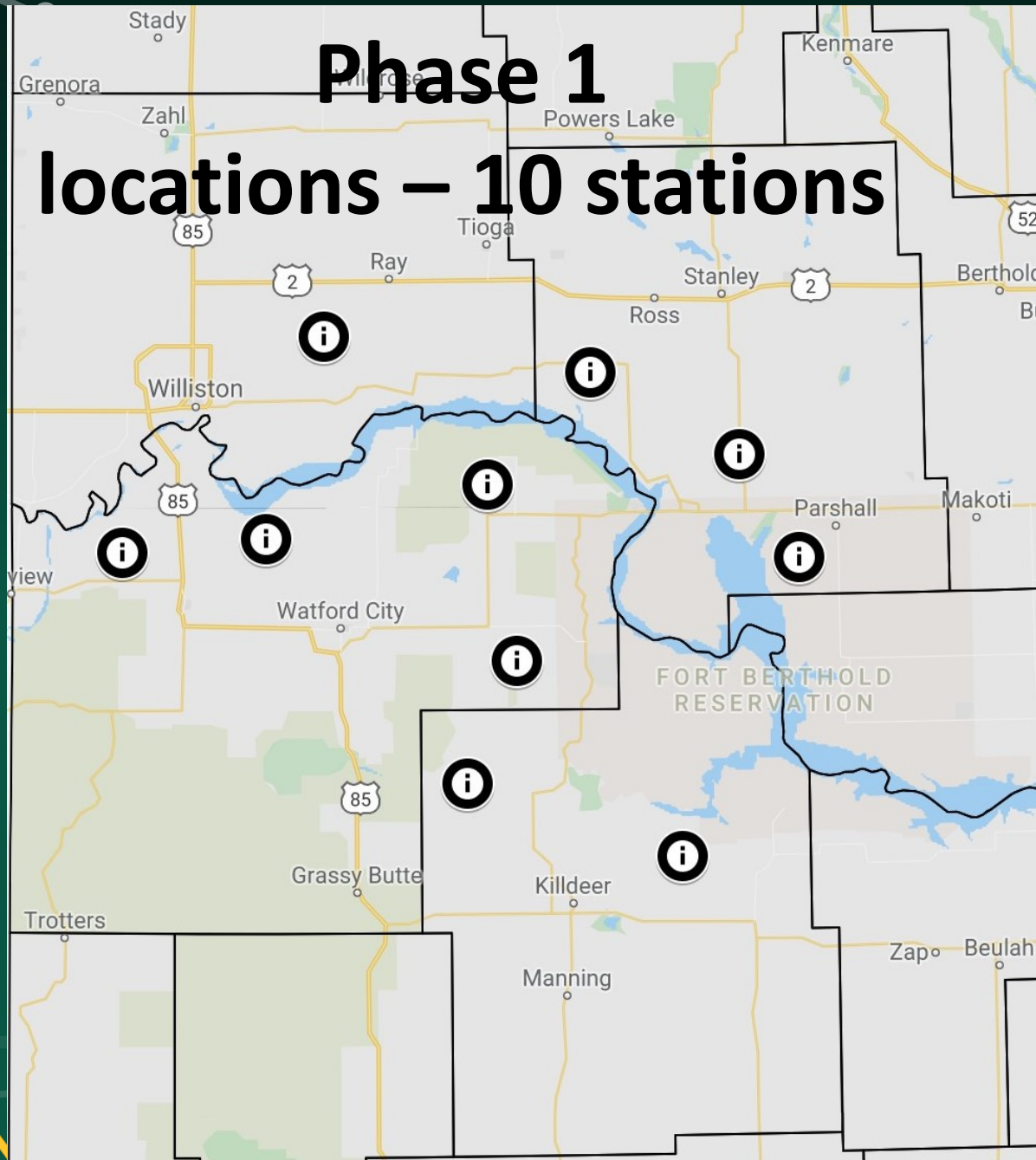
- ✓ Work with research partners, agriculture, and Industry to maximize benefit
- ✓ Install research-grade weather stations in areas with heavy oilfield traffic
- ✓ Make data publicly available through NDAWN, LoadPass and other sites
- ✓ Provide training to road managers through LTAP



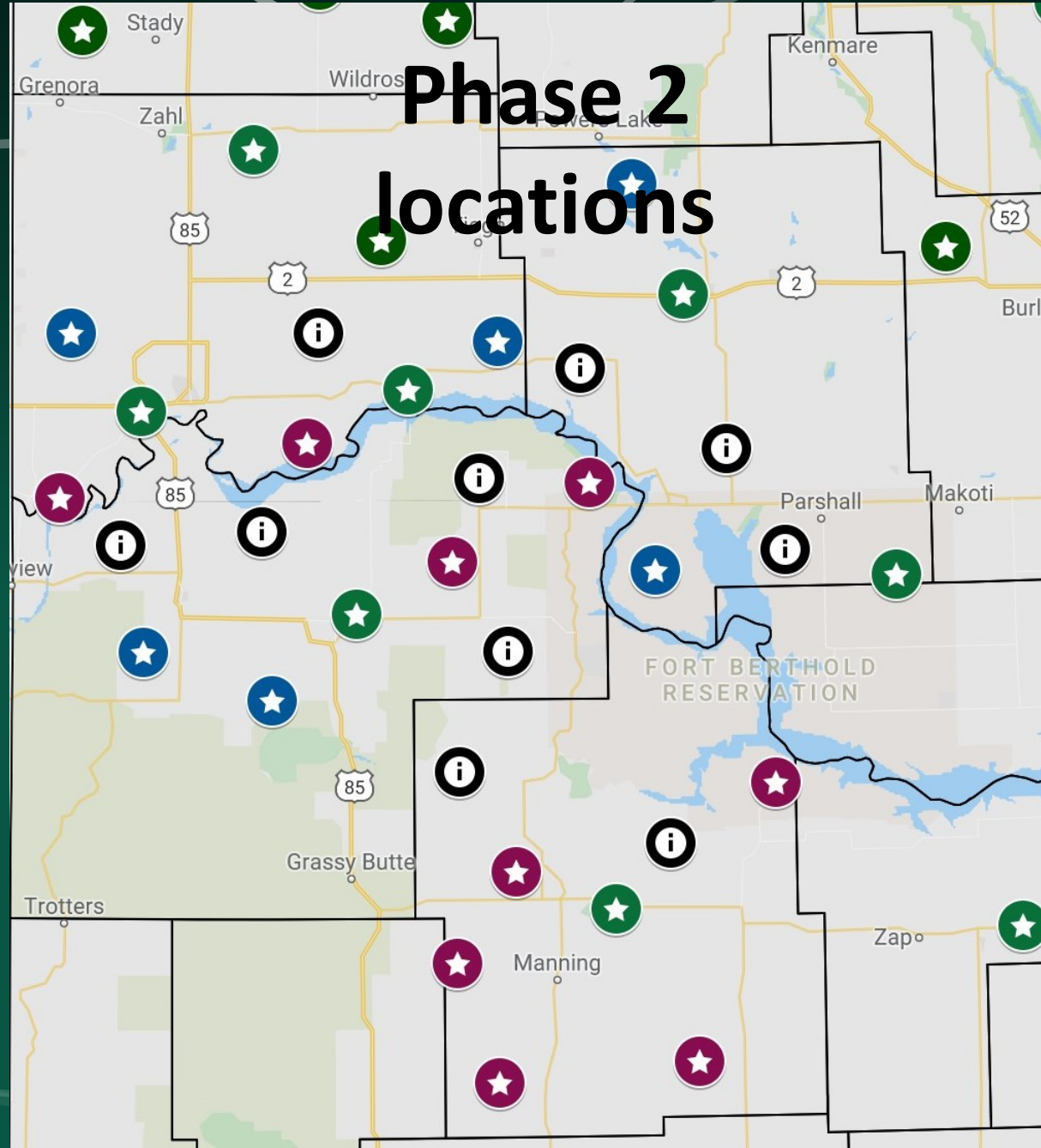
Toward 365



Phase 1 locations – 10 stations



Phase 2 locations

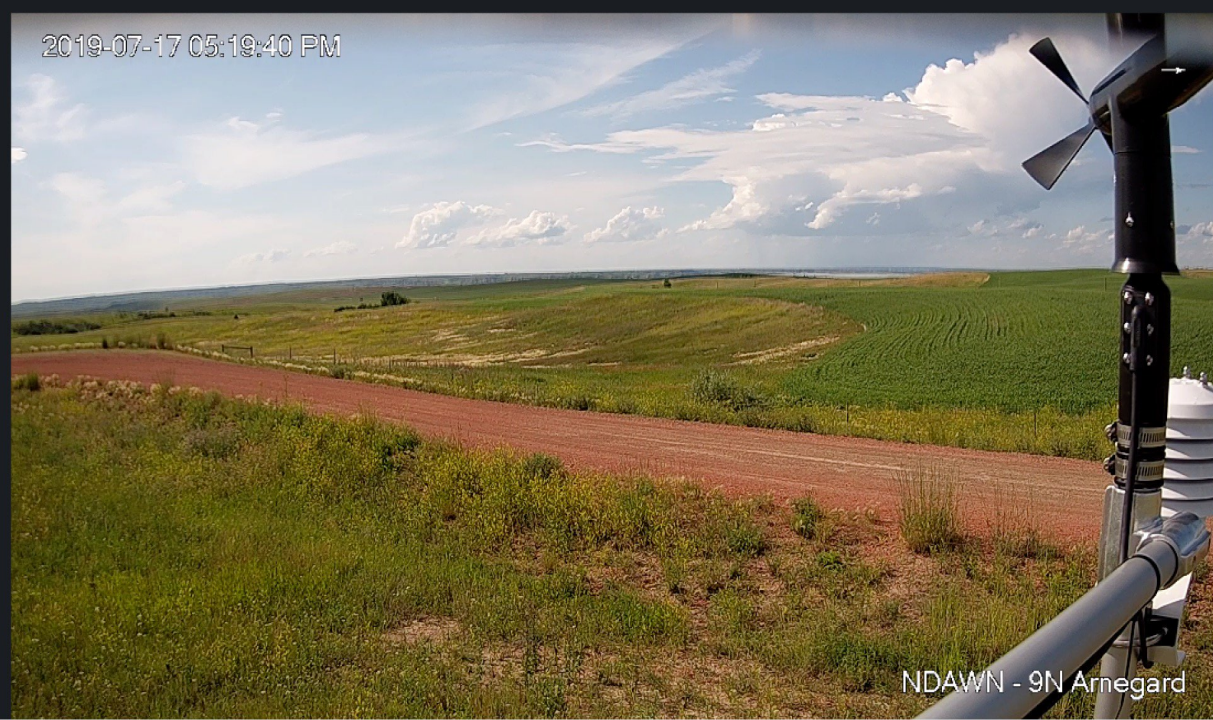


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NDAWN - 5NW Charbonneau

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NDAWN - 9N Arnegard

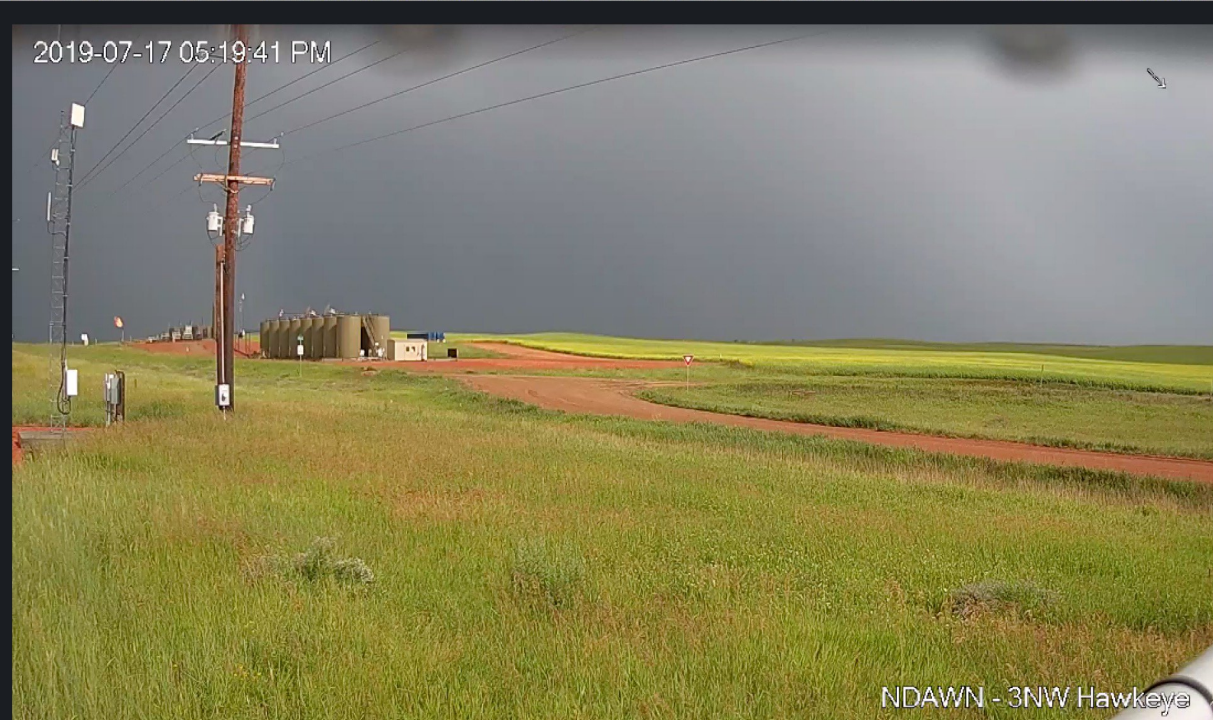
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Rain Events are
often isolated

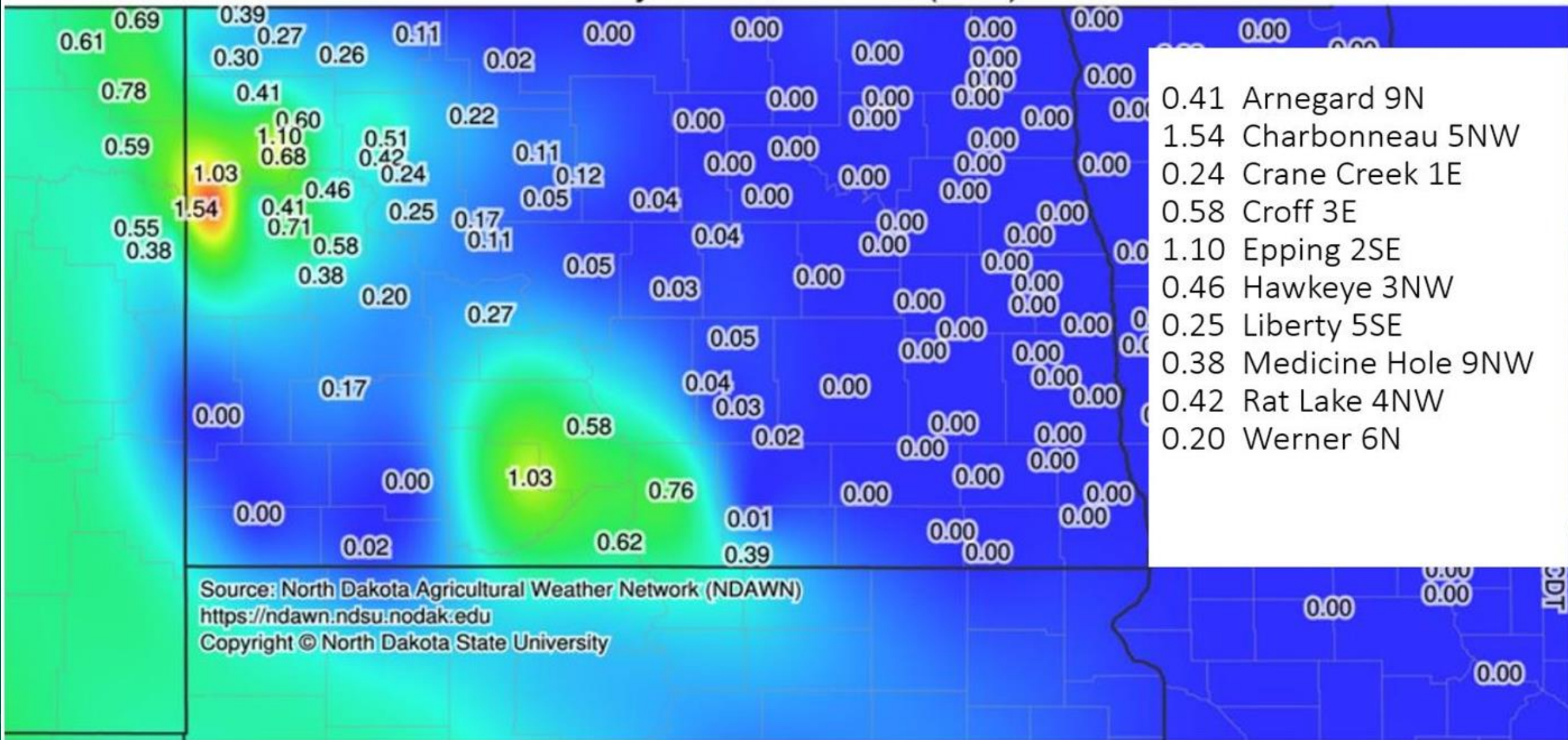
NDAWN - 3E Croff

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NDAWN - 3NW Hawkeye

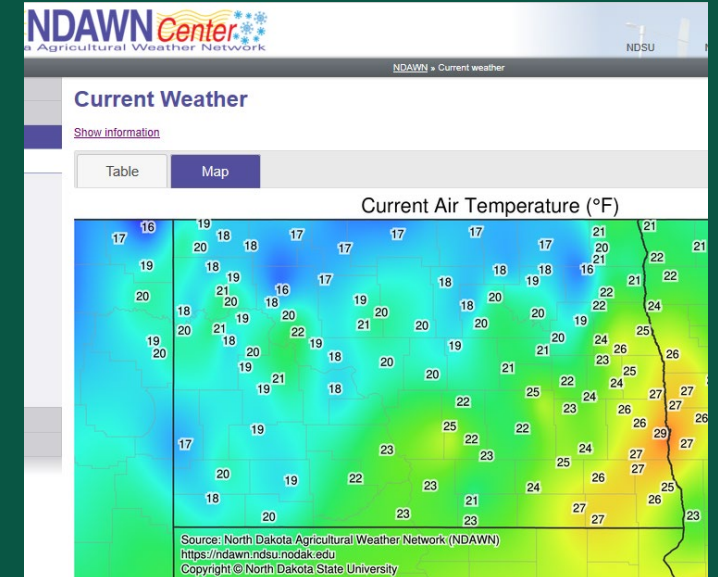
Today's Total Rainfall (inch)

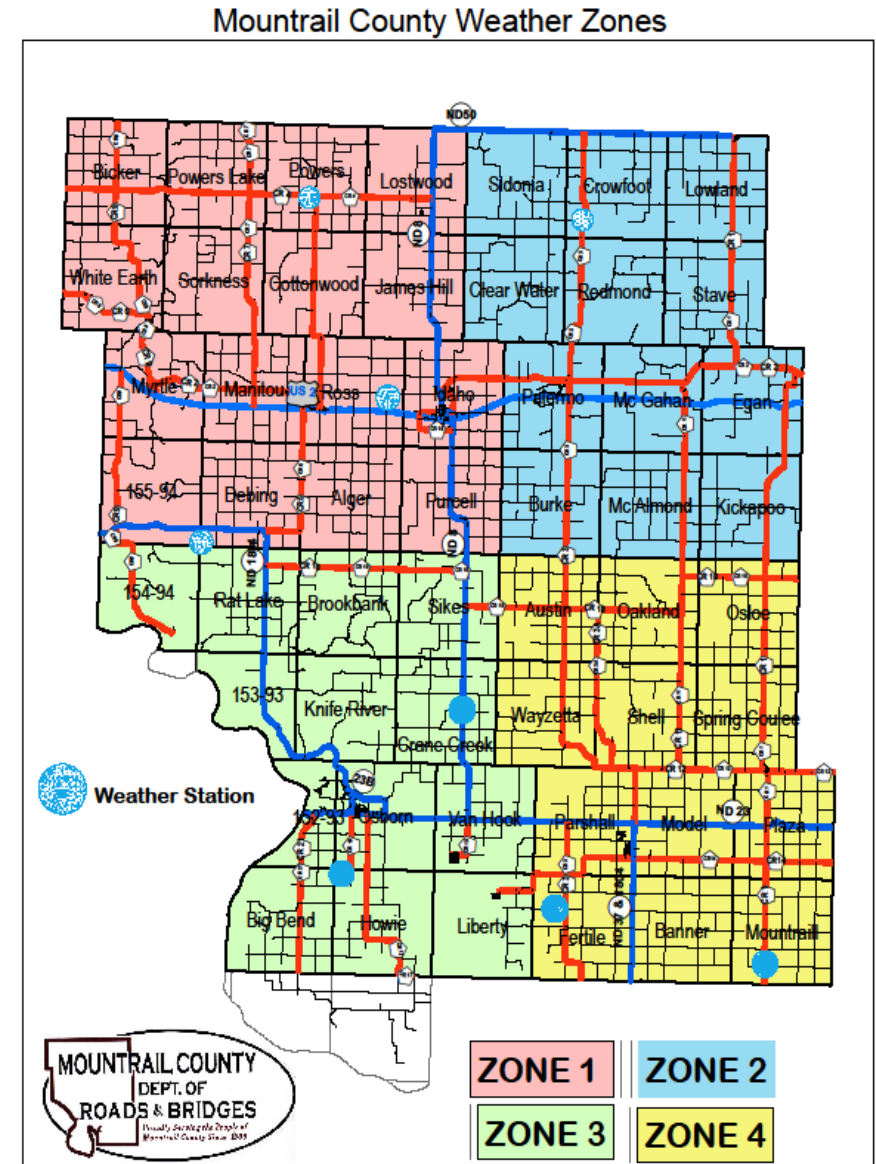
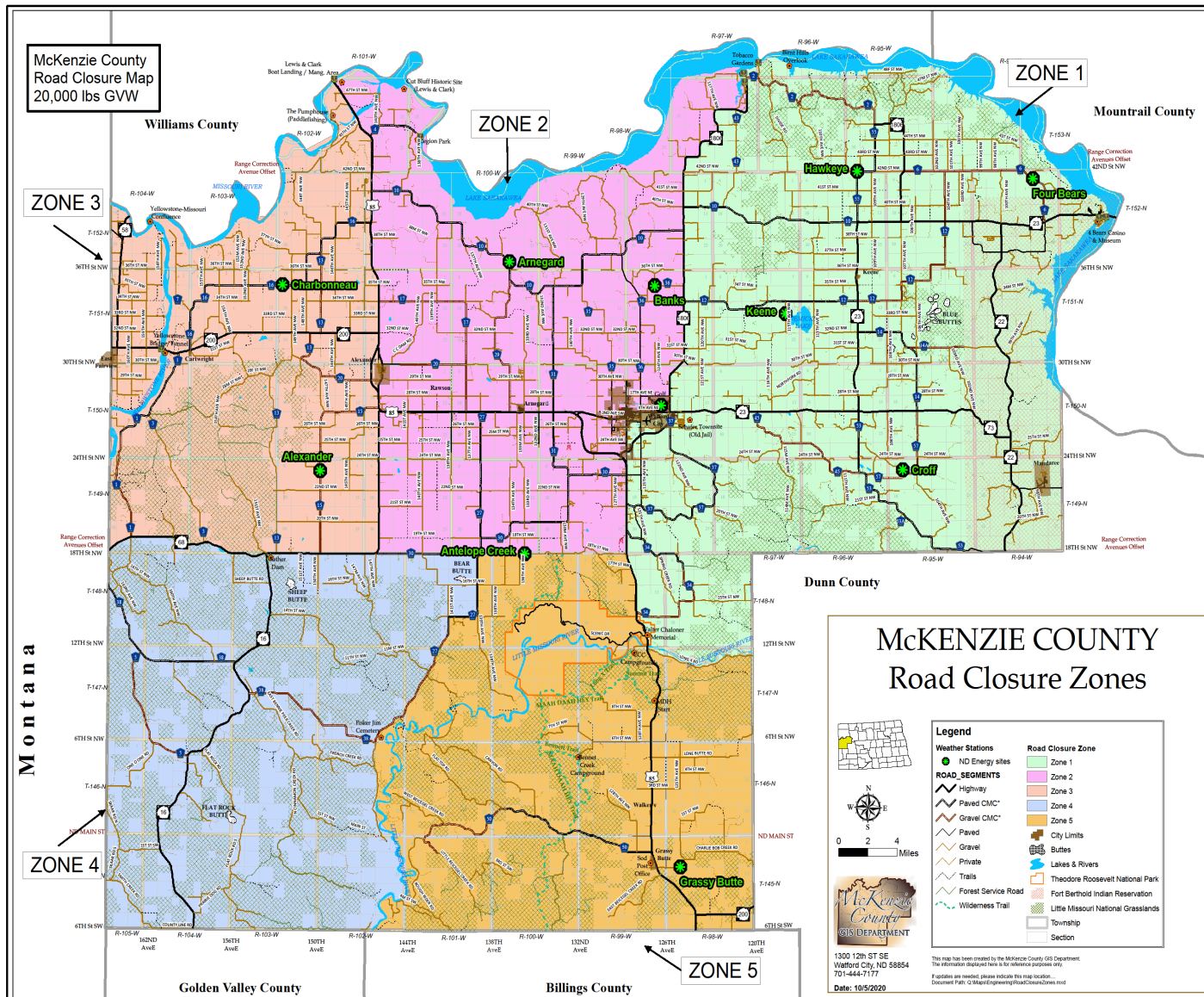


The new stations can be identified by the precipitation numbers on the map. The names are either related to a nearby community or the township in which the station is located.

EXPECTATIONS OF THE PROJECT

- ▶ County Road Departments can use the weather data to determine the area of impact for weight restrictions
- ▶ County Road Departments use weather station locations to create/modify road “zones” for issuing restrictions
- ▶ Forecast and weather accessible from:
 - ▶ Ndenenergy.org and LoadPassPermits.com
 - ▶ NDAWN (ndawn.ndsu.nodak.edu)
 - ▶ County Websites
 - ▶ UGPTI - GRIT





GRAVEL ROAD WARRIOR

NDSU UPPER GREAT PLAINS
TRANSPORTATION INSTITUTE

Better Gravel = Better Roads =
SAFER ROADS



www.ndltap.org/resources/

Roadway Condition Assessments



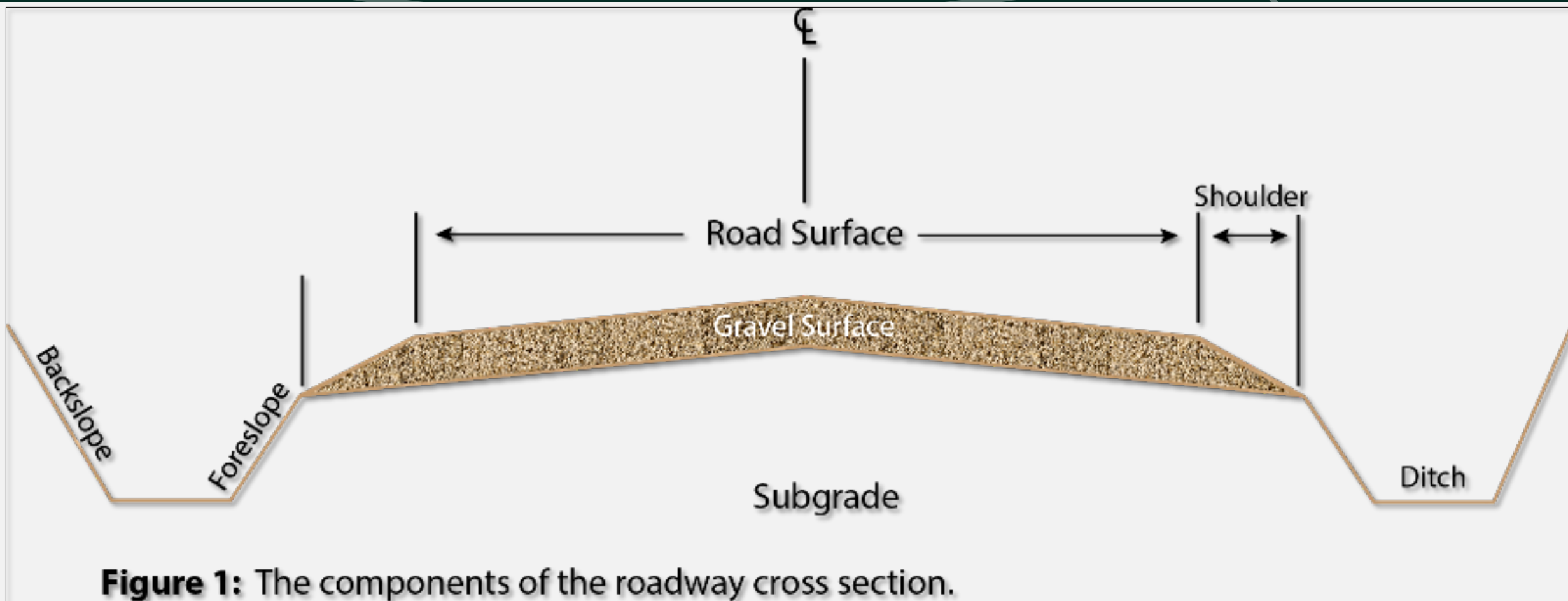


Figure 1: The components of the roadway cross section.

Gravel Depth

05/20/2020 13:20

Roadway Slope



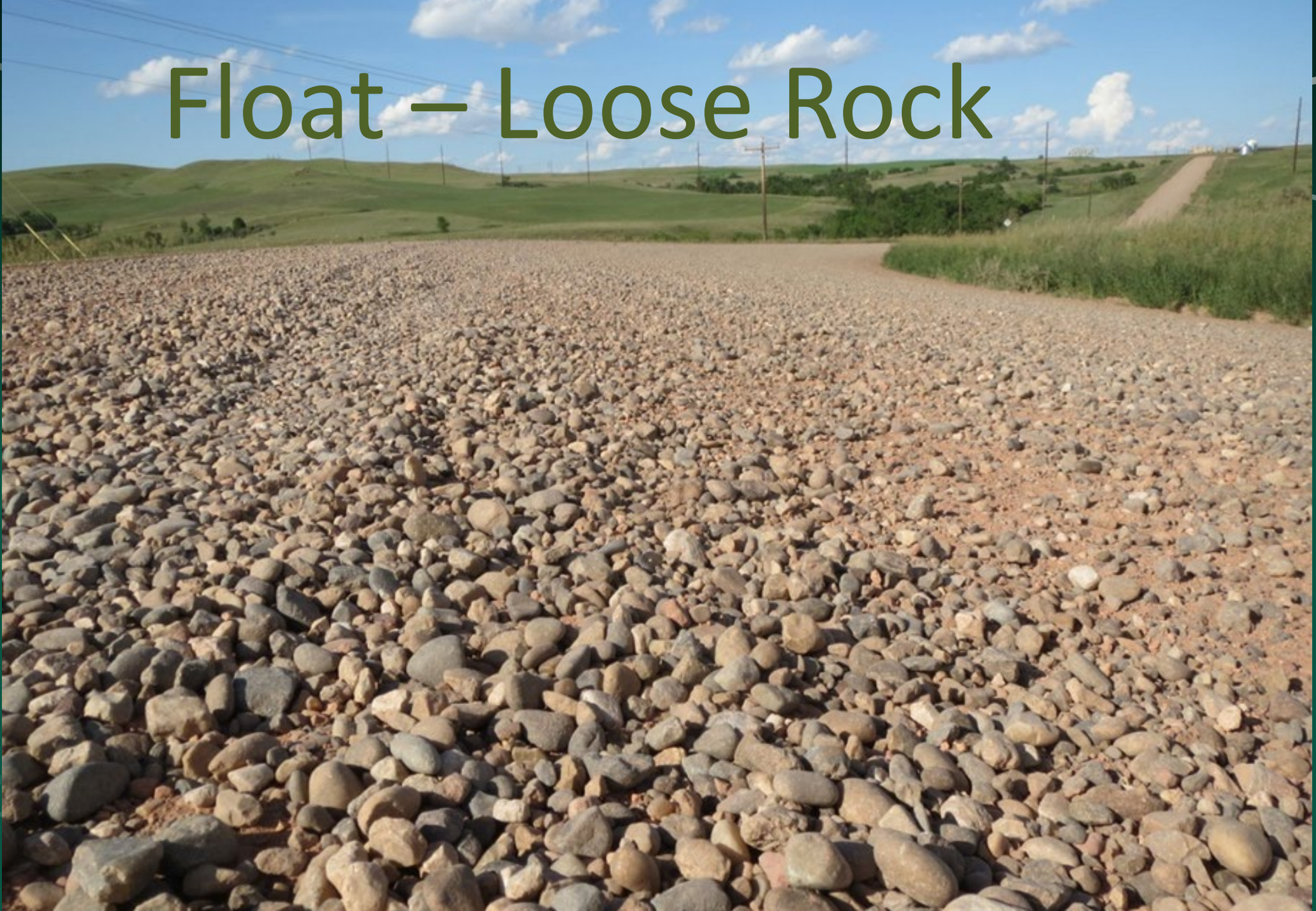
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4% Slope on Gravel



Float – Loose Rock



Float



05/20/2020 14:00

Corrugations = Wash Boarding



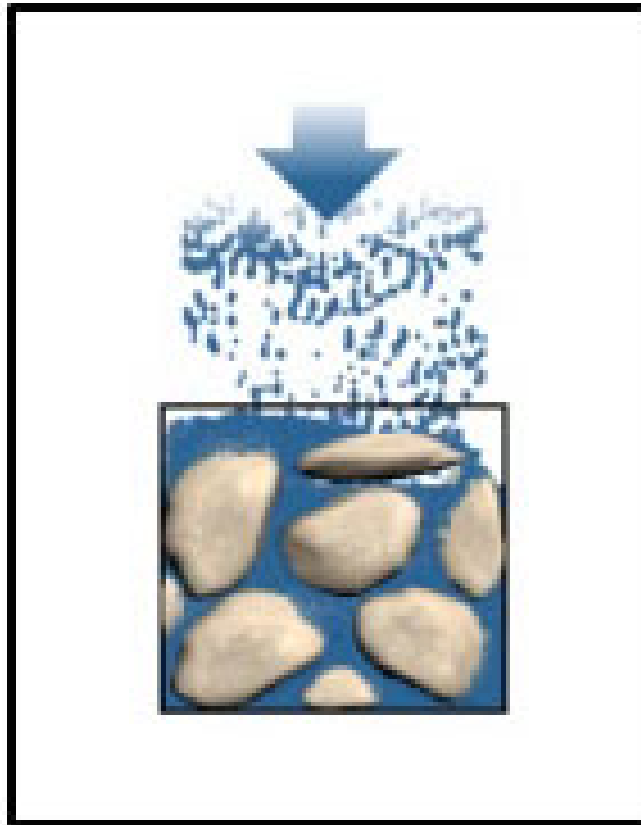
Gravel

Material Assessment

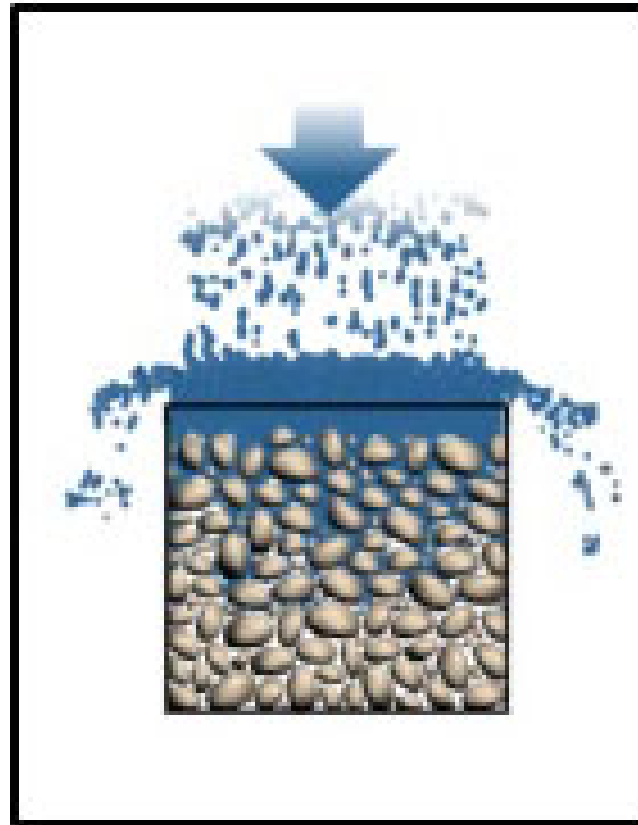


Gravel Quality – Gradation and Binder

Infiltration Variations by Soil Texture



Sand



Silt




Clay

©The COMET Program



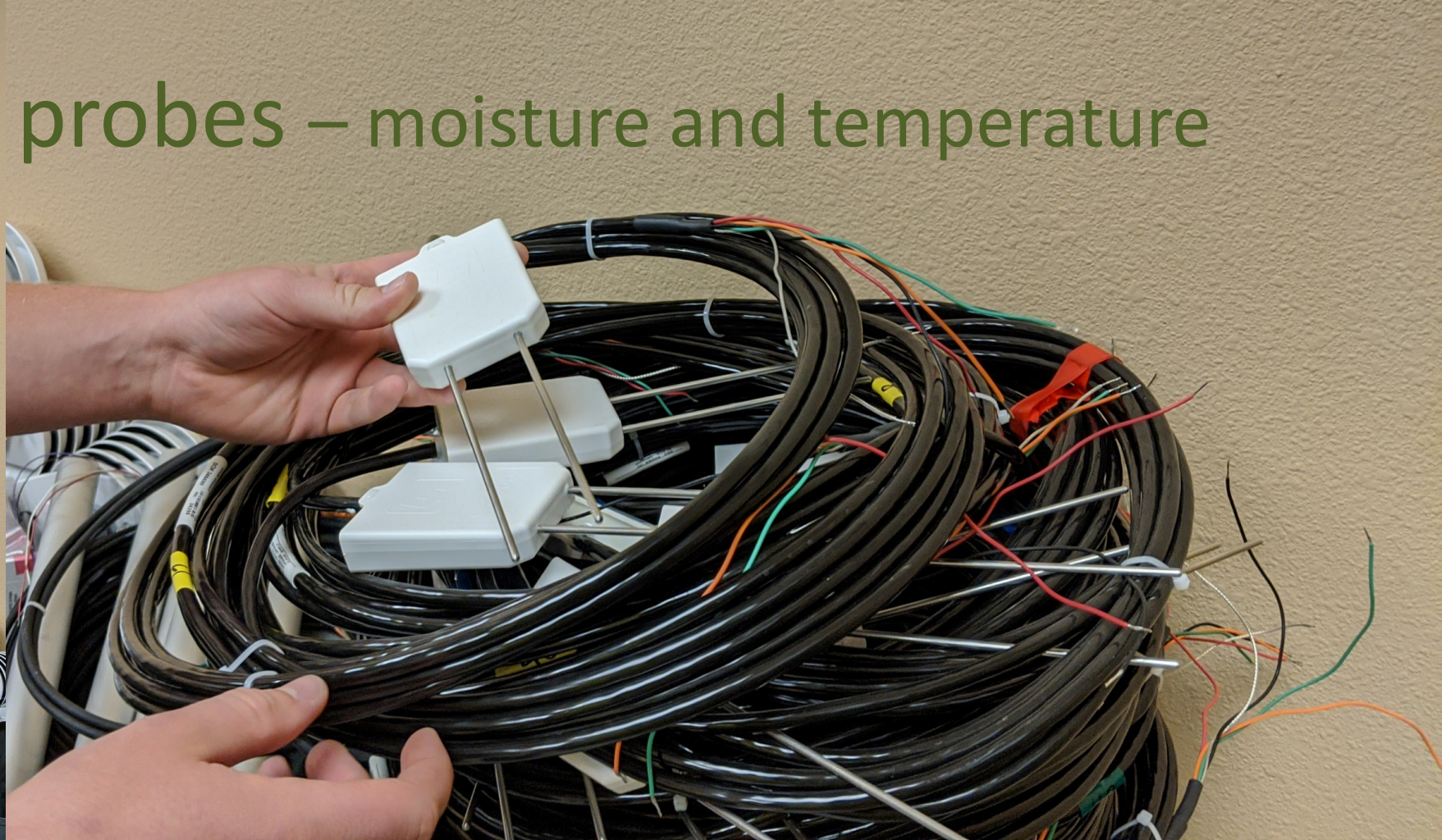
Traffic Counts



A person wearing a dark jacket and jeans is bent over, using a penetrometer to test the subgrade strength of a dirt surface. The device is a vertical metal rod with a handle at the top and a base that penetrates the ground. The person is holding the handle with both hands. The background is a grassy area with yellow flowers.

Subgrade Strength

Subsurface probes – moisture and temperature



Jonathan Rosencrans - Meteorologist





MEDICINE HOLE PROBE INSTALLATION





EPPING PROBE INSTALLATION





PEPPING PROBE INSTALLATION



Gravel Roadway Properties

plus

Rainfall Event Data

Equates to refined roadway condition data:

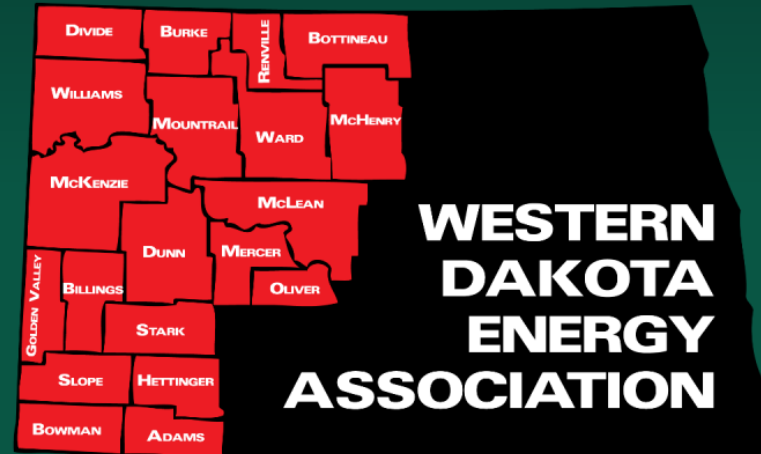
TOWARD 365 Prediction Model

WISE ROADS 2020

Weather Information System to Effectively
Assess Rain Influenced Gravel Road Conditions



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Project is funded and supported by: NDAWN,
WDEA/LoadPass, UGPTI/NDLTAP and a grant from the Oil
and Gas Research Council

