County and Local Transportation Infrastructure Needs

North Dakota Transportation Coalition

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NDSU UPPER GREAT PLAINS TRANSPORTATION INSTITUTE

Contents

- Overview of studies
  - Roads and bridges
  - 4-county study
  - Regional railroad study
- Overview of approach
- Summary of results
- Remaining tasks and timeline

Background

- Third study for legislature and governor
- Requested to present to interim committees:
  - Economic Impact
  - Energy Development and Transmission
  - Budget Section
- Periodic updates for NDDOT

Key Factors in County Road Study

Oil and Gas	***Agriculture***
Number of wells	Cultivated acres
Well locations	Crop mix
Production rate/curve	Yield
Inputs/outputs	Crop densities
Gathering pipeline	Elevator network

Key Factors in Road Study (cont.)

Traffic	***Road***
Truck trips	Surface type
Truck axles/weights	Width & design
ESALs	Age & condition
Avg. Daily Traffic	Soil

Infrastructure Data Collection

- Goal: build a consistent county database across state
- Traffic counts and vehicle classifications
- Road geometry [width]
- Road structure [layers, depths, support]
- Current road condition
- Road jurisdiction/ownership
- Bridge attributes

County Traffic Counts 2013

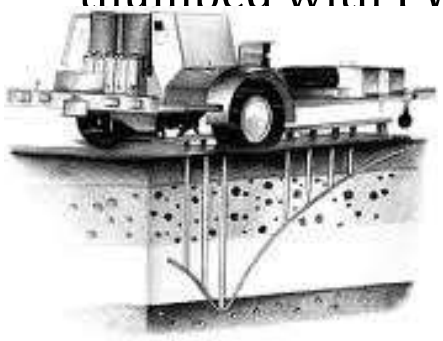
Pavement Data Collection

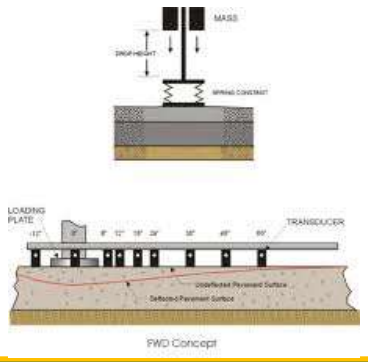
Objective – collect pavement distress, ride , strength and geometric information on paved county roads to determine remaining life and projected construction costs

- Condition Data Collection
  - Collect data with NDDOT pathway van
  - 5,600 miles of paved county roads
  - Will not collect short segments
  - Van will provide consistent pavement distress and ride information
  - Collection in July, August, Sep. 2013

Pavement Data Collection

- Non-Destructive Testing - verify prior estimates on subgrade strength
  - Falling Weight Deflectometer (FWD) and Ground Penetrating Radar (GPR)
  - Western ND – all pavements not recently improved
  - Eastern ND – selected based on agricultural production facilities and other major traffic generators
  - FWD will be done first and GPR will be done on the sites thumped with FWD





FWD Concept

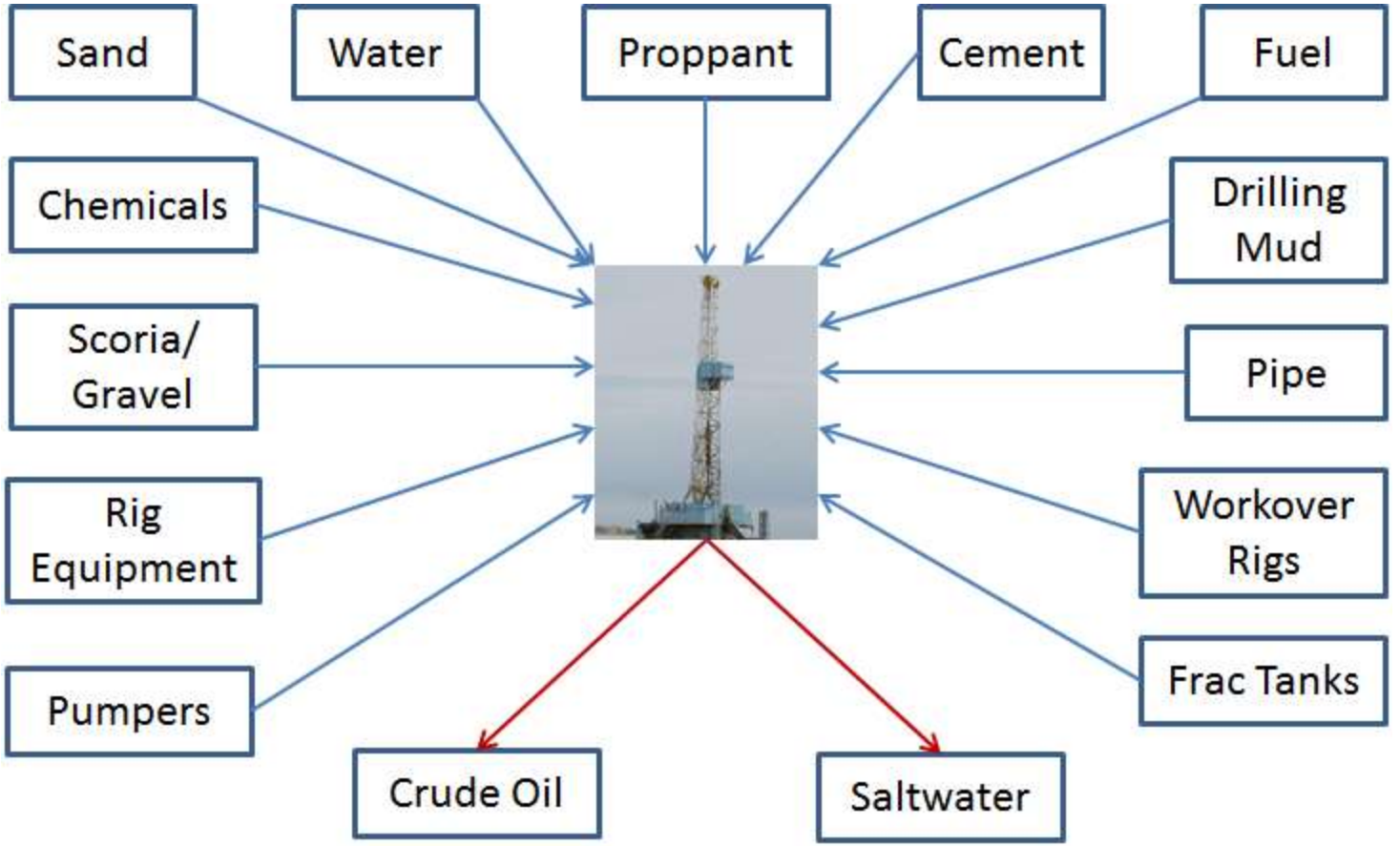
Data Collection: County Survey

- Aggregate (gravel) costs
- Gravel production techniques
- Placement costs
- Transportation costs from pit to roads
- Dust suppressant usage/costs
- Stabilization usage/costs
- Intermediate practices
  - Stabilization armor coat
  - Double chip seal/armor coat
  - Others

Model Components

- 20 year forecasts for agricultural and oil production
- Ag forecasts specific to township and crop
  - Reflect county yields and yield forecasts
  - Changing crop mix
- Oil forecasts
  - Specific to spacing unit
  - Reflect filling in over time
  - All inputs and outputs
- Baseline traffic

Drilling Related Truck Movements

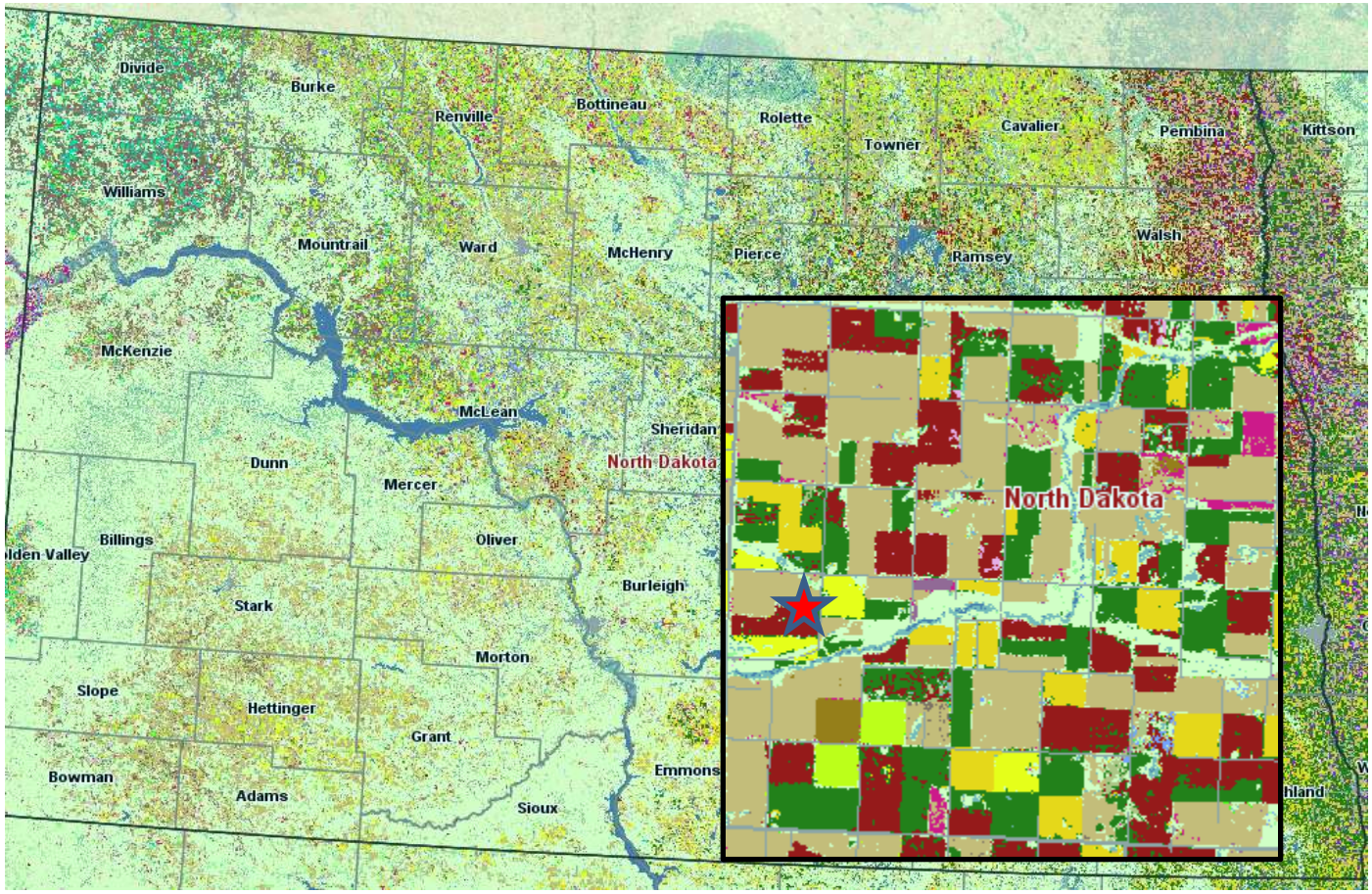


Agricultural Analysis

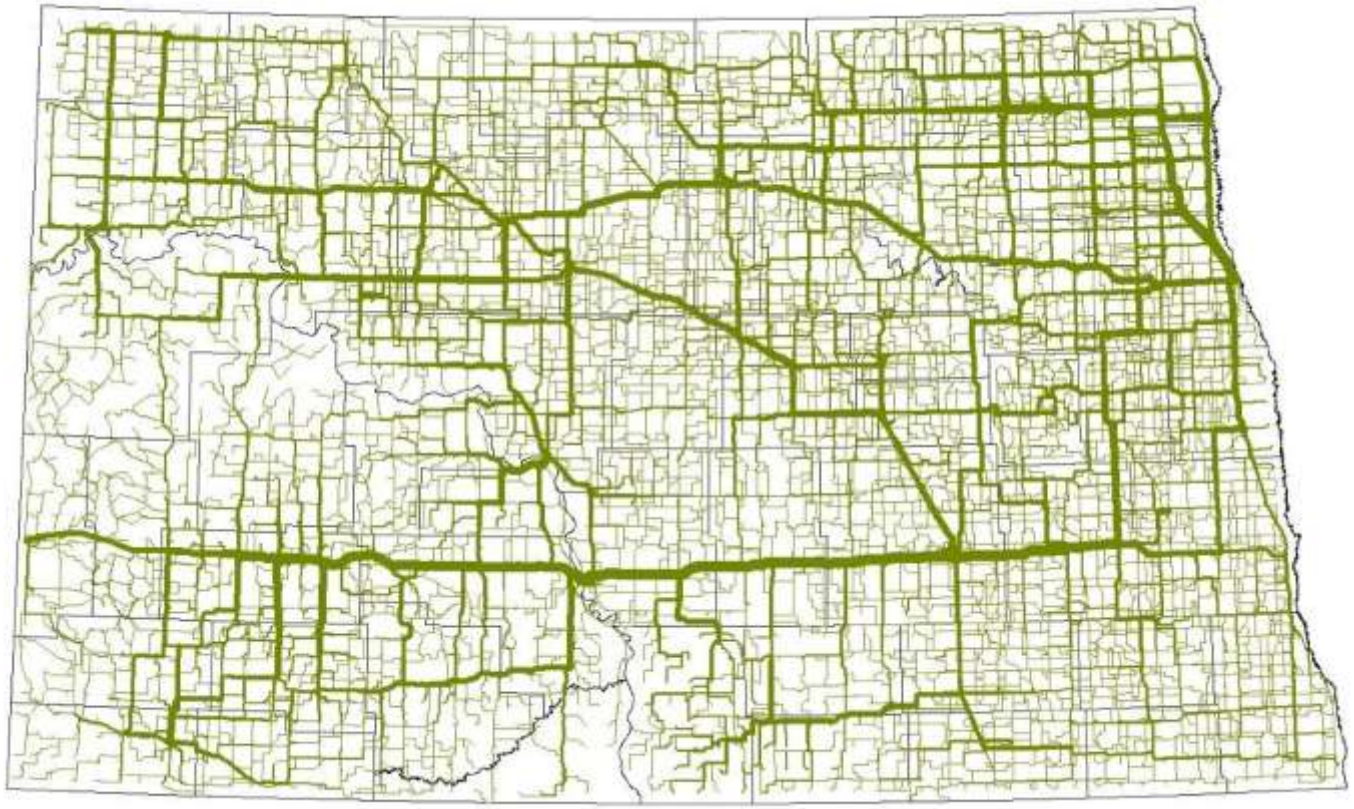
Known	Crop production
Predict	Truck trips and routes
Known	Elevator & plant demands
Estimate	Segment specific traffic

Data: crop production (NASS), elevator volumes (NDPSC), in-state processors (survey), road network (NDDOT-GIS Hub), local road data (2008 survey)

Crop Production and Location



Wheat Movements



Gravel Road Analysis

- Life-cycle cost analysis - practices
  - Graveling and blading
    - Normal levels (e.g. regraveling every 5 years, blade once per month)
    - Increased levels (e.g. regraveling every 3-4 years, blade twice per month)
    - High levels (e.g. regraveling every 2-3 years, blade once per week)
    - Usage of dust suppressant on impacted roads

Paved Road Analysis Process

- AASHTO 1993 Design Guide
- Predict year & type of improvement
- Improvement threshold based on pavement condition
- Year of improvement based on:
  - Existing structural capacity
  - Existing condition
  - Forecasted ESALs (Equiv. Single Axle Loads)

Paved Road Improvements/Maint.

- Improvement type
  - Overlay
  - Sliver widening
  - Reconstruction
  - Mine & blend
- Normal maintenance
  - Chip seals
  - Crack sealing and patching
  - Other

County Bridge Analysis

- Current NBI (County and Township)
  - Identified structurally deficient and functionally obsolete bridges
  - Estimate replacement unit cost from recent ND bridge projects
  - Survey counties for biennial maintenance cost
  - Forecast replacement of deficient and obsolete bridge

County and Township Bridges

- 37% are 50 years or older
- Over 20% are structurally deficient; others are functionally obsolete
- 490 bridges with capital improvement needs; almost all immediate
- $329 million of needs ($251 million for replacement)

Status of County Bridges

Status (2013)	Number	Percentage
Not Deficient	1,729	70.11%
Structurally Deficient	552	22.39%
Functionally Obsolete	185	7.5%
Total Bridges	2,466	100%

Projected Bridge Improvements

Treatment	Number	Subtotal
Deck Rehabilitation	4	99
Rehab. & Widening	95	
Bridge Replacement	110	390
Culvert Replacement	280	

County and Township Roads

- Paved road improvement needs:
  - Resurfacing
  - Widening
  - Reconstruction
  - Preservation/ maintenance
- Unpaved road needs
  - Accelerated maintenance (graveling and blading)

County Road Investment Needs by Surface Type ($2014 Million)

Biennium	Gravel	Paved	Total
2015-2016	$606.40	$395.00	$1,001.40
2017-2018	$547.60	$345.60	$893.20
2019-2020	$547.60	$305.33	$852.93
2015-2034	$5,456.60	$2,744.15	$8,200.75

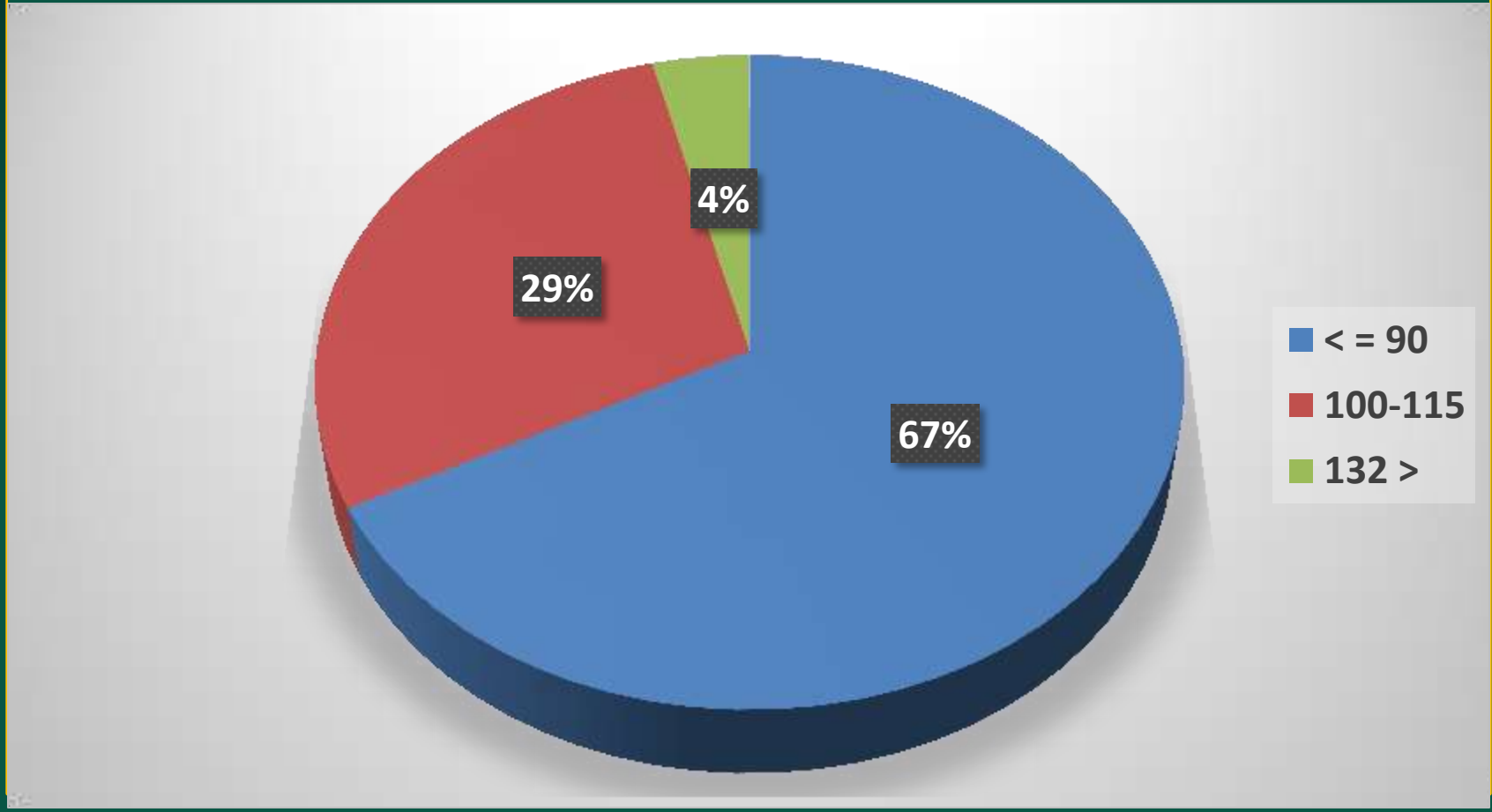
County Road Investment Needs by Region ($2014 Million)

Biennium	East	West
2015-2016	46%	54%
2017-2018	52%	48%
2019-2020	45%	55%
2021-2022	44%	56%
2015-2034	49%	51%

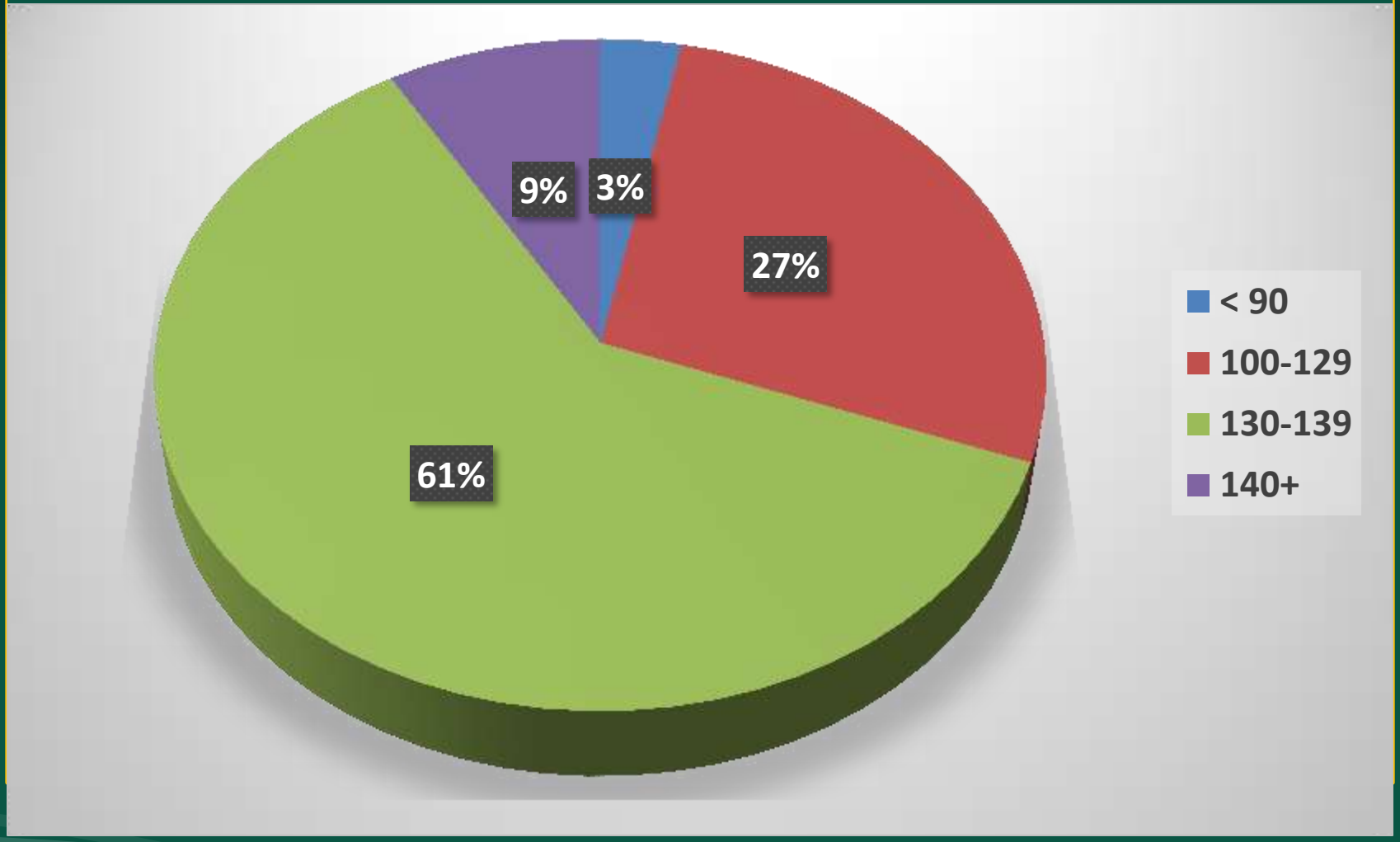
Regional Railroad Infrastructure

- 1,200+ miles
- Inherited from Class I railroads
- Mostly light weight rails: age 100+ years
- Important to agriculture and energy
- Accumulated investment needs

Rail Weights (lb/yd)
ND Regional Railroads



Rail Weights: U.S. Class I Railroads



Next Steps/Timeline

- Comments on county road study
- 4-county study
- Regional railroad study
- Expected reports to legislature