



Freight Trends and Issues

TERRA Pavement Conference
2015

We all have a stake in **A**  **B**

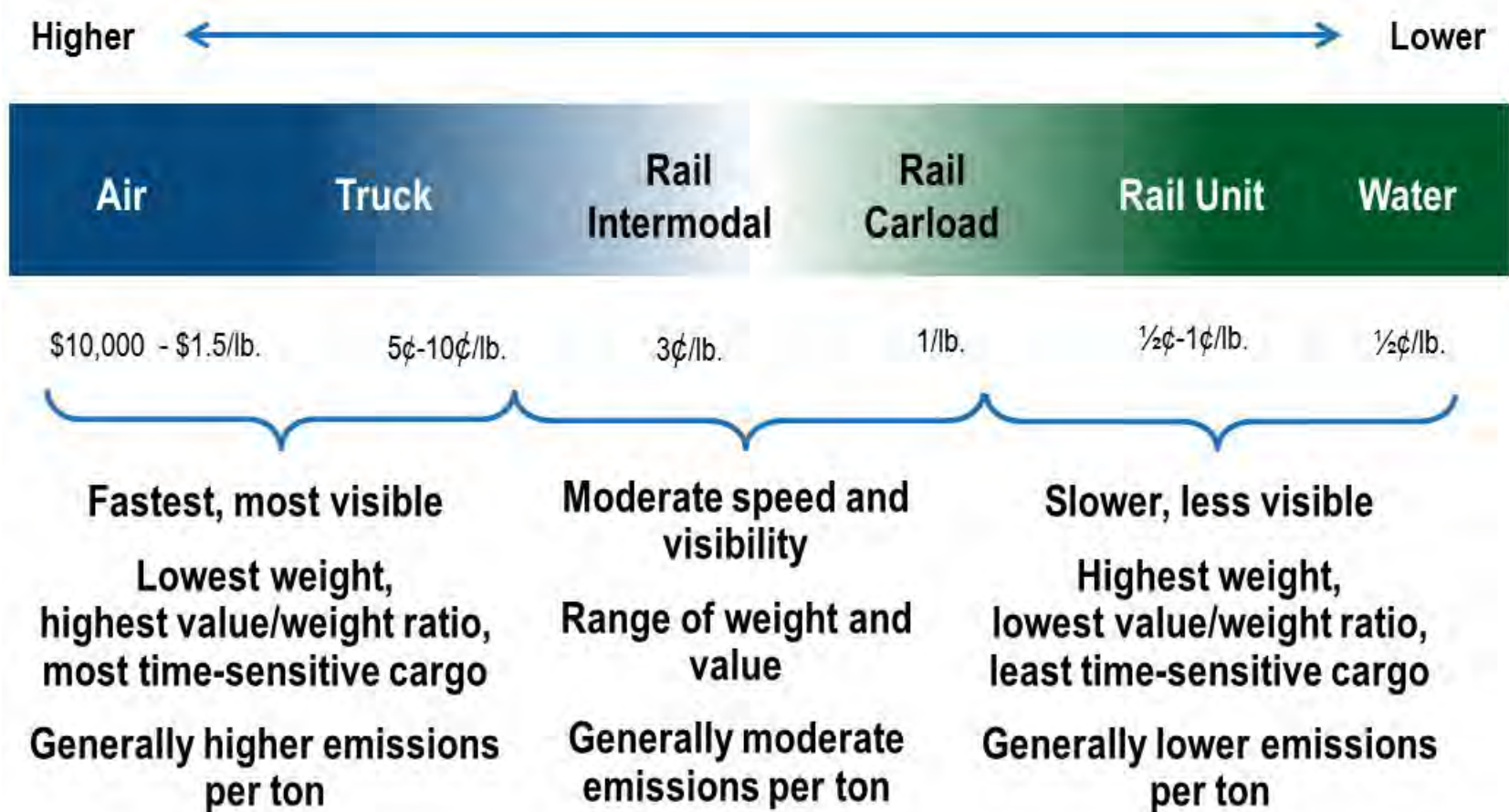


Presentation Overview

- ▶ Fun Freight Facts
- ▶ Issues
- ▶ Directions



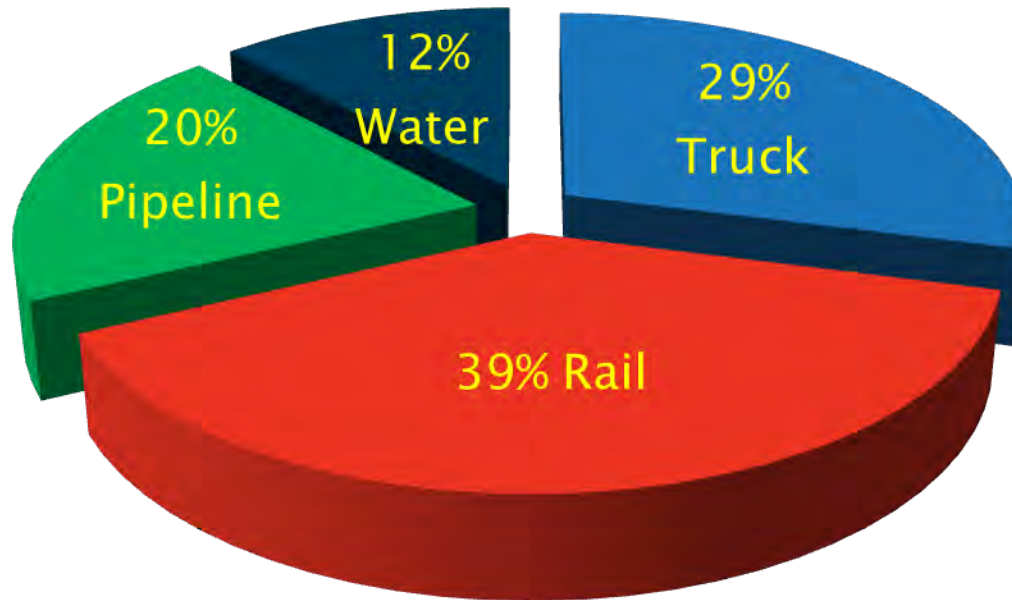
Goods Movement Service Spectrum



Source: Cambridge Systematics, 2014



Modal Share of Freight (US 5.9 Trillion Ton-miles annually)

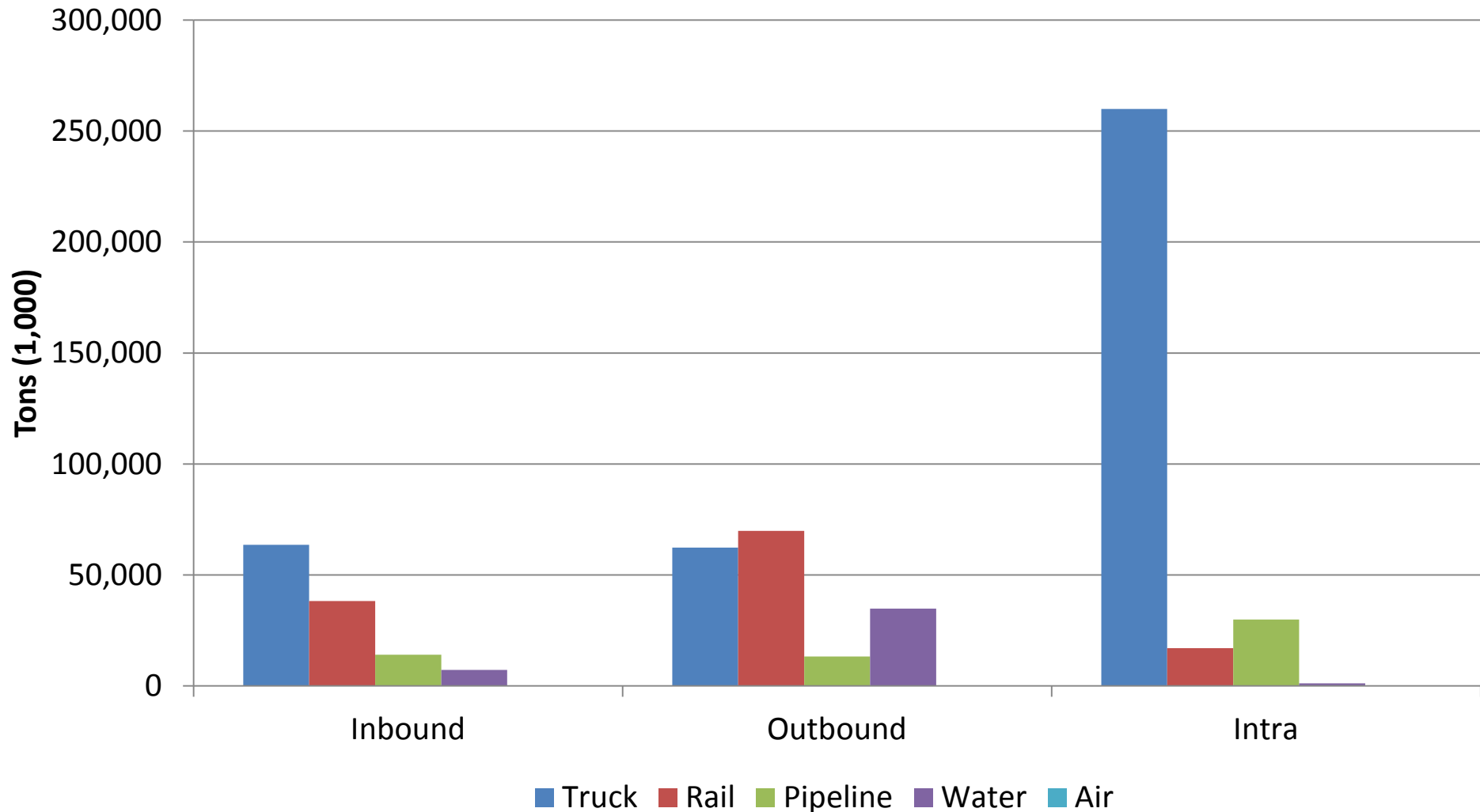


- ▶ Average Haul; 917 miles, rail; 26 miles, truck
- ▶ 80% of all freight trips are by truck

2010 FRA National Rail Plan Progress Report



Statewide Freight Tonnage by Mode



Major Freight Commodities

Commodity Type	2012		2040	
	K Tons	Percent	K Tons	Percent
Cereal Grains	149	23%	268	24%
Metallic Ores	57	9%	52	5%
Coal	47	7%	87	8%
Gravel	45	7%	66	6%
Animal Feed	34	5%	68	6%
Other Ag. Products	31	5%	86	8%
Nonmetal Minerals	29	4%	48	4%
Waste/Scrap	23	4%	29	3%
Gasoline	23	3%		
Crude Oil	–	–	26	2%
Other Foodstuffs	21	3%	37	3%
Coal	20	3%	87	8%
All Others	169	26%	320	29%

Where are the trucks?

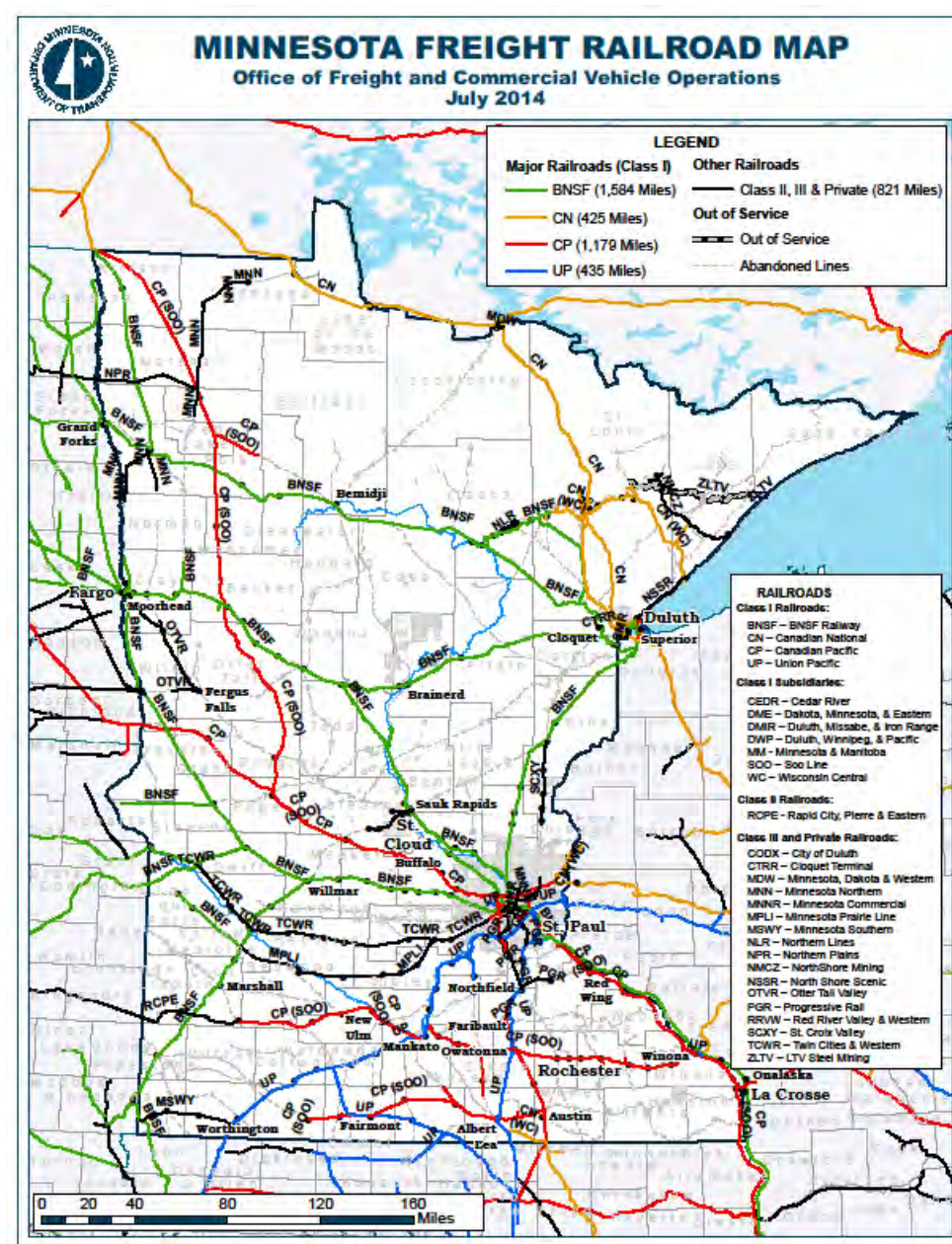
System	Miles	Percent	VMT %	HCADT
Interstate	916	.6	21.7	1,199,106,000
US	3,229	2.3	16.3	764,102,000
MN	7,671	5.4	19.5	746,982,000
CSAH & CR	44,821	31.5	24.3	?
MSAS & City Streets	22,415	15.7	15.9	?
Townships & Other	63,457	44.5	2.2	?
TOTAL	142,510			



They are everywhere

Current Rail System

- 4 Class I Railroads
- 1 Class II Railroad
- 16 Short Line Railroads
- 4400 Route Miles
- 4500 Grade Crossings
- 250 Million tons/year
- Rail moved 38% by weight, 14% by value of all freight in MN – 3X US average
- 8th Largest system in Nation
- 7% growth, 2008-2013



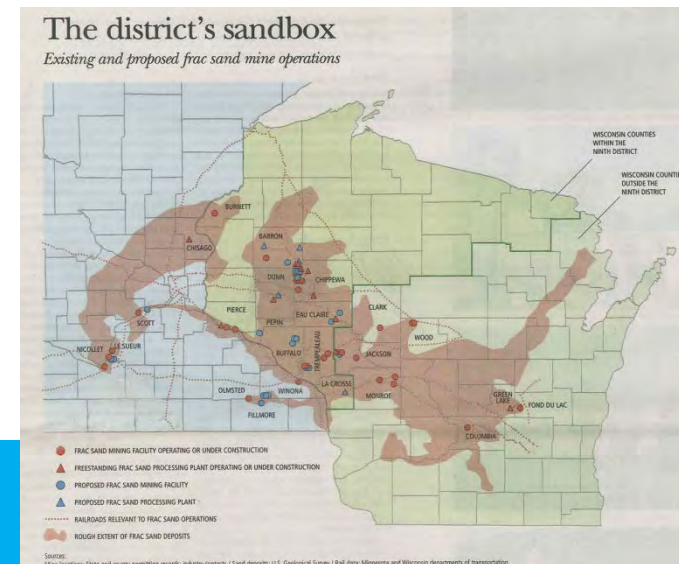
Significant Changes in Logistics

- ▶ Reduced Coal moves thru state (-4 trains/day in MN) as gas replaces coal in power plants
- ▶ High volumes of sand (2-3 trains/day) to fields
- ▶ Unit Oil Trains by Rail (7/day, BNSF; 2/day, CP)



Projected Frac Sand Demand

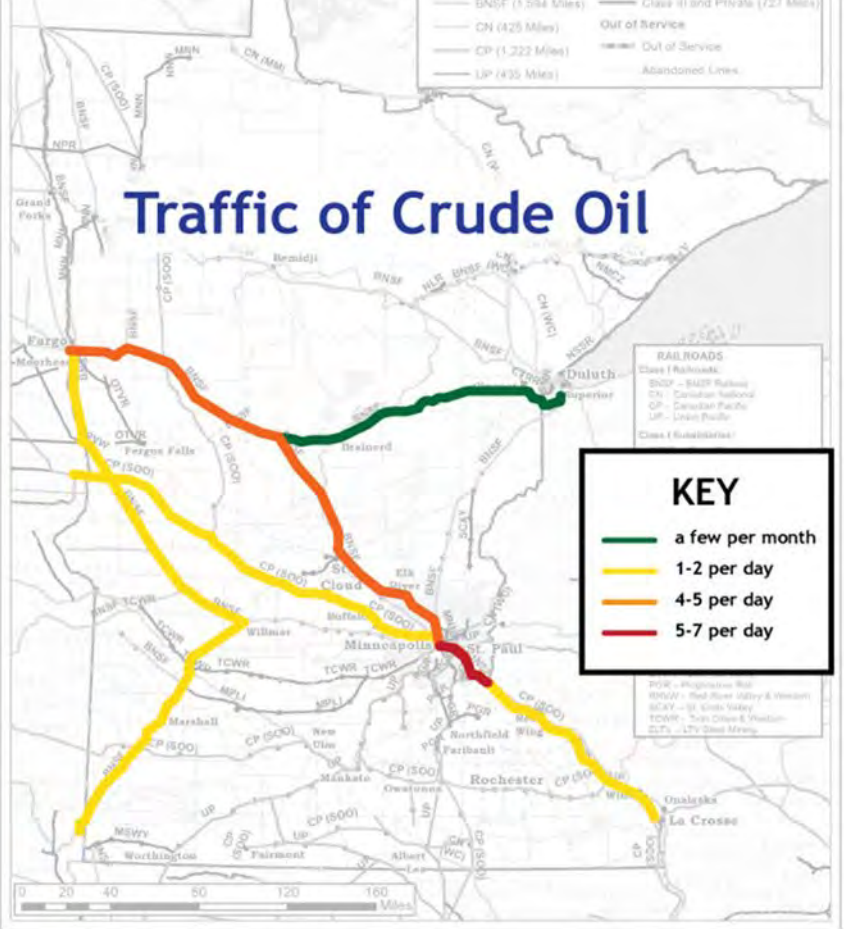
- ▶ Current Wisconsin & Minnesota production at 28–30 Million tons/year (90% Wisconsin)
- ▶ Estimated long-term demand, 34–50
- ▶ Estimated production if all prospective WI mines brought on line, 60–70 MMT/Yr
- ▶ Life of current Shale Oil & Gas exploration trend, 25–35 Years ?



Crude-by-Rail issues

- ▶ Only enough pipeline capacity for 1 / 3–1 / 2 of production over next ten years
- ▶ Rail flexibility to multiple Gulf or Coast refineries a major incentive to refiners. Shipping is a small part of the cost.
- ▶ Bakken crude sweet, light, extremely volatile; Low flash point & boiling point like gasoline or diesel
- ▶ Tank car designs, track capacity, rail operations, EMS coordination





© ZUMA/REX

Oil Train State Actions

- ▶ Study Crude-By-Rail routes: crossing safety on 700 miles of main lines
- ▶ Determine high priority grade crossing upgrades for \$2 Million of 2014 funds
- ▶ Hired additional Track & Hazmat Inspectors
- ▶ DPS: Coordinate Improved Emergency Training, Planning, Resources & Response
- ▶ PCA: Improve Rail Spill Response, Planning
- ▶ ND: lower volatile gas pressure 4/1/15



Freight Rail Issues

- Captive Shippers (15–20% of customers)
- Reduced Resiliency
- Rail Safety
 - Positive Train Control
 - Hazmat
- Congestion – Mainline and interchange
- Expansion, Improvements (\$26 Billion, 2014)
 - Community impacts
 - Trails to rails? (NIMBY)



Today's Freight Rail Atmosphere

- 2014's perfect storm:
 - Severe Weather (blizzards, floods)
 - Increased demand
 - Bakken
 - Large grain harvest
 - Decrease in shipping supply (BNSF especially)
 - Decrease in port shipping (flood, drought, freeze)
 - Increase in shipping costs
- Governor's listening Sessions
 - Railroads not responsive to local concerns
- STB meeting, Fargo
- Crystal Connection



Truck Freight Issues

- Changing Economic Conditions and Markets
 - Changing types, quantity and destination of goods
 - Availability of Drivers
- Congestion on highways
 - Just in time challenge especially in metro
- Infrastructure Quality
 - Rough pavements damage goods, increase fuel consumption
- Size and Weight Restrictions
 - Inconsistent among states
 - 10 ton network – gaps



MnDOT Over Size, Over Weight Truck Permits

- ▶ Issue ~ 90,000 permits annually
- ▶ 32% of permits auto-issued, no MnDOT review
- ▶ Superload and Megaload applications make up about 5% of all application requests, but take about 30% of resources to process



Statewide Permit Coordination Study

- ▶ To Study the Practicality of a Statewide Coordinated Permitting Process...
 - Ease and efficiency for carriers to purchase permits
 - Collaboration and coordination between agencies:
 - MnDOT
 - Counties
 - Municipalities
 - Consistency in process



Preliminary Findings: Road Network...

- ▶ Most agencies have three levels of “approval”...
 1. Roadways where reasonably-sized vehicles are allowed; absent construction projects
 2. Roadways with limited travel; seasonal/weather issues (gravel, drainage, snow removal, etc.)
 3. Roadways with problems; OSOW vehicles are not allowed
- ▶ No efficient way of broadcasting last-minute road construction, weather, or other event information
- ▶ When official detour routes are defined, there is limited, or no, coordination between State/local permitting entities



FHWA Comprehensive Truck Size and Weight Limits Study

- ▶ MAP 21 requirement
- ▶ Evaluate and compare different truck configurations to report on the impacts of changing size and weight policy:
 - Infrastructure impacts
 - Safety risks
 - Effect of levels of enforcement
- ▶ Report to Congress: November, 2014
 - Did not occur
- ▶ Technical report under internal review



FHWA Truck Size and Weight Study

Configuration	# Trailers	# Axels	GVW (kips)
1) 5-axel	1	5	88
2) 6-axel	1	6	91 & 97
3) Tractor + twin 33 ft. trailer	2	6	80
4) Tractor plus three 28-28.5 ft. trailers	3	7	105.5
5) Tractor plus three	3	9/10	129

2006 Mn Proposal	GVW	Allowed on
6-axel	90	All 10-ton rated, no interstates
7-axel	97	All 10-ton rated, no interstates
8-axel twin (28.5 ft. ea)	108	Twin Trailer Network



MnROAD LVR Study

To evaluate the effects of traffic loadings on pavement performance at MnROAD by quantifying the differences between the two lanes on the Low Volume Road



Truck Configurations



34,000 lb

STANDARD

34,000 lb

12,000 lb

44,750 lb

OVERLOADED

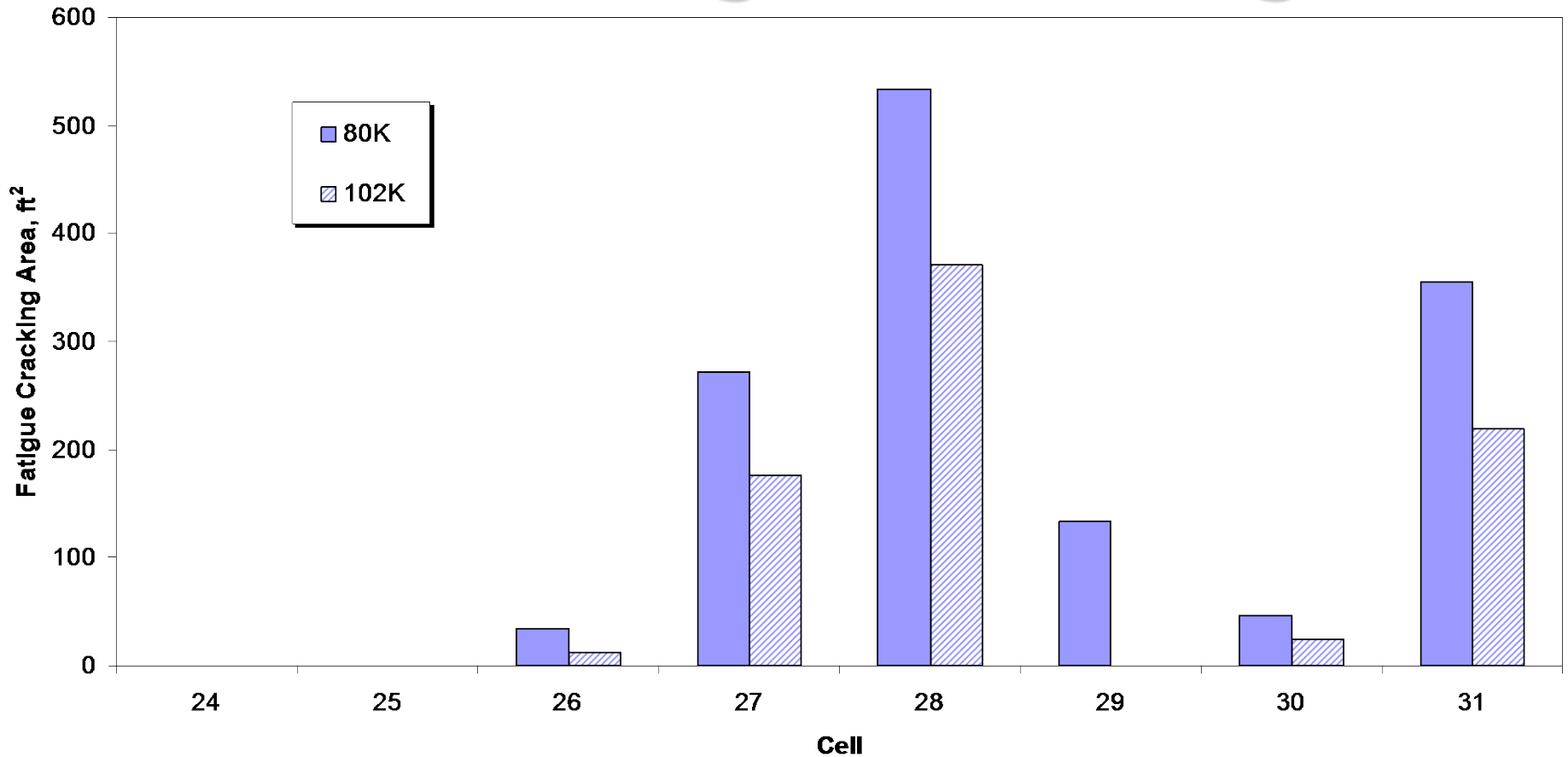
44,750 lb

12,500 lb

▶ Equal ESAL applications over time



HMA Fatigue Cracking



► More fatigue cracking in 80K lane



Observations and Conclusions

- ▶ Low temperature cracking and ride performance unaffected by traffic loadings
- ▶ PCC faulting and HMA rutting, fatigue cracking more severe in 80K lane
- ▶ Distresses on these sections more affected by number of passes than by ESALs
- ▶ Load Spectra more appropriate for evaluating how pavement loading effects pavement performance



Impact of Wide-Base Tires on Pavements (pooled fund)



Quantify the impact of WBT on thin and thick pavements

- Contact stress measurements
- Pavement test sections
- FEM modeling
- Pavement Damage Calculations



Wide Based Tires Observations

- + Reduced tire weight: 800–1000 lbs for a typical 5-axle truck
- + Increase hauling capacity
- + Fuel saving: 2 – 5%
 - + Due to less rolling resistance
- + Reduced emissions



▶ Observations:

- Vertical contact stresses slightly higher
 - Contact area may be 30% greater for Duals, but length may be 65% shorter
- Strain difference between WBT and Duals become more pronounced with higher load and higher tire pressure
 - Greater effect on thinner structures



Legislative Activities & Directions

- ▶ Governor proposal & Senate bill to generate revenue from railroads grade crossings
- ▶ Bonding bills for grade separations
- ▶ Revival of the 2006 Truck Weight proposal?
 - Some discussion by industry
- ▶ Questions:
 - How do we get data to understand what's on the roads?
 - What does effective enforcement look like for more, bigger, heavier trucks?



An aerial photograph of a multi-lane highway interchange. A large, kidney-shaped pond is situated in the foreground, with a road curving around its perimeter. A semi-truck is visible on the road near the pond. The highway extends into the distance, flanked by green fields and trees. The text "Thank You!" is overlaid in large, bold, yellow letters across the center of the image.

Thank You!