

MCEA 10-TON COMMITTEE FWD CALCULATION TOOL

MCEA 10-TON COMMITTEE

- D1 - Al Goodman (Chair) – Lake
- D2 - Rich Sanders - Polk
- D3 - Bob Kozel – Benton
- D4 - David Overbo – Clay
- M - Mark Krebsbach – Dakota
- D6 – Mike Hanson – Mower
 - Originally Marcus Evans - Houston
- D7 – Steve Schnieder - Nobles
 - Originally Mike Wagner - Nicollet
- D8 - Ron Mortensen – Meeker

10-TONNER'S EFFORTS

- DEVELOP, IDENTIFY, & MAP TIERS (1, 2, & 3)
- TRAFFIC :
 - ATR'S
 - WIM'S
 - OVERWEIGHT
 - Legal overweights
 - VEHICLE CLASSIFICATION
- STATEWIDE FWD CONTRACT
- CONSIDER LEGISLATIVE PROPOSALS

TIER CRITERIA

Item	Tier I	Tier II	Tier III
ADT	1500	750	400
HCADT	150	75	50
FUNCTIONAL CLASS (OR GREATER)	MAJOR COLLECTOR	MINOR COLLECTOR	
COMMUNITY SERVED (POPULATION)	5000	1500	500
CONNECTION TO ANOTHER SYSTEM	YES/NO	YES/NO	YES/NO
SPACING BETWEEN OTHER 10 TON	+10 MILES	10 – 6 MILES	5 – 3 MILES
FREIGHT GENERATOR (TRUCKS PER DAY)	+100	99 - 50	49- 10

TIER 1 ROUTES

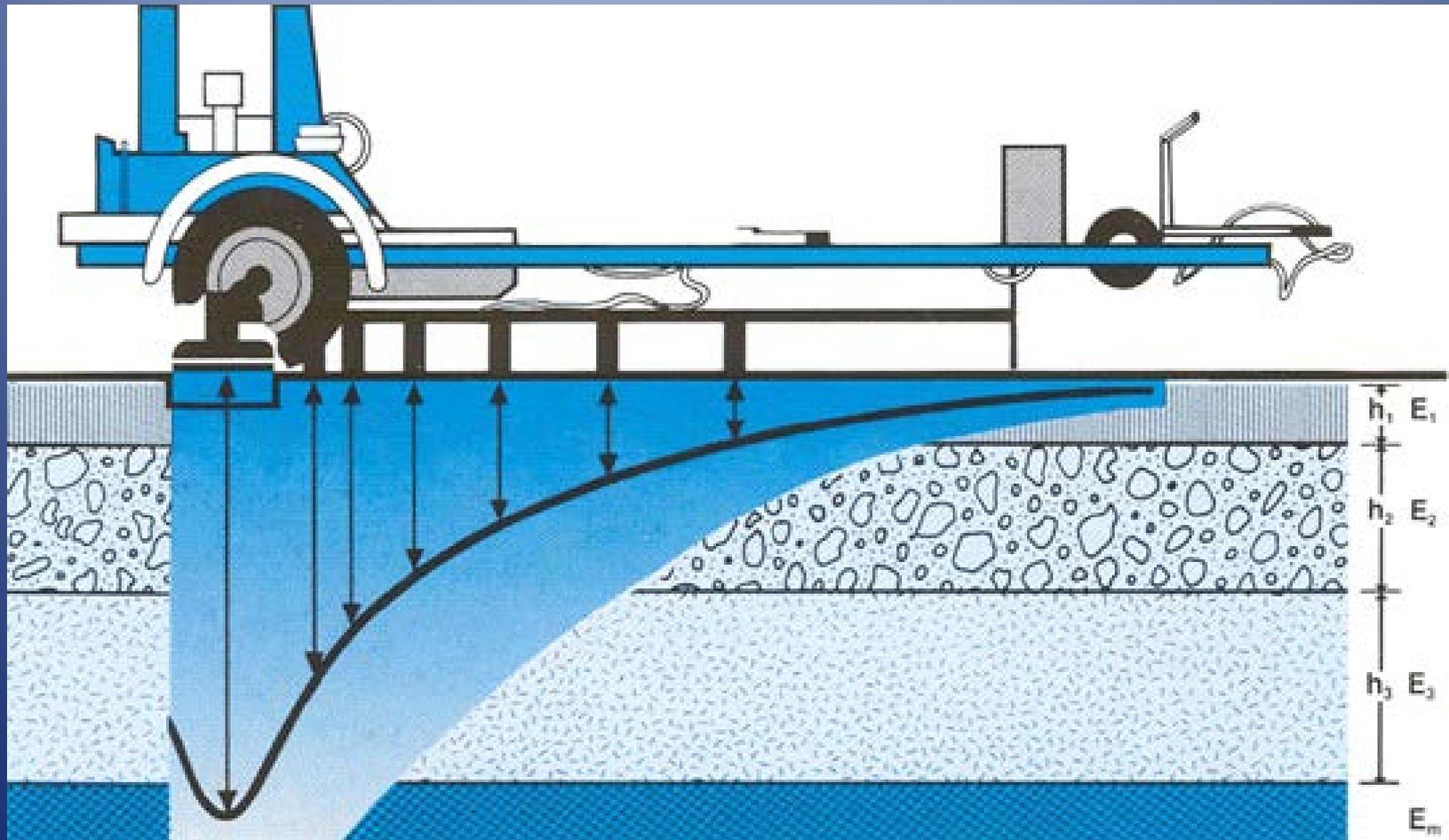
Minnesota Conceptual 10-ton Tier 1 CSAH Network
may include the following attributes: local roads of regional significance,
Major Collector, AAT > 1500, HCADT > 150.



FWD VS. PQI

- PQI = SMOOTHNESS
- FWD = STRENGTH
- A SMOOTH ROAD CAN BE WEAK
 - WON'T BE SMOOTH FOR LONG
- A STRONG ROAD CAN BE ROUGH
 - NOTE THAT FWD CAN RATE ROAD STRONG EVEN THOUGH LOOKS ROUGH

DEFLECTION TESTING



STATEWIDE FWD CONTRACT

- 2009 / 2010 - Braun, AET, and SRF
- Tested About 1/3 CSAH System (**354,000 Drops**), Mostly On The Tier 1 System
- Dr. Erland Lukanen (MnDOT): Analysis Tool That Back-Calculates Pavement Strength
- System Level Information
- Dr. Wilde (MSU) Under Contract To Develop Overlay Thickness Tool (TONN 2010)



State Aid for Local Transportation



[Get Help for SALT Website or Applications](#)

Hot Topics

[MDSS Reference Guide](#)

[LRIP Project List](#)

[Best Value Procurement](#)

[Design Build for Locals](#)

[State Aid Scene](#)

[State Aid Flood and Disaster Relief Information](#)

[County Roadway Safety Plans](#)

[Curb Ramp Guidelines Memo](#)

[Pavement Design Information](#)

[Partners and Resources](#)



MnDOT's State Aid for Local Transportation (SALT) Division works closely with local levels of government to ensure the state maintains a safe, effective and coordinated highway network.

In addition to funding support, staff from SALT provides technical assistance in highway and bridge design, construction and maintenance, authorizes grants for bridge construction, coordinates local federally funded projects and provides overall management of the state aid system.

Important State Aid Information

- [Bridge Info](#) * Needs Citrix Client and Password
- [Bridge Grant Agreement Template](#)
- [Bridge Grant Agreement Instructions](#)
- [Comprehensive Highway Safety Plan](#)
- [EAdvert](#)
- [Electronic Communications](#)
- [Finance Forms](#)
- [FWD Project Files](#)
- [Metro State Aid](#)
- [Org Chart](#)
- [Roundabout List](#)
- [Safe Routes to School](#)
- [Sample Bond Fund Resolution](#)
- [SA Applications](#)
- [SA Bicycle Path Design](#)
- [SA Manual](#)
- [Salt PMWriter](#)
- [SA Rules](#)
- [SA Scene](#)



truck routes.

Hot Topics

[MDSS Reference Guide](#)[LRIP Project List](#)[Best Value Procurement](#)[Design Build for Locals](#)[State Aid Scene](#)[State Aid Flood and
Disaster Relief Information](#)[County Roadway Safety
Plans](#)[Curb Ramp Guidelines
Memo](#)[Pavement Design
Information](#)[Partners and Resources](#)[Mission Study](#)[Resource Links](#)[State Aid Manual](#)[State Aid Tech Memos](#)[About State Aid](#)

The consultant team of Braun Intertec, American Engineering Testing, and SRF Consulting Group, Inc. was selected and placed under contract in May 2009 to perform the pavement materials data gathering work. The consultant team asked each county to identify approximately one-third of their CSAH mileage to be falling weight deflectometer (FWD) tested and to provide pavement materials information for these tested routes. In May 2009, testing began and by the end of 2010, all field FWD data had been completed.

The "Analysis Tool" uses FWD data, pavement data, soil data, temperature data and traffic data to evaluate roadway strength (10 ton, 9 ton, etc.). The "Analysis Tool" was originally developed by Erland Lukanen, from Mn/DOT and was further refined under the direction of Professor Jim Wilde, Minnesota State University, Mankato, MN.

As of June 2010, approximately one-half of the Minnesota counties had been provided Version 1.1 of the FWD "Analysis Tool". Version 1.1 of the "Analysis Tool" required manual entry of some parameters to determine the roadway strength. In May 2011, counties were provided version 1.2, which automatically inputs the required parameters to determine the roadway strength. The only input parameter that the user may change is "traffic".

If you have any questions concerning the FWD contract or the "Analysis Tool", please contact Paul Stine, State Aid Operations Engineer, at 651-366-3830.

[FWD DATA](#) (Password Required)

[FWD Analysis Tool Demo](#)

[Conceptual Tier 1 Network](#)

[Tier Criteria](#)

- [Bridge Grant Agreement Instructions](#)
- [Comprehensive Highway Safety Plan](#)
- [EAdvert](#)
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- [SA Rules](#)
- [SA Scene](#)
- [SA Tech Memos](#)
- [Section 404 & Section 10 Permit Reference Guide](#)
- [STIP](#)
- [Underwater Bridge Inspection](#)
- [Variance Information](#)

FTP Directory:

<ftp://ftp2.dot.state.mn.us/pub/products/stateaid/FWD-Data/>

	Parent Directory							
	CountyDeflectionAnalysis-WJWcom>	Mar 03	2010	299K				
	FWD AnalysisTool Aitkin Ver1.24>	May 27	2011	9761K				
	FWD AnalysisTool Anoka Ver1.24.>	May 27	2011	9792K				
	FWD AnalysisTool Becker Ver1.24>	May 27	2011	11M				
	FWD AnalysisTool Beltrami Ver1.>	May 27	2011	10066K				
	FWD AnalysisTool Benton Ver1.24>	May 27	2011	9837K				
	FWD AnalysisTool Big Stone Ver1.>	May 27	2011	9635K				
	FWD AnalysisTool Blue Earth Ver>	May 27	2011	11M				
	FWD AnalysisTool Brown Ver1.24.>	May 27	2011	9987K				
	FWD AnalysisTool Carlton Ver1.2>	May 27	2011	9781K				
	FWD AnalysisTool Carver Ver1.24>	May 27	2011	9873K				
	FWD AnalysisTool Cass Ver1.24.x>	May 27	2011	11M				
	FWD AnalysisTool Chippewa Ver1.>	May 27	2011	9715K				
	FWD AnalysisTool Chisago Ver1.2>	May 27	2011	9828K				
	FWD AnalysisTool Clay Ver1.24.x>	May 27	2011	9935K				
	FWD AnalysisTool Clearwater Ver>	May 27	2011	9919K				
	FWD AnalysisTool Cook Ver1.24.x>	May 27	2011	9500K				
	FWD AnalysisTool Cottonwood Ver>	May 27	2011	9842K				
	FWD AnalysisTool Crow Wing Ver1.>	May 27	2011	10107K				

File Home Insert Page Layout Formulas Data Review View Add-Ins Acrobat

Normal Page Break Preview Ruler Formula Bar Zoom 100% Zoom to Selection New Window Split Arrange All Hide Save Workspace Switch Windows Macros

Page Layout Custom Views Full Screen Gridlines Headings

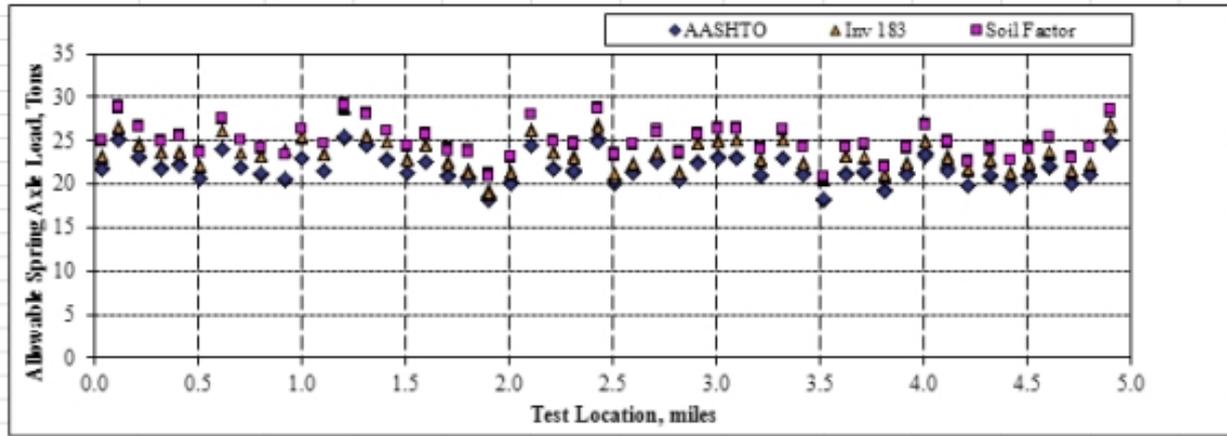
Workbook Views Show Window

A1 County: Lake of the Woods
 Date Tested: 7/29/2009
 Highway: Ver 122 5/20/2011
 From:
 To:
 Design ESALs: 195 ESALs
 Annual Growth: 2.0 %
 Design Period: 20 years

Some data does not exist for this segment.
 Please enter a default value for AADT, Prev Day Temp, Bit Thickness, Soil Type.

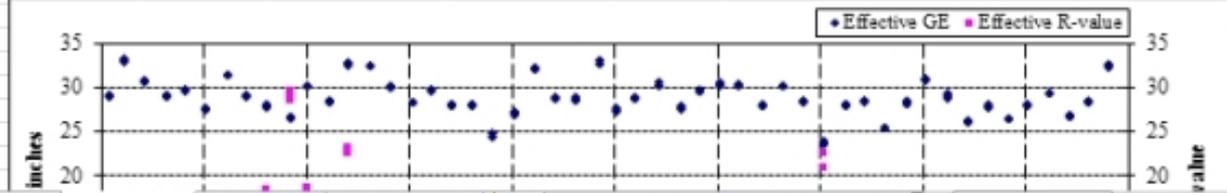
- Click for Instructions
- Click to Change Settings
- Click to Modify Default

Summary of Analysis Results						
	Erg psi	Eff. R-val	E.G.E. inches	Axle Load for Design Defl.		
				Tons AASHTO	S.F.	Inv. 183
Average	8,898	14.8	28.3	21.8	25.0	23.5
Median	8,624	14.2	28.7	21.5	24.6	23.3
Std.Dev.	1,609	3.3	2.0	1.7	1.9	1.9
85th %ile	7,419	11.8	27.2	20.3	23.4	21.5



Show Analysis:

- AASHTO
- Inv 183
- Soil Factor



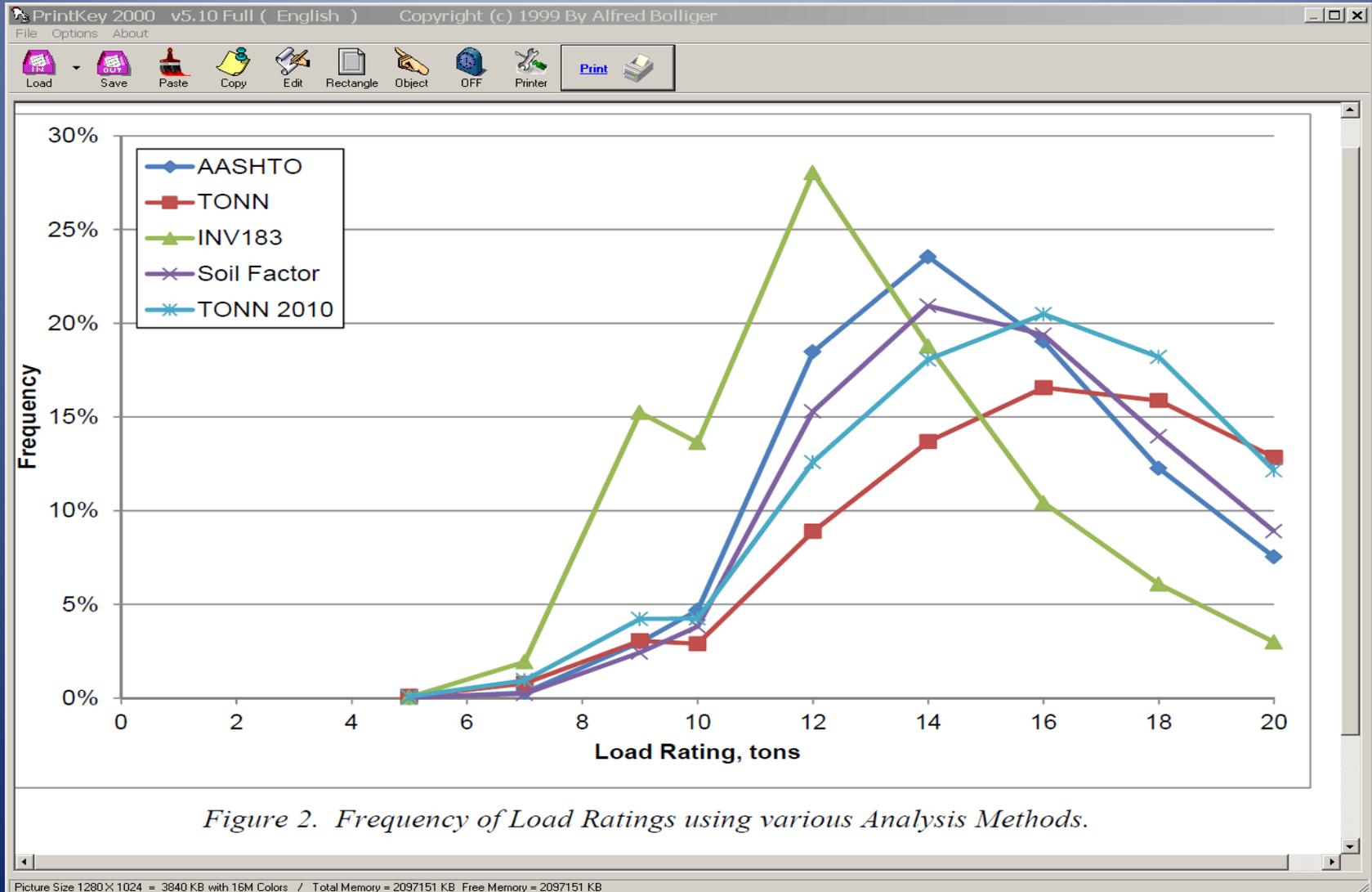
QUESTIONS

- HAVE YOU USED FWD TOOL?
- WERE RESULTS AS EXPECTED?
- USER-FRIENDLY?
- SUGGESTIONS FOR IMPROVEMENTS:

TONN 2010

- TONN is a computer program developed for estimating the spring-time load carrying capacity
- TONN Update by Dr. Lev Khazanovich, U of M
- Dr. Wilde reworking FWD Tool:
 - TONN 2010
 - Next steps are to beta-test reworked tool
 - PRE-Preliminary results on following pages

PRE- Preliminary Results



OVERLAY CALCULATOR

- TONN 2010
- CAPABILITY OF INDIVIDUALIZED SEGMENTATION AT REGULAR INTERVALS, OR BY SPECIFYING PARTICULAR ROAD SEGMENTS OF DIFFERENT LENGTHS.
- COMPUTED VALUE, NOT ROUNDED. THEREFORE ABLE TO MAKE BETTER DECISIONS IN UPGRADING THE ROAD SYSTEM TO 10-TON.
- CUSTOMIZABLE FOR MINIMUM OVERLAY THICKNESS, THICKNESS INCREMENT, ETC.
- MAY HAVE DESIRED TON RATING AS AN INPUT.
- TO BE DELIVERED FALL 2012; TRAINING FOLLOWS.

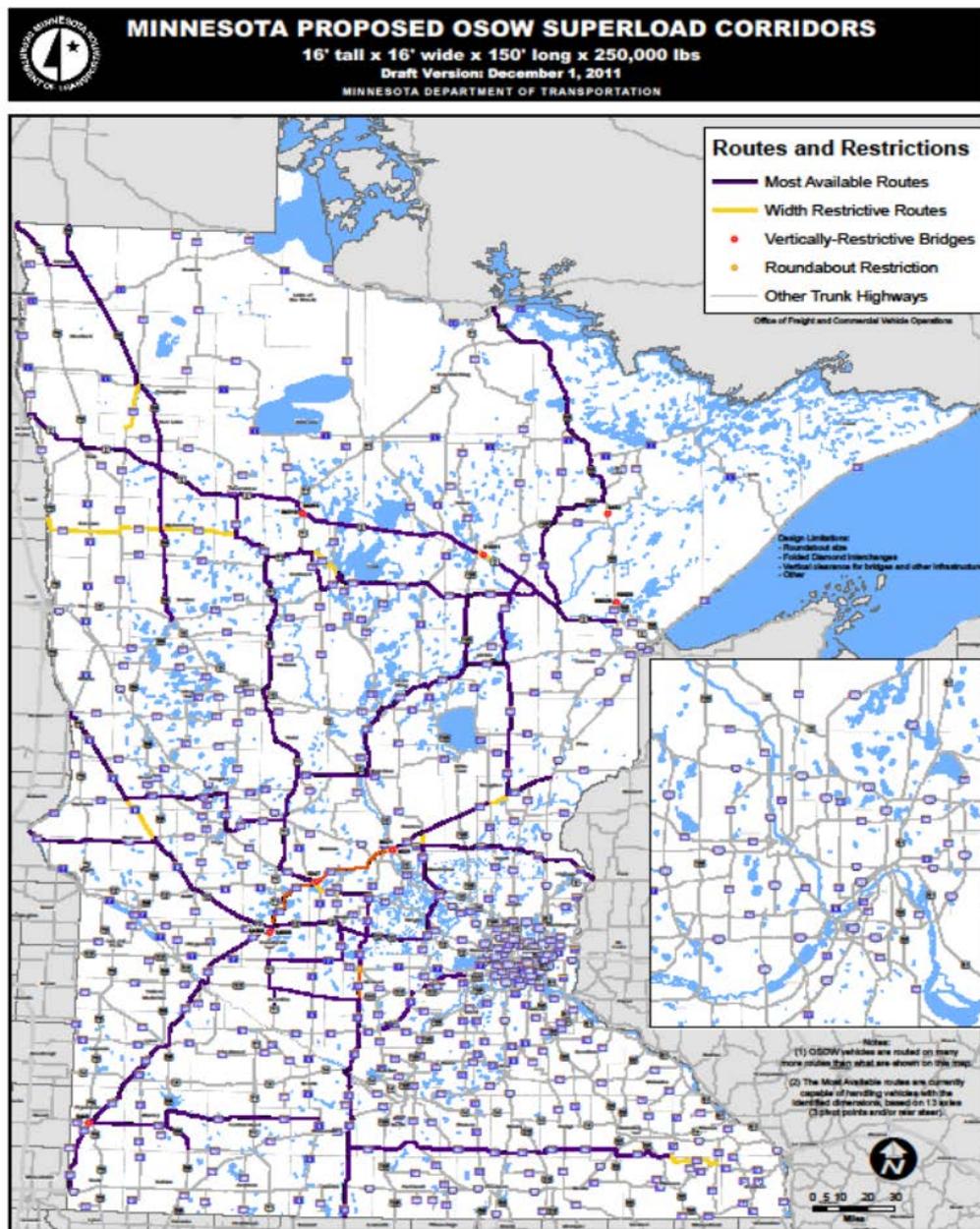
GENERIC FWD CONTRACT

- 10-TON COMMITTEE – NO MORE STATEWIDE FWD CONTRACT AT THIS TIME
- FUTURE DATA WORKS WITH STATEWIDE CONTRACT DATA
- IDEALLY EASILY LINKS TO POPULAR PMS

SUPER-CORRIDOR LOAD



SUPER-CORRIDOR MAP



SUPER-CORRIDORS VS TIER 1'S

- MNDOT PERMITS TO GAPS, BUT WHAT HAPPENS AT GAPS
- IDENTIFY LOCAL ROAD AVAILABILITY
- TIER AND FWD INFO
- MAP HELPS IDENTIFY GAPS
- COORDINATE SHIPPER TRIPS
- OPPORTUNITY TO DEVELOP RELATIONSHIP WITH SHIPPER

PERMITS

- U OF M LTAP – COUNTY PERMIT CONTACTS
 - <http://www.mnltap.umn.edu/about/programs/truckweight/county/>
- CONSIDER PERMIT POLICY / PROCESS OF OTHER COUNTIES

CONCLUSION

- Much Was Learned
- Many Questions Generated
- Must Work With Partners (10-ton Comm, Research, Consultants, TH, Shippers, Legislators)
- Look For Dr. Wilde's Overlay Tool
 - Save Lots Of \$\$\$ With Correct Thickness
- Might Lead to Designing Roads Differently
- Much More To Learn