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

<table>
<thead>
<tr>
<th>Item</th>
<th>Tier I</th>
<th>Tier II</th>
<th>Tier III</th>
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<tr>
<td>ADT</td>
<td>1500</td>
<td>750</td>
<td>400</td>
</tr>
<tr>
<td>HCA DT</td>
<td>150</td>
<td>75</td>
<td>50</td>
</tr>
<tr>
<td>Functional Class (Or Greater)</td>
<td>MAJOR COLLECTOR</td>
<td>MINOR COLLECTOR</td>
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<tr>
<td>Community Served (Population)</td>
<td>5000</td>
<td>1500</td>
<td>500</td>
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<tr>
<td>Connection to Another System</td>
<td>YES/NO</td>
<td>YES/NO</td>
<td>YES/NO</td>
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<tr>
<td>Spacing Between Other 10 Ton</td>
<td>+10 MILES</td>
<td>10 – 6 MILES</td>
<td>5 – 3 MILES</td>
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<tr>
<td>Freight Generator (Trucks per Day)</td>
<td>+100</td>
<td>99 - 50</td>
<td>49 - 10</td>
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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.

In the Metro district, Tier 1 conceptual 10-ton routes have not been established because of high traffic volumes on most roads.
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)
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.
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
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<tr>
<th>Directory Name</th>
<th>Date</th>
<th>Size</th>
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<td>299K</td>
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<td>May 27</td>
<td>9761K</td>
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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

![Graph showing frequency of load ratings using various analysis methods.](image)

Figure 2. Frequency of Load Ratings using various Analysis Methods.
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-CORRIDORS VS TIER 1’S

• MNDOT PERMITS TO GAPS, BUT WHAT HAPPENS AT GAPS
• IDENTIFY LOCAL ROAD AVAILABLITY
• 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