Freight Analysis

Freight Growth = Business Vitality
District 7 Freight Project Goals

- Put in context of Statewide Freight Study (2005) - “macro” analysis of freight flows and value
- Identify and analyze local freight issues – local “micro” study of why and how business moves commodities
- Directly involve businesses, industry and agencies
- Identify strategies to respond to trends
- Define roles and responsibilities for improving District and overall freight system
- Integrate freight into investment planning process
Context of Plan

District 7 Regional Connectivity

South Dakota

Minnesota

District 7

Wisconsin

Illinois

Nebraska

Legend:
- Major Cities
- Major Highways
- Railroads
- Regional Trade Centers
  - Level 5
  - Level 4
  - Level 3
  - Level 2
  - Level 1

[Map showing regional connectivity in the specified region]
Freight Transportation in District 7 – A Case Study in Minnesota

- Mn/DOT District 7; 13 Southwestern Counties
- Minnesota’s Corn Belt – Representative of the Central Midwest
- Steady and Significant Growth
- Responsive Management & Productivity
- Technology: Genetics, Communications
- Central to Established Economy & Renewable Energy Initiatives
What is Impacting D-7?

- Energy costs and Biofuels
- Globalization of market
- Industry Consolidation
- Market Economy
- Labor/Technology
- Truck Size & Weight
- Public/Private Projects
- Unit & Shuttle Trains
- Intermodalism

Star Tribune
March 8, 2004
Long Term (Continuing) Trends

- Farm Consolidation
- Increasing Yields – Crops & Livestock
- More Intensive Cultivation
- Vertical Integration
- Increase in Industrial, Mineral, Aggregate Production – Metro, International Demands
- Stable, Aging Population and Workforce
- System Capacity Constrained
- Continued Freight Transportation Growth
Growth in Freight Traffic

U.S. domestic freight tonnage growth forecast, 2000-2020

Source: USDOT
“Volatile” Trends

• Ethanol Expansion & Economics
• Cellulosic Ethanol – 5 year horizon; growth multiplied 2-5 times (?)
• International Markets – Corn, Soy, DDGS
• Shuttle Train Elevators – longer trains, better rates; overbuilding
• Inland Waterways – cost, capacity limits
• Oil & Natural Gas Supplies and Prices
  – makes ethanol economically viable
  – adds to farm costs, fuel & fertilizer
D-7 Key Commodities – In Order of Importance (2005)

- Corn Production 358M Bushels (1/3 of Mn.)
- Soybeans 72M Bushels (1/3 of Mn.)
- Hogs – 5 million head (1/2 of Mn.)
- Ethanol – 186 million Gallons (1/2 of Mn.) (Minnesota third largest producing state)
- Non-Metallic Minerals – Silica, Kaolin Clay, Aggregate
- Manufactured Goods
## District 7 Commodity Exports

<table>
<thead>
<tr>
<th>Export Rank</th>
<th>Commodity Category</th>
<th>Tonnage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Farm Products</td>
<td>14,446,158</td>
</tr>
<tr>
<td>2</td>
<td>Nonmetallic Minerals</td>
<td>5,666,323</td>
</tr>
<tr>
<td>3</td>
<td>Secondary Traffic</td>
<td>2,955,870</td>
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<tr>
<td>4</td>
<td>Food Or Kindred Products</td>
<td>1,497,484</td>
</tr>
<tr>
<td>5</td>
<td>Clay, Concrete, Glass Or Stone</td>
<td>822,684</td>
</tr>
<tr>
<td>6</td>
<td>Petroleum Or Coal Products</td>
<td>796,987</td>
</tr>
<tr>
<td>7</td>
<td>Chemicals Or Allied Products</td>
<td>327,723</td>
</tr>
<tr>
<td>8</td>
<td>Pulp, Paper Or Allied Products</td>
<td>145,037</td>
</tr>
<tr>
<td>9</td>
<td>Lumber Or Wood Products</td>
<td>124,960</td>
</tr>
<tr>
<td>10</td>
<td>Transportation Equipment</td>
<td>77,910</td>
</tr>
<tr>
<td></td>
<td>All other</td>
<td>269,487</td>
</tr>
<tr>
<td></td>
<td><strong>Total Commodity Exports</strong></td>
<td><strong>27,130,623</strong></td>
</tr>
</tbody>
</table>

Source: 2001 TRANSEARCH Data
Soybean Yield Per Acre


Yield: 25, 30, 35, 40, 45, 50, 55

Counties: Sibley, Cottonwood, Jackson, Nobles, Rock, Blue Earth, Brown, Faribault, Le Sueur, Martin, Nicollet, Waseca, Watonwan
Hogs

![Hogs Graph](image)

- Sibley
- Cottonwood
- Jackson
- Nobles
- Rock
- Blue Earth
- Brown
- Faribault
- Le Sueur
- Martin
- Nicollet
- Waseca
- Watonwan

Years: 1965 to 2010

Hogs (in thousands) range from 0 to 700,000.
Vehicle and Shipment Sizes

- Grain Shuttle Trains
- Ethanol Unit Trains
- Railcar Size & Weight; 263K>286K>315K
- Truck Size & Weight; 80K>89K, axle loads
- Farm Equipment: Mega-combines, 5-axle Semis common (65% of farm delivery)
- Infrastructure Limits: Bridges, Local roads, Rail branches & sidings
- Barge Tows: Upper Mississippi Structures
Bio-Fuels Growth
Corn Ethanol Plants
Ethanol Plant Characteristics

- Produces 40 million gallons/year of ethanol
- Produces 125 thousand tons/year of DDGS
- Consumes 15 million bushels of corn
- Collects grain from 30 mile radius
- 50-70 heavy commercial trucks per day
- 4-7 loaded railcars per day
- 10 days storage for corn on average
- Next generation plant – 100 million gallons/year
# Ethanol Plant Expansion

**Vs. Corn Consumption**

<table>
<thead>
<tr>
<th>YEAR</th>
<th>PLANT CAPACITY</th>
<th>% OF D-7 CROP YIELD</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(Million Gals./Year)</td>
<td></td>
</tr>
<tr>
<td>2005</td>
<td>186</td>
<td>19%</td>
</tr>
<tr>
<td>2006</td>
<td>252</td>
<td>25%</td>
</tr>
<tr>
<td>2007</td>
<td>380</td>
<td>33%</td>
</tr>
</tbody>
</table>
### Economic & Market Effects

<table>
<thead>
<tr>
<th>YEAR (Planting Price)</th>
<th>CORN</th>
<th>SOYBEANS</th>
</tr>
</thead>
<tbody>
<tr>
<td>2000</td>
<td>2.22</td>
<td>4.83</td>
</tr>
<tr>
<td>2001</td>
<td>2.44</td>
<td>5.23</td>
</tr>
<tr>
<td>2002</td>
<td>2.29</td>
<td>4.44</td>
</tr>
<tr>
<td>2003</td>
<td>2.42</td>
<td>5.34</td>
</tr>
<tr>
<td>2004</td>
<td>2.53</td>
<td>6.95</td>
</tr>
<tr>
<td>2005</td>
<td>2.27</td>
<td>5.53</td>
</tr>
<tr>
<td>2006</td>
<td>2.38</td>
<td>6.25</td>
</tr>
<tr>
<td>2007</td>
<td>3.96</td>
<td>7.01</td>
</tr>
</tbody>
</table>

(Market Low of $1.78/Bu., 2000)
Ethanol Freight Flows

Corn
10 Tons

Truck

Plant

Storage

Tank Truck
Tank Car

Ethanol
3.2 Tons
(965 Gal.)

$1.90/Gal.

CO₂

Pipeline

DDGS
2.9 Tons

$1/22/Ton

$6.10/Bu. Corn
(Gross)
Direct Economic Benefits: grain price increases and ethanol value added

<table>
<thead>
<tr>
<th></th>
<th>Crop Value Added</th>
<th>Added Value Ethanol/DDGS</th>
</tr>
</thead>
<tbody>
<tr>
<td>District 7</td>
<td>$850 million</td>
<td>$180 million</td>
</tr>
<tr>
<td>Minnesota</td>
<td>$2,700 million</td>
<td>$350 million</td>
</tr>
</tbody>
</table>
Agricultural Logistics - Then & Now

**Historic**
- Grains
  - Export
  - Foods
  - Feeds
  - Rail/Barge
  - Truck/Rail
  - Truck
  - Processor
  - International, U.S., Markets

**Current**
- Grains
  - Truck
  - Storage
  - Export
  - Foods
  - Feeds
  - Fuels
  - Pork Farrowing
- Feeder
  - Truck
- Processor
  - Truck/Rail
  - Rail/Barge Intermodel
  - Truck
  - International, U.S., Markets
Agricultural Response To Ethanol Growth & Transportation Impacts

- Corn-on-Corn Crop Rotation: up to **55% growth** in production over next 5 years
- Genetics & Management: **15-35% growth** in yield over next 5 years
- Projected Heavy Commercial Truck Trips grow to **155-230%** of 2005 levels by 2030
- Farm-to-Market grain delivery grows from 80 to 160 Semis per square mile annually
- Cellulosic Ethanol Feedstocks could increase tonnage 2-5X (>five years)
Growth in Agricultural Trucking

Trends in HCADT Growth (Market Price-Driven Grain Yields)

- Base Line Projection
- Yield Increase - Low
- Yield Increase - High

% Growth

Years

2005 2010 2015 2020 2025 2030
Engineering Considerations

- Road Design Life: Doubled truck traffic; ESAL’s on loaded semis, $1 = 5,500$ autos
- Bridges: Axle and span loadings
- Road Load Testing: Lack of data, method of testing, statewide program
- Targeted, Coordinated 10-Ton Network: Most cost-effective and contiguous buildout
- Road Design Modernization: Heavy commercial truck & farm equipment accommodation, cross-section & structure
Opportunities -> & Challenges

- Preserve Rail Capacity --> (Minnesota Prairie Line)
- Efficient Trucking -------> (Farm-own, 5-axle Semis)
- Safety & Security ------> (Rail Transport - Ethanol)
- Intermodal Growth ------->
- Accident Reduction ----->
- Energy Efficiency ------->
- Private Infrastructure (+ Public roads, Waterways)
- Local Road Conditions (1950’s design, 3-season)
- Dispersed Network (Low Funding, Awareness)
- Local Access Points
- Grade Crossing Safety
- Maintain Mix of Modes
National & Local Significance

• Energy & Agriculture – Growing National Significance (ethanol, wind, solar)
• Integrated Freight Network Needed at Both Local & National Level for Business Viability (heavy duty, all seasons, all modes)
• Rural Infrastructure & Resources Falling Behind Accelerating Transportation Needs
• Safety, Energy Conservation, Environment all served by Rural Freight Network Investment and Policy Support
Key Findings & Recommendations

• Preserve Freight Network Infrastructure Connectivity, Capacity and Flexibility: Deterioration of roads, bridges, local rail lines, waterways damages cost and competitiveness

• Recognize Characteristics of Modern Freight & Farm Vehicles: Widespread farm use of semis, heavy truck dynamics, oversize farm equipment, safety, rail car sizes

• Upgrade Freight-Related Traffic & Road Data: Comprehensive and current information on road load capacity, vehicle types, HCAADT counts for county, state roads
Key Findings & Recommendations (continued)

- Improve Mn/DOT, Interagency Planning Procedures: Biofuels task force; interagency advice on permits, regulation, plans, legislation
- Involve Local Businesses and Stakeholders: Ongoing public/private information exchange on needs, plans, development, trends
- Promote Safety on Roads, Rail: Grade crossing safety improvements, road geometry, education
- Facilitate Intermodal Access Improvement: Coordinate information and efforts of area businesses to improve containerized freight moves
Questions