Southeastern Wisconsin Regional Freeway Reconstruction System Study

April 19, 2001
Agenda Item 4

Overview of the Problems and Deficiencies of the Regional Freeway System

- Physical Design
- Traffic Accidents
- Traffic Congestion
Overview of the Physical Design Deficiencies of the Regional Freeway System
Determination of Physical Design Deficiencies

- Review existing freeway system with respect to modern freeway design standards

- Design standards
  - AASHTO’s “A Policy on Geometric Design Standards of Highways and Streets”
  - WisDOT’s “Facilities Development Manual”
Design Criteria

- Vertical curvature
- Horizontal curvature
- Vertical alignment (grade)
- Lane width
- Shoulder width
- Vertical clearance
- Lane balance/route continuity
- Weaving
- Ramp spacing
- Interchange spacing
Freeway Segment Strip Maps

IH 94 South Milwaukee County Line to the Mitchell Interchange

Southeastern Wisconsin Regional Freeway Reconstruction Plan

County Line Rd.
Oakwood Rd.
Ryan Rd.
Puetz Rd.
Drexel Ave.
Rawson Ave.
College Ave.
Edgerton Ave.
Grange Ave.
43
4
Layton Ave.
Physical Design Deficiency Summary

- Many of the oldest freeway segments, predominantly in the Milwaukee area, do not meet a number of modern design standards for much of their length.

- Many older freeway segments, predominantly in outlying counties, meet the modern design standards with the exception of one or two standards at isolated locations.

- A number of freeway segments at the far outlying portions of the Region fully meet all design standards.
Regional Freeway Design Deficiencies
Overview of the Traffic Safety Problems of the Regional Freeway System
Determination of Traffic Safety Problem Locations

- Estimate crash rate (crashes per 100 million vehicle-miles) for the freeway system
  - 0.10 mile freeway segments

- Compare freeway segment crash rates to regionwide and countywide average freeway crash rates
Southeastern Wisconsin Freeway System Crash Rate Averages: 1996-1998 Data

<table>
<thead>
<tr>
<th>REGION</th>
<th>CRASH RATE (CRASHES PER 100 MILLION VEHICLE MILES)</th>
</tr>
</thead>
<tbody>
<tr>
<td>REGION</td>
<td>77</td>
</tr>
<tr>
<td>KENOSHA COUNTY</td>
<td>71</td>
</tr>
<tr>
<td>MILWAUKEE COUNTY</td>
<td>106</td>
</tr>
<tr>
<td>OZAUKEE COUNTY</td>
<td>54</td>
</tr>
<tr>
<td>RACINE COUNTY</td>
<td>61</td>
</tr>
<tr>
<td>WALWORTH COUNTY</td>
<td>40</td>
</tr>
<tr>
<td>WASHINGTON COUNTY</td>
<td>53</td>
</tr>
<tr>
<td>WAUKESHA COUNTY</td>
<td>44</td>
</tr>
</tbody>
</table>
Regional Freeway System Crash Rates
Safety Deficiency Summary

- Within each county there are segments of freeway which exceed the countywide and regionwide freeway crash rates by 50 percent or more
  - These high-crash freeway segments, in particular, will be addressed during the consideration of freeway reconstruction alternatives
Overview of Traffic Congestion on the Regional Freeway System
Overview Outline—
Traffic Congestion

- Levels of Traffic Congestion
- Current Traffic Congestion
- Historic Traffic Congestion
- Forecast Future Traffic Congestion
Levels of Traffic Congestion

- Define the severity of traffic congestion
  - Extreme
  - Severe
  - Moderate
Levels of Traffic Congestion—continued

Extreme Traffic Congestion—“F”

- **Speed** - 20 to 30 mph or less
- **Operating Conditions** - Stop-and-go, bumper-to-bumper traffic
- **Impact of Incidents** - Duration and extent of extreme congestion extended
Levels of Traffic Congestion—continued

Severe Traffic Congestion—“E”

- **Speed**
  - 5 to 15 mph below free-flow speed

- **Operating Conditions**
  - No gaps in traffic for lane changing

- **Traffic Volumes**
  - 81% to 100% of maximum traffic

- **Impact of Incidents**
  - Most minor will result in extreme congestion
Levels of Traffic Congestion—continued

Moderate Traffic Congestion—“D”

- **Speed**
  - 1 to 5 mph below free-flow speed

- **Operating Conditions**
  - Substantial restrictions on ability to change lanes

- **Traffic Volumes**
  - 66% to 80% of maximum traffic

- **Impact of Incidents**
  - Minor incidents will result in extreme traffic congestion
Estimated Existing Freeway Congestion: 1999

27 miles - Extreme Congestion
10% of System
1.3 hours - extreme
3.2 hours - severe
4.3 hours - moderate
8.8 hours - total congestion
Estimated Existing Freeway Congestion: 1999—continued

26 miles - Severe Congestion
10% of System
1.4 hours - severe
2.4 hours - moderate
3.8 hours - total congestion
Estimated Existing Freeway Congestion: 1999—continued

16 miles - Moderate Congestion
4% of System
1.8 hours - moderate
1.8 hours - total congestion
### Estimated Existing Congestion: 1999

<table>
<thead>
<tr>
<th>Level</th>
<th>Distance</th>
<th>Percentage</th>
<th>Total Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme</td>
<td>27 miles</td>
<td>10%</td>
<td>8.8</td>
</tr>
<tr>
<td>Severe</td>
<td>26 miles</td>
<td>10%</td>
<td>3.8</td>
</tr>
<tr>
<td>Moderate</td>
<td>12 miles</td>
<td>4%</td>
<td>1.8</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>65 miles</td>
<td>24%</td>
<td>5.5</td>
</tr>
</tbody>
</table>
Historic Trend in Freeway Traffic Congestion

Source: SEWRPC.
Historic Trend in Freeway Traffic Congestion

- MODERATE CONGESTION
- SEVERE CONGESTION
- EXTREME CONGESTION

YEAR

FREeways MILES


0 10 20 30 40 50 60 70
Historic Trend in Freeway Traffic Congestion

- Increase in total miles of freeway experiencing congestion
  
<table>
<thead>
<tr>
<th>Year</th>
<th>Miles</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>9</td>
<td>6%</td>
</tr>
<tr>
<td>1980</td>
<td>18</td>
<td>8%</td>
</tr>
<tr>
<td>1991</td>
<td>45</td>
<td>18%</td>
</tr>
<tr>
<td>1999</td>
<td>65</td>
<td>24%</td>
</tr>
</tbody>
</table>

- Increase in miles of freeway experiencing extreme congestion
  
<table>
<thead>
<tr>
<th>Year</th>
<th>Miles</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>1980</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>1991</td>
<td>11</td>
<td>4%</td>
</tr>
<tr>
<td>1999</td>
<td>27</td>
<td>10%</td>
</tr>
</tbody>
</table>
Historic Trend in Freeway Traffic Congestion—continued

- **Increase in miles of freeway experiencing severe congestion**
  
  - 1972 - 2 miles 2%
  - 1980 - 14 miles 7%
  - 1991 - 18 miles 7%
  - 1999 - 27 miles 10%

- **Increase in average number of hours that a freeway segment experiences congestion**
  
  - 1972 - 2.8 hours
  - 1980 - 3.5 hours
  - 1991 - 3.5 hours
  - 1999 - 5.5 hours
Forecast Future Regional Freeway System Traffic Congestion: Year 2020

- Forecast significant increase in traffic congestion
  - Extent
  - Severity

- Forecast traffic volumes and congestion are based on implementation of regional land use plan and transportation plan
Comparison of Existing 1999 and Forecast Year 2020 Freeway System Traffic Congestion
Comparison of Existing 1999 and Forecast Year 2020 Freeway System Traffic Congestion
## Comparison of Existing 1999 and Forecast Year 2020 Freeway System Traffic Congestion

<table>
<thead>
<tr>
<th>Congestion Level</th>
<th>Existing 1999</th>
<th>Forecast 2020</th>
</tr>
</thead>
<tbody>
<tr>
<td>Extreme</td>
<td>27 miles 10% 8.8 total hours</td>
<td>48 miles 18% 11.5 total hours</td>
</tr>
<tr>
<td>Severe</td>
<td>26 miles 10% 3.8 total hours</td>
<td>29 miles 10% 3.5 total hours</td>
</tr>
<tr>
<td>Moderate</td>
<td>12 miles 4% 1.8 total hours</td>
<td>42 miles 15% 2.1 total hours</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>65 miles 24% 5.5 average total hours</td>
<td>119 miles 43% 6.3 average total hours</td>
</tr>
</tbody>
</table>
Summary and Conclusions: Freeway System Deficiencies—Design, Safety, and Congestion

Design

- Many of the oldest freeway segments, predominantly in the Milwaukee area, do not meet a number of modern design standards for much of their length.

- Many older freeway segments, predominantly in outlying counties, meet the modern design standards with the exception of one or two standards at isolated locations.

- A number of freeway segments at the far outlying portions of the Region fully meet all design standards.
Summary and Conclusions: Freeway System Deficiencies—Design, Safety, and Congestion—continued

Safety

- Within each county there are segments of freeway which exceed the countywide and regionwide freeway crash rates by 50 percent and more
  - These high crash freeway segments, in particular, will be addressed during the consideration of freeway reconstruction alternatives
Traffic Congestion

- Existing freeway traffic congestion is substantial
  - Extreme congestion
    - 27 miles - 10% - 8.8 hours
  - Severe congestion
    - 26 miles - 10% - 3.8 hours
  - Moderate congestion
    - 12 miles - 4% - 1.8 hours
  - Total
    - 65 miles - 24% - 5.5 average total hours
Summary and Conclusions: Freeway System Deficiencies—Design, Safety, and Congestion—continued

Freeway traffic congestion has increased, particularly over the past 20 years—extent, severity, and duration

- Miles of freeway experiencing congestion
  
<table>
<thead>
<tr>
<th>Year</th>
<th>Miles</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>9</td>
<td>6%</td>
</tr>
<tr>
<td>1980</td>
<td>18</td>
<td>8%</td>
</tr>
<tr>
<td>1991</td>
<td>45</td>
<td>18%</td>
</tr>
<tr>
<td>1999</td>
<td>65</td>
<td>24%</td>
</tr>
</tbody>
</table>

- Miles of freeway experiencing extreme or severe congestion
  
<table>
<thead>
<tr>
<th>Year</th>
<th>Miles</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>2</td>
<td>2%</td>
</tr>
<tr>
<td>1980</td>
<td>14</td>
<td>7%</td>
</tr>
<tr>
<td>1991</td>
<td>29</td>
<td>11%</td>
</tr>
<tr>
<td>1999</td>
<td>53</td>
<td>19%</td>
</tr>
</tbody>
</table>
Summary and Conclusions: Freeway System Deficiencies—Design, Safety, and Congestion—continued

- Average number of hours of congestion on congested freeways
  
<table>
<thead>
<tr>
<th>Year</th>
<th>Hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1972</td>
<td>2.8</td>
</tr>
<tr>
<td>1980</td>
<td>3.5</td>
</tr>
<tr>
<td>1991</td>
<td>3.5</td>
</tr>
<tr>
<td>1999</td>
<td>5.5</td>
</tr>
</tbody>
</table>
Summary and Conclusions: Freeway System Deficiencies—Design, Safety, and Congestion—continued

- Freeway traffic congestion is forecast to increase substantially—extent, severity, duration
  - Miles of freeway experiencing congestion
    - 1999 - 65 miles 24%
    - 2020 - 119 miles 43%
  - Miles of freeway experiencing extreme congestion
    - 1999 - 27 miles 10%
    - 2020 - 48 miles 18%
  - Average total hours of congestion on a congested freeway
    - 1999 - 5.5 hours
    - 2020 - 6.3 hours