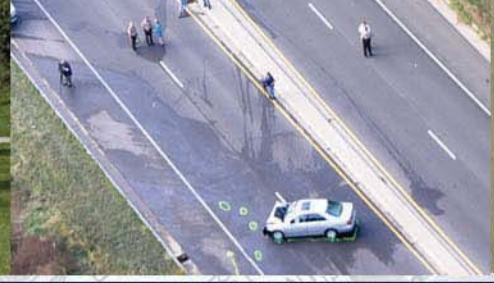


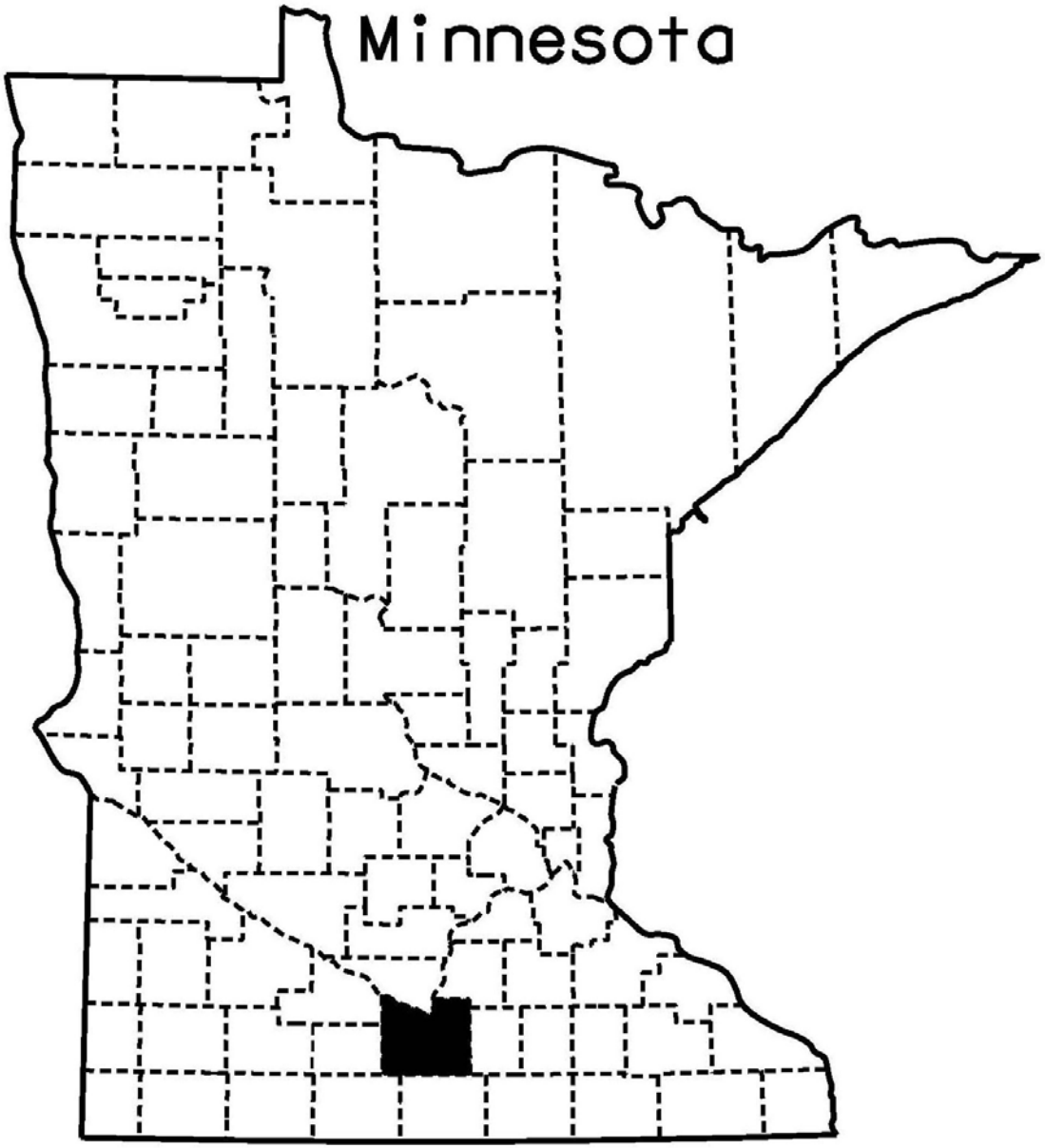



Road Safety Audits

Blue Earth County

Minnesota

Blue Earth County



National Crash Facts

- Three million Americans have died in motor vehicle crashes since the invention of the automobile
- In 2003, motor vehicle traffic crashes were the leading cause of death for the age group 4 through 34.
- Traffic fatalities accounted for more than 90 percent of all transportation-related fatalities.
- 2004 - 6,181,000 police reported motor vehicle traffic crashes.
  - An average of 117 people died each day in motor vehicle crashes — one every 12 minutes.
  - 42,636 people died
  - 2,788,000 people injured
- Economic impact of traffic crashes (2000) = $230.6 billion

2005 Minnesota crashes

- 1,431 motorcycle crashes
- 965 bicycle crashes
- 938 pedestrian crashes
- One-third of all crashes involved one vehicle
- 1 of every 3 fatalities was < 25 years of age
- 1 of every 8 fatalities was a SUV occupant
- 70% fatalities occurred in rural areas (< 5,000 population)

Cost of Motor Vehicle Crashes 2005 - State of Minnesota

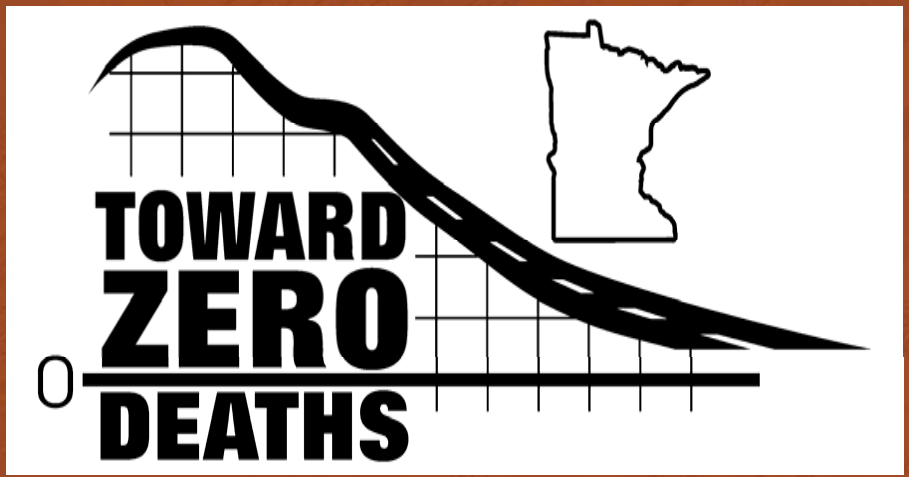
Cost of Motor Vehicle Crashes in 2005 - State of Minnesota

Category	Incidents	Cost per Incident	Total Cost
Deaths	559	$1,130,000	$631,670,000
Severe Injuries	2,019	$58,500	$118,111,500
Moderate Injuries	10,453	$18,900	$197,561,700
Minor Injuries	25,214	$10,700	$269,789,800
Property Damaged	60,695	$7,400	$449,143,000
Total			**$1,666,276,000**
		Per Capita Cost	**$327**
Total Crashes	87,813		

State of Minnesota

Minnesota Comprehensive Highway Safety Plan (CHSP)

Toward Zero Deaths Campaign (TZD)



Toward Zero Deaths (TZD)

VISION:

To reduce fatalities and injuries on Minnesota's roads to zero.

MISSION:

To move the State of Minnesota toward zero traffic deaths on our roads through the application of engineering, enforcement, education, emergency services, research activities and community involvement.

Critical Strategies (Four E's)

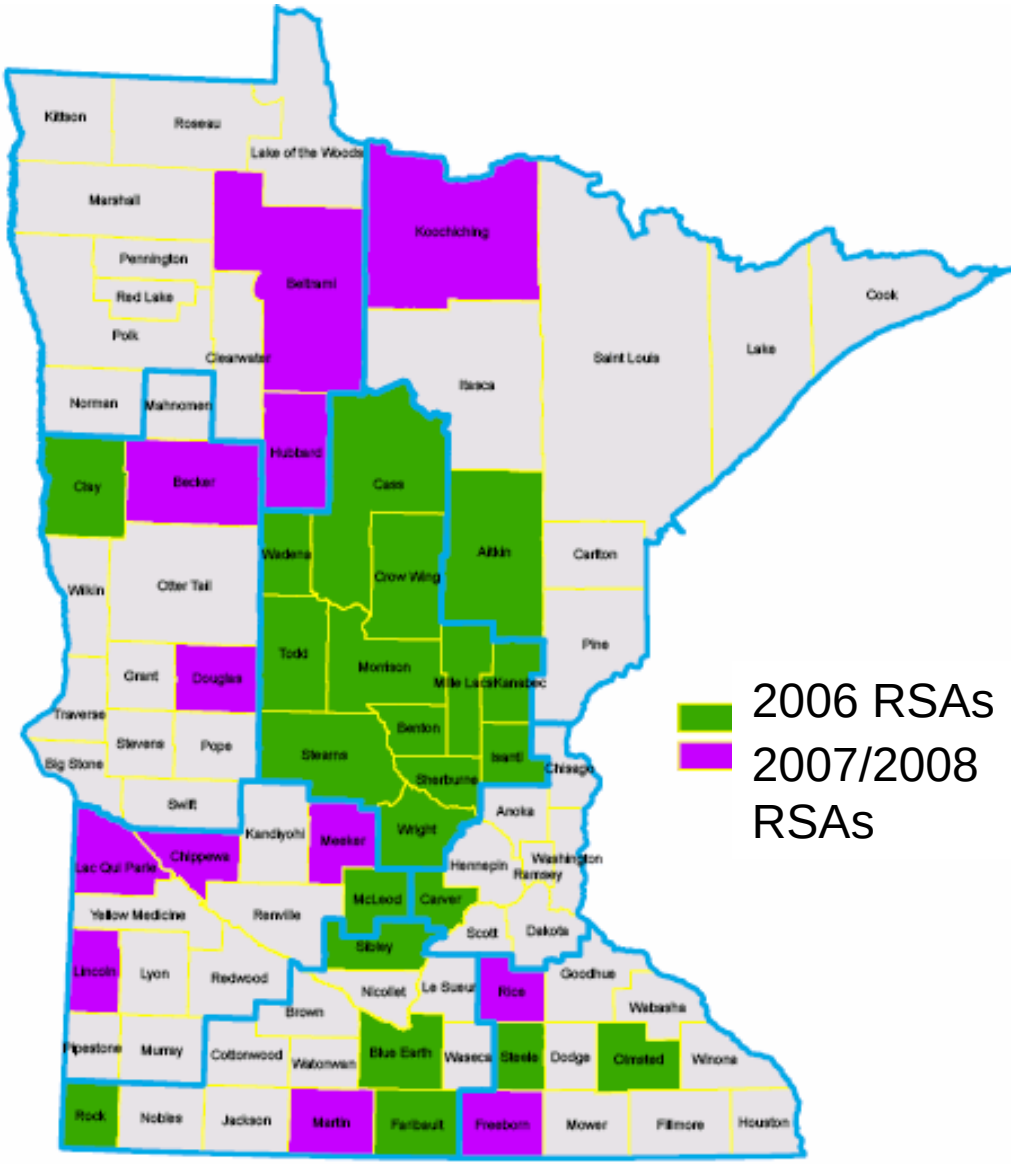
- Engineering
- Enforcement
- Education
- Emergency medical response and care

Five Critical Emphasis Areas

1. Increase seatbelt use and reduce impaired driving
2. Improve roadway design and operation
3. Decrease lane departure crashes
   - Reducing head-on and across median crashes
   - Keeping vehicles on roadway
   - Minimize consequences
4. Address young / aggressive drivers
5. Increase driver safety awareness
   - Improve information
   - Decision support systems

MN Road Safety Audit (RSA) by County

- 22 RSAs were completed in 2006 with CHSP funds (Central Safety Funding)
  - 13 adjoining counties were chosen for a region review (Mn/DOT District 3)
- 12 RSAs to be completed in 2007 or 2008 with CHSP Funds (Central Safety Funding)



Blue Earth County Crash Profile

- Purpose
  - To provide a comprehensive analysis of all traffic crashes in Blue Earth County within a five year period
  - To identify locations with greater-than-expected numbers of fatal and injury crashes
  - To examine specific crash characteristics to better understand the causes of and the solutions to these crashes
  - Compare Blue Earth County crash statistics to Minnesota state averages

Cost of Motor Vehicle Crashes 2005 – Blue Earth County

Cost of Motor Vehicle Crashes in 2005 - Blue Earth County

Category	Incidents	Cost per Incident	Total Cost
Deaths	7	$1,130,000	$7,910,000
Severe Injuries	26	$58,500	$1,513,768
Moderate Injuries	134	$18,900	$2,532,036
Minor Injuries	323	$10,700	$3,457,742
Property Damaged	945	$7,400	$6,993,000
Total			**$22,406,546**
		County Per Capita Cost	**$390**
		State Per Capita Cost	**$327**

Blue Earth County
Road Safety Audit

RSA Team Members

SRF Consulting Group, Inc.

Jeff Bednar
Renae Cornelius
Phil Hahn
Kevin Kittridge
Dave Montebello
Karen Sprattler

Minnesota Department of Transportation

Dan Brannan
Brad Anderson

Process for Crash Profile

- Crash data from Mn/DOT and MN DPS
- SRF's Crash Data Analysis Tool
- Used to uncover trends:
  - Who is involved in these crashes?
  - What types of crashes are occurring?
  - When are the crashes occurring?
  - Where are crashes occurring?
  - Why are crashes occurring?

Brief History of MnCMAT

- Developed in Iowa
  - late 1990's – early 2000's
  - Iowa DOT & CTRE @ ISU
  - Original named Crash Mapping Analysis Tool (CMAT)
- Introduced to Minnesota in 2006
  - Via County Engineers
  - Funded by
    - Local Road Research Board (LRRB) Project
    - Research Implementation Committee (RIC)
    - State Aid for Local Transportation (SALT)

Crash Analysis Tool Classification

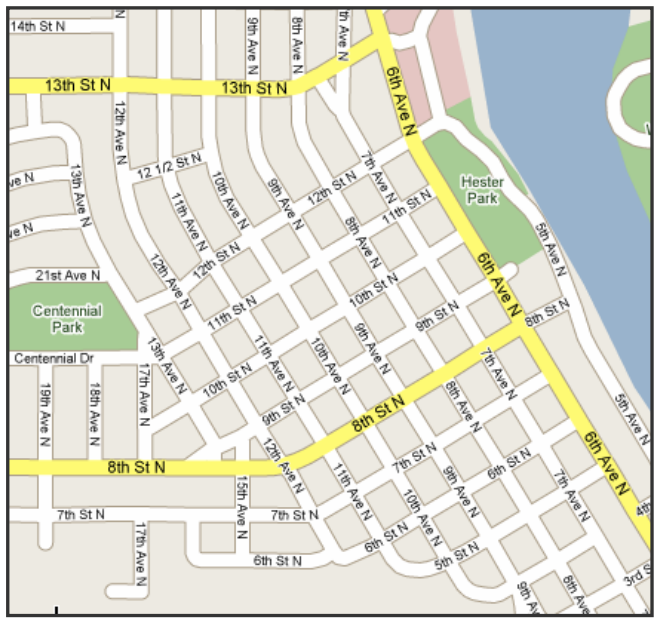
- Macroscopic Tool
  - Large Area Coverage
  - Trends and Statistics
- Microscopic Tool
  - Drill Down Capabilities
    - Filters
    - Selection Capabilities
- GPS Based Coordinate System GIS
- Visual Tool
  - Charts
  - Maps
  - Reports

Basics of MnCMAT Program

MnCMAT

GIS Based Mapping System

Mn/DOT Mainframe Data



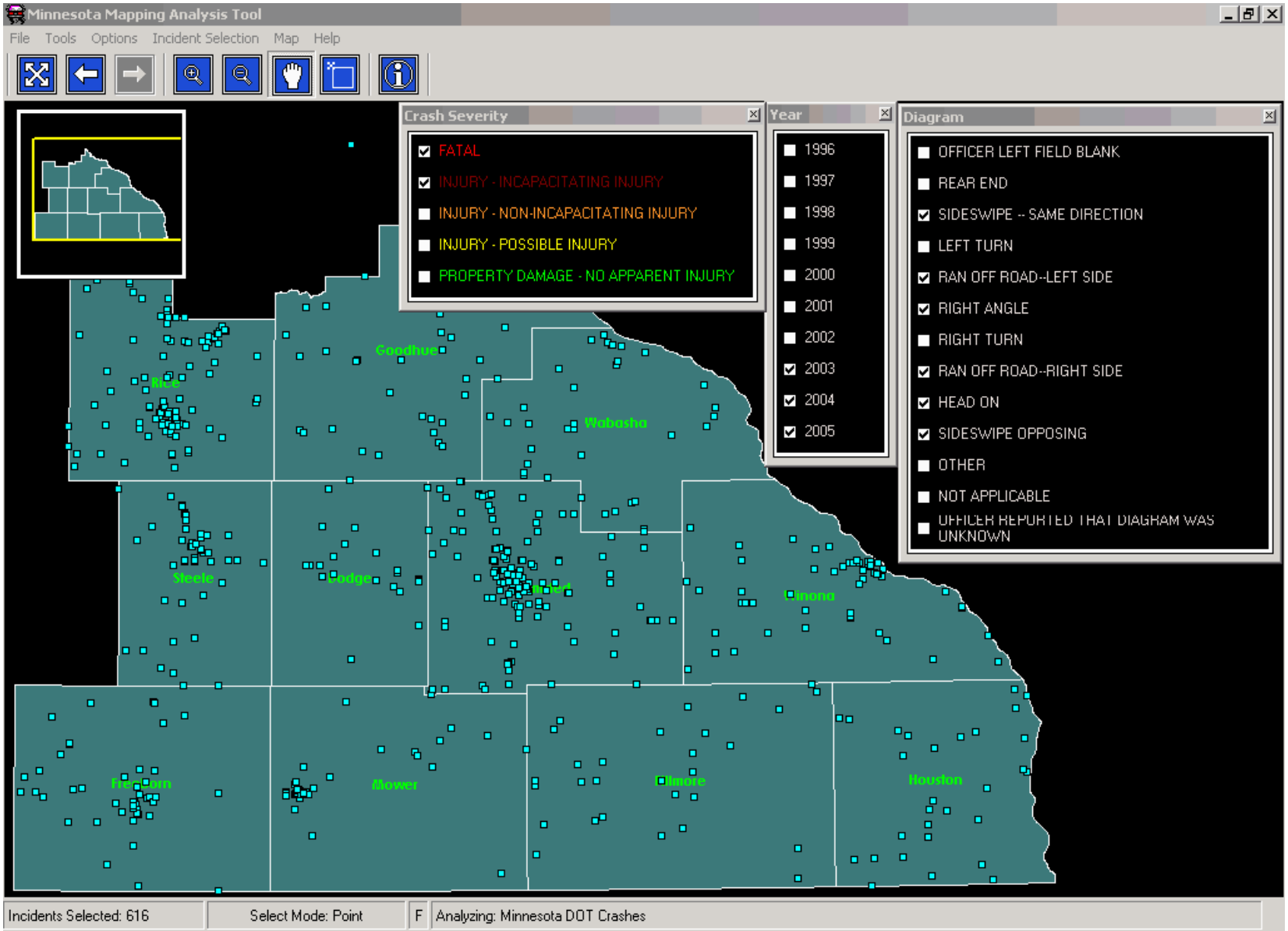
Transportation Information System (T.I.S.)			
Location	Crash Type	Road Condition	Driver Data
XXXXXX	XXXXXX	XXXXXX	XXXXXX
X	X	X	X

T.I.S. Data is Generated from Law Enforcement and Citizen Crash Reports

Basic MnCMAT Crash Analysis Process

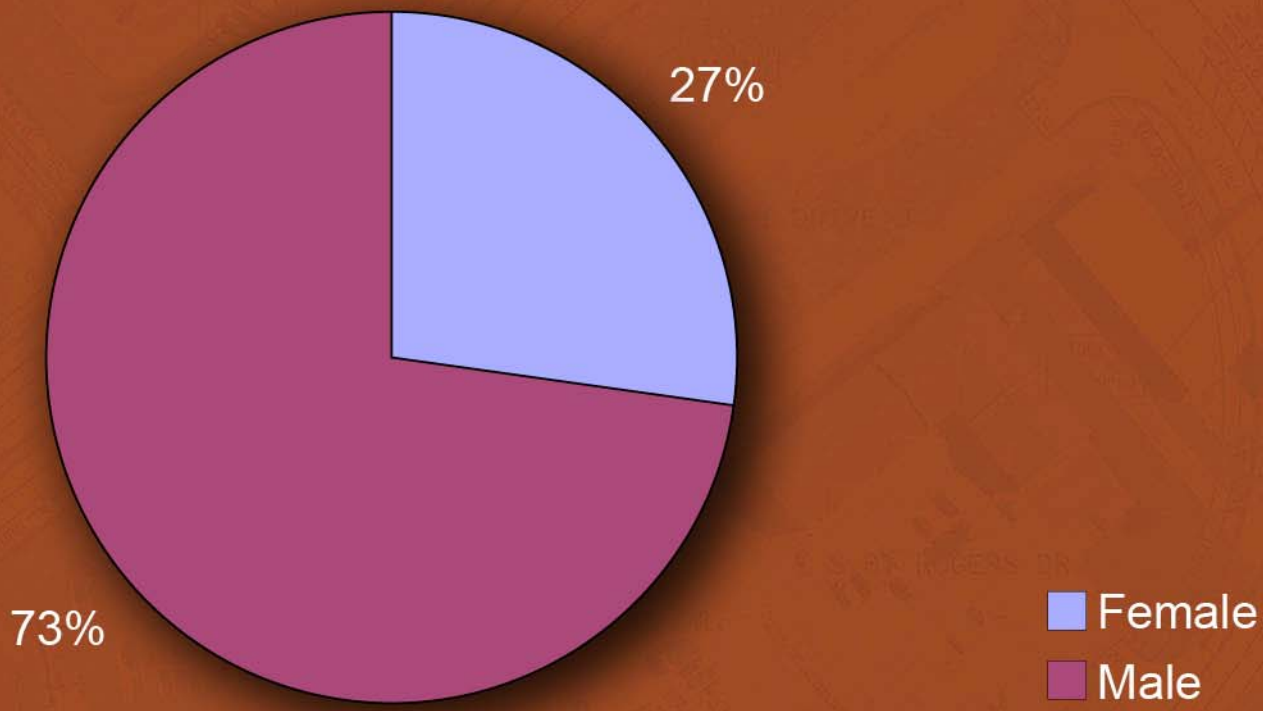
- Step 1
  - Select Area to be Analyzed
- Step 2
  - Apply Filtering Criteria
- Step3
  - Process Data
- Step 4
  - Generate Output
    - Maps
    - Charts
    - Reports

Lane Departure Crashes by Severity



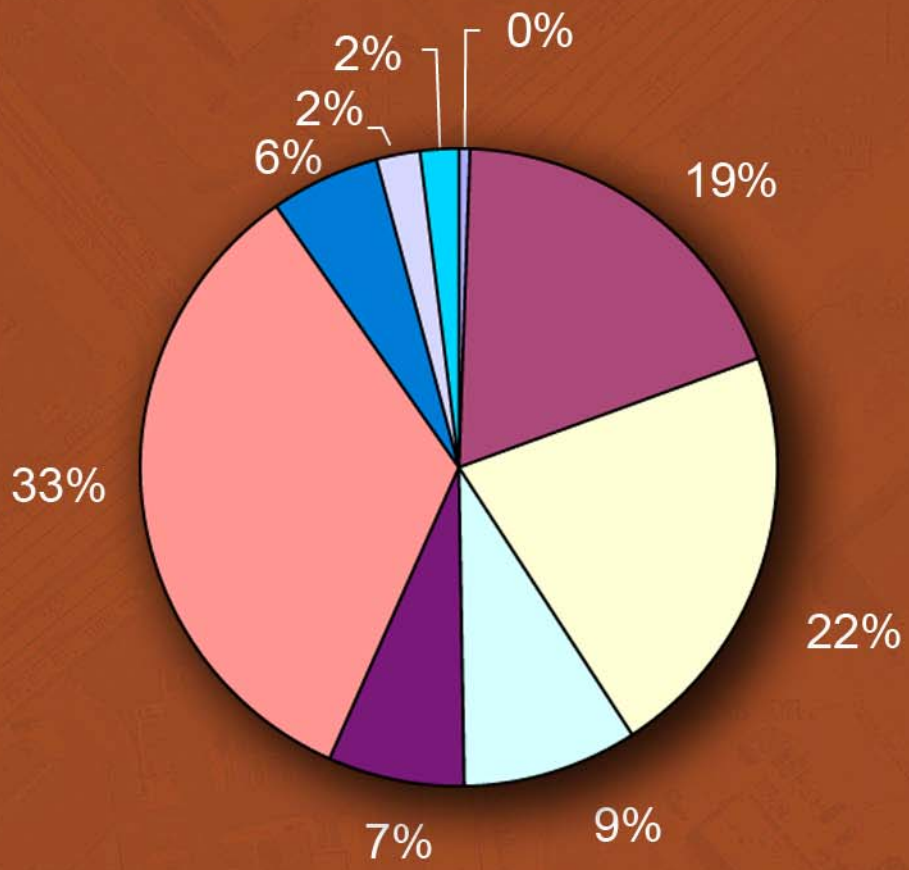
Blue Earth County: Who is involved?

Sex of Drivers Involved in Fatal Crash



Con… Who is involved?

Age of Drivers Involved in Crashes that Resulted in an Injury or a Fatality



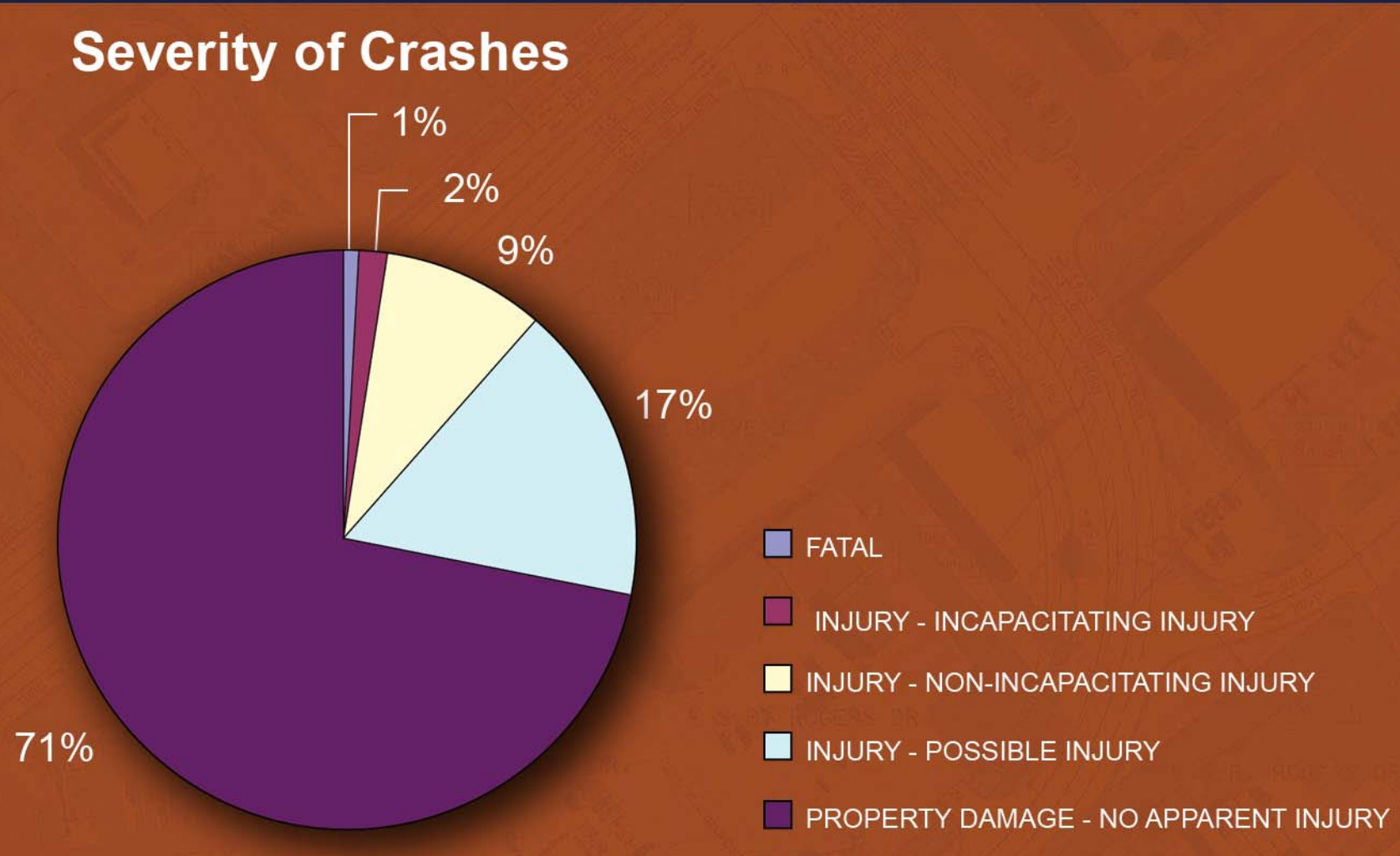
Blue Earth County: 41% of crashes involve drivers ages 15-24

State of Minnesota: 30% of crashes involve drivers ages 15-24

Blue Earth Co.: What type of crashes are occurring?

- Collision with motor vehicle in transport
  - 57% of fatal crashes
    - 46% Statewide
  - 65% of injury crashes
    - 65% Statewide

Con.. What type of crashes are occurring?



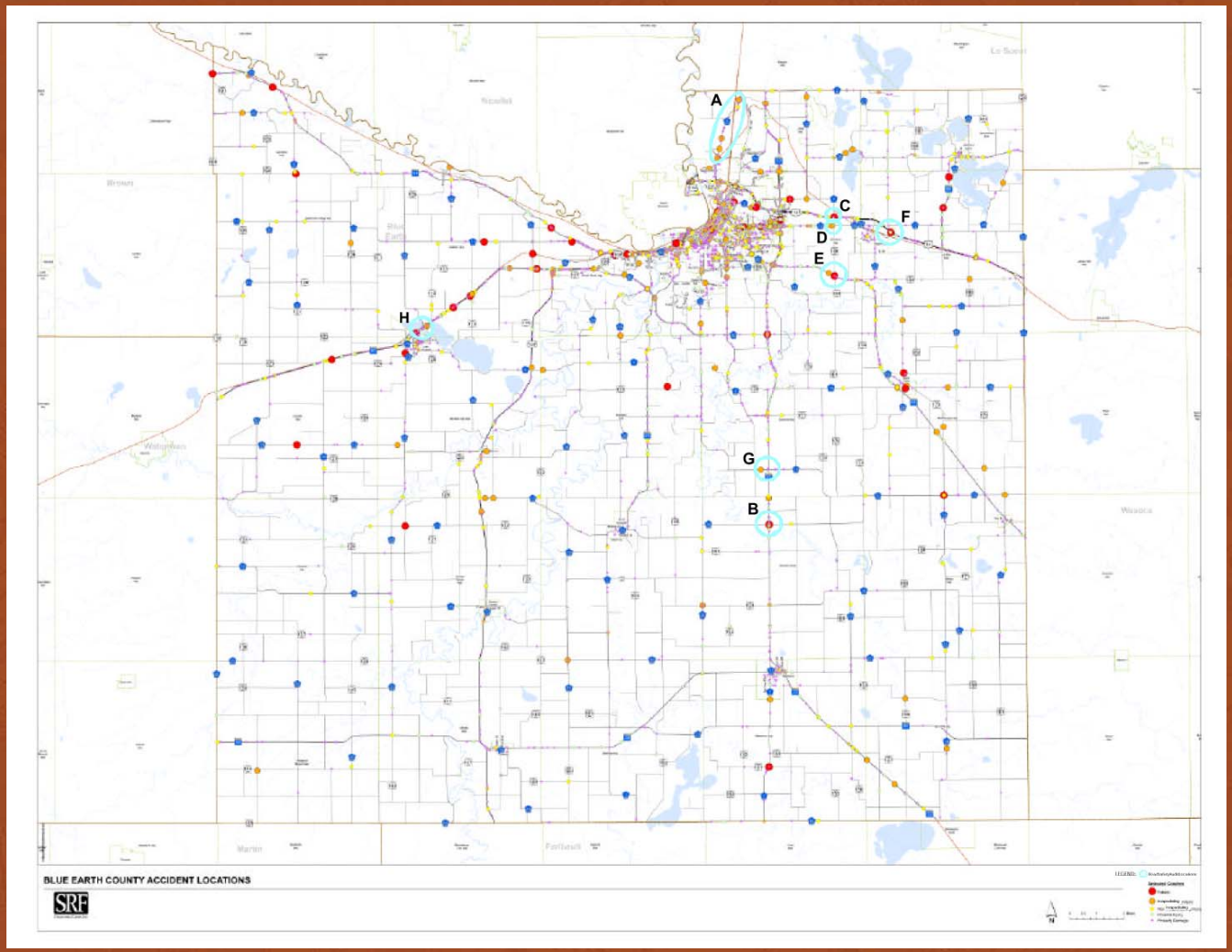
Con… What type of crashes are occurring?

- Of fatal and injury crashes:
  - Right angle - 33.4%
    - (Statewide avg - 22.9%)
  - Rear end - 22.3%
    - (Statewide avg - 26.9%)
  - Ran off road - 17.6%
    - (Statewide avg - 18.9%)

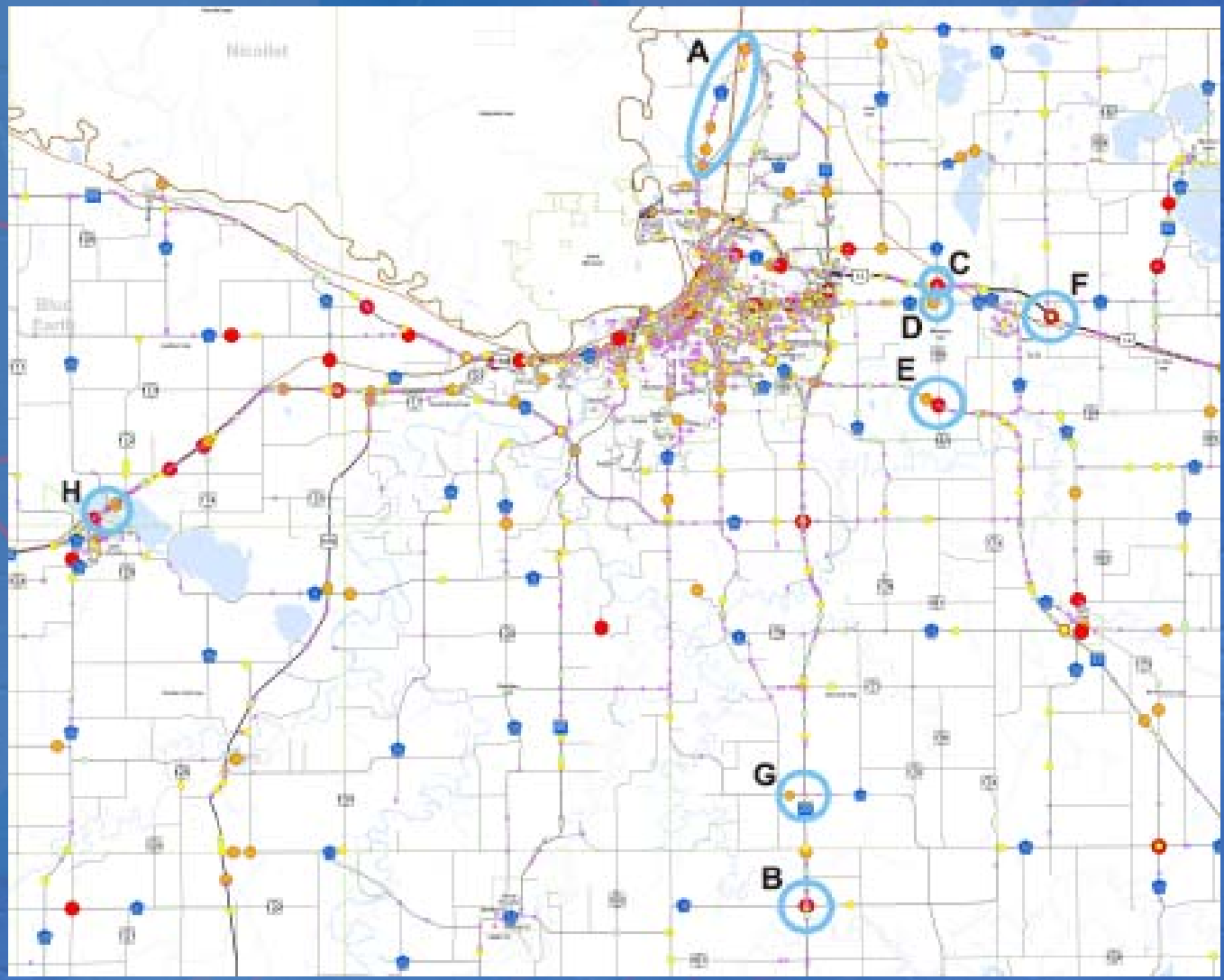
Road Safety Audit Methodology

- RSA Process
  - Site visits
  - Formal report
  - Safety Stakeholder meeting
- RSA Site Identification
  - GIS Crash maps
  - Input from County

Blue Earth County Site Identification



BLUE EARTH COUNTY ROAD SAFETY AUDITS



Improvements to Consider

- Add double yellow center line in median to emphasize that vehicles must stay on the correct side of the median when yielding to cross traffic
- Add stop bars on minor approaches to increase the saliency of the intersection for the cross-street approaches
- Investigate need for stop signs over yield signs in wide medians of four-lane divided roadways
- Review sign supports to ensure they meet Mn/DOT standards
- Review access management on County roads
- Review signing and pavement markings maintenance program to include a scheduled replacement program by roadway segment and/or area
- Refresh existing pavement markings throughout the County
- Install end treatments for bridge guardrails for increased safety

Other Improvements to Consider

- Enforcement
  - Enforcement for speed and stop sign violations
- Education
  - Driver education on speed and stop signs
- Emergency response
- Other stakeholders

Site G: TH 22/CSAH 16

Crash History:

- 3 recorded crashes in 5 years

Site G: TH 22/CSAH 16

General Observations:

- 90 degree intersection
- Stop controlled minor approaches
- Greater than adequate sight distance
- Observed speeds in excess of posted speed limit
- Rumble strips on both minor approaches
- Stop ahead signing at 750 feet
- No intersection lighting
- No stop bars on minor approaches

Site G: TH 22/CSAH 16

Improvements to Consider:

- Add stop bars on minor approaches
- Install double solid yellow line on all approaches
- Install larger stop signs

Site H: TH 60/CSAH 20

General Observations:

- Intersection of TH 60/CSAH 20
  - Stop controlled minor approaches
  - No intersection lighting
  - Limited sight distance for NB approach looking to the east
  - Limited sight distance for WB vehicles at the CR 6 overpass
  - Observed multiple NB left and though commercial vehicles movements
  - Observed speeds in excess of posted speed limit by 5-10 mph

- Other
  - As informed by local authorities, CSAH 20 will be reconstructed as a three-lane section with no on-street parking in the near future
  - Proposed Speedway development northwest of the intersection

Site H: TH 60/CSAH 20

Improvements to Consider:

- Intersection of TH 60/CSAH 20
  - Increased law enforcement on TH 60
  - Install stop bars on minor approaches
  - Consider potential impact of proposed speedway
  - **Close median and restrict intersection to right-in/right-out access and reroute traffic to CR 6**
  - Realignment of TH 60/CSAH 20 intersection to the west should be considered in order to:
    - Construct a WB inside acceleration lane on TH 60
    - Extend the WB left-turn lane
    - Improve distance between CR 6 Overpass bridge and CSAH 20 intersection
  - Construct full diamond interchange at TH 60/CR 6

Site H: TH 60/CSAH 20

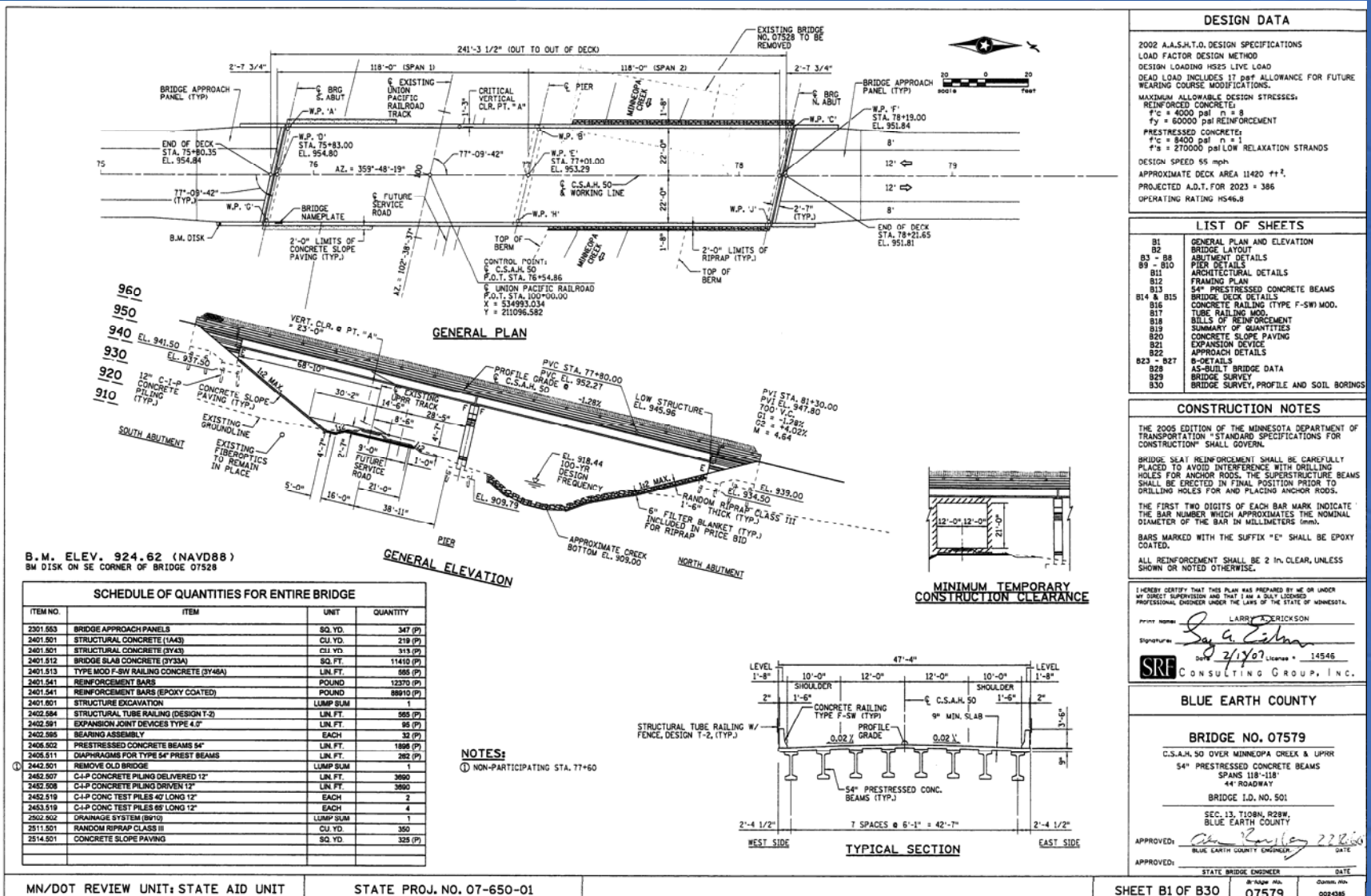
Improvements to Consider:

- Other
  - Consider extending CR 6 to the south along open corridor to Bert Street
  - If school traffic at this intersection is greater than expected:
    - By school district policy, prohibit WB to SB bus traffic and route busses to CR 6.
    - Educate and encourage student drivers to use CR 6 as well
  - Location of proposed trail crossing at CSAH 79 is dependant on future school traffic patterns
  - Monitor future pedestrian activity and construct crossings on CSAH 20 if needed (consider pedestrian refuge islands)
  - Actively enforce “no parking” on CSAH 20 after reconstruction of corridor

Site H: TH 60/CSAH 20

CSAH 50 Project

CSAH 50 Project



B.M. ELEV. 924.62 (NAVD88)
BM DISK ON SE CORNER OF BRIDGE 07528

SCHEDULE OF QUANTITIES FOR ENTIRE BRIDGE

ITEM NO.	ITEM	UNIT	QUANTITY
2301.553	BRIDGE APPROACH PANELS	SQ. YD.	347 (P)
2401.501	STRUCTURAL CONCRETE (1A43)	CU. YD.	219 (P)
2401.501	STRUCTURAL CONCRETE (3Y43)	CU. YD.	313 (P)
2401.512	BRIDGE SLAB CONCRETE (3Y33A)	SQ. FT.	11410 (P)
2401.513	TYPE MOD F-SW RAILING CONCRETE (3Y46A)	LIN. FT.	585 (P)
2401.541	REINFORCEMENT BARS	POUND	12370 (P)
2401.541	REINFORCEMENT BARS (EPOXY COATED)	POUND	88910 (P)
2401.601	STRUCTURE EXCAVATION	LUMP SUM	1
2402.584	STRUCTURAL TUBE RAILING (DESIGN T-2)	LIN. FT.	565 (P)
2402.591	EXPANSION JOINT DEVICES TYPE 4.0"	LIN. FT.	95 (P)
2402.595	BEARING ASSEMBLY	EACH	32 (P)
2405.502	PRESTRESSED CONCRETE BEAMS 54"	LIN. FT.	1898 (P)
2405.511	DIAPHRAGMS FOR TYPE 54" PREST BEAMS	LIN. FT.	282 (P)
① 2442.501	REMOVE OLD BRIDGE	LUMP SUM	1
2452.507	C-I-P CONCRETE PILING DELIVERED 12"	LIN. FT.	3690
2452.508	C-I-P CONCRETE PILING DRIVEN 12"	LIN. FT.	3690
2452.519	C-I-P CONC TEST PILES 40' LONG 12"	EACH	2
2453.519	C-I-P CONC TEST PILES 65' LONG 12"	EACH	4
2502.502	DRAINAGE SYSTEM (B910)	LUMP SUM	1
2511.501	RANDOM RIPRAP CLASS III	CU. YD.	350
2514.501	CONCRETE SLOPE PAVING	SQ. YD.	325 (P)

NOTES:
① NON-PARTICIPATING STA. 77+60

DESIGN DATA

2002 A.A.S.H.T.O. DESIGN SPECIFICATIONS
LOAD FACTOR DESIGN METHOD
DESIGN LOADING HS25 LIVE LOAD
DEAD LOAD INCLUDES 17 psf ALLOWANCE FOR FUTURE WEARING COURSE MODIFICATIONS.
MAXIMUM ALLOWABLE DESIGN STRESSES:
REINFORCED CONCRETE:
f'c = 4000 psi n = 8
fy = 60000 psi REINFORCEMENT
PRESTRESSED CONCRETE:
f'ci = 6400 psi n = 1
f's = 270000 psi LOW RELAXATION STRANDS
DESIGN SPEED 55 mph
APPROXIMATE DECK AREA 11420 ft²
PROJECTED A.D.T. FOR 2023 = 386
OPERATING RATING HS46.8

LIST OF SHEETS

CONSTRUCTION NOTES

THE 2005 EDITION OF THE MINNESOTA DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR CONSTRUCTION" SHALL GOVERN.

BRIDGE SEAT REINFORCEMENT SHALL BE CAREFULLY PLACED TO AVOID INTERFERENCE WITH DRILLING HOLES FOR ANCHOR RODS. THE SUPERSTRUCTURE BEAMS SHALL BE ERECTED IN FINAL POSITION PRIOR TO DRILLING HOLES FOR AND PLACING ANCHOR RODS.

THE FIRST TWO DIGITS OF EACH BAR MARK INDICATE THE BAR NUMBER WHICH APPROXIMATES THE NOMINAL DIAMETER OF THE BAR IN MILLIMETERS (mm).

BARS MARKED WITH THE SUFFIX "E" SHALL BE EPOXY COATED.

ALL REINFORCEMENT SHALL BE 2 in. CLEAR, UNLESS SHOWN OR NOTED OTHERWISE.

I HEREBY CERTIFY THAT THIS PLAN WAS PREPARED BY ME OR UNDER MY DIRECT SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF MINNESOTA.

Print Name: LARRY G. ERICKSON
Signature: Larry G. Erickson
Date: 2/1/07 License #: 14546

SRF CONSULTING GROUP, INC.

BLUE EARTH COUNTY

BRIDGE NO. 07579

C.S.A.H. 50 OVER MINNEOPA CREEK & UPRR
54" PRESTRESSED CONCRETE BEAMS
SPANS 118'-118'
44' ROADWAY

BRIDGE I.D. NO. 501

SEC. 13, T108N, R28W,
BLUE EARTH COUNTY

APPROVED: _____ BLUE EARTH COUNTY ENGINEER — DATE 2/21/07
APPROVED: _____ STATE BRIDGE ENGINEER — DATE

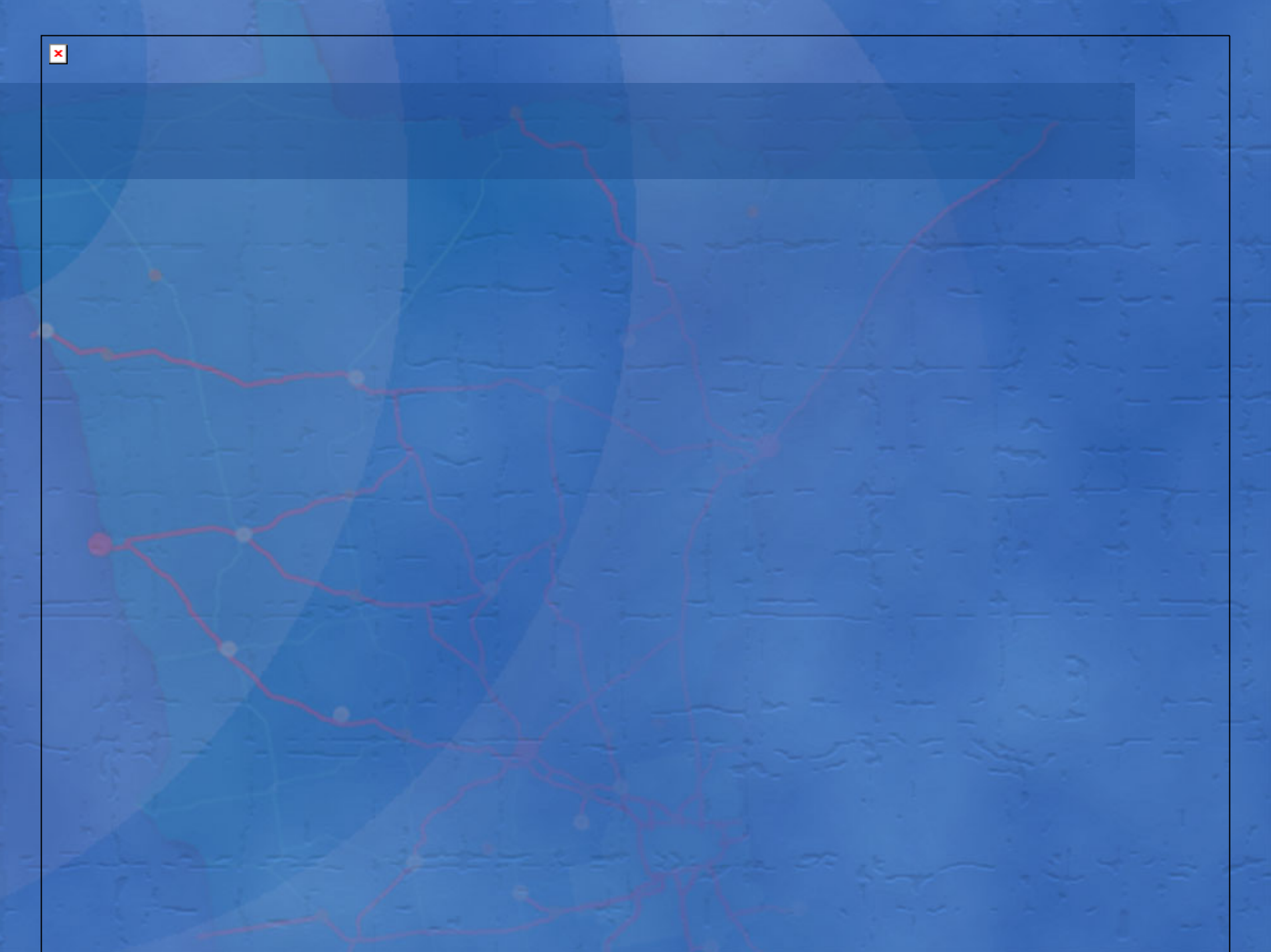
MN/DOT REVIEW UNIT: STATE AID UNIT | STATE PROJ. NO. 07-650-01 | SHEET B1 OF B30 | B-Type No. 07579 | Const. No. 0024385

Statewide Fatalities (2001-2005)

Total Fatalities	3,008		
Total Vehicle Occupant Fatalities	2,429		
Driver Behavior Based Emphasis Areas			
Unbelted (Based on Veh. Occ. Fatalities)	1,271	(52%)	1
Alcohol-Related	1,068	(36%)	2
Speeding-Related	850	(28%)	5
Involved Drivers Under 21	718	(24%)	6
Infrastructure Based Emphasis Areas			
Single Vehicle ROR	965	(32%)	4
Intersection	1,004	(33%)	3
Head-On and Sideswipe	611	(20%)	7

Emphasis Area Fatality Rank

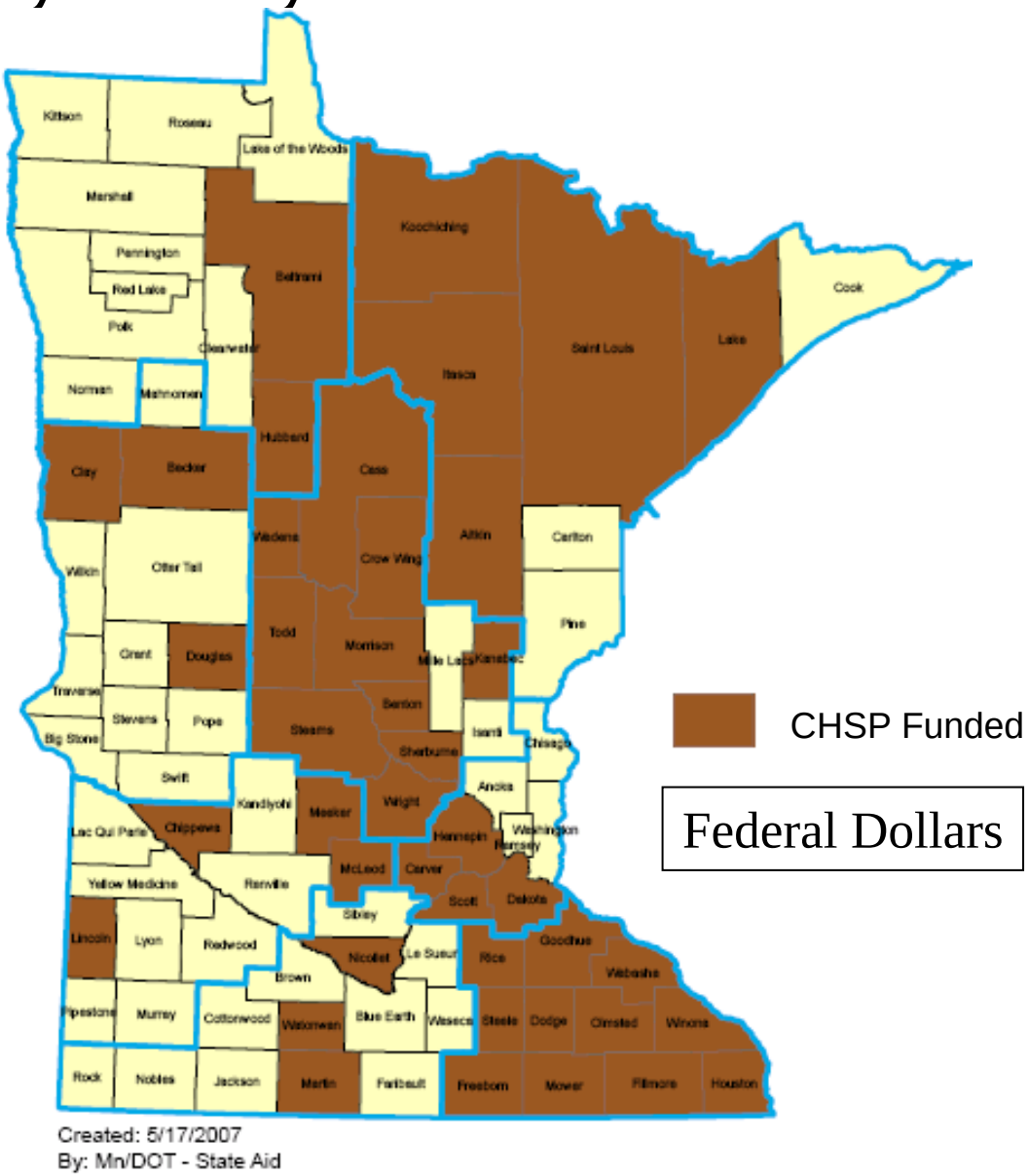
CH2MHILL



Edgeline painted over rumble strips.

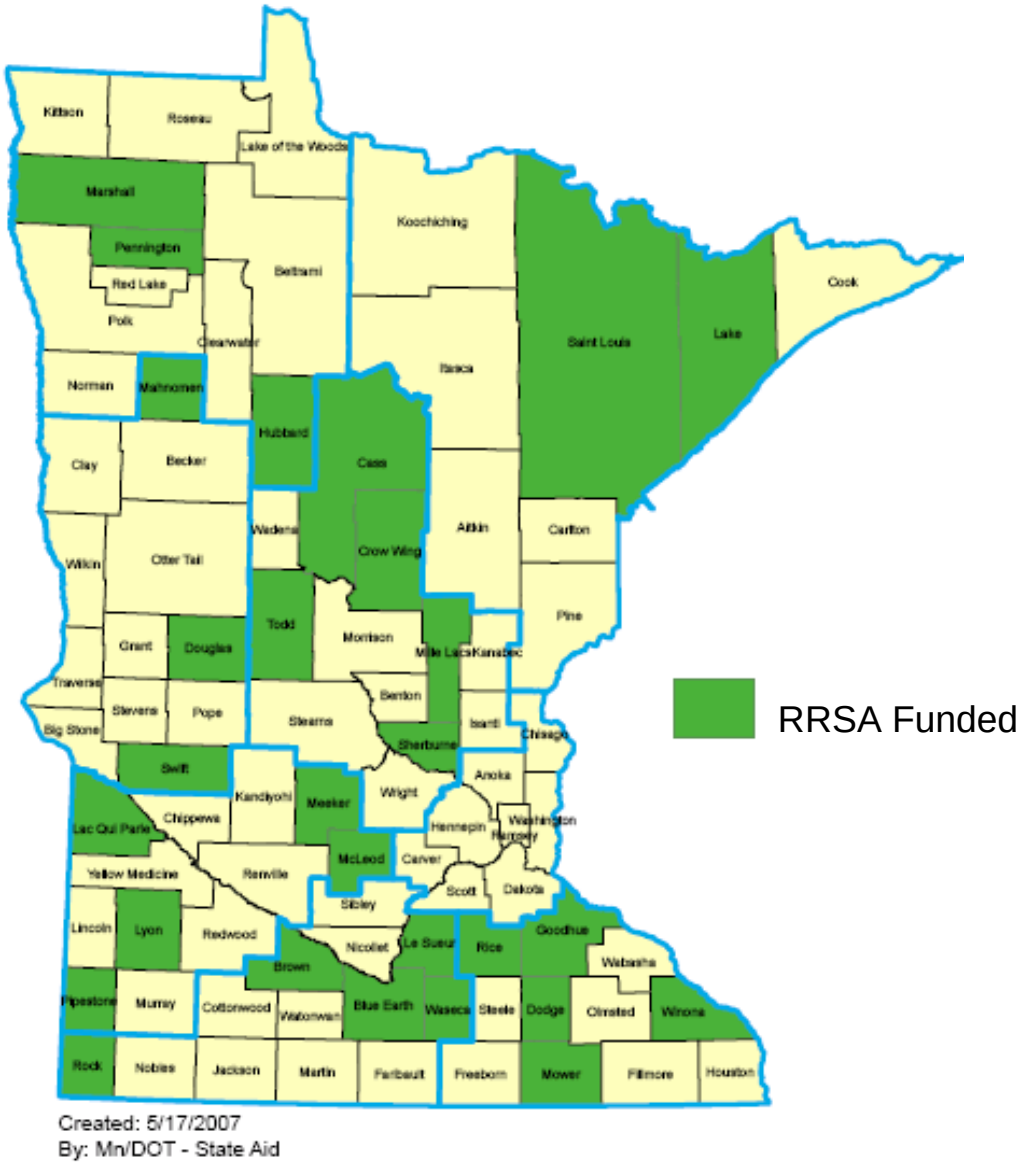
MN Comprehensive Highway Safety Program (CHSP) by County

- 63 proposals were received for CHSP funds (Central Safety Funding)
- 46 Counties received funding in 2007 & 2008 CHSP Solicitation (Central Safety Funding)
- 55 Projects were Funded with an Average Award of $75,500



MN Rural Road Safety Account (RRSA) by County

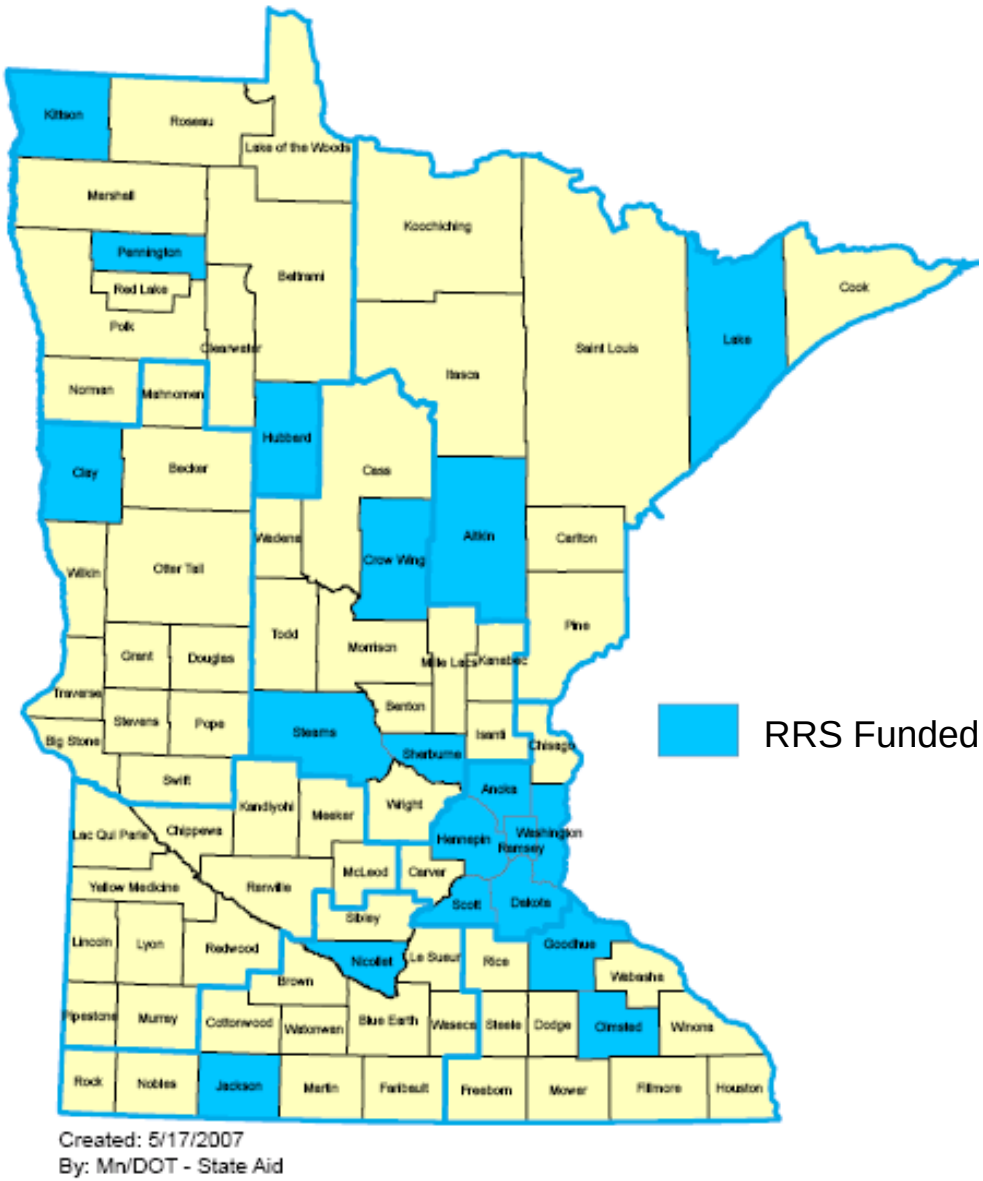
- Funding Provided by State Bonding Program
- CSAH System only
- 40 Projects were Funded with an Average Award of $191,300



Created: 5/17/2007
By: Mn/DOT - State Aid

MN Routes of Regional Significance (RRS) by County

- Funding Provided by State Bonding Program
- Any Non-Interstate and Non-Trunk Highway Systems
- 22 Projects were Funded with an Average Award of $347,700



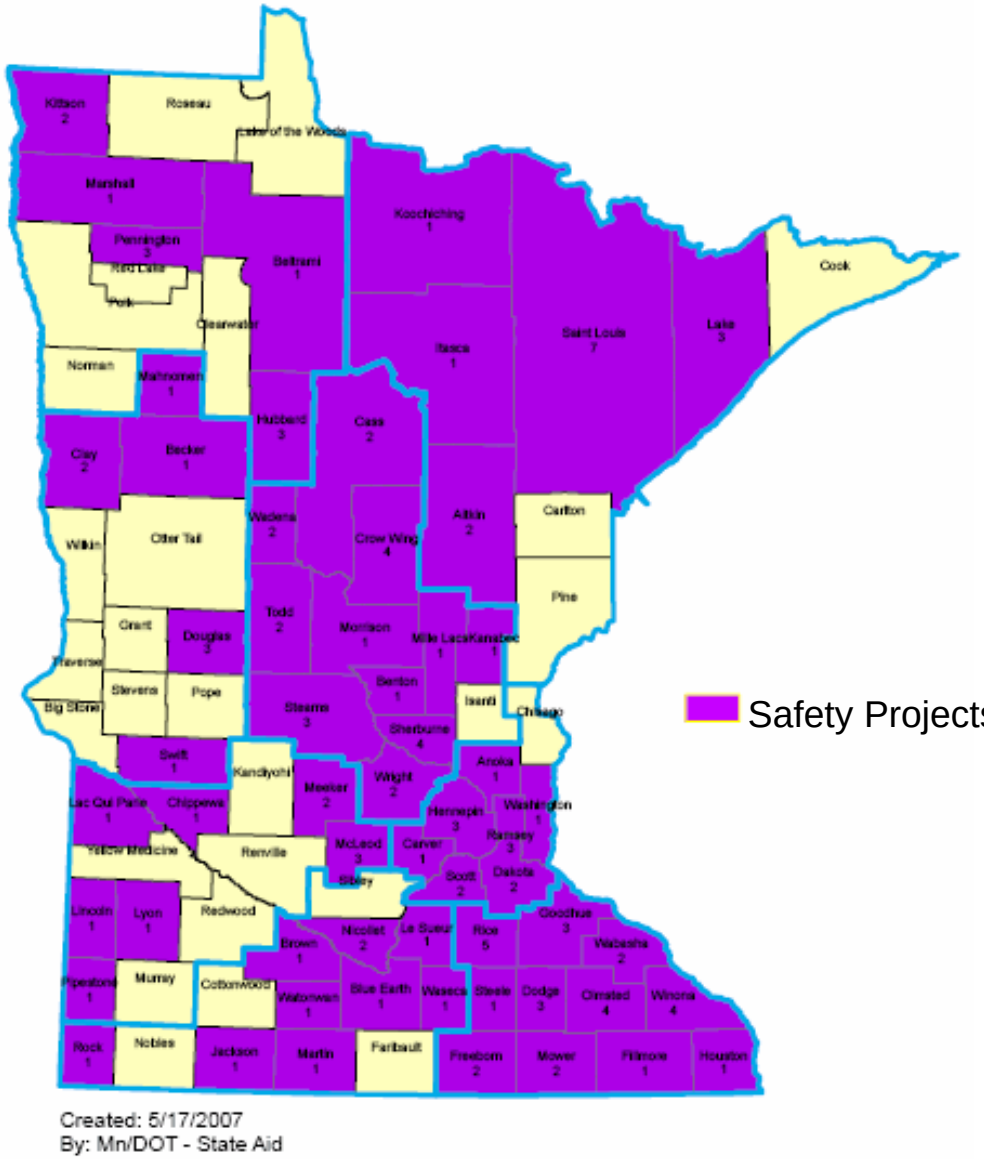
Created: 5/17/2007
By: Mn/DOT - State Aid

MN Traffic Safety Improvement Project Summary by County

- 117 Projects received safety funding in 2006 & 2007 with an Average Award of $166,200

- Improvement Strategies

  - Lane Departure
  - Signage
  - Road Safety Audits
  - Lighting
  - Guardrail
  - Geometrics



Look for Opportunities