Raising Speed Limits on Rural Highways:

A Process for Identification of Candidate Segments

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Policy Debate

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Speed limits highways

5.6k shares

THE VIDEO WATCH IS PLEASE CH

Oregon speed limit signs changed

Oregon Department of Transportation crews Idaho border around 5:30 a.m. March 1, the freeway.

By Elliot Njus | The Oregonian/Ore
Email the author | Follow on Twitte
on February 29, 2016 at 8:21 AM, u

Speed limits on much of Interstat as several rural Oregon highways Tuesday as a law passed last year

386

75-mph speed limits officially coming to Michigan

42.8k shares

Speed limits on some rural, limited-access Michigan highways could rise to 75 miles per hour after speed and safety studies. (Gillian Van Stratt | MLive)

By Emily Lawler | elawler@mlive.com
on January 05, 2017 at 11:47 AM, updated January 05, 2017 at 2:18 PM

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LANSING, MI -- Gov. Rick Snyder on Thursday signed bills allowing speed limits on some Michigan highways to 75 miles per hour.

"Ensuring that all Michiganders are safe while operating vehicles on our state's roadways is critically important, and these bills allow for appropriately increased speed limits on certain roadways after safety studies are conducted," Snyder said.

The main bill requires the Michigan Department of Transportation and Department of State Police to raise speed limits to 75 miles per hour on 600 miles of rural, limited-access freeways if a safety and engineering study deems it safe.

The bills require safety and engineering studies before speed limits are raised.

The House initially approved the package in June, but both chambers passed the latest version in December. The Senate changed the bills from what the House had passed. Sen. Tom Casperson, R-Escanaba, said the Senate-passed bills went back toward using the 85th percentile -- that is, the speed that 85 percent of drivers on a stretch of road do not exceed -- to help set speed limits.

Speed limit increase to 75 squeezes through House, heads to governor

Some highway speeds could increase to 75 miles-per-hour.

Rep. Bradford Jacobsen, R-Oxford, led the package. The bills were HBs 4423-4427, and are now Public Acts 445-449 of 2016.

The bills also allow for speed limit changes in other areas, including:

- Speed limits on gravel roads in counties with populations over 1 million would decrease to 45 miles per hour.
- Up to 900 miles of rural state trunk line highways would see hikes to 65 miles per hour.

Note: This story has been edited to reflect the speed limit of state trunk line highways.

DETROIT AUTO SHOW

Rundown of vehicle unveilings

- Early peek at the auto show floor
- Ram 1500 special edition to debut at auto show

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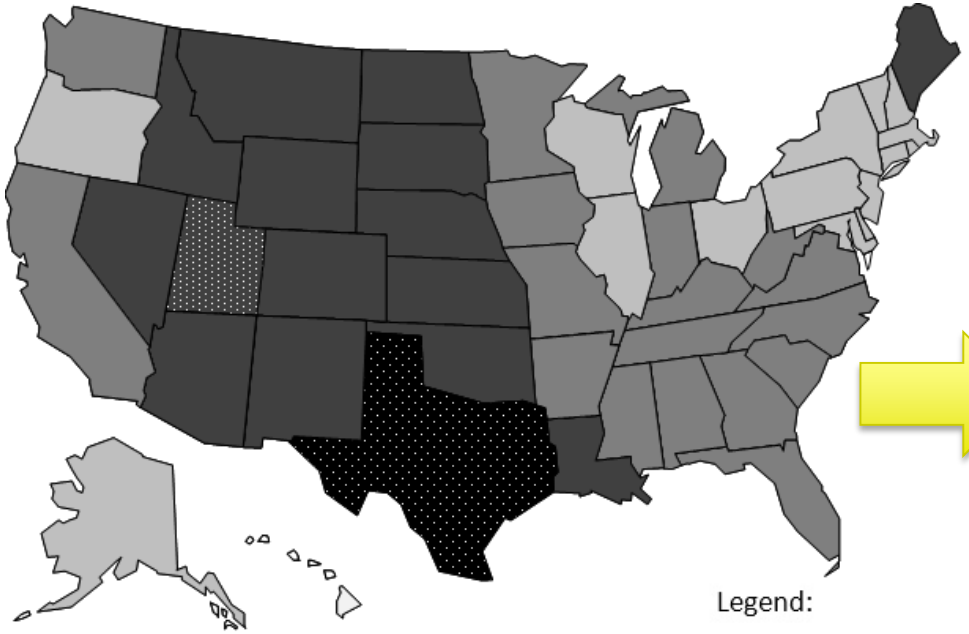
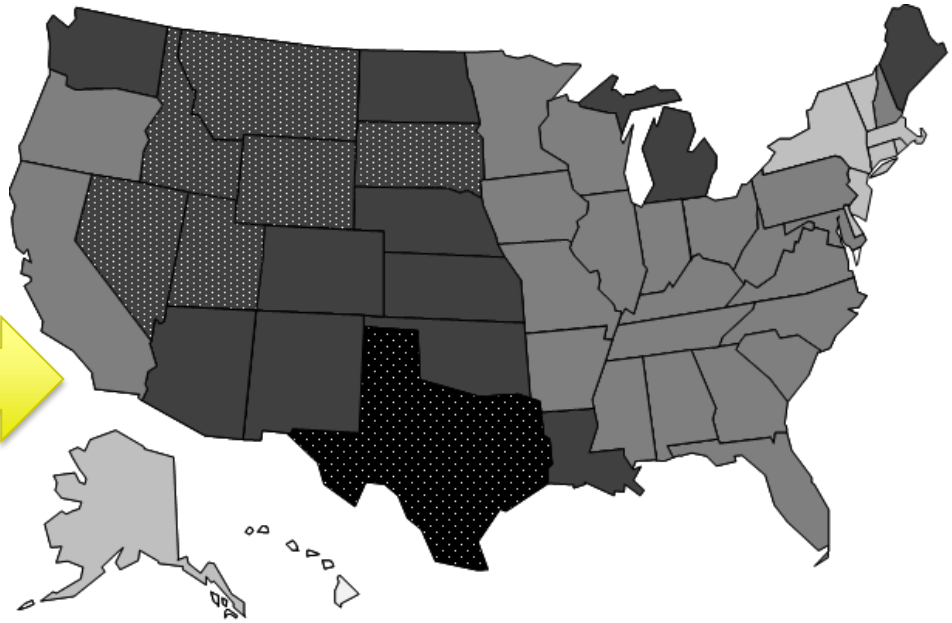
Maximum Limits - Freeways

Freeways - 2012



Freeways - 2017

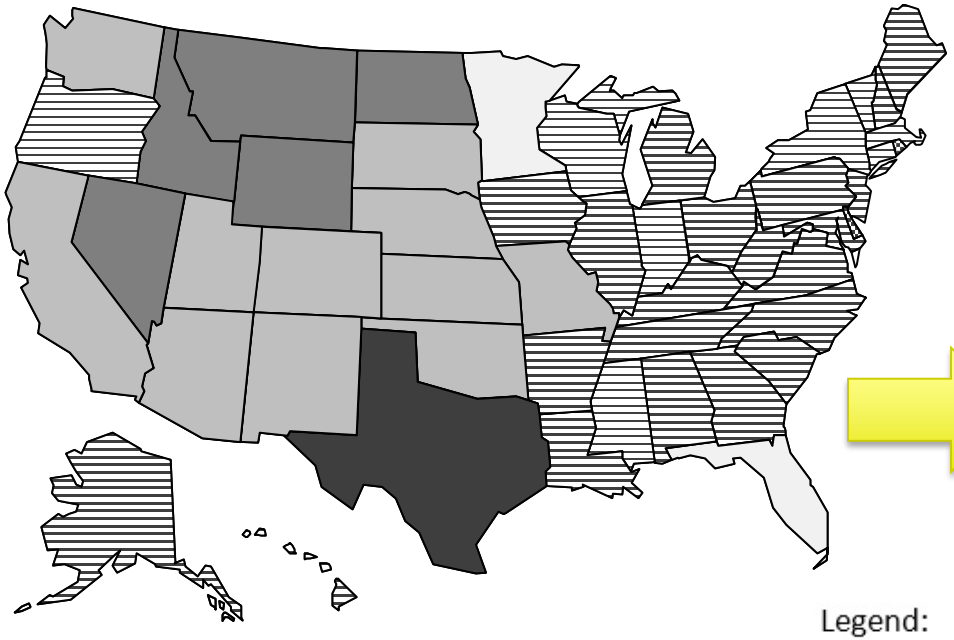


Legend:

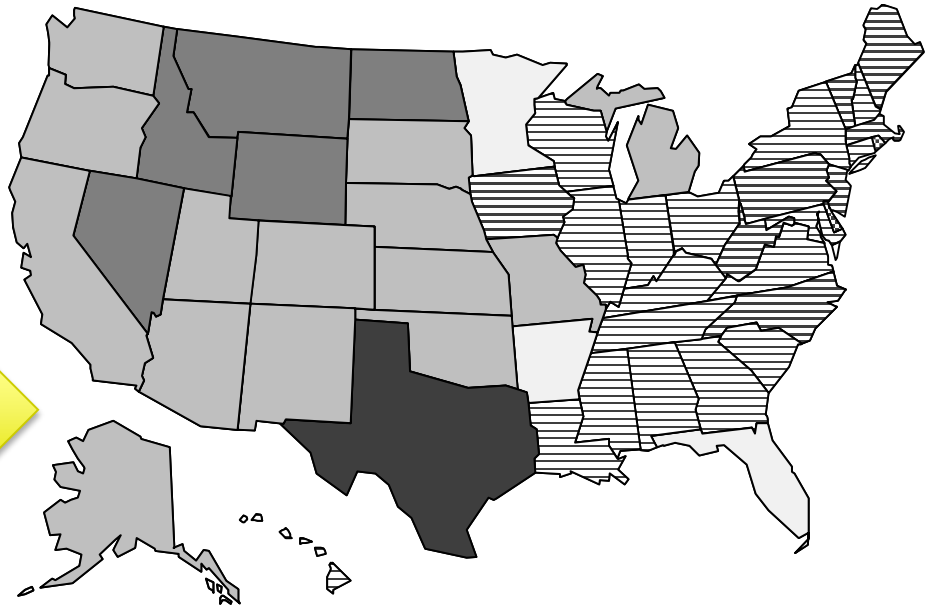
- 85 mph
- 80 mph
- 75 mph
- 70 mph
- 65 mph
- 60 mph
- 55 mph

Maximum Limits - Undivided Highways

Undivided - 2012



Undivided - 2017



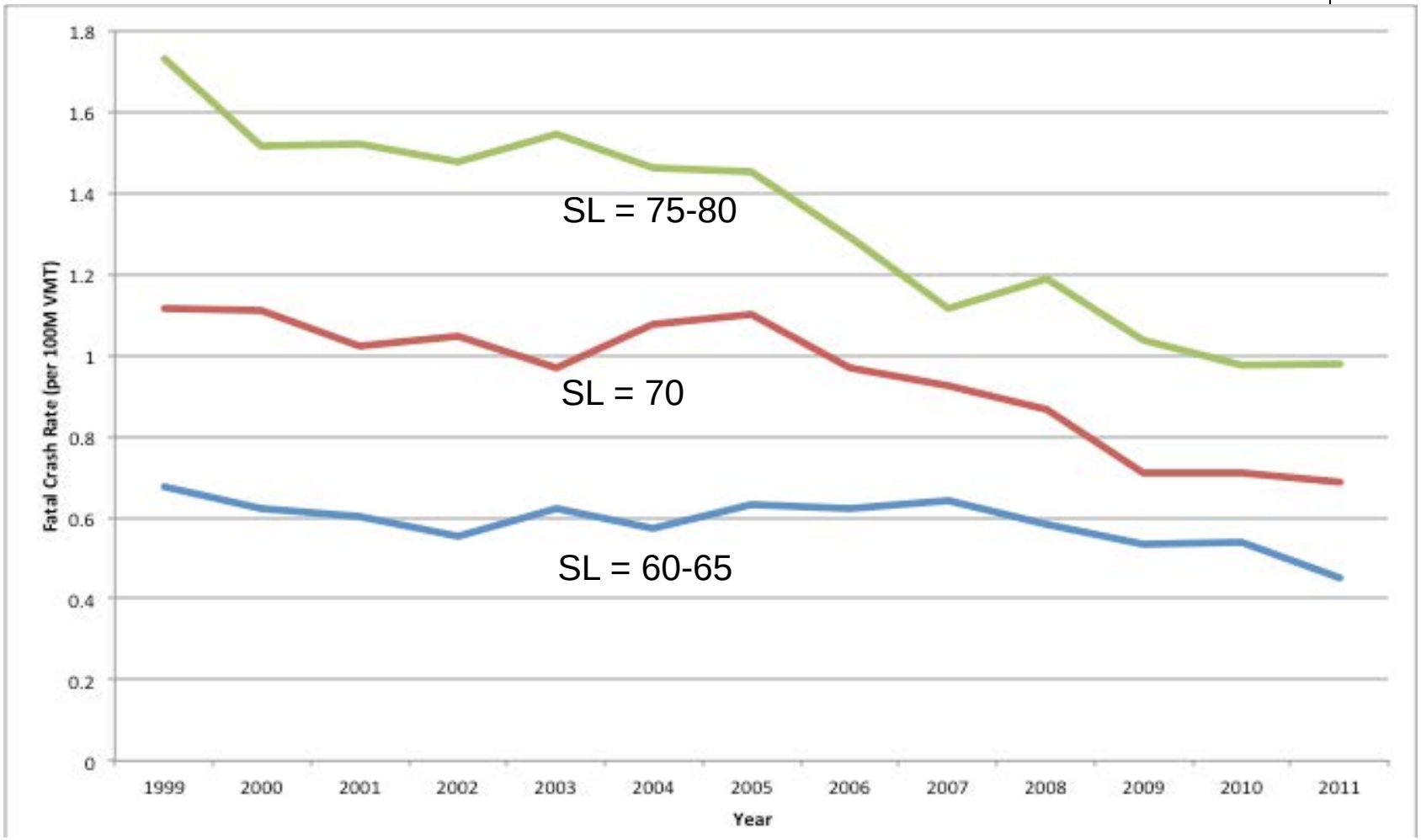
Legend:

- 75 mph
- 70 mph
- 65 mph
- 60 mph
- 55 mph
- 50 mph

Impacts of Policy on Safety

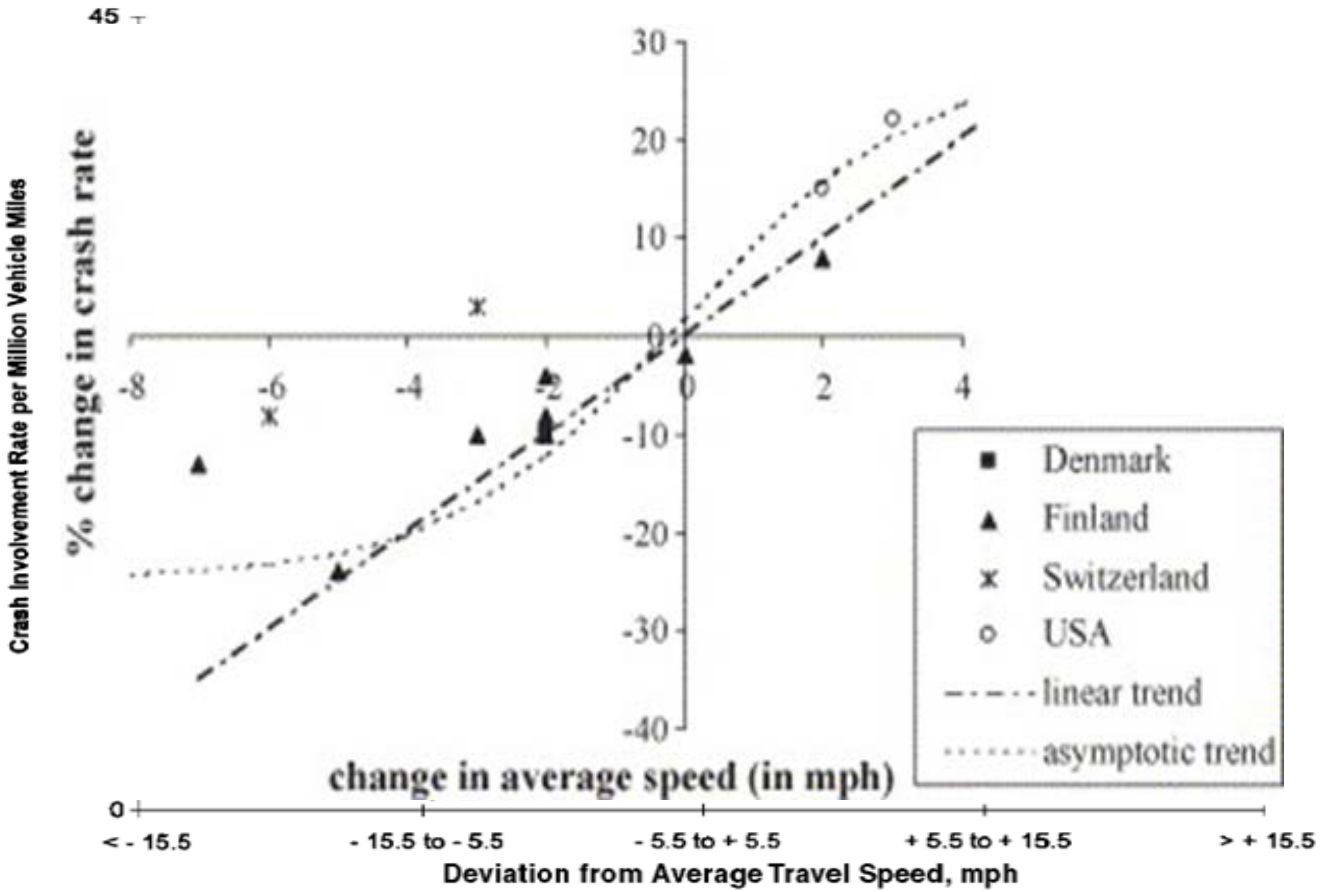
- Safety impacts of important Federal actions
  - 1974 – 1987
    - 55 mph maximum speed limit on all U.S. roadways
    - Traffic fatalities decreased by ~7,500 annually
  - 1987 – 1995
    - 65 mph allowed on rural interstates
    - Traffic fatalities increased by 29 percent
  - 1995 – present
    - Maximum speed limits controlled by states
    - More than 12,500 total additional fatalities (through 2005)

US Interstate Fatality Trends 1999 - 2011



Speed and Crash Risk

Solomon (1964)
Finch et al. (1994)
West and Dunn (1971)



Recent Speed Limit Policy Changes: Summary of Findings

- Increases have generally occurred on select segments (rather than system-wide)
- Feasibility determined based on engineering studies, evidence, and data
- Too soon for formal before/after safety analyses
- Unknown economic impacts
- Literature -> interstates/freeways and/or outdated

Study Purpose and Objectives

- In response to proposed speed limit legislation introduced in Michigan, MDOT sought to:
  1. Develop data driven process to identify candidate highway segments for speed limit increases, based on
     - Crash data
     - Additional risk criteria (geometry, driveways, schools, etc.)
     - Operating speeds
     - Infrastructure cost estimates
  2. Use the strategy to determine candidates on MDOT's rural highway network

Candidate Selection Process

Part A - Safety/Risk Assessment:

- Step 1: Compare segment crash rates to statewide rates
- Step 2: Assess additional risk criteria

Part B - Infrastructure Cost Assessment:

- Step 3: Review geometric features for Part A candidates
- Step 4: Estimate costs (initial vs. 3R/4R)

Part C - Field Study for Initial Candidates:

- Step 5: Analyze travel speeds, review crashes, and assess factors not available in statewide datasets

Data Collection

Michigan Crash Databases (2004-2013)

- Total
- Injury
- K&A

+

MDOT Roadway Inventory Files (2004-2013)

- AADT
- Laneage
- Shoulders
- Speed Limit
- Area Type
- Medians
- NPZs
- Passing Lanes

+

Independently Collected Data:

- Driveways
- Horizontal Curves
- K-8 Schools

Safety/Risk Assessment

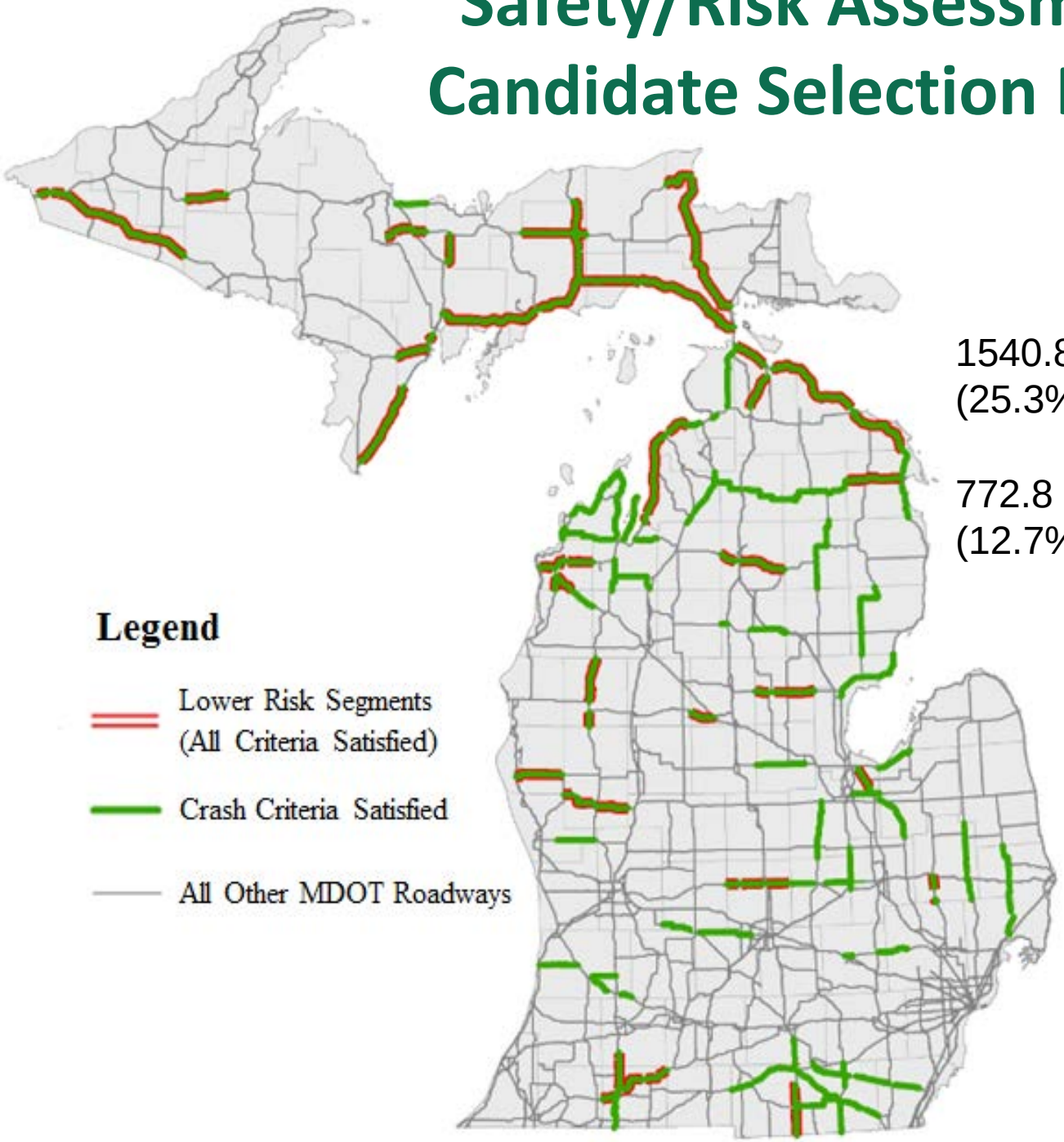
Factor	Criteria
Segment Length	UNDIVIDED: Minimum 8.0 mi. posted at 55 mph DIVIDED: Minimum 4.0 mi. posted at 55 mph
Total Crash Rate, 2004-2013	UNDIVIDED: Fewer than 252.58 crashes per 100M VMT DIVIDED: Fewer than 219.73 crashes per 100M VMT
Injury Crash Rate, 2004-2013	UNDIVIDED: Fewer than 35.80 crashes per 100M VMT DIVIDED: Fewer than 44.74 crashes per 100M VMT
Severe (K+A) Crash Rate, 2004-2013	UNDIVIDED: Fewer than 7.12 crashes per 100M VMT DIVIDED: Fewer than 4.80 crashes per 100M VMT
Horizontal Curvature	No curves with radii below 3R minimum design speed
Speed Reduction Zones	Less than 25% of the total segment length below 55 mph
Proximity to K-8 Schools	Fewer than 1 per 10 miles
Signalized Intersections	UNDIVIDED: Fewer than 1 per 10 miles DIVIDED: Fewer than 1 per 2 miles
Access Point Density	Fewer than 20 driveways per mile
No-Passing Zones	Less than 40% of the segment in NPZ (undivided only)
Lane Width	Greater than 10 ft
Paved Shoulder Width	Greater than or equal to 3 ft

Step 1: Assess Crash Rates

Step 2: Assess Additional Risk Criteria

Developed based on MDOT crash data analysis and literature

Safety/Risk Assessment – Candidate Selection Results



1540.8 miles met crash criteria (25.3% of statewide mileage)

772.8 miles met all criteria (12.7% of statewide mileage)

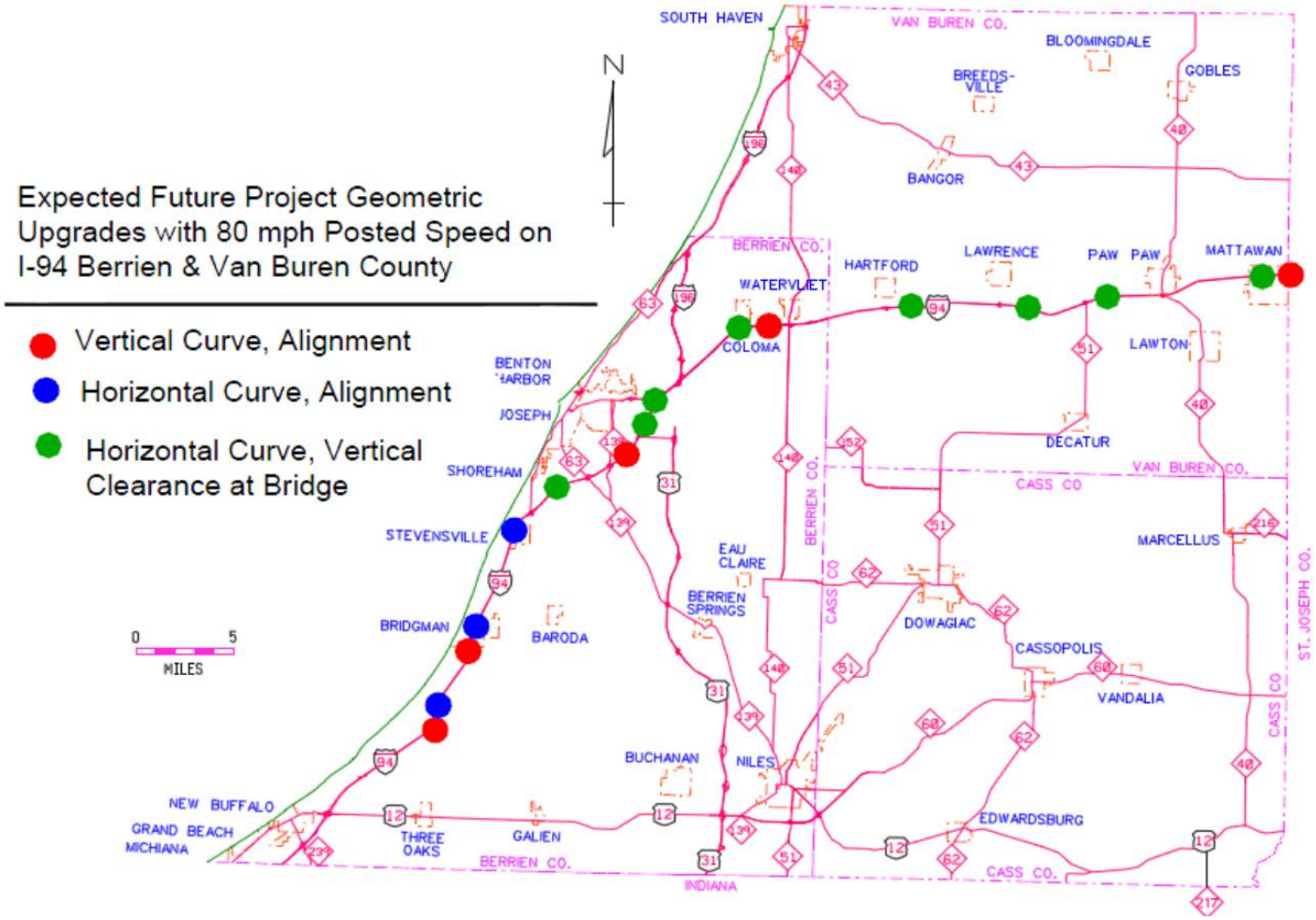
Cost Assessment

- Benefit/cost analysis performed for several 65 mph implementation scenarios
  1. Minimum cost candidates from Part A
  2. Candidates from Part A with no major geometric upgrades
  3. All candidates from Part A
  4. All routes systemwide
- Considered costs and benefits related to
  - Infrastructure upgrades
  - Travel time and fuel consumption
  - Traffic crashes

Infrastructure Upgrade Costs

- Costs estimated from recent MDOT 3R projects
  - Initial upgrades:
    - Speed limit signage, no-passing zone extensions, restripe merging tapers, curve warning signs
    - $10,000 /mi
  - 3R/4R upgrades:
    - Minimal Upgrades (Guardrail extension, Tapers): $8,000 /mi
    - Moderate Upgrades with No Realignment: $70,000 /mi
    - Major Upgrades (Horizontal or Vertical Realignment): $195,000 /mi

Deficient Curves
I-94 in Southwest Michigan



User Benefits and Costs

- Mean speeds estimated to increase by 3.4 mph per 10 mph speed limit increase
  - Travel times decrease by 5.5 - 5.7 %
  - Fuel consumption increases by 4.6 - 5.0 %
    - -0.1 mpg/mph (trucks)
    - -0.4 mpg/mph (cars)
- Time savings outweigh fuel consumption costs by
  - 1.06 for heavy trucks ($0.0019/mile)
  - 2.98 for passenger vehicles ($0.0113/mile)

Safety Impacts and Costs

- Increasing the speed limit to 65 mph is expected to
  - Increase crash occurrence by 3.3%
  - Increase crash severity

Crash Severity	Estimated Increase in Crash Occurrence (Kockelman, 2006)	Cost Per Additional Crash (National Safety Council, 2014)
Fatality (K)	28.1%	$1,693,476
Incapacitating Injury (A)	12.1%	$120,526
Non-Incapacitating Injury (B, C)	5.0%	$38,455
Property Damage (O)	2.7%	$9,194

Benefit/Cost Analysis by Implementation Scenario

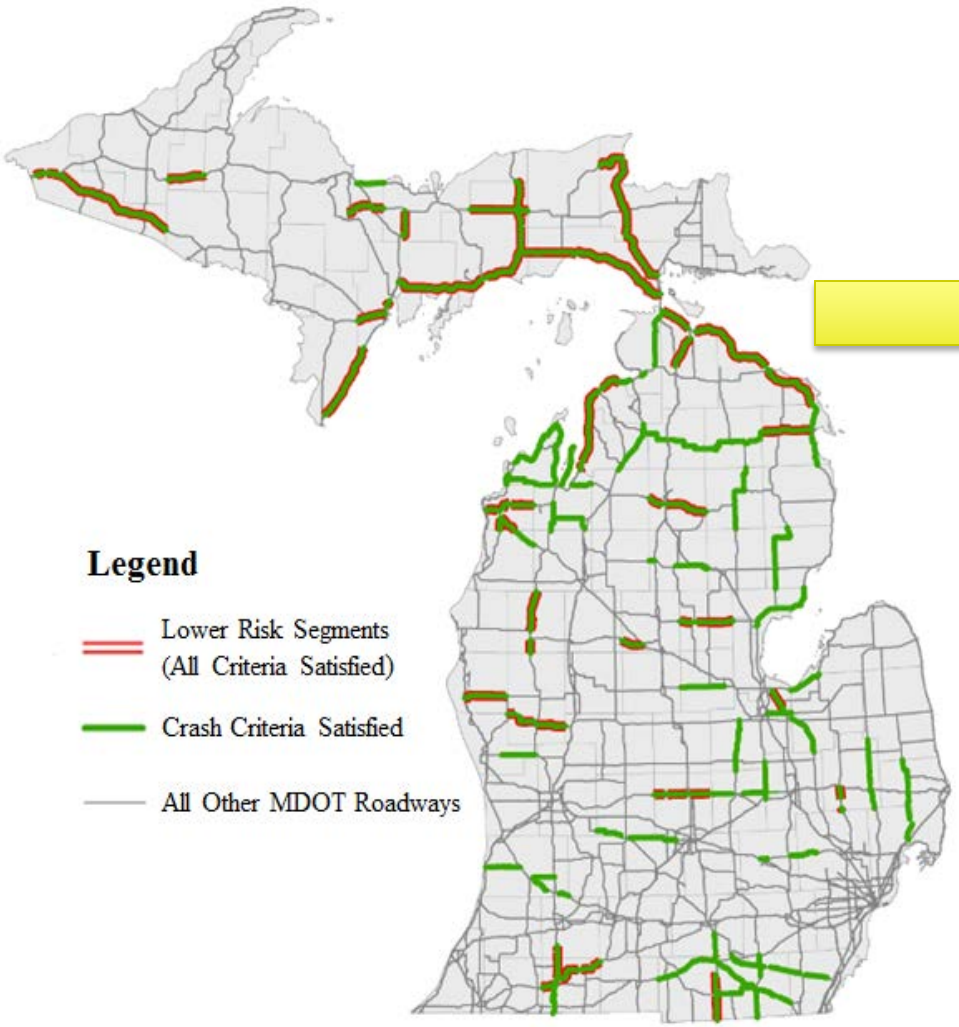
65 mph Highway Speed Limit Implementation Scenario	MDOT Affected Mileage	**B/C**
Scenario 1: Lower Risk, Lower Cost Candidates (M-28 and US-2)	235.1	**1.23**
Scenario 2: Lower Risk, Moderate Cost Candidates	512.6	**1.12**
Scenario 3: All Lower Risk Candidates	772.8	**0.94**
Scenario 4: All MDOT 55 mph Trunklines	6,092.2	**0.77**

Implementation Recommendations

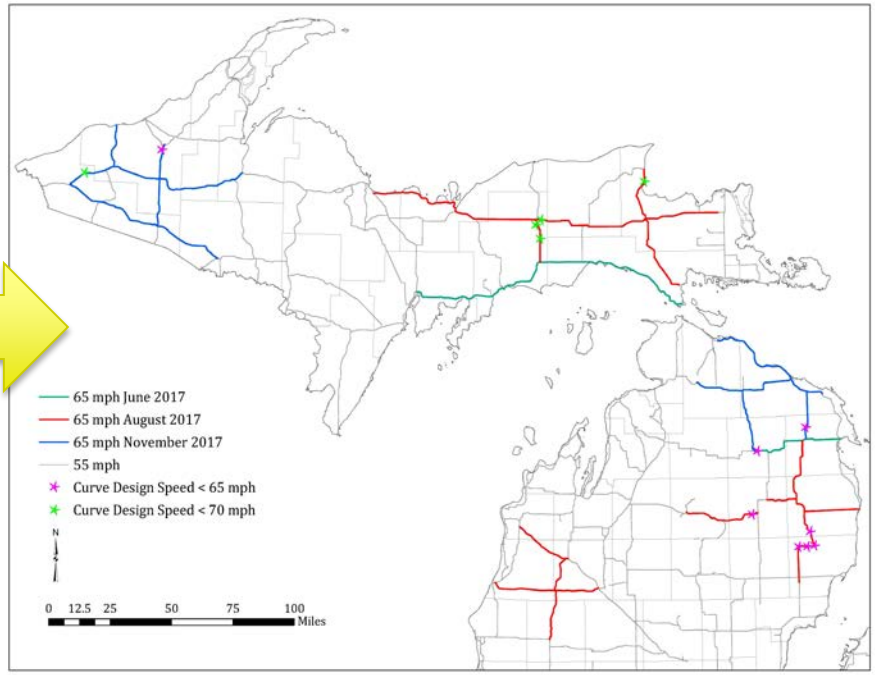
- Systemwide application of increased maximum speed limits is <u>not desirable</u>
- Identify "Lower Risk/Lower Cost" candidate segments for further consideration
  - Low crash, injury, and K&A rates
  - Favorable roadway geometry
  - High operating speeds
  - Few access points
  - Low truck volumes
- Perform project-level engineering, speeds/operations, safety, and infrastructure cost assessment prior to final segment selection (Part C)
  - Can't ignore federal design standards

Recommended vs. Implemented: Non-Freeways

Recommended

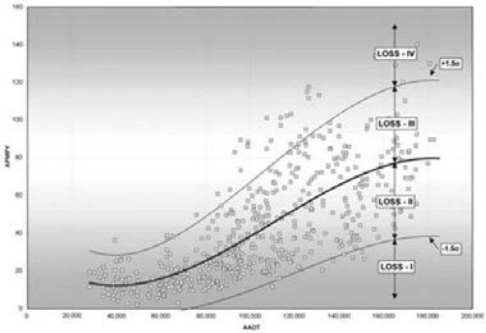


Implemented



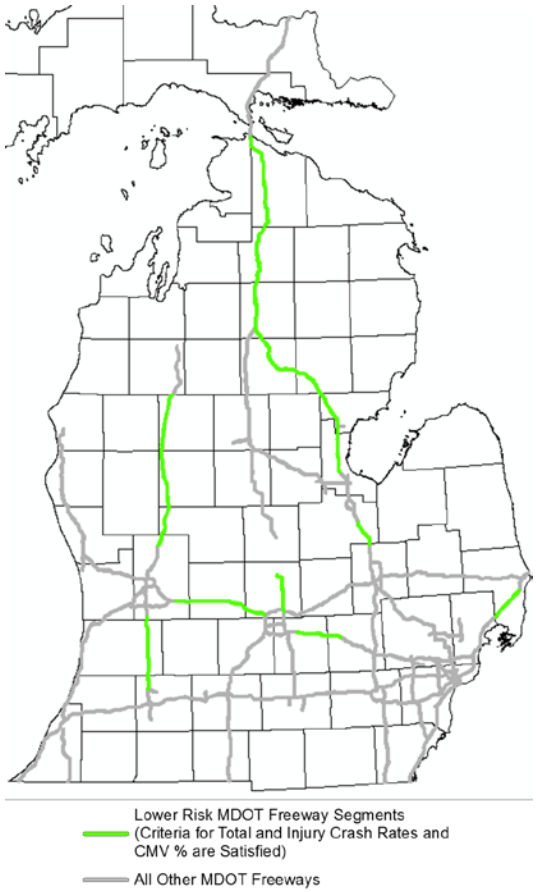
Based on:

- HSM LOSS Cat.1,2;
- Geometry;
- AADT;
- Speeds



Recommended vs. Implemented: Freeways

Recommended



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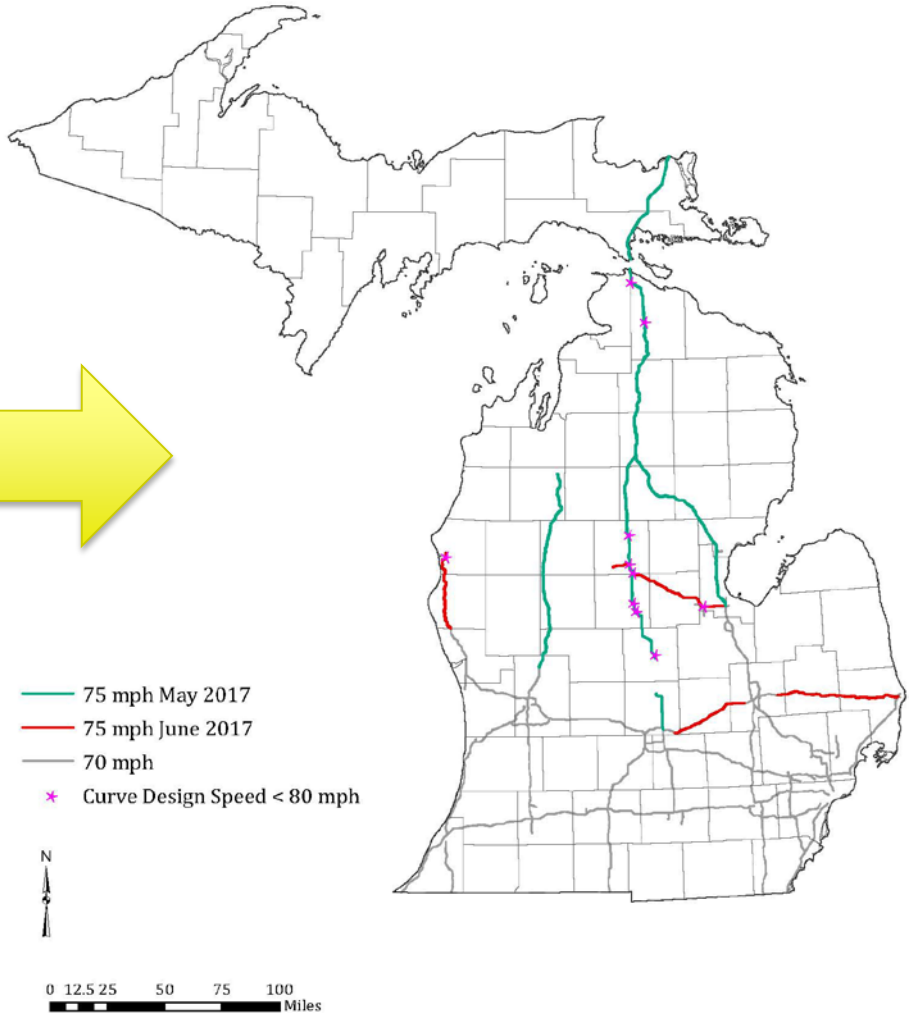

Ongoing Research

- Horizontal Curves
  - Determine how speeds and safety are affected by speed limit increases on these curves
  - Determine how various curve warning devices (traditional and innovative) may mitigate any driver speed control concerns at such locations
- Policy Impacts
  - Statewide speed and safety evaluation
  - MDOT implementations vs. Research recommendations
  - Life cycle costs

Questions?

- Research Report Links
  - **Freeways:** https://www.michigan.gov/documents/mdot/RC-1609_478401_7.pdf
  - **Non-Freeways:** https://www.michigan.gov/documents/mdot/RC1609B_487484_7.pdf
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