# TRENDS IN TRUCK TRANSPORT, POLICY AND SAFETY

PREPARED FOR: CMAP FREIGHT COMMITTEE

PRESENTED BY: MARK BERNDT

WilburSmith ASSOCIATES

# Mark Berndt – Vice President
# WSA Freight Planning Services

- **25 years truck regulation and policy development**
  - Former MnDOT Enforcement Supervisor
  - Project Manager for truck policy studies in Wisconsin, Minnesota, Maine, New Hampshire, Virginia and the District of Columbia
- **National truck policy expertise**
  - Chair, TRB Motor Vehicle Size and Weight
  - Chair, AASHTO Task Force on TS&W and author of the Guidebook on Vehicle Weights  Dimensions
  - Staffed bi-national AASHTO/RTAC Committee on TSW Uniformity
  - Panel Member for NCHRP 314; *Strategies for Managing Increasing Truck Traffic*

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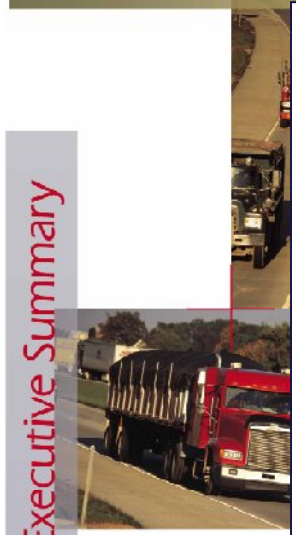
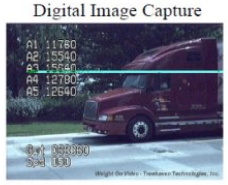
# Heavy Vehicle Safety & Policy Studies

Study of Impacts
Caused by Exempting the Maine Turnpike
and the New Hampshire Turnpike
From Federal Truck Weight Limits

Executive Summary



Digital Image Capture



**District-Wide Truck Safety Enforcement Plan**

Task 5—GAP Analysis

Prepared for
District of Columbia Department of Transportation

Prepared by
KLS Engineering
Wilbur Smith Associates

DRAFT REPORT
August 05, 2010

**Wisconsin Statewide Truck Safety and Enforcement Study**

A Working Paper: Comparative Analysis of Large Truck Crashes in Wisconsin vs. the Rest of the United States

Prepared by Wilbur Smith Associates

July 28, 2010

Virginia Department of Transportation
On-Call ITS / Safety / Operations Contract
151-BLW

Minimum Highway Features for Safe
k Operations

inal Report

June 2008

repared for:

repared by:

and

ffe Dynamics, LLC

WilburSmith
ASSOCIATES

# Wisconsin Truck Safety Study

- The objective of the study is to perform a system-wide review of existing large truck and oversize/overweight (OS/OW) commercial vehicle safety concerns.
- Recommendations will address current problem areas using engineering data and enforcement strategies. Specific areas that will be examined include:
  - Work Zones
  - Roundabout Designs

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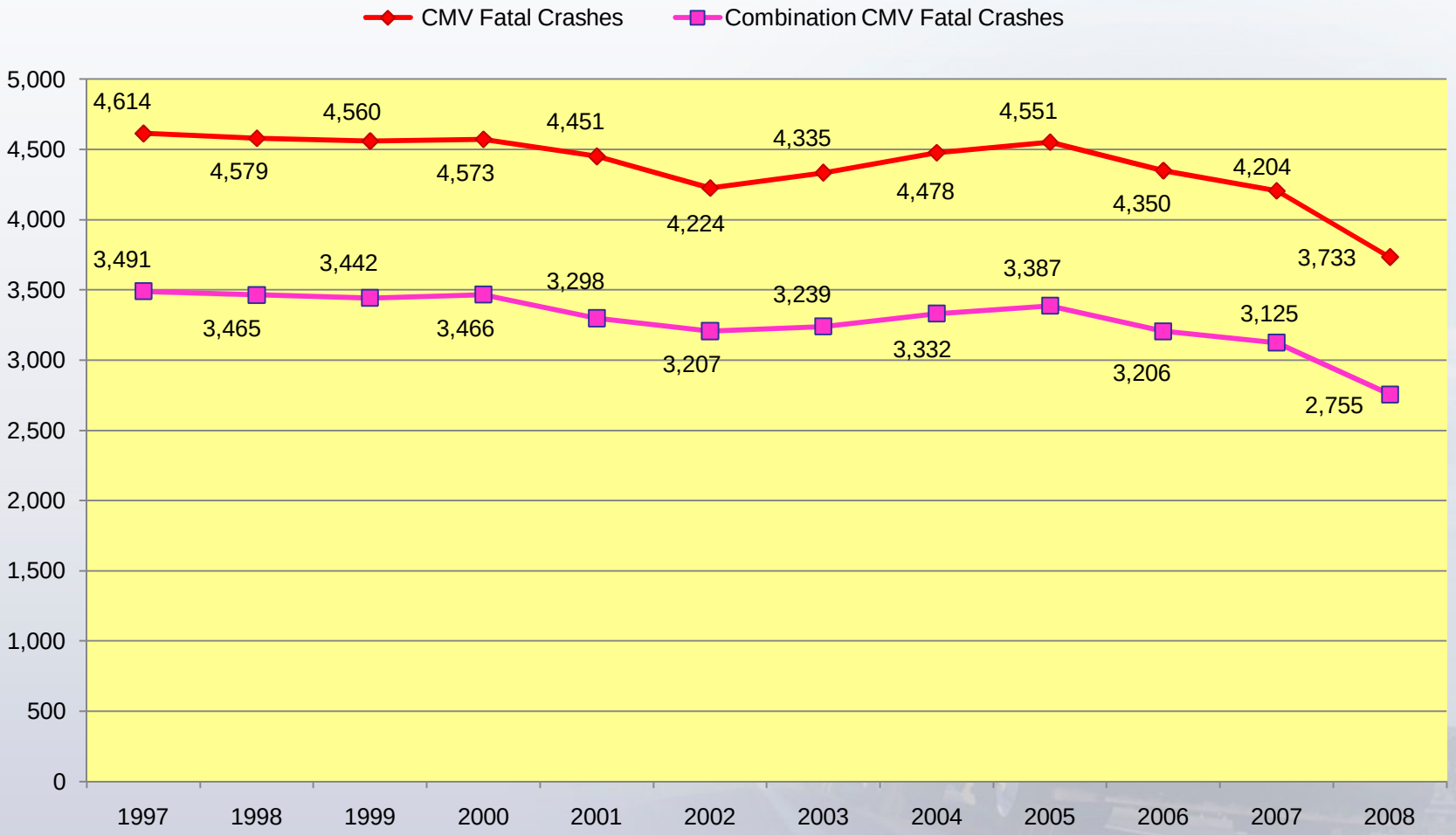
# National Truck Safety Trends

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# Truck Crash Comparison Measures

| | *1988* | *2008* | *change* |
|---|---|---|---|
| Fatal Crashes | 4,885 | 3,733 | -24% |
| Vehicles Involved | 5,241 | 4,066 | -22% |
| Occupant Fatalities | 911 | 677 | -26% |
| Total Fatalities | 5,679 | 4,229 | -26% |
| Million VMT | 137,985 | 227,458 | 65% |
| Fatal CMV Crashes per 100 Million VMT | 3.54 | 1.64 | -54% |
| CMV Involved in Fatal Crashes per 100 Million VMT | 3.8 | 1.79 | -53% |
| Fatalities per 100 Million VMT | 4.12 | 1.86 | -55% |
| Large Trucks Registered | 6,136,884 | 9,006,738 | 47% |

Source: Federal Motor Carrier Safety Administration, *Large Truck and Bus Crash Facts 2008*

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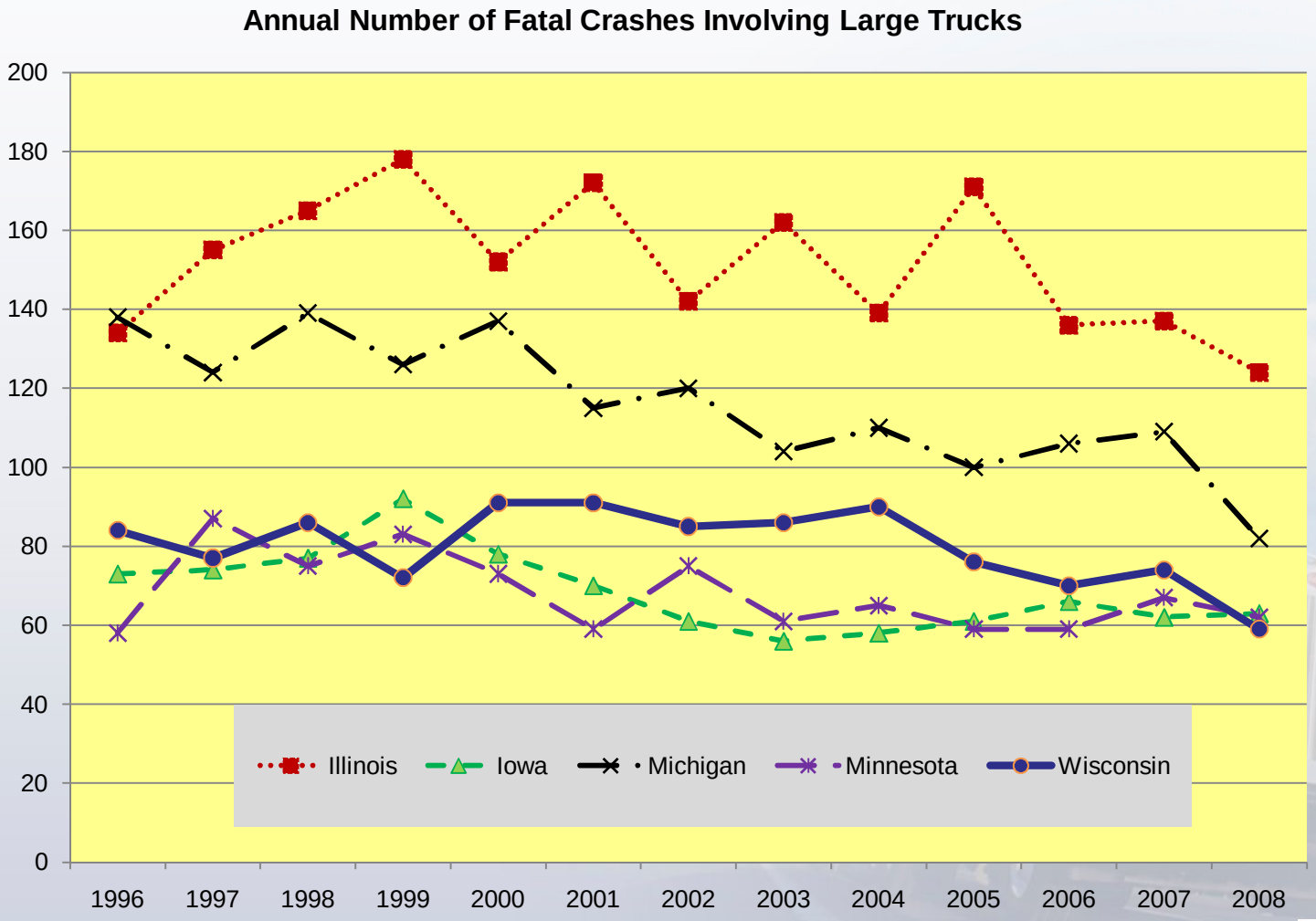
# Midwest Truck Safety – Fatal Crashes

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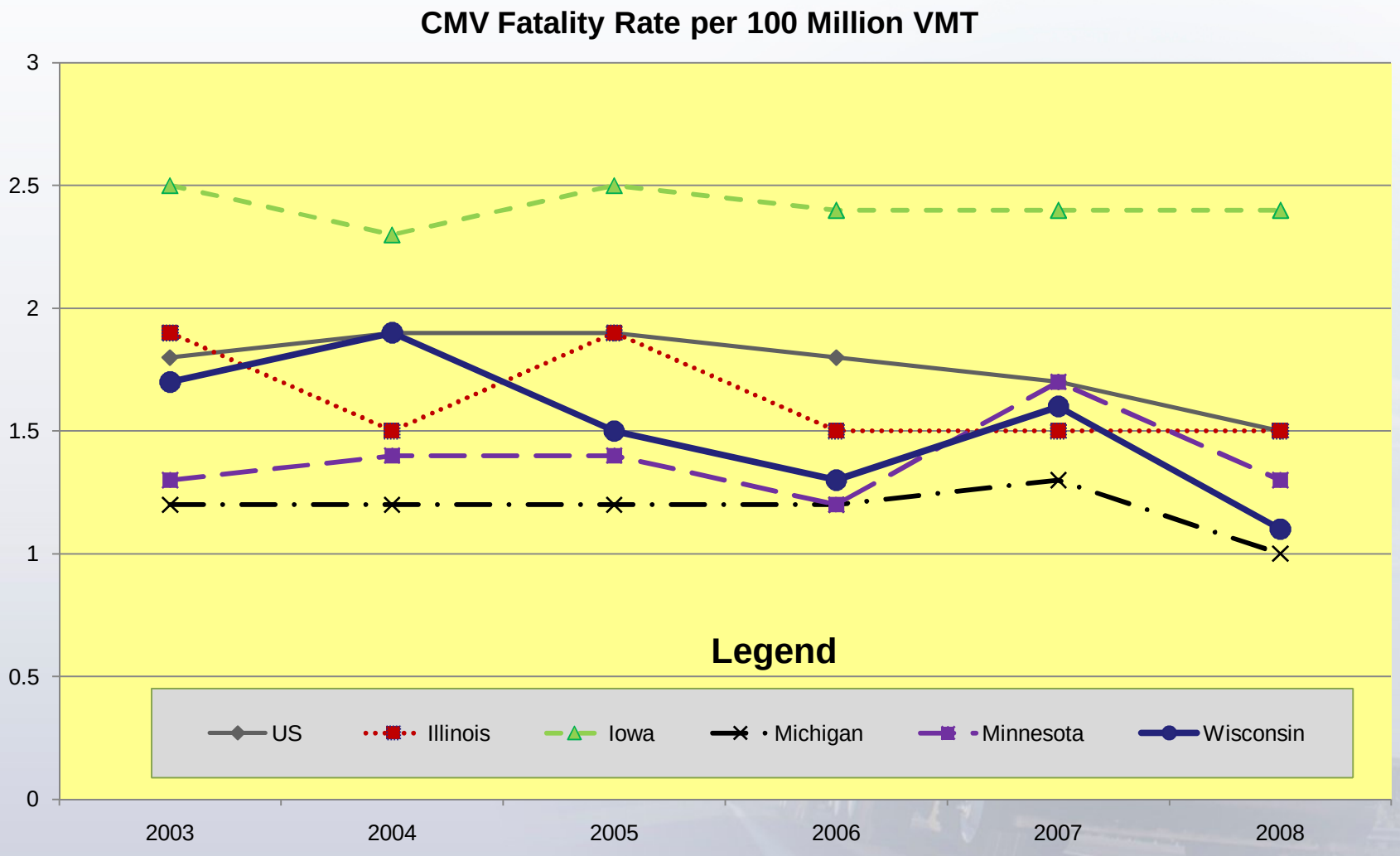
# Midwest Truck Safety – Fatal Crash Rates

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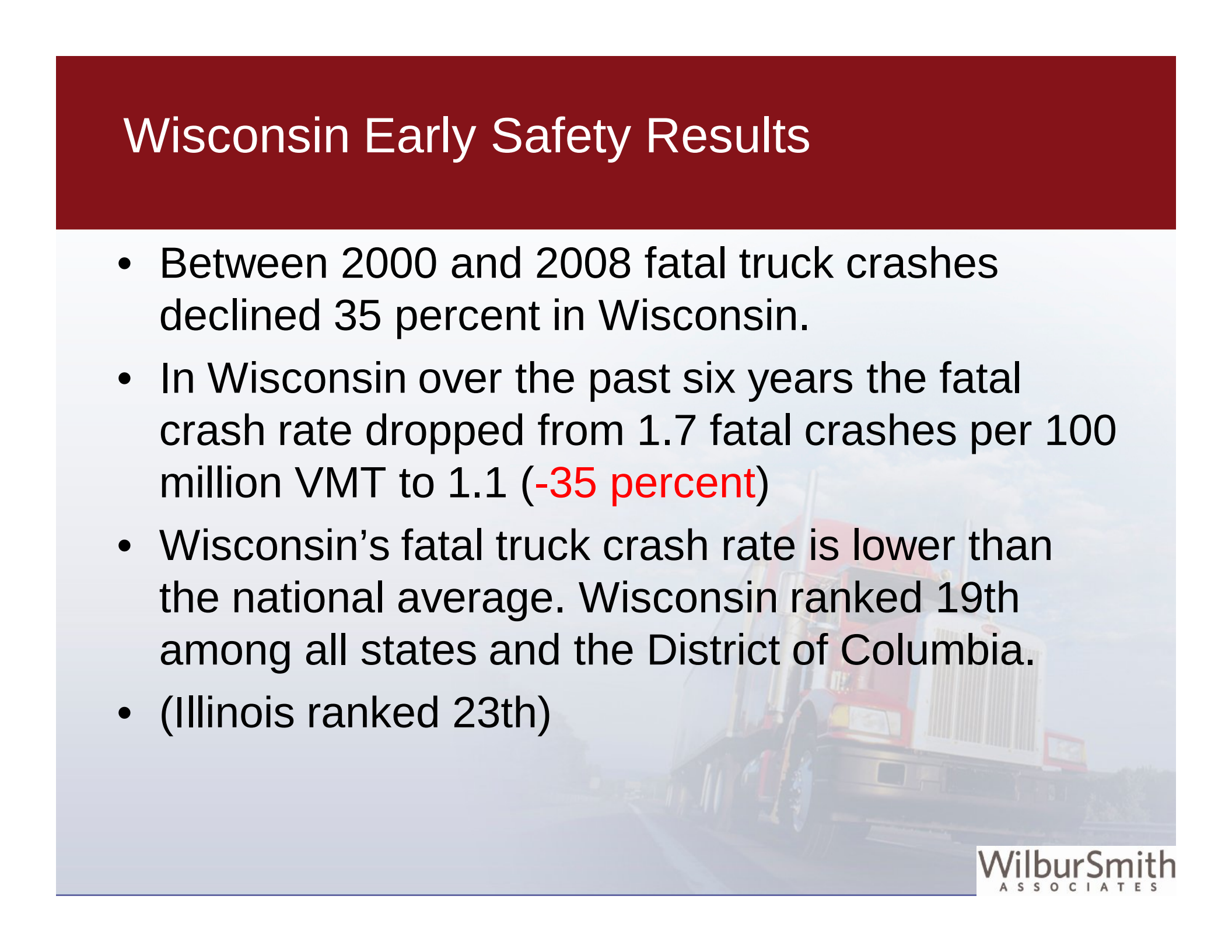
# Wisconsin Early Safety Results

- Between 2000 and 2008 fatal truck crashes declined 35 percent in Wisconsin.
- In Wisconsin over the past six years the fatal crash rate dropped from 1.7 fatal crashes per 100 million VMT to 1.1 (-35 percent)
- Wisconsin's fatal truck crash rate is lower than the national average. Wisconsin ranked 19th among all states and the District of Columbia.
- (Illinois ranked 23th)



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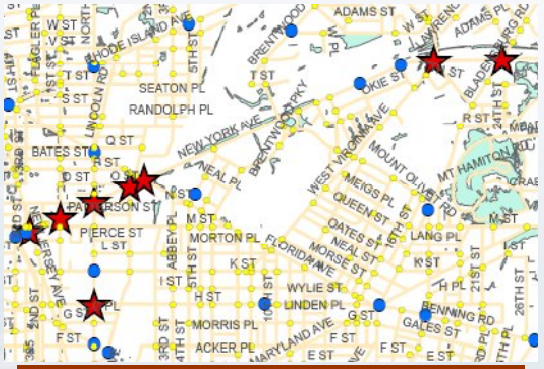
# Wisconsin Early Safety Results

- **Single Unit Trucks Over-represented**: Comparing fatal and non-fatal truck crashes in Wisconsin to national averages suggest that single unit trucks, in particular cement mixers and dump trucks are over-represented in crashes.
- **Crash prevalence toward rural routes**: Large truck crashes in Wisconsin are more prevalent in rural areas than they are nationally. Over 70 percent of Wisconsin's large truck crashes took place in rural areas. Rural collector roads saw the most truck crashes, and throughout the state trucks over 26,000 pounds were much more likely to be involved in fatal crashes.

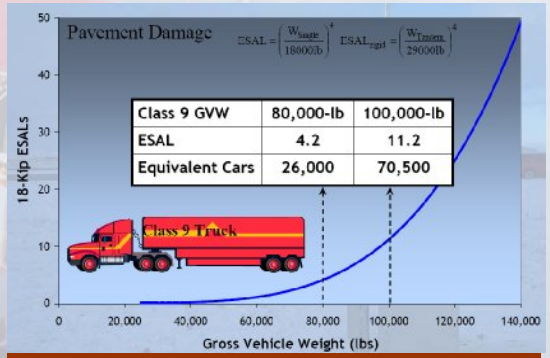
# D.C. Truck Study Project Overview

Develop a citywide truck safety enforcement plan that

- Identifies safety concerns regarding truck operations
- Assesses the economic impacts of overweight trucks
- Recommends a comprehensive approach to truck enforcement




CMV high crash locations




Roadway damage from excessive Truck loading



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# District of Columbia Existing Conditions

- **No formal integrated truck management program exists**
  - Overweight truck impacts on infrastructure not considered
  - No data driven policies for permitting or enforcement
- **Adopting an official truck route in progress**
  - Sporadic use of “no through trucks” and “no trucks” signs based on neighborhood complaints and physical roadway constraints
- **Data program erratic**
  - 3 WIM locations, often off-line
  - Missing data a significant problem on crash reports

# District of Columbia Existing Conditions

**Enforcement**

- Motor Carrier Safety Unit (MCSU) main responsibility is driver & vehicle inspections
- Ancillary responsibilities include weight enforcement

**Electronic safety and screening system**

- Performance and Registration Information Systems (PRISM)
- CVISN to be enacted in future
- Lack of adequate education and outreach activities related to truck traffic

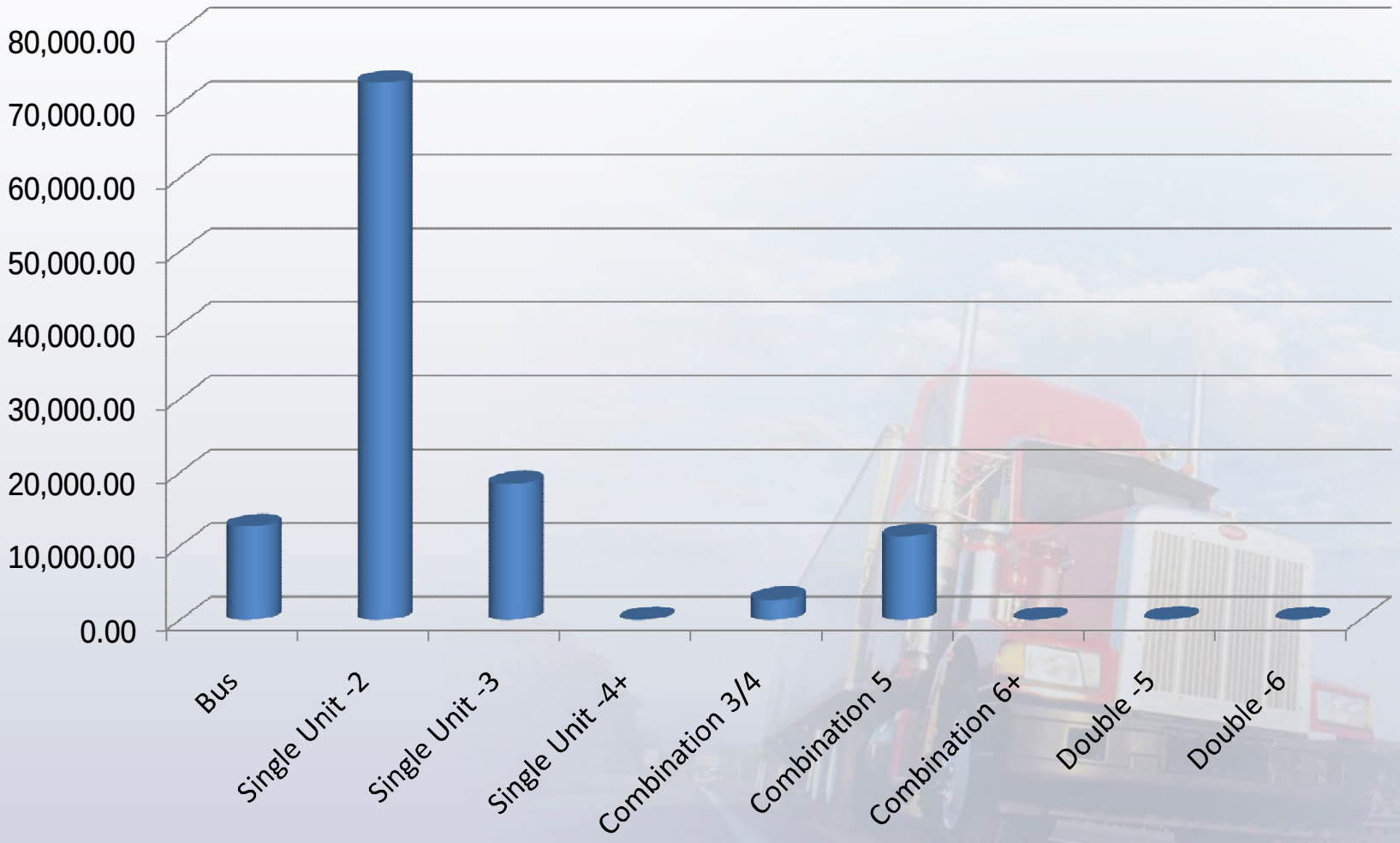
# Analysis of Hazardous Locations

- **Identified high crash locations for corridors and intersections**
  - (2006-2008 crash data)
- **Reviewed over 200 crash forms**
  - Many forms missing data (axles, body type, etc)
  - Over 40% are light trucks
- **Prepared collision diagrams and identified predominant crash patterns**
    - Side-swipe – 41.1%
    - Rear End – 19.3%
    - Right angle – 9.6%

# Infrastructure Impacts Assessment

- Partnered to beta test a new Truck Permit Cost Application developed for FHWA by Roger Mingo, PhD.
- Damage assessments limited to bridges and pavement sections on proposed Truck Route system
- Truck count and axle weight information captured in the raw data used Weigh-in-Motion (WIM) scale data from three stations (2005)

# WIM Data – Vehicle Counts by Class



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# Application of Bridge Costs to Vehicle Class

| Vehicle Class | % Allocation | Annual Bridge Costs | Engr. Fees & Constr. Insp. | Total Annual Bridge Costs |
|---|---|---|---|---|
| **Passenger Cars** | 59.0 | $ 28,197,000 | $ 6,485,000 | $ 34,682,000 |
| **Legal Trucks & Buses** | 23.2 | $ 11,067,000 | $ 2,545,000 | $ 13,613,000 |
| **Overweight Trucks & Buses** | **17.8** | **$ 8,525,000** | **$ 1,961,000** | **$ 10,486,000** |
| **Totals** | 100.0 | $ 47,789,000 | $10,991,000 | $ 58, 781,000 |



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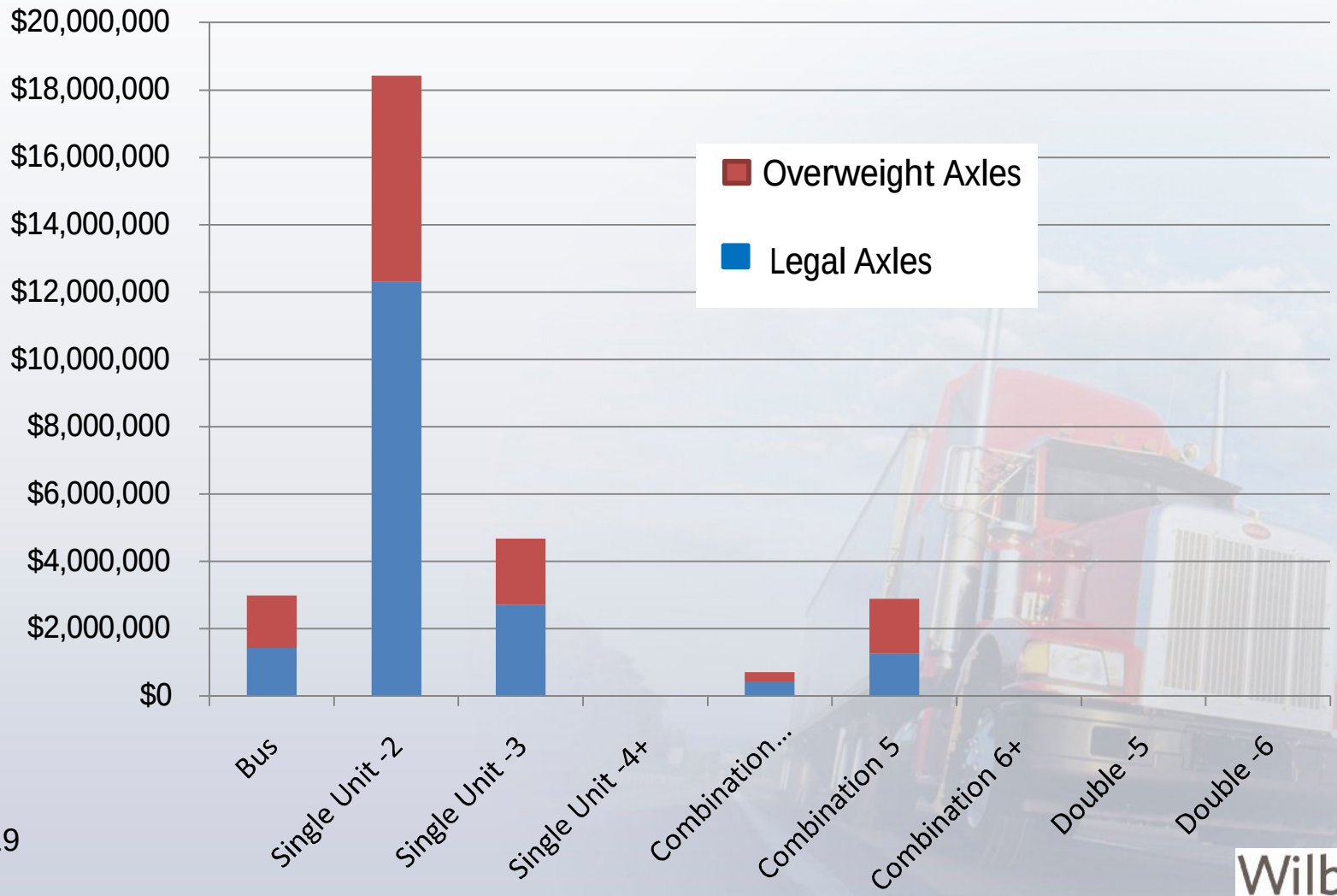
# Bridge Analysis Conclusions

- 50-60 % of all bridge related costs are attributed to passenger vehicles
- 15-20 % of all bridge impacts (damage) are attributable to overweight axles, this is 43.5% of all truck related damage
  - Total annual bridge costs attributable to overweight trucks is ~$10.5 million
- ~10% of all sample axles weighed were overweight

# Pavement Cost Allocation by Vehicle Class



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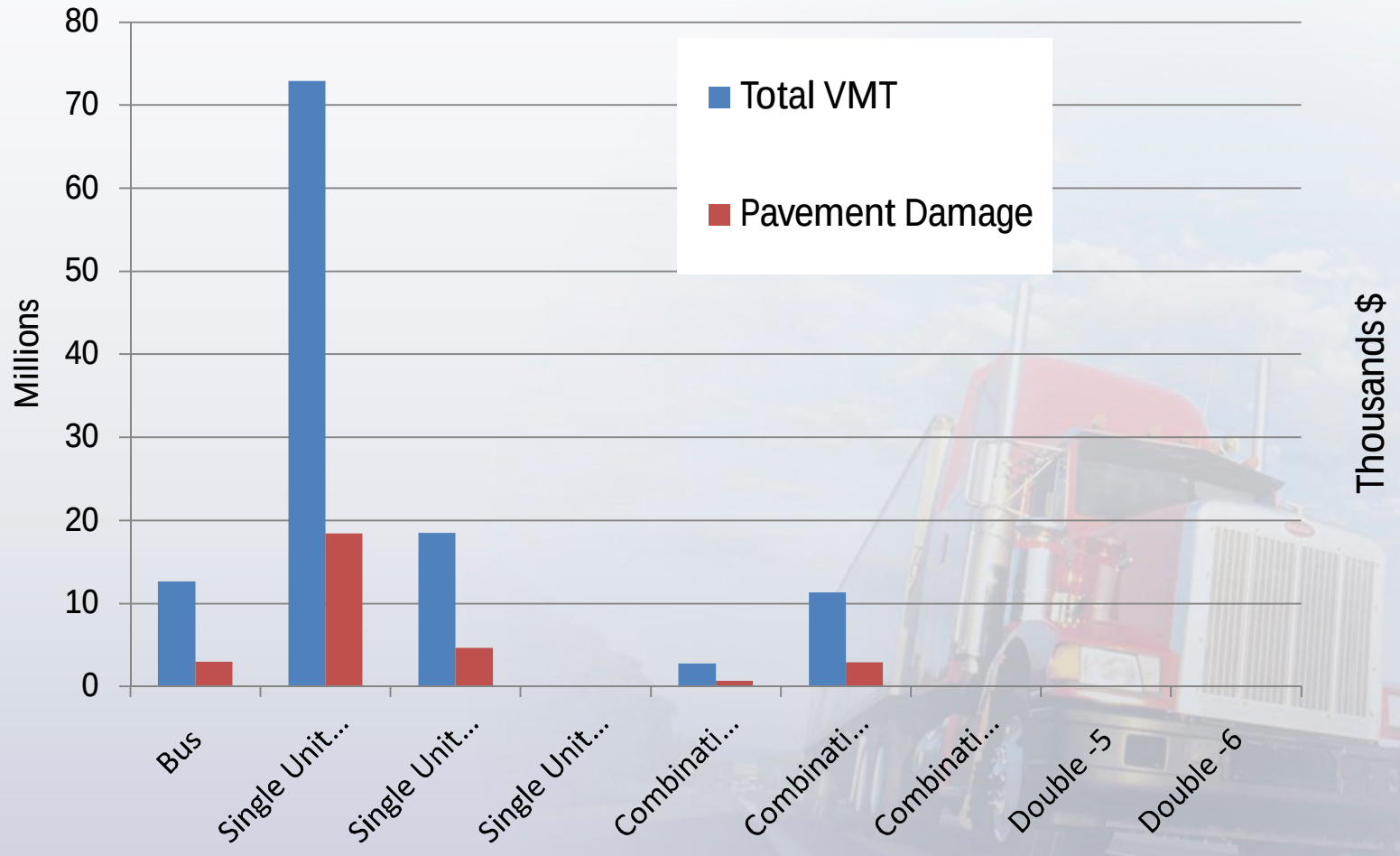
# Mileage vs. Pavement Consumption



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# Total Infrastructure Impacts Due to Overweight Trucks

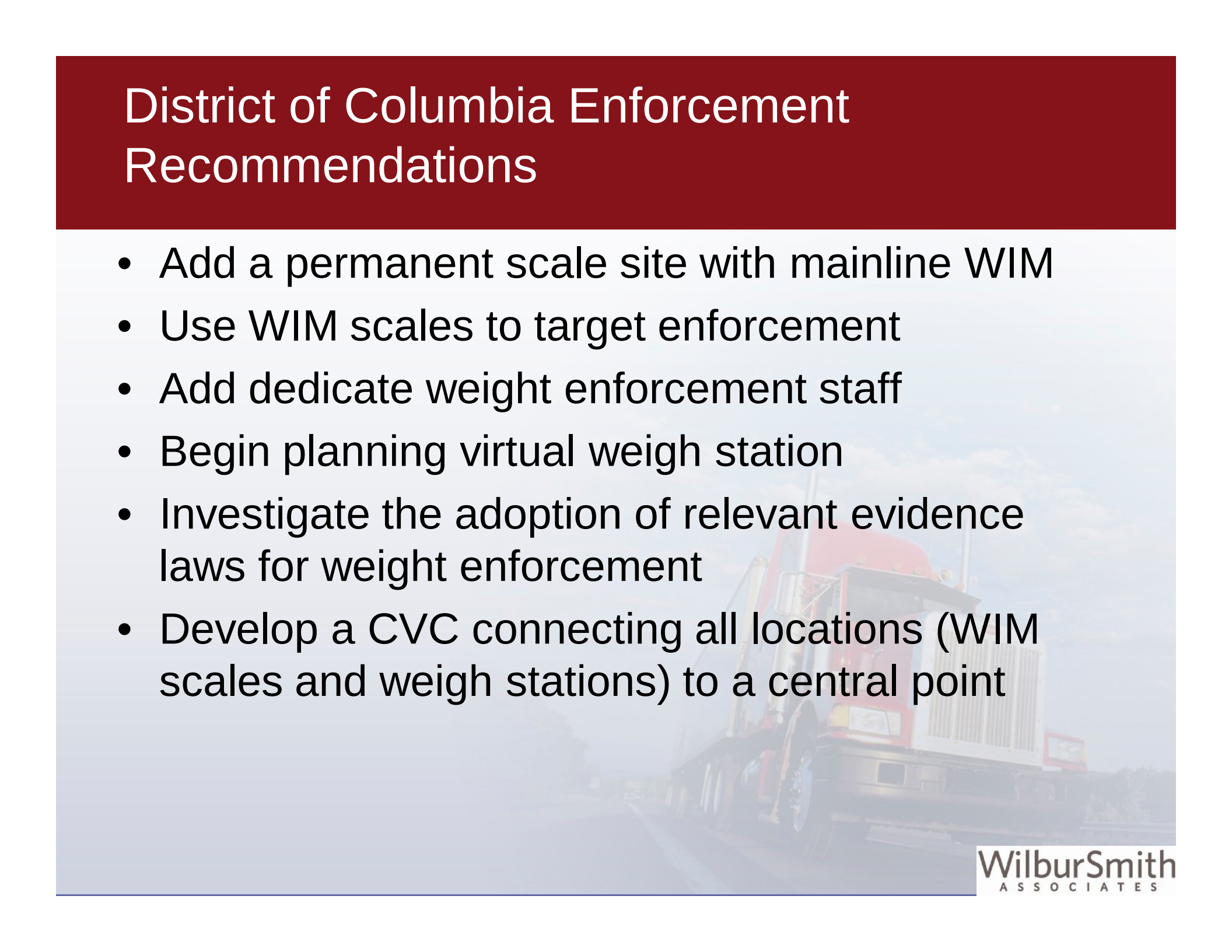
| Vehicle Class | Overweight Pavement Costs | Overweight Bridge Costs | Total Overweight Infrastructure Costs |
|---|---|---|---|
| **Buses** | $ 1,559,152 | $ 2,473,671 | $ 4,032,823 |
| **SU2** | $ 6,112,682 | $ 496,198 | $ 6,608,880 |
| **SU3** | $ 1,964,200 | $ 355,706 | $ 2,319,906 |
| **SU4+** | $ 4,558 | $ 1,839,642 | $ 1,844,200 |
| **CS3/4** | $ 270,741 | $ 169,100 | $ 439,841 |
| **CS5** | $ 1,626,812 | $ 2,803,628 | $ 4,430,440 |
| **CS6+** | $ 4,785 | $ 323,131 | $ 327,916 |
| **DS5** | $ 17,656 | $ 19,103 | $ 36,759 |
| **DS6** | $ 8,165 | $ 12,599 | $ 20,764 |
| **DS7+** | $ 345 | $ 31,978 | $ 32,323 |
| **Total** | **$ 11,569,097** | **$ 8,524,757** | **$ 20,093,854** |
| **Total W/O Buses** | **$10,009,945** | **$ 6,051,086** | **$ 16,061,031** |

# D.C. Truck Safety Recommendations

- Planning
  - Finalize and adopt a Truck Route System
  - Improve route design to accommodate trucks
- Engineering
  - Static warning signs
  - Signal phasing (Clearance Intervals)
  - Pavement markings
- Public Outreach/Education
  - Improve communication with truck community on construction-related traffic impacts
  - Increase driver education (Share the Road Campaign, Operation Safe Driver, etc)

# District of Columbia Enforcement Recommendations

- Add a permanent scale site with mainline WIM
- Use WIM scales to target enforcement
- Add dedicate weight enforcement staff
- Begin planning virtual weigh station
- Investigate the adoption of relevant evidence laws for weight enforcement
- Develop a CVC connecting all locations (WIM scales and weigh stations) to a central point



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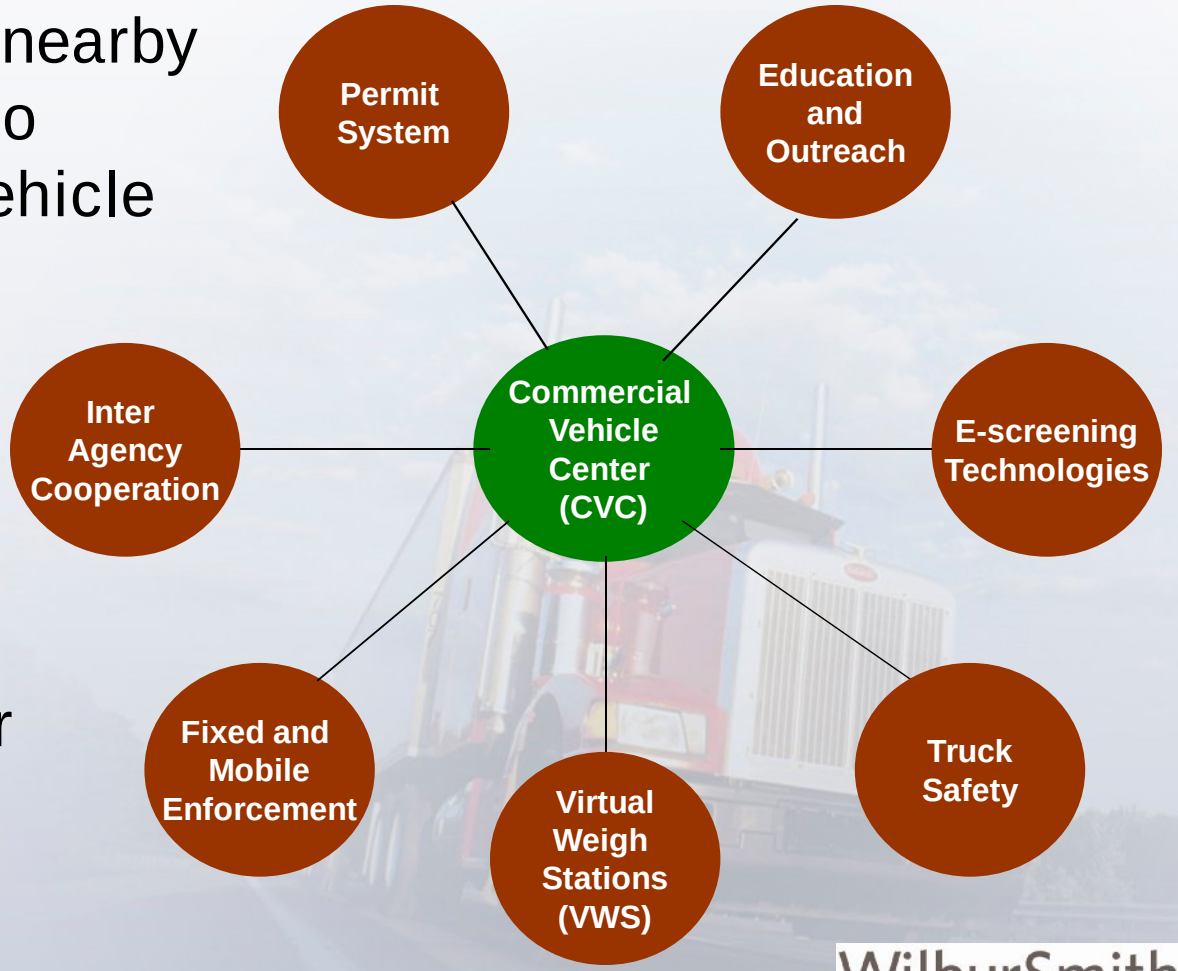
# Commercial Vehicle Center (CVC)

- Staff monitors data and informs/dispatches nearby enforcement units to intercept suspect vehicle




- Extension of the DDOT Traffic Management Center (TMC)



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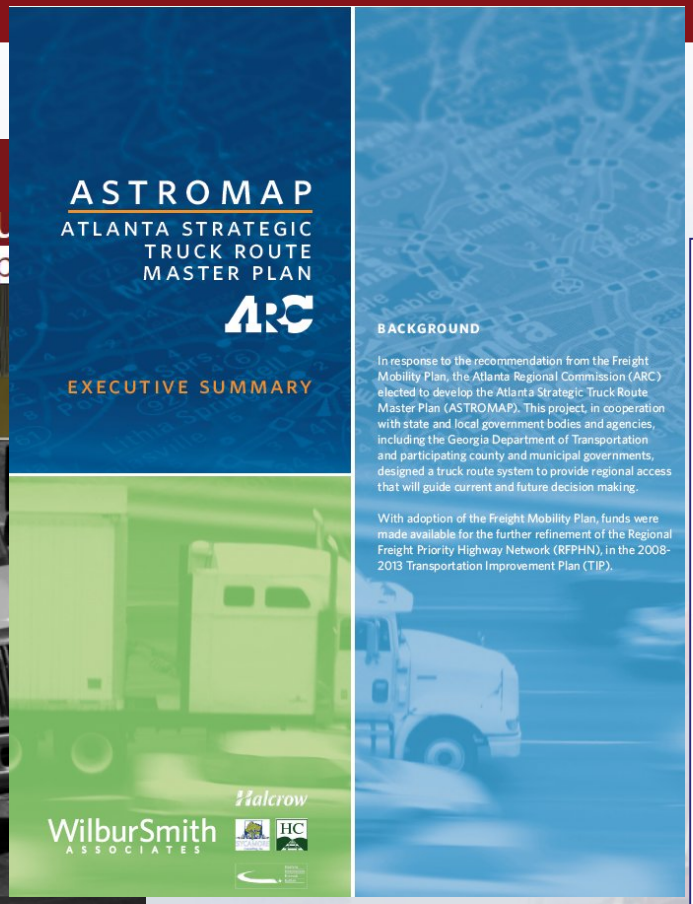
# WSA - Urban Truck Studies



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# Twin Cities Freight Connectors Study

- Develop specific goals for freight connector performance
- Identify a process template for freight connector evaluation
- Define freight connector adequacy measures
- Propose freight connector investment criteria


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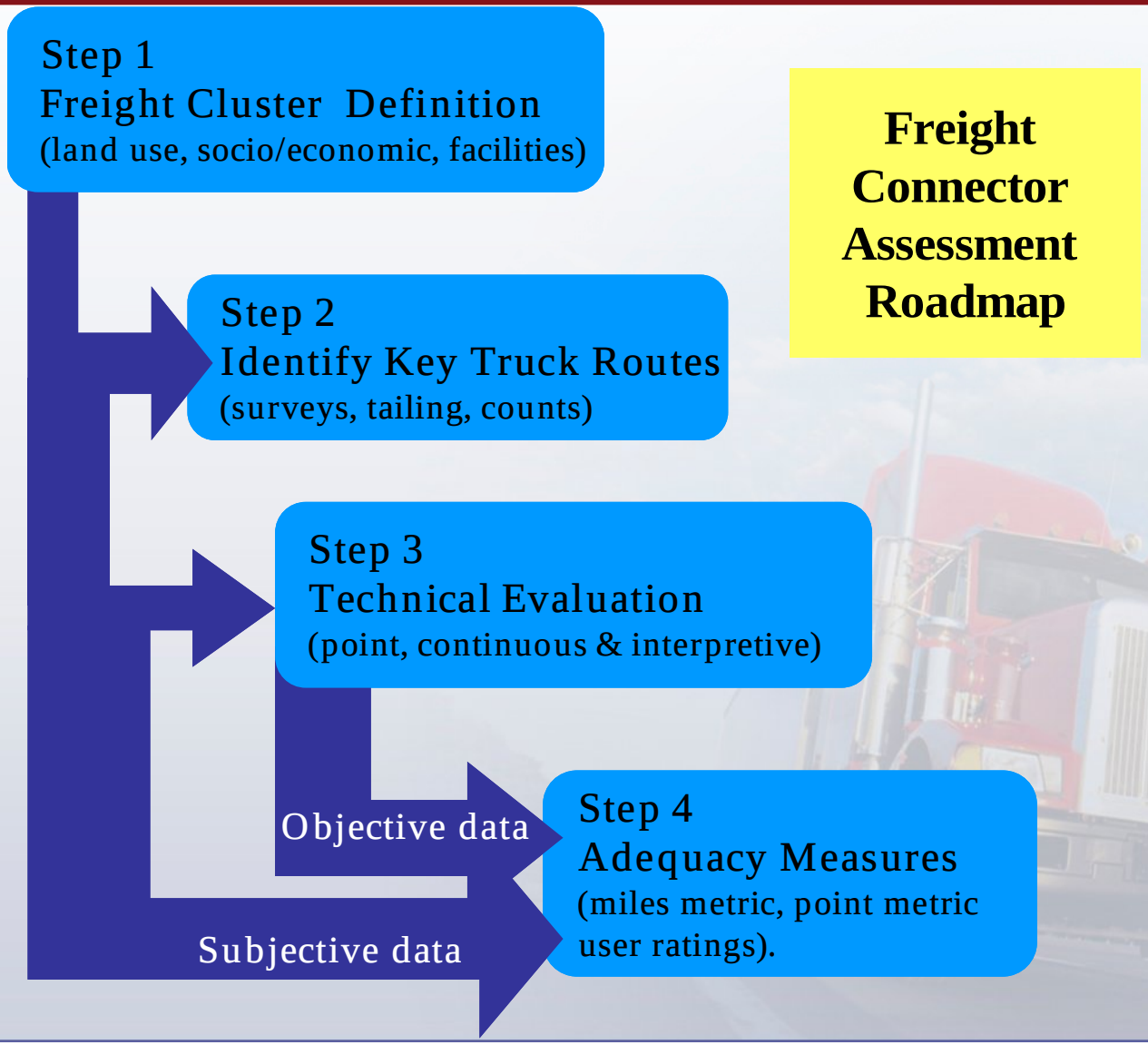
# The Freight Connector Roadmap




**Freight Connector Assessment Roadmap**

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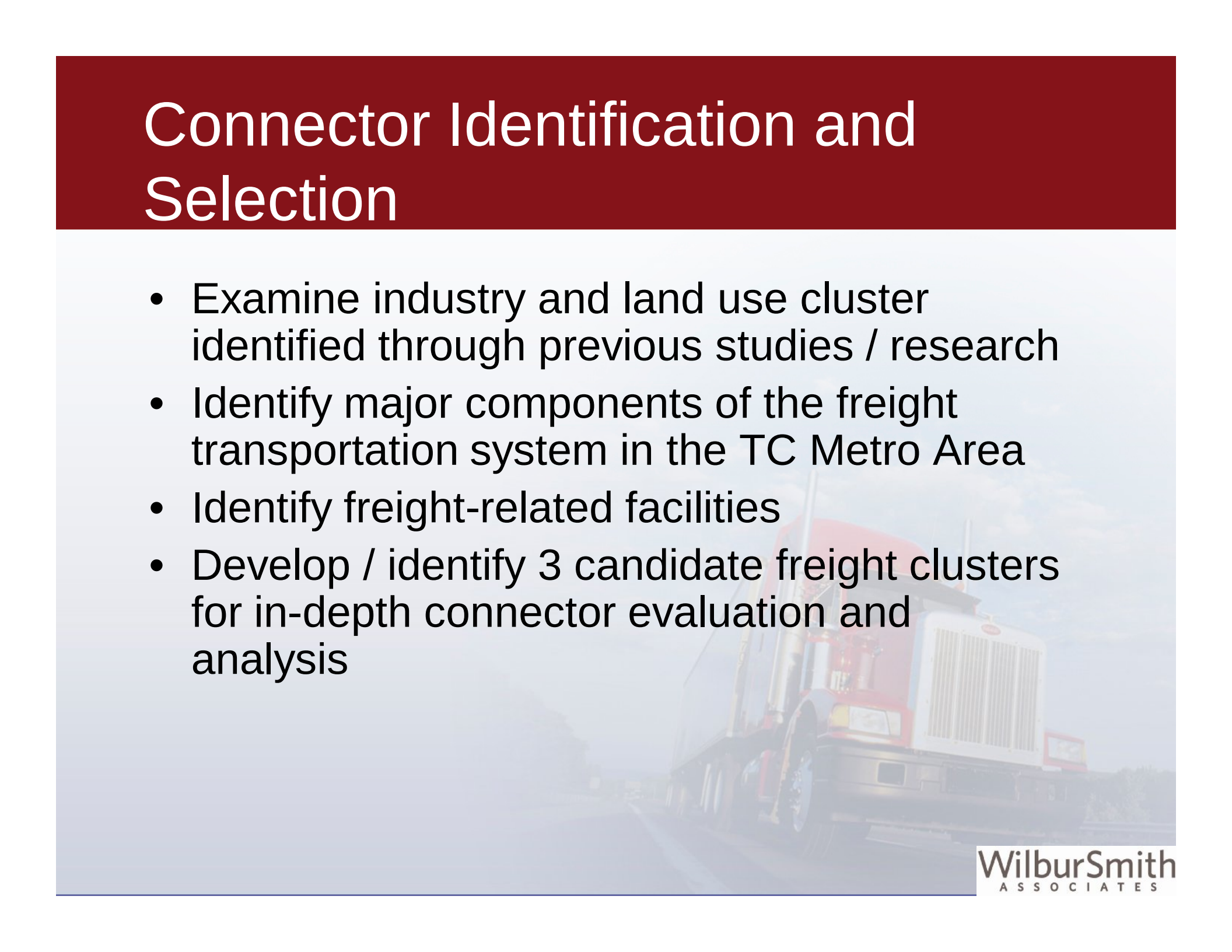
# Connector Identification and Selection

- Examine industry and land use cluster identified through previous studies / research
- Identify major components of the freight transportation system in the TC Metro Area
- Identify freight-related facilities
- Develop / identify 3 candidate freight clusters for in-depth connector evaluation and analysis



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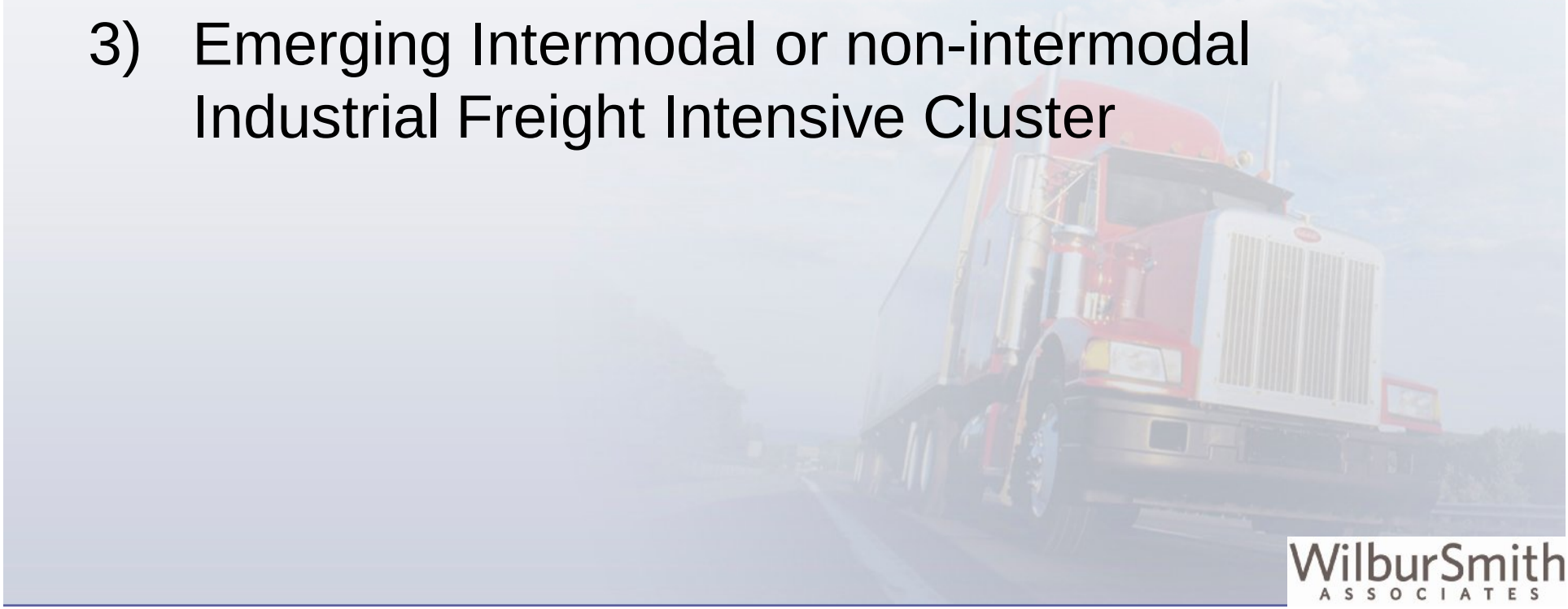
# TCA Freight Cluster "Types"

1) Intermodal Freight Terminal / Facility – Mature development
2) Non-intermodal, Industrial Freight Intensive Cluster – Mature with redevelopment potential
3) Emerging Intermodal or non-intermodal Industrial Freight Intensive Cluster



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# TCA Freight Cluster GIS Attributes Examined

1. Major Metro Intermodal Facilities
2. Previous cluster identification
3. Transportation Analysis Zones
4. Manufacturing and Wholesale Employment
5. Metro area current and future land use
6. Environmentally sensitive areas
7. Socio-economic data
   - Median Family Income
   - Unemployment
   - Education level
8. Heavy commercial traffic levels
9. Heavy commercial crashes

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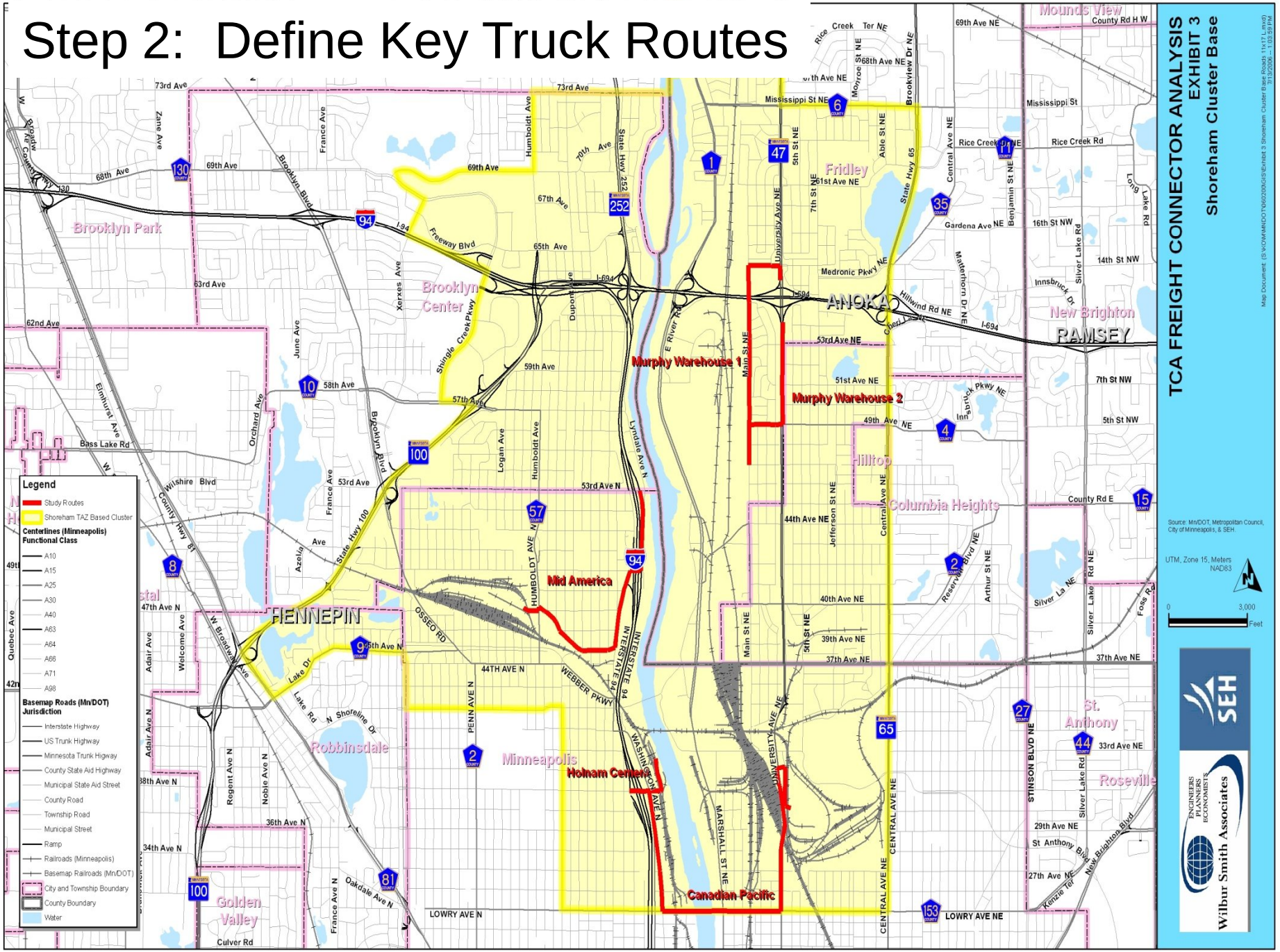
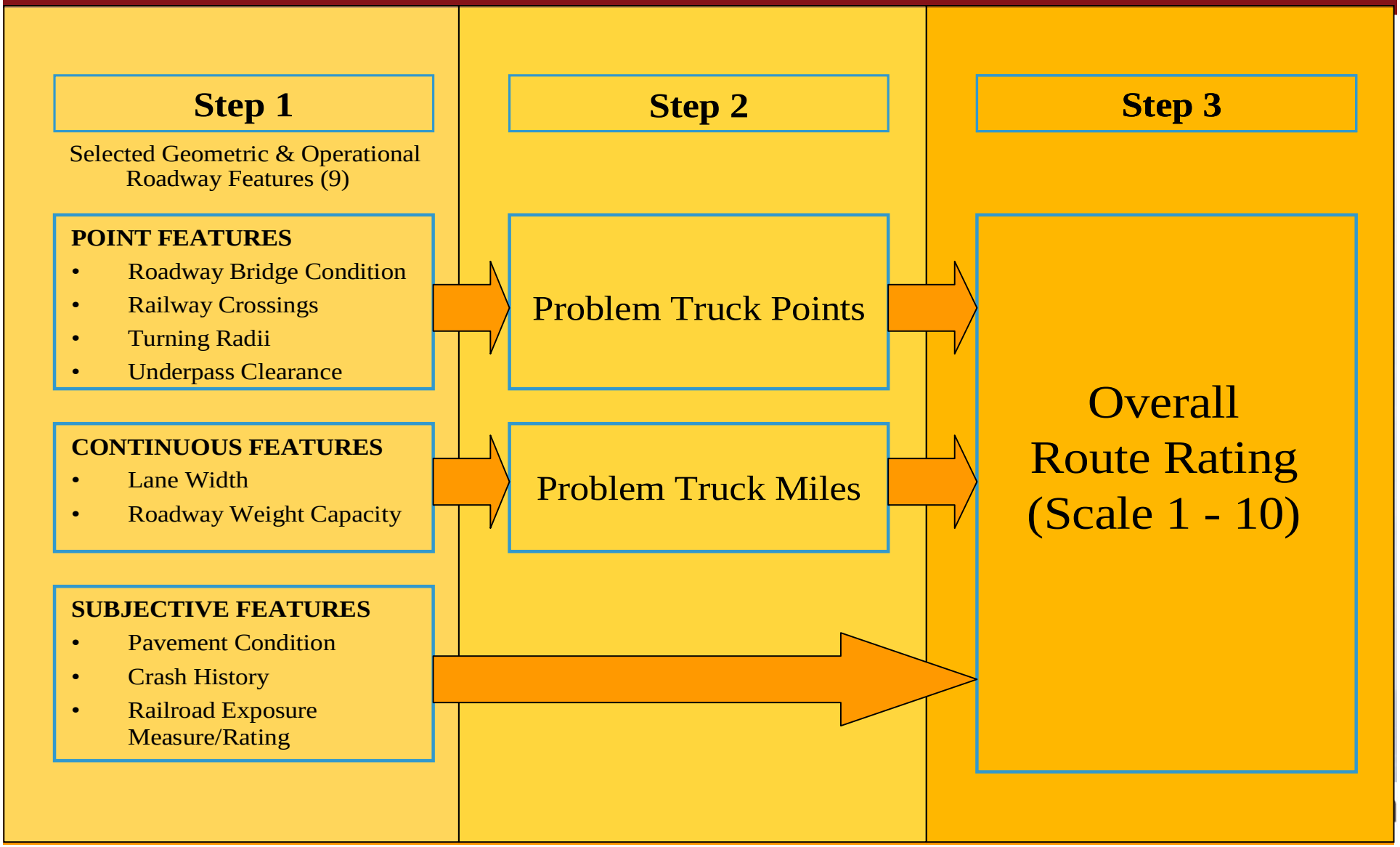
# Step 2: Define Key Truck Routes



# 3-Step Process to Determine Adequate



# Freight Connector Scorecard

| Route | Length (Miles)* | Avg. Daily Truck Volume | Truck Point Score | Truck Mile Score | Combined Performance Score | Index | Adequacy |
|---|---|---|---|---|---|---|---|
| CP Shoreham | 5.8 | 845 | 8458 | 4833 | 13291 | 2 | Low |
| Murphy Whse #1 | 3.12 | 132 | 396 | 869 | 1265 | 7 | High |
| Murphy Whse #2 | 2.26 | 144 | 576 | 651 | 1227 | 6 | High |
| Mid-America Dist | 3.76 | 613 | 4298 | 3237 | 7535 | 3 | Medium |
| Holcim Cement | 0.88 | 319 | 1278 | 434 | 1712 | 5 | High |
| Aldrin Drive Rte | 3.7 | 1,959 | 5880 | 9482 | 15362 | 1 | Low |
| Bituminous Rdwys | 5.1 | 648 | 648 | 6428 | 7076 | 4 | Medium |

* Route length is bi-directional

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# WSA- Heavy Vehicle Systems Planning and Design

## Defining Drayage Routes

White Paper

Prepared for:
Florida Department of Transportation
Systems Planning Office

Prepared by:
WilburSmith

April 29, 2009

## Federal Highway Administration

Intermodal Connector Assessment Tool (ICAT)
Beta Testing - Summary of Findings

Contract No.: DTFH61-07-Q-00098

April, 2009

Prepared for: Simplified Acquisition Team
Office of Acquisition Management
Federal Highway Administration
1200 New Jersey Avenue, S.E.
Room W36-436
Washington, DC 20590

Prepared by: Wilbur Smith Associates

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## The Minnesota Interstate Truck Parking Study

January 2008

Conducted by Wilbur Smith Associates

In association with the Center for Transportation Research and Education (CTRE) at Iowa State University

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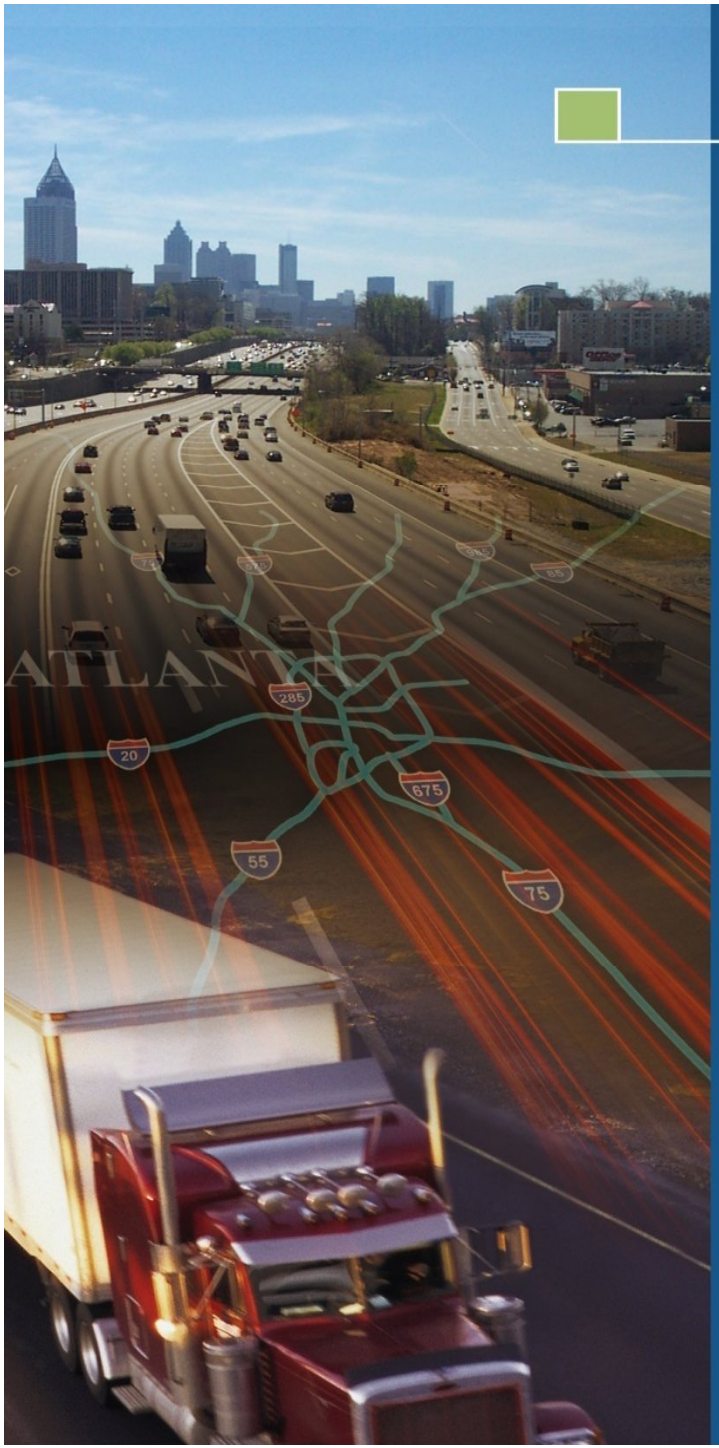


# ASTRoMaP
# Atlanta Strategic Truck Route Master Plan

ARC

**“Service to Greater Atlanta”**

# ASTRoMaP Purpose

A network to enhance intra-regional truck mobility:

- Promote better, sustainable truck service
- Enhanced public safety
- Economic vitality
- Productive use of limited resources

What it is **NOT**:

- A plan for addressing truck traffic moving to and from points outside the region
- Designating local roadways for deliveries and pick-ups (last mile system)

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# Foundational Event

## Freight Mobility Study

- Completed in 2007
- DRAFT Regional Freight Priority Highway Network (RFPHN)
- Led to development effort for ASTRoMaP, **A**tlanta **S**trategic **T**ruck **R**oute **M**aster **P**lan

# Meetings and Interviews

Twenty local jurisdictions interviewed

- City of Atlanta
- North Fulton Municipalities
- Eighteen Counties, accompanied by municipalities

Why?

- Understand current truck route policies
- Educate participating jurisdictions on the project

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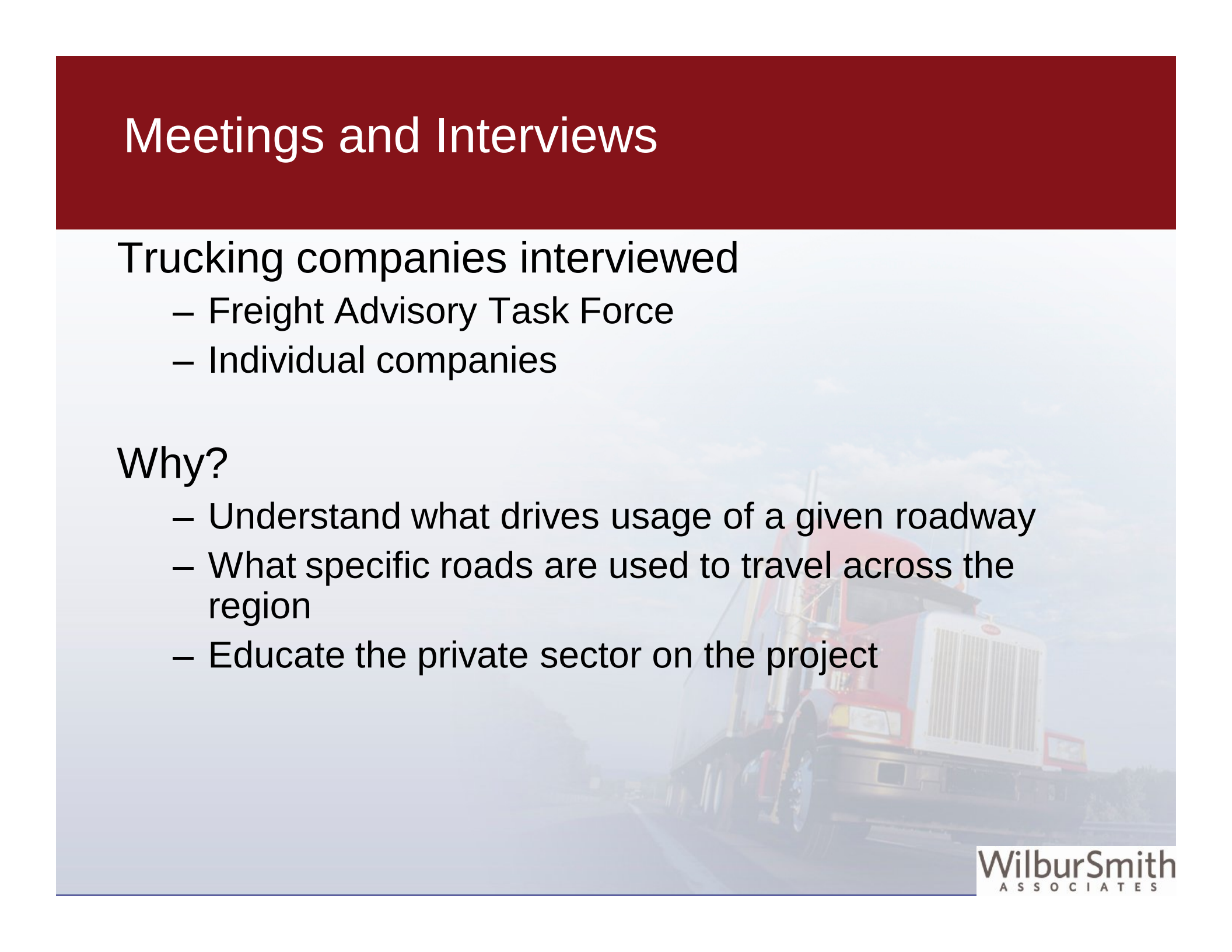
# Meetings and Interviews

Trucking companies interviewed

- Freight Advisory Task Force
- Individual companies

Why?

- Understand what drives usage of a given roadway
- What specific roads are used to travel across the region
- Educate the private sector on the project



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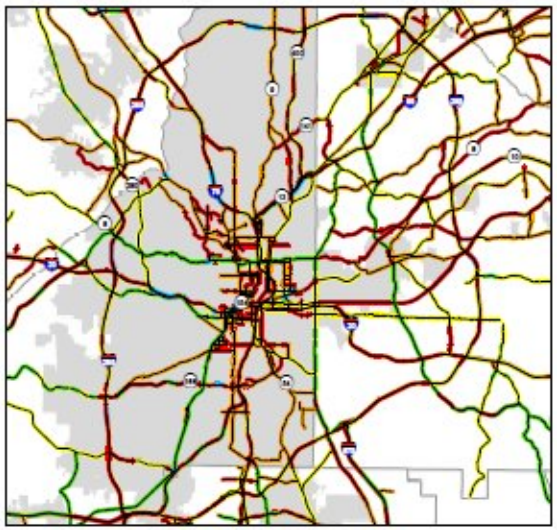
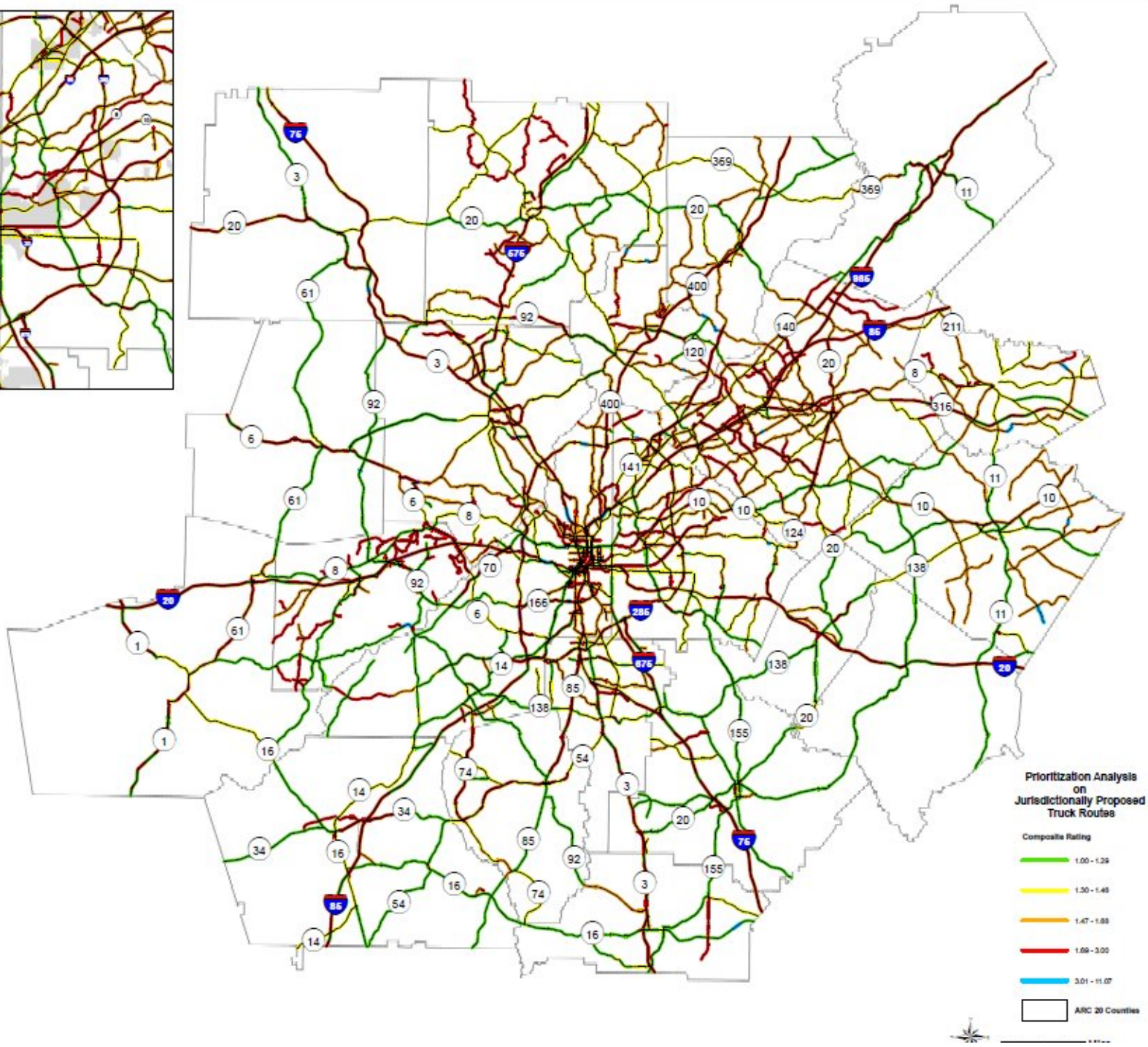


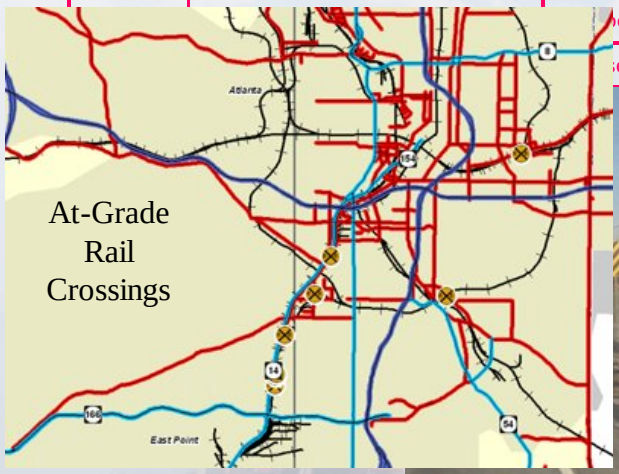

Prioritization Analysis
on
Jurisdictionally Proposed
Truck Routes
Composite Rating
1.00 - 1.29
1.30 - 1.46
1.47 - 1.68
1.69 - 3.00
3.01 - 11.07
ARC 20 Counties

# Data Collection

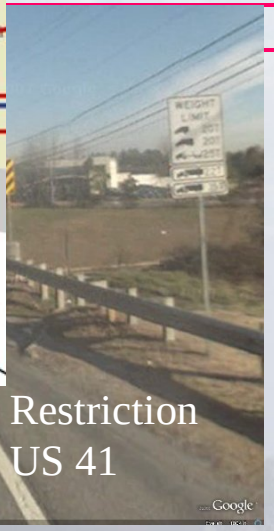
## Analysis of actual roadway design

- Functional Class
  - Design Speed
  - Stopping Sight Distance
  - Turning Radii
  - Clear Zone
  - Grade
- Actual Travel Lane Width
- Actual Shoulder Width
- Posted Speed
- Bridge Conditions
  - Bridge Weight Restrictions
  - Bridge Minimal Vertical Clearance
  - Bridge Sidewalk Width
- Railway At-Grade Crossings
- Proximity to Land Use features
- Crash History

| ROUTE | SEGMENT | LESS THAN 12 ft Travel Lane Width |
|---|---|---|
| ID | START | END |
| GA 3 | Intersection with GA 92 | Cobb-Fulton County Line |
| GA 3 | North border of Henry County | South border of Henry County |
| GA 16 | Intersection with GA 155 | West border of Spalding County |
| | | order of Clayton County |
| | | ection with GA 360 |




At-Grade Rail Crossings



Weight Restriction on US 41

**Real-Time Truck Travel Analysis**

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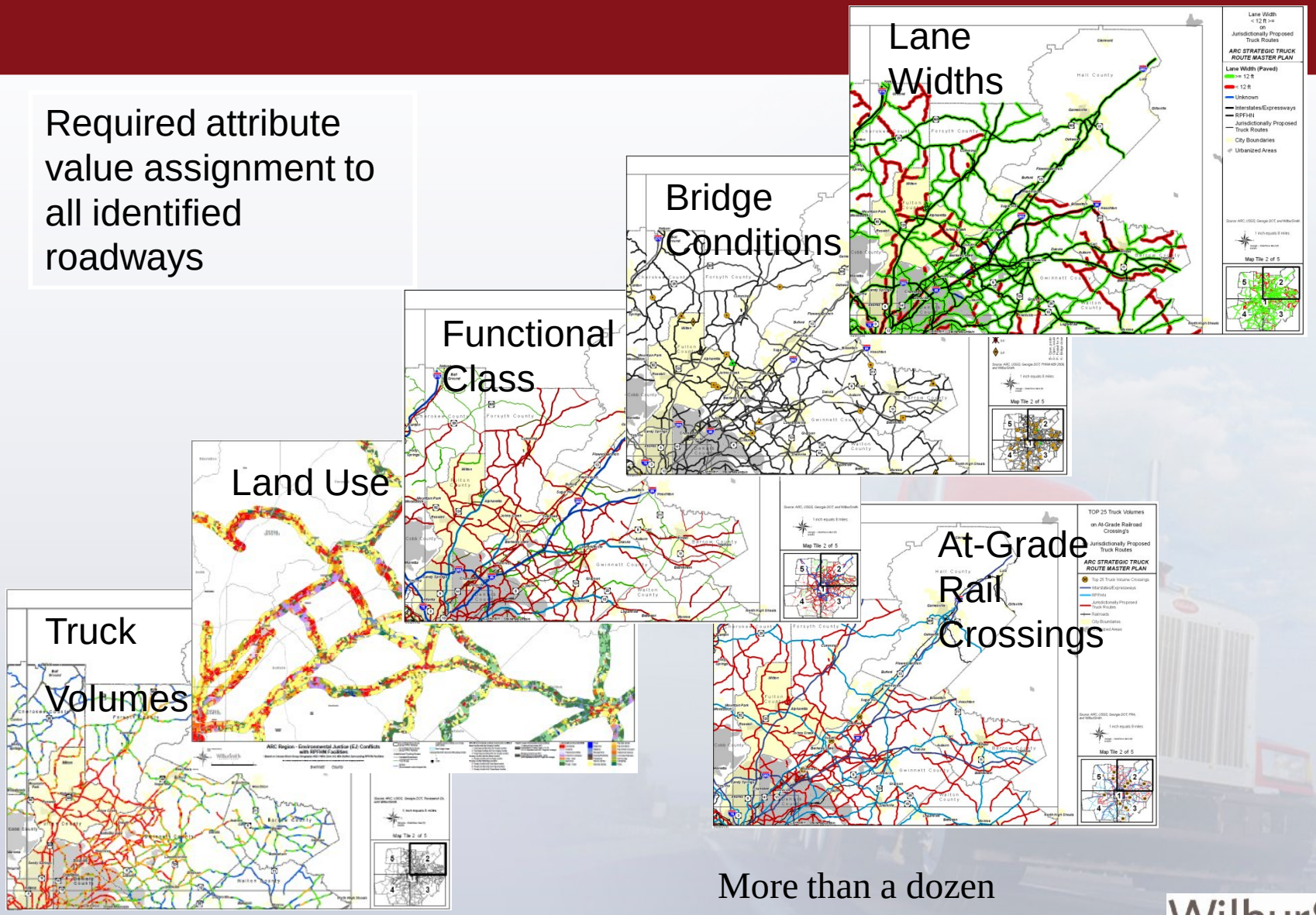
# Mapping

Required attribute value assignment to all identified roadways




More than a dozen attributes mapped

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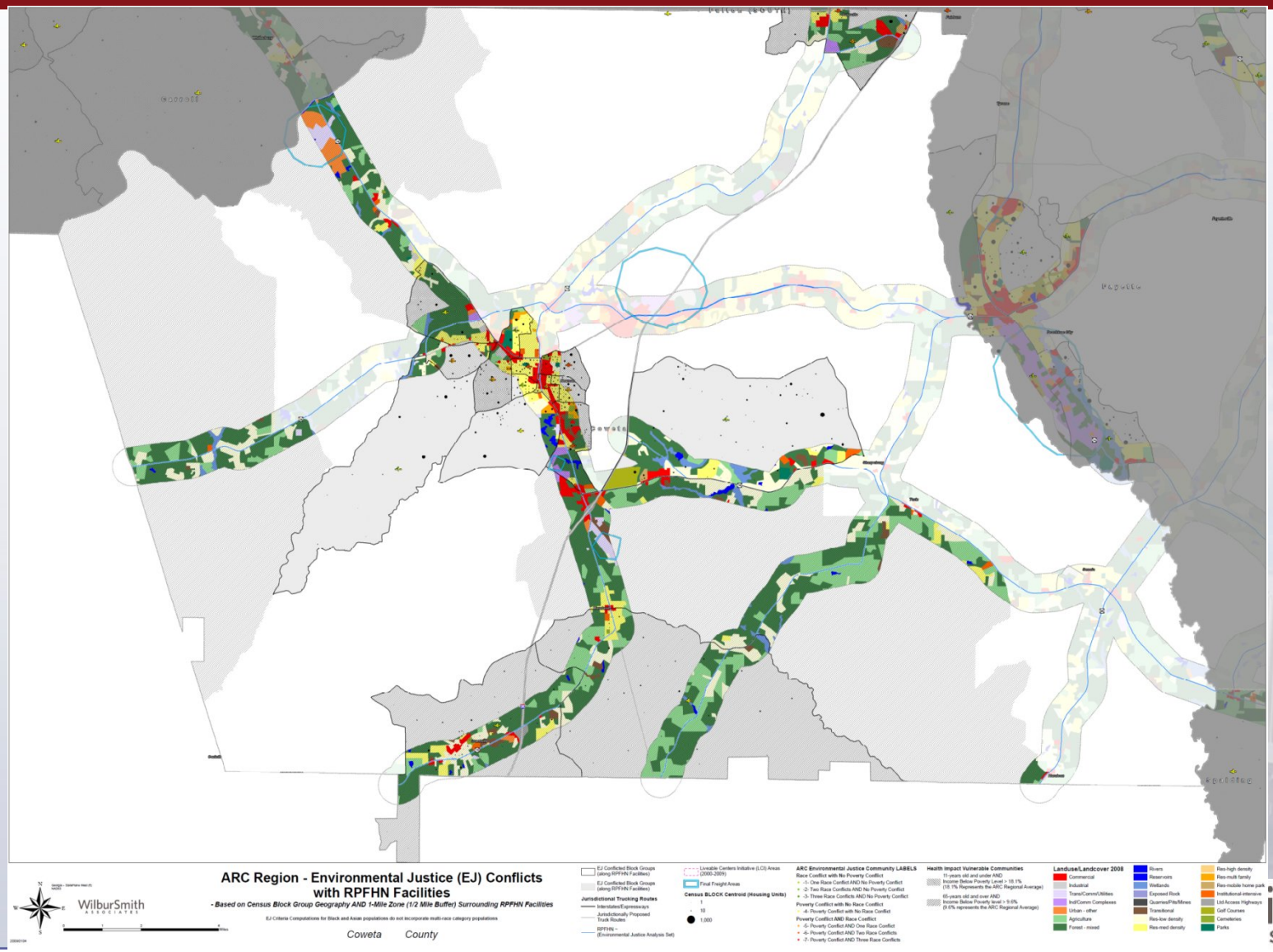
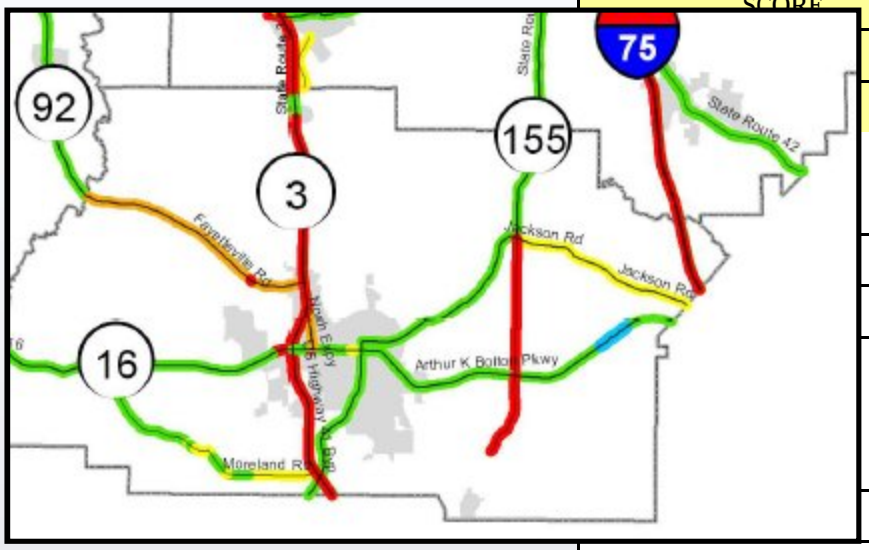
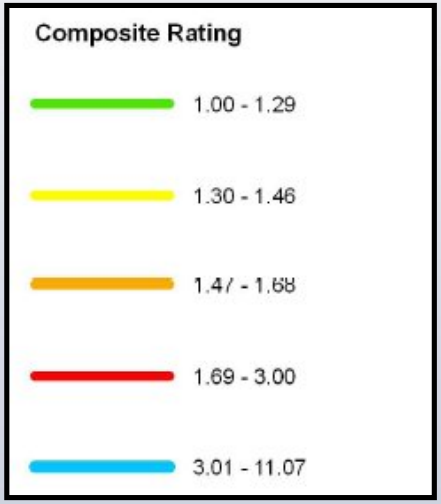
# Environmental Justice Mapping Example



# Criteria Scorecard



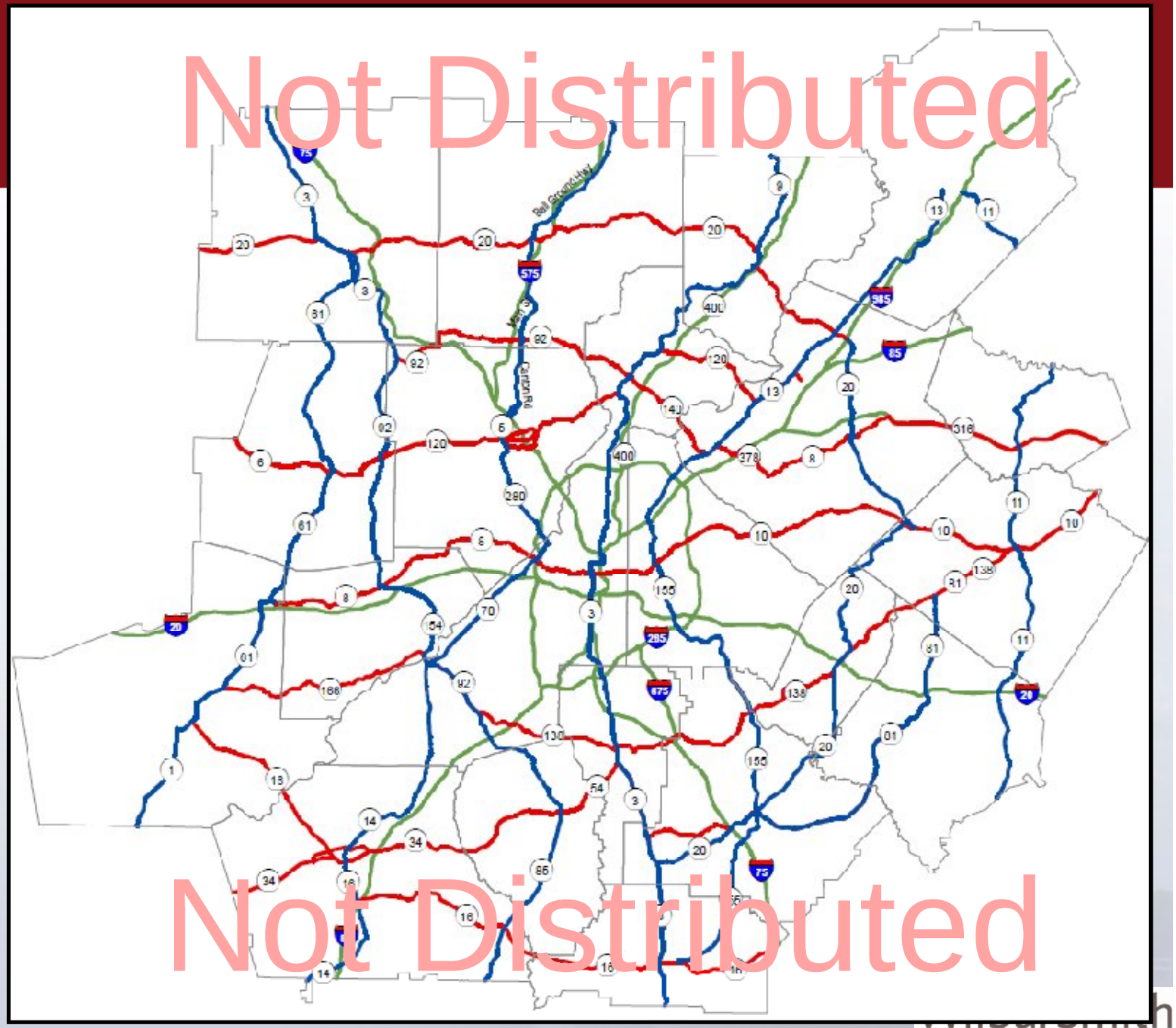

| Prioritization Criteria | | | |
|---|---|---|---|
| EXAMPLE: | | | |
| CRITERIA | COMMENT | | Weight |
| SCORE | SCORE | SCORE | |
| | CONDITION | CONDITION | |
| | Design attributes reflecting truck considerations | | 15% |
| | 2 | 1 | |
| | Collector | Arterial | |
| | Congestion and resultant recurring delays | | 15% |
| | 2 | 1 | |
| E or F Designation | D Designation | A, B, or C Designation | |
| Lane width | Curb to curb | | 12% |
| 3 | 2 | 1 | |
| < 12 ft | NA | 12 ft or greater | |
| Posted speed | MPH | | 12% |
| 3 | 2 | 1 | |
| < 35 | 35-44 | >45 | |

# ASTRoMaP 1.0

INITIAL VERSION

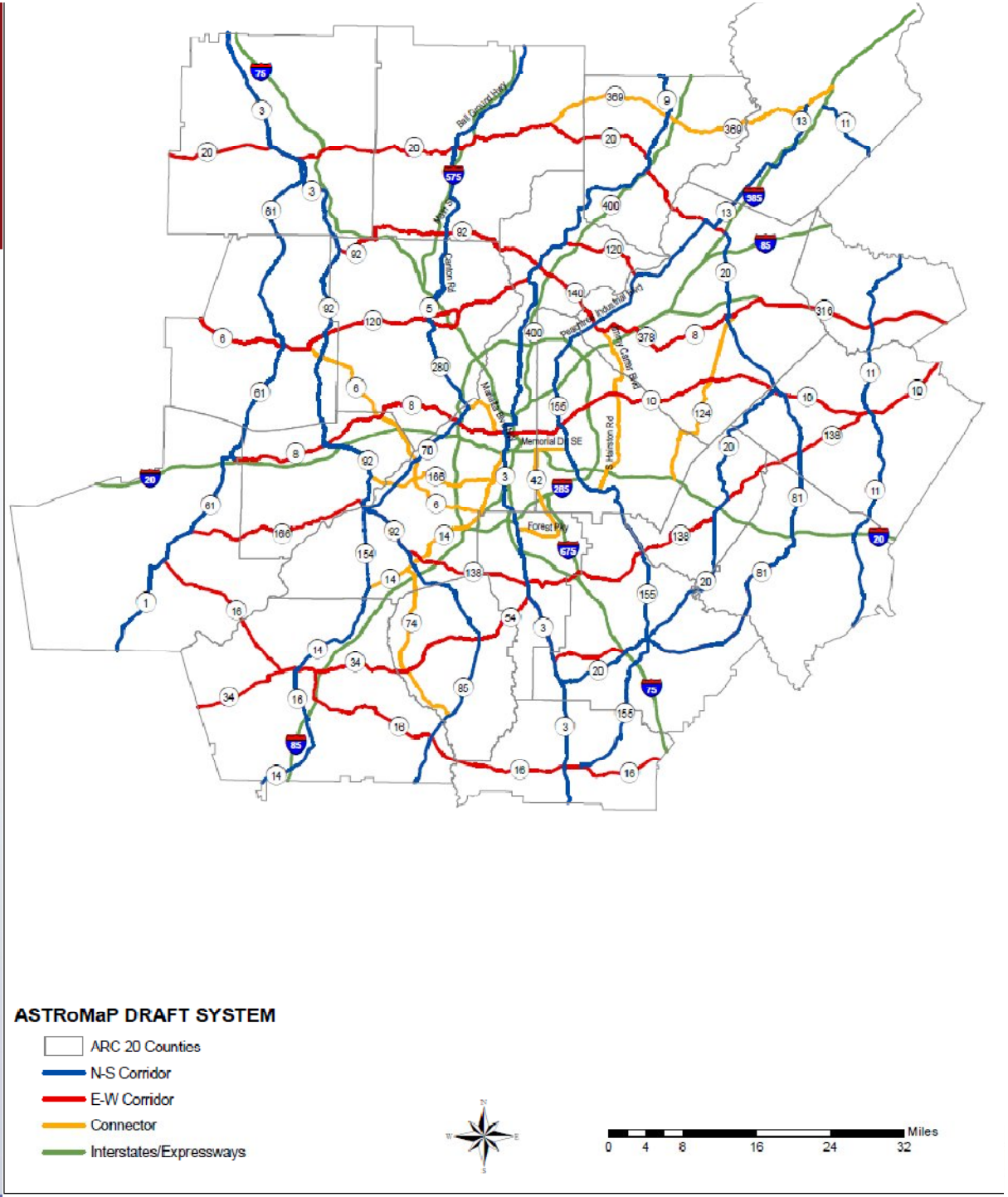
Without

NN and NHS Connectors

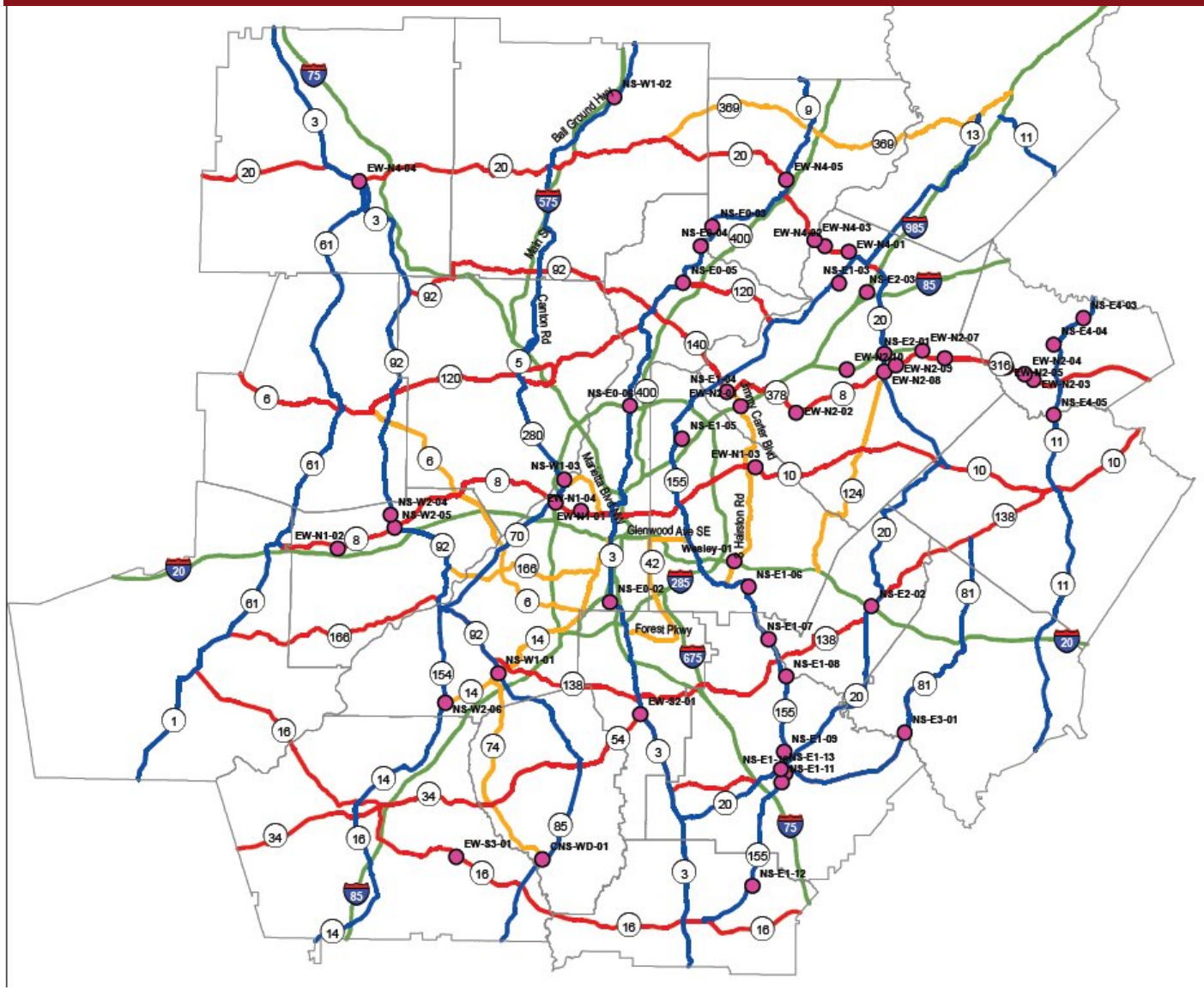


# ASTRoMaP 5.0

With All Feedback and Review



# ASTRoMaP Network Enhancement Projects




Fifty short – medium range projects Identified

Six capital expenditure (CapEx) projects identified >$20 million

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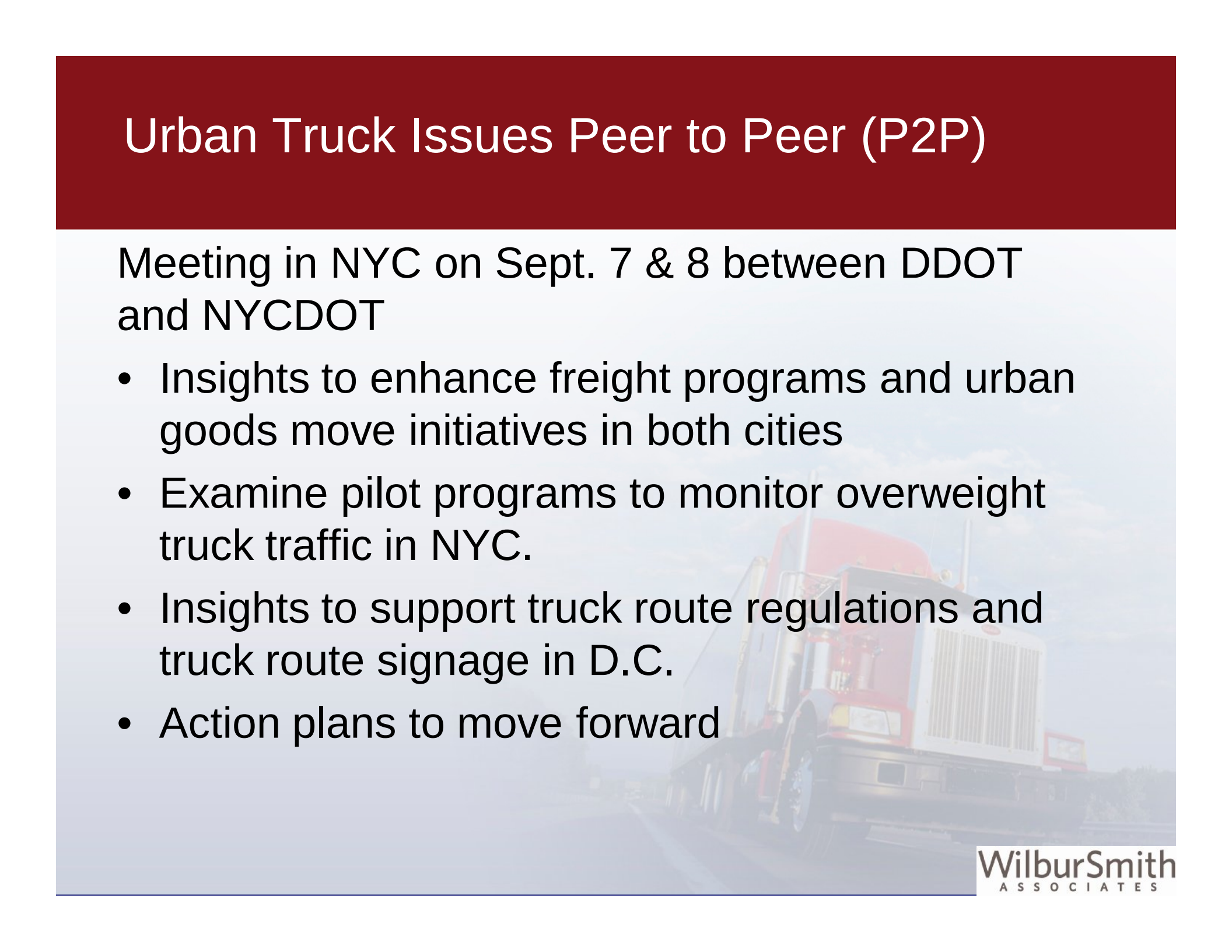
# Urban Truck Issues Peer to Peer (P2P)

Meeting in NYC on Sept. 7 & 8 between DDOT and NYCDOT

- Insights to enhance freight programs and urban goods move initiatives in both cities
- Examine pilot programs to monitor overweight truck traffic in NYC.
- Insights to support truck route regulations and truck route signage in D.C.
- Action plans to move forward



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# NYC Program Initiatives

- Truck Route Enforcement
  - Annual updates to truck route map
  - Precinct map inserts created for NYPD officer memo books
  - Traffic Stat is data monitoring the program for effectiveness
- Truck Route Signage Program
  - Seeking new designs for truck route identification
  - Testing new designs to increase compliance
  - Pilot launched in Hunts Point area in the Bronx

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# NYC Program Initiatives

- Manhattan Off-Hour Delivery Program
  - Partnership between NYCDOT, Rensselaer Polytechnic Institute and 33 industry stakeholders
  - Deliveries shifted to between 7 p.m. and 6 a.m.
  - Shippers reported more time for customer focus and better productivity from employees
  - Carriers report more deliveries per shift, fuel cost savings and legal parking more available
- Delivery Windows
  - Objective is to make more curb space available
  - Customize delivery windows based on data

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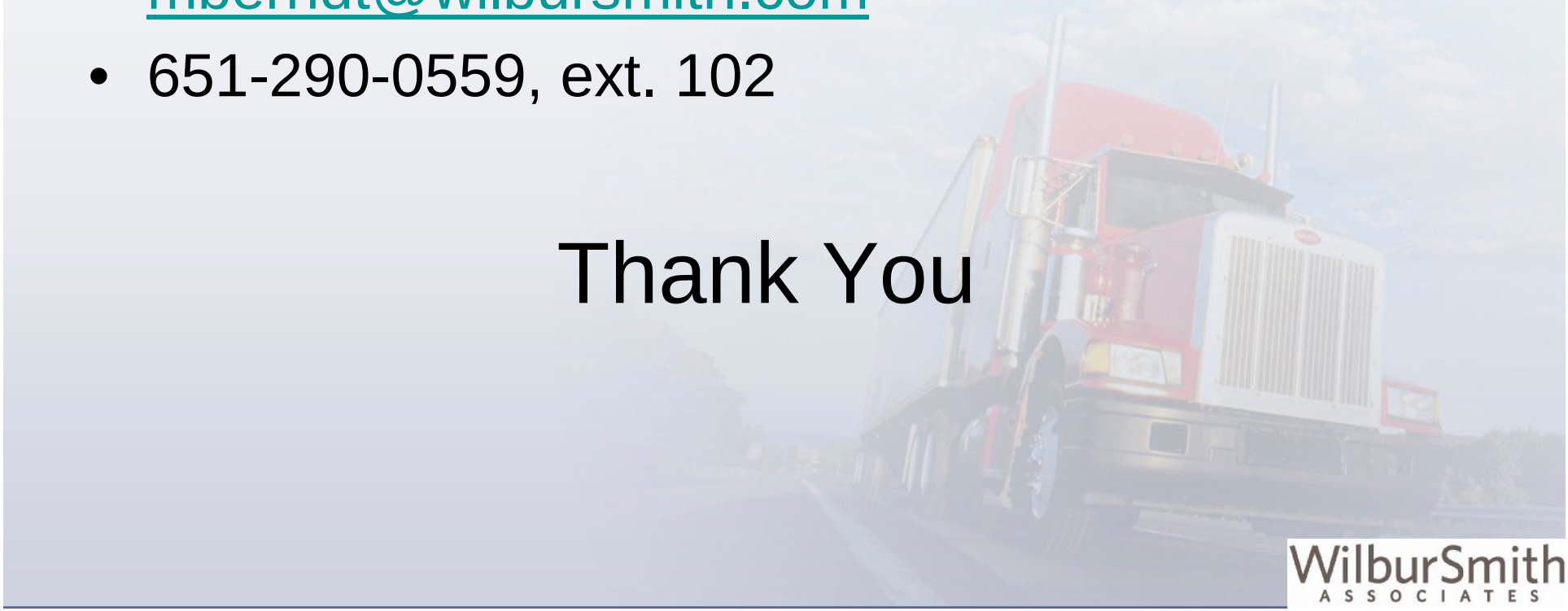
# Questions?

Contact information:


- Mark Berndt
- mberndt@wilbursmith.com
- 651-290-0559, ext. 102


Thank You



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