High Wind Blow Over Briefing

Joint Transportation, Highways and Military Affairs Committee
August 31, 2023

Photo Credit: Beth Wood - still image from video posted to YouTube

Agenda

- Background
- Why are high wind blow overs increasing?
- Recent UW research
  - Characterization of Blow Over Risk in the Wyoming Highway System
- Proposed changes to pre-trip, roadside and in-vehicle information systems
- Timeline

Background

How do we alert drivers to wind events?

- **Pre-trip information systems** – Website, Commercial Vehicle Operator Portal (CVOP), 511 phone system, text and email alerts, mobile app, YouTube video forecasts, Public Affairs social media

- **Roadside information systems** – Dynamic Message Signs (DMS), Variable Speed Limits (VSL), Highway Advisory Radios (HAR), Road Weather Information Systems (RWIS)

- **In-vehicle information systems** – Shared road condition information with third-party providers (Google,TomTom, SiriusXM, etc.)

Pre-trip Statistics - 2022

511 Notify

- About 118,000 Subscribers
- 31 million messages

Website Hits

- 2.2 Billion web hits

511 Phone Calls

- Over 250,000 calls

CVOP

- About 2600 registered users

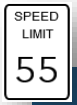
Mobile App

- Over 530,000 unique users

Road Statistics - 2022

DMS

- 162 devices
- 129,188 Updates



VSL

- 218 devices @ 125 sites
- 42,851 Updates

RWIS

- 97 devices
- Low Temp = -43.6 F

Webcams

- 224 devices
- 126 million images
- 14 TB

Condition Reports

- Over 214,000 reports

2011 – First use of closures to light, high-profile vehicles

Definition of Light, High-Profile Vehicle

- We all know a light, high-profile vehicle when we see it
- Defining a light, high-profile vehicle is extremely difficult
  - Loading and weight of vehicle
  - Wind gust
  - Wind direction
  - Roadway geometry
  - Road surface condition
  - Vehicle speed
  - Shape of vehicle
  - Driver's experience

Source: Still image from WHP trooper dash cam

Why are high wind blow overs increasing?

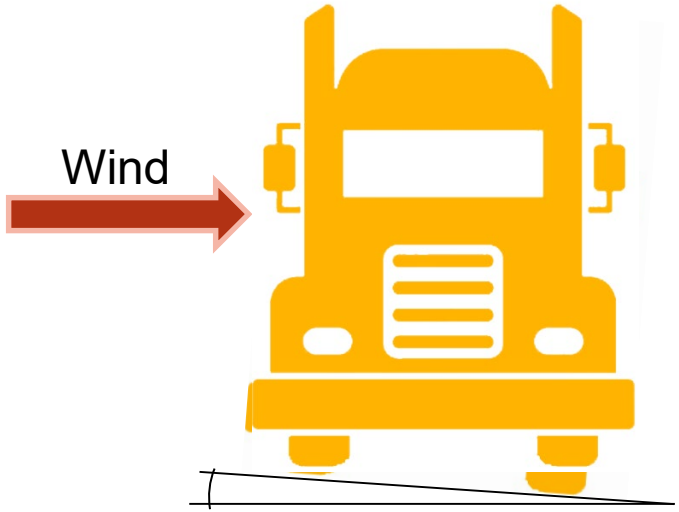
- Strong wind events are increasing in intensity and frequency
- Tractor trailers are becoming lighter for fuel efficiency
  - Crashes involving lighter boxes require more clean-up time
- Distribution centers – Trucks are coming to Wyoming fully loaded but leaving Cheyenne distribution centers as empty trailers
- Complacency
  - General warnings happening too frequently
  - The National Weather Service uses regional alerting systems that contribute to different understanding of high wind events across neighboring states - drivers are not prepared for Wyoming winds

UW Research

Characterization of Blow Over Risk in the Wyoming Highway System

UW - Dr. Ohara's Research Highlights

- Focused on I-25 south of Cheyenne at Wyo Hill
- Provides ability to extrapolate data to other locations
- Provides risk levels for tractor trailer combination
  - Side note (not included in research): flatbeds and tankers are less prone to blowing over
- Includes the cross slope of a curve as a contributing factor

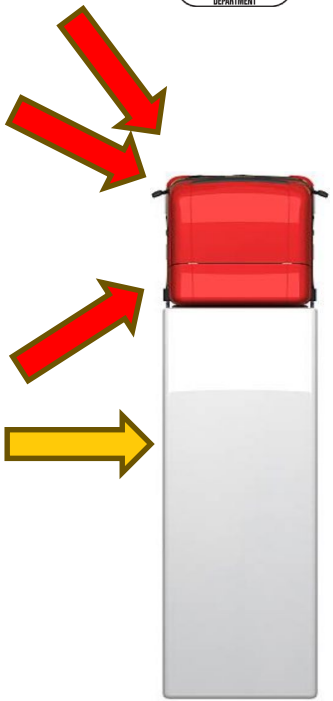


Cross slope or "superelevation"

UW - Dr. Ohara's Research Highlights

- Slight head-wind is more dangerous than a direct broadside gust for a heavy vehicle

- Light vehicles are more prone to blowing over regardless of wind direction



Proposed Changes

Proposed Changes

Use UW research to enhance operational systems that use our current capabilities (Pre-trip, Roadside, In-vehicle information)

- Create Operational Pre-Event System to provide ***EXPECTED*** wind closures
  - Add information to Commercial Vehicle Operator Portal
    - Create an option for driver to self-evaluate blow over risk
    - Show windows of opportunity for drivers
  - Update all pre-trip and in-vehicle systems and provide pre-event video forecasts & social media posts
- Create Operational System to improve ***ENFORCEMENT***
  - Use DMS and Ports of Entries to clearly target weight limits – no general warnings
  - Create an optional system for a driver to self assess

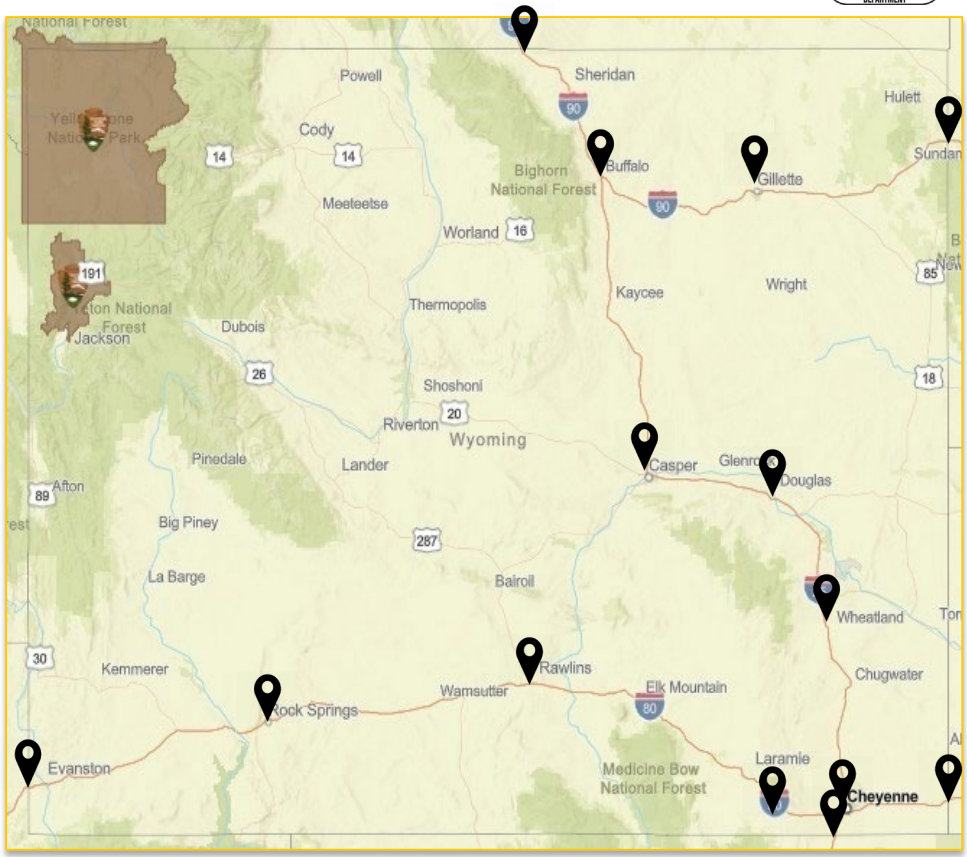
Where and Why?

- Implement weight-based closures only on Interstates
- Interstates have adequate density of:
  - Dynamic Message Signs (DMS) for alerting the public
  - Road Weather Information System (RWIS) for analyzing real-time wind data
  - Interstates have truck traffic and greater blow over potential

Segment-Based Road Closures

Close roads based on worst-case in a “segment”

- Major communities are the decision points and provide resources for the driver
- There is adequate signage to properly inform drivers going into a community and leaving a community



Messaging

- Dynamic Messages Signs – Examples
  - Targeted information for better messaging and enforcement
  - DMS messages would have to be conservative because winds can change
  - Reduce change frequency - evaluate hourly to avoid rapid changes

Example #1

Example #2

Messaging – Other Systems

- Closures based on vehicle weight would be posted on WYDOT pre-trip travel information systems and provided to third-parties:
  - https://wyoroad.info
    - Eliminate the Closure to Light, High-Profile Vehicles definition
    - Extreme Blow Over Risk definition will remain
  - https://map.wyoroad.info
  - 511 Phone System
  - 511 Notify (email/text)
  - Wyoming 511 Mobile App
  - Highway Advisory Radios
  - Modify CVOP
  - Situational Data Exchange (SDX)
  - Enhance video forecasts/social media

Create Specific Vehicle Review Process

Specific Vehicle Review

- A review system could be more specific to driver/vehicle
- Create optional self-review - web application
  - Check specific vehicle for time-limited travel authorization
    - USDOT number
    - Vehicle profile
    - Vehicle weight
    - Route
    - Person requesting permission/email
    - Driver information/email
  - CVOP users will have direct link to the new web application

Review Criteria (simplified)

- Evaluation process:
  - If vehicle is a flatbed or tanker: **automatic authorization**
  - If vehicle is a tractor with a box trailer:
    - A) Evaluate current wind conditions against vehicle weight
    - B) Evaluate forecasted wind conditions for the next hour against vehicle weight

If A and B **ARE NOT** met, vehicle is not authorized to travel

- Record the information and send a denial email

If A and B **ARE** met, vehicle is authorized to travel <u>for 1 hour</u>

- Record the information and send a conditional approval email
  - » Give time limit for which travel is approved (until XX time)
  - » Inform the driver they are traveling at their own risk. Hazardous conditions may exist


ww.wyoroad.info Thu Jan 19 06:58:56 2023
Copyright © 2022 State of Wyoming. All rights reserved.
Questions/Discussion