CHAPTERS 553/554, 2018 ACTS OF ASSEMBLY

SECOND STAKEHOLDER MEETING

Agenda for Today's Meeting

- **Welcome and Introductions**
- **Overview of 1st Stakeholder meeting/High-level comment summary**
- **Summary of Literature Identified to Date**
- **Considerations for Participating in Pilot**
- **Data Requirements for Pilot Evaluation**
- **Comments from Stakeholders**

Written comments should be submitted to Keith Wandtke (keith.wandtke@vdot.virginia.gov)

SUMMARY OF STAKEHOLDER COMMENTS

Summary of Stakeholder Comments

- Received comments both in support and opposition
- Important to note that the majority of comments related to support of or opposition to a change in policy that would allow heavier vehicles to operate on Virginia roadways, not to the pros and cons of participation in a pilot
- Comments are summarized by whether they are “Supportive of” or “In Opposition to” with no comment given more weight than any other and no independent checking of facts (in the summary)

Comments in support of…

- **Referencing the 2015 Comprehensive Truck Size and Weight Study (CTSWS), 91,000 lbs on a 6-axle tractor trailer would result in a 2.4-4.2% reduction in the life-cycle cost of pavements**
- **Same reference, no additional one-time bridge rehab costs compared to the configuration meeting current regulations**
- **The additional axle provides a 1 ft. shorter stopping distance compared to current 80,000 lb, 5-axle loads.**
- **The additional loading will result in a 16% reduction in total miles driven for shippers that currently weight out before they box out.**
- **Fewer trucks will mean lower emissions.**

Comments in support of…

- Again citing the CTSWS, an increase to 91,000 lb would result in an estimated $5.6 billion reduction in freight costs.
- Virginia’s participation in the pilot program will be useful in helping USDOT to collect data pertaining to loaded weights of trucks at the time of a crash, which is currently not collected.
- Current exemptions allow heavier trucks to operate off the interstate. Operation on the interstate would be safer.
- An increase to 91,000 lb is necessary for economic competitiveness.

Comments in opposition to…

- CTSWS found that an increase in the legal load to 91,000 lb would result in a sharp decline in the freight shipped by rail. An MIT study found that benefits in terms of reduced trucks from heavier loads would be offset by rail diversion (10-15% reduction) and result in 6-12 million more truck trips or 3-5 million more truck miles traveled.
- TRB study found that increasing the weight of a heavy truck by only 10% increases bridge damage by 33%.
- The CTSWS found 18% higher brake violation rates and a separate study by IIHS found that trucks with out of service violations have 362% higher crash risk.

Comments in opposition to…

- CTSWS found a 47% higher crash rate in Washington State for 91,000 lb 6-axle trucks
- VDOT should conduct an inventory of infrastructure assets and estimate the costs to improve any that lack the capacity to accommodate the additional loading.
- Virginia would make a poor test case for a pilot of 91,000 lb, 6-axle trucks due to the existing congestion on interstates. Pilot participation would require neighboring states to participate as well.
- Reasonable access accommodations would result in significant travel on local roads.

Comments in opposition to…

- It is not VDOT’s job to design a pilot and doing so could result in lobbyists saying that if it designed to our comments, VDOT would participate.
- There is no economic development benefit in participating in a pilot – that only comes with a policy change.
- Trucks at current GVW limits struggle to maintain speed up grades which forces other vehicles to reduce speed, sometime quickly, increasing crash risk.
- Brakes, tires, and suspension are likely to wear out more quickly.

Comments in opposition to…

- CTSWS cites a "profound lack of data" from which to draw any safety conclusions.
- Truck VMT has increased from 112,423 in 1982 to 287,895 in 2016.
- It is bad public policy to experiment with Virginia citizens.
- Rather than participating in a pilot, the focus should be on better data collection with existing heavier trucks including VMT and a uniform crash report form that would collect number of axles, truck weight, and road type at time of crash.

SUMMARY OF LITERATURE IDENTIFIED TO DATE

Summary of Literature Collected

- **Total documents retrieved: 150+**
- **Majority cover infrastructure and safety**

2000
Comprehensive Truck Size and Weight Study (Vols. I-IV).
USDOT

2003
National Cooperative Highway Research Report 495: Effect of Truck Weight on Bridge Network Costs.
Center for Advanced Bridge Engineering, Wayne State University

2004
The U.S. Department of Transportation's Western Uniformity Scenario Analysis: A Regional Truck Size and Weight Scenario Requested by the Western Governors' Association.
USDOT

2011
NCHRP 20-07 Directory of Significant Truck Size and Weight Research.
American Association of State Highway Transportation Officials

2015
Comprehensive Truck Size and Weight Limits Study: Technical Summary + 5 Technical Reports.
USDOT

2016
Comprehensive Truck Size and Weight Limits Study: Report to Congress, Final Report.
USDOT

References Provided by Stakeholders

An Analysis of Truck Size and Weight: Phase I – Safety. Multimodal Transportation & Infrastructure Consortium, 2013

An Analysis of Truck Size and Weight: Phase I Technical Corrections. Rahall Appalachian Transportation Institute, 2014

Comprehensive Truck Size and Weight Limits Study, Truck Crash Comparative Analysis, Final Draft, Desk Scan. U.S. Department of Transportation, Federal Highway Administration, 2013

Comprehensive Truck Size and Weight Limits Study: Report to Congress, Final Report. USDOT, FHWA, 2016

Comprehensive Truck Size and Weight Limits Study: Highway Safety and Truck Crash Comparative Analysis Technical Report. USDOT, FHWA, 2015

Crash Risk Factors for Interstate Large Trucks in North Carolina. Insurance Institute for Highway Safety, 2016

Estimating the Competitive Effects of Larger Trucks on Rail Freight Traffic. Carl D. Martland, MIT, 2007

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Highlights from FHWA's 2017 National Bridge Inventory Data. American Road & Transportation Builders Association, 2018

Long-Run Diversion Effects of Changes in Truck Size and Weight (TS&W) Restrictions: An Update of the 1980 Friedlaender Spady Analysis. G.J. McCullough, Department of Applied Economics, College of Food, Agricultural and Natural Resource Sciences, University of Minnesota, 2013

National Cooperative Highway Research Report 495: Effect of Truck Weight on Bridge Network Costs. Center for Advance Bridge Engineering, Wayne State University, 2003

Rural Connections: Challenges and Opportunities in America's Heartland. TRIP National Transportation Research Group, 2014

The U.S. Department of Transportation's Comprehensive Truck Size and Weight Study (Bridge and Safety Sections). U.S. Department of Transportation, 2000

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Common Themes

- Five primary areas of uncertainty:
  - Safety
  - Pavements
  - Bridges
  - Modal Shift
  - Enforcement and Compliance
- Significant data gaps exist in each of these areas
  - Reduces the ability to provide useful policy advice
  - It is easy but dangerous to use data out of context to support a specific view on a single issue

Common Themes (cont.)

- Safety
  - Heavier trucks associated with lower crash numbers, higher crash severities
  - Heavier trucks have a higher crash risk due to handling and stability characteristics
- Pavements
  - Decreased costs related to decreased axle weights
  - Impacts are more sensitive to axle weight than GVW
- Bridges
  - Heavier trucks associated with increased damage and increased costs
  - Impacts are more sensitive to GVW, not axle weight
- Modal Shift
  - Increased weight limits result in increased truck transport due to lower costs
  - Shift is dependent on rate of cost of reduction
- Enforcement and Compliance
  - Difficult to predict due to inconsistent enforcement practices
  - There is an increasing trend in the use of technology that will help enforcement

VDOT CONSIDERATIONS FOR PARTICIPATION IN PILOT

Considerations for Participation in Pilot

- Corridors involved – pilot vs. control
- Axle Spacing
- Contiguous states
- Pilot Duration
- Permit process
- Requirements for participants
- Costs incurred by State in participation

DATA COLLECTION PLAN FOR EVALUATION

Traffic Operations and Safety

Traffic Engineering

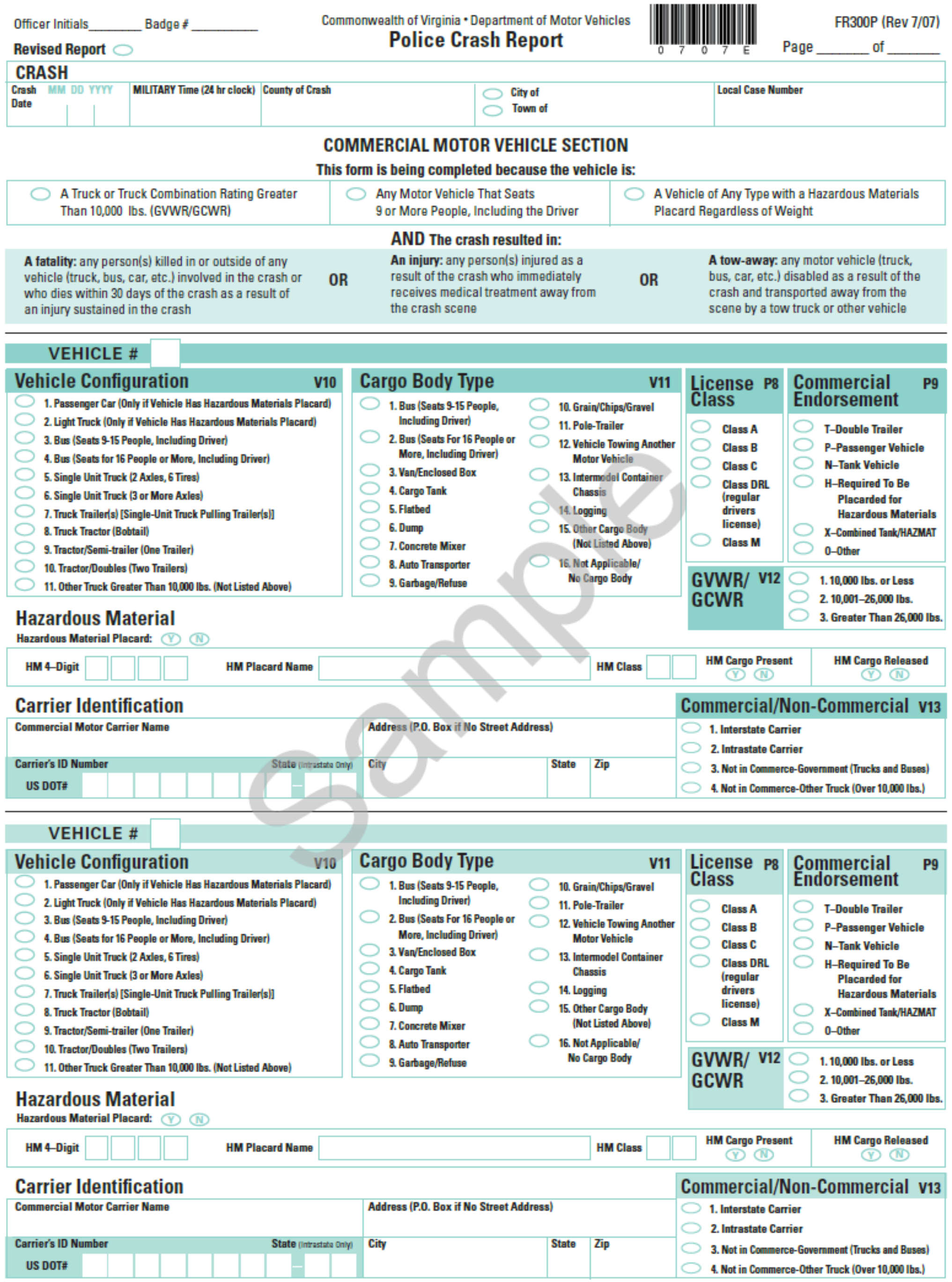
Potential Safety & Operational impacts of proposed heavier 91,000 lb pilot study vehicles vs. 80,000 lb. vehicles on interstate highways

- Safety
  - Potential increase in:
    - Number of crashes
    - Severity of crashes
    - Safety violations

Safety

Study of potential crash impacts requires changes in Virginia's Crash Reporting System

- Include pilot vehicle 6-axle configuration
- GVW for pilot and 80,000 lb. comparison vehicles
- Ideally, vehicle's weight at time of a crash or incident



Officer Initials_______ Badge # _________ Commonwealth of Virginia • Department of Motor Vehicles FR300P (Rev 7/07)

Revised Report **Police Crash Report** Page _______ of _______

CRASH

Crash Date MM DD YYYY | MILITARY Time (24 hr clock) | County of Crash | City of / Town of | Local Case Number

COMMERCIAL MOTOR VEHICLE SECTION

This form is being completed because the vehicle is:

A Truck or Truck Combination Rating Greater Than 10,000 lbs. (GVWR/GCWR) | Any Motor Vehicle That Seats 9 or More People, Including the Driver | A Vehicle of Any Type with a Hazardous Materials Placard Regardless of Weight

AND The crash resulted in:

A fatality: any person(s) killed in or outside of any vehicle (truck, bus, car, etc.) involved in the crash or who dies within 30 days of the crash as a result of an injury sustained in the crash OR **An injury:** any person(s) injured as a result of the crash who immediately receives medical treatment away from the crash scene OR **A tow-away:** any motor vehicle (truck, bus, car, etc.) disabled as a result of the crash and transported away from the scene by a tow truck or other vehicle

VEHICLE #

Vehicle Configuration V10
1. Passenger Car (Only if Vehicle Has Hazardous Materials Placard)
2. Light Truck (Only if Vehicle Has Hazardous Materials Placard)
3. Bus (Seats 9-15 People, Including Driver)
4. Bus (Seats for 16 People or More, Including Driver)
5. Single Unit Truck (2 Axles, 6 Tires)
6. Single Unit Truck (3 or More Axles)
7. Truck Trailer(s) [Single-Unit Truck Pulling Trailer(s)]
8. Truck Tractor (Bobtail)
9. Tractor/Semi-trailer (One Trailer)
10. Tractor/Doubles (Two Trailers)
11. Other Truck Greater Than 10,000 lbs. (Not Listed Above)

Cargo Body Type V11
1. Bus (Seats 9-15 People, Including Driver)
2. Bus (Seats For 16 People or More, Including Driver)
3. Van/Enclosed Box
4. Cargo Tank
5. Flatbed
6. Dump
7. Concrete Mixer
8. Auto Transporter
9. Garbage/Refuse
10. Grain/Chips/Gravel
11. Pole-Trailer
12. Vehicle Towing Another Motor Vehicle
13. Intermodel Container Chassis
14. Logging
15. Other Cargo Body (Not Listed Above)
16. Not Applicable/ No Cargo Body

License Class P8
Class A
Class B
Class C
Class DRL (regular drivers license)
Class M

Commercial Endorsement P9
T–Double Trailer
P–Passenger Vehicle
N–Tank Vehicle
H–Required To Be Placarded for Hazardous Materials
X–Combined Tank/HAZMAT
0–Other

GVWR/ GCWR V12
1. 10,000 lbs. or Less
2. 10,001–26,000 lbs.
3. Greater Than 26,000 lbs.

Hazardous Material
Hazardous Material Placard: Y N
HM 4–Digit | HM Placard Name | HM Class | HM Cargo Present Y N | HM Cargo Released Y N

Carrier Identification
Commercial Motor Carrier Name | Address (P.O. Box if No Street Address)
Carrier's ID Number | State (Intrastate Only) | City | State | Zip
US DOT#

Commercial/Non-Commercial V13
1. Interstate Carrier
2. Intrastate Carrier
3. Not in Commerce-Government (Trucks and Buses)
4. Not in Commerce-Other Truck (Over 10,000 lbs.)

Sample

VEHICLE #

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Operational Impacts

Potential impacts of pilot vehicles on traffic flow

- On steep grades (e.g. I-81) - Pilot vehicles may operate at slower speeds than the current 80,000 lb. vehicles
- Traffic in the vicinity of ramps –Pilot vehicles may be less capable to accelerate at entrance ramps and decelerate to slower speeds when exiting the interstate.
- Evaluation of operational impacts requires AVL for both pilot and comparison 80,000 lb. vehicles to accommodate time and location data collection to conduct comparative analysis.

Traffic Asset Impacts

Potential increase in roadside hardware damage (e.g. guardrail, median barriers, breakaway signs etc.)

- Proper analysis may require revised crash reporting methods properly identifying and comparing damage costs

Traffic Data Collection Needs

Evaluating impacts of the pilot vehicles on interstate bridges and pavement

- Average daily traffic (ADT), vehicle miles of travel (VMT), vehicle classification (e.g. vehicle type, # of axles) etc. for pilot and 80,000 lb.

- May require significant additional traffic data collection (traffic-count sites, weigh-in-motion sites) to provide data at a sufficient number of locations to conduct the various required analysis.

DATA COLLECTION PLAN FOR EVALUATION

Pavement Condition

Pavement Data Types

- Distress Data
  - Cracking (fatigue, linear, transverse, etc.)
  - Roughness (IRI)
  - Rutting
  - Faulting
- Structural Data
  - Falling Weight Deflectometer (FWD)
  - Ground Penetrating Radar (GPR)
- Weigh-In-Motion (WIM) Data

Pavement Data Needs

- Distress Data
  - VDOT collects distress data annually and there is no need to change anything to gather this information
- Structural Data
  - VDOT will need to collect additional FWD and GPR data at the beginning of the study to establish a baseline
  - FWD data will be used to calculate subgrade and structural strength

Pavement Data Needs (Contd.)

- Structural Data (contd.)
  - GPR data will be used to estimate and validate pavement thickness and determine drainage problem (if any)
  - FWD and GPR data will have to be recollected at 3 years interval during the study period
- Weigh-In-Motion (WIM) Data
  - VDOT will need to collect and analyze WIM data from existing sites along the study corridor
  - VDOT may need to establish new WIM stations depending on study corridor, existing locations, etc.

Pavement Data Analysis

- Collected pavement data will be used to observe changes in pavement condition over the study period
- Rate of deterioration of the control sections (study corridor) will be compared against the data from the rest of the network
- Deterioration models may be developed to project/predict the long-term trends
- Analysis will be performed based on collected data and deteriorations trends

DATA COLLECTION PLAN FOR EVALUATION

Bridge Condition

Structure & Bridge 91k lb. truck Pilot - Focal Areas

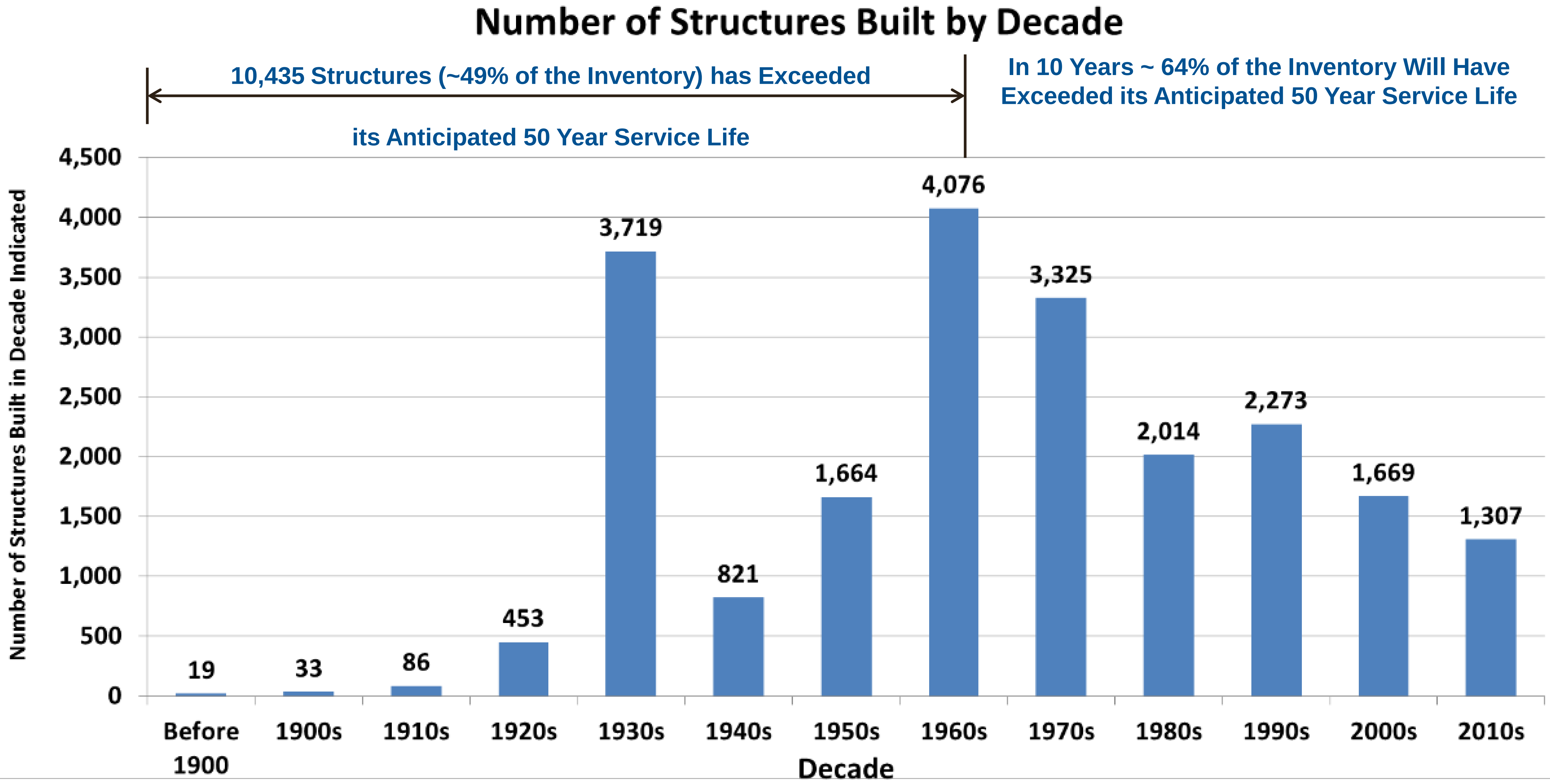
Focus on four main concepts:

1. Strength evaluation through analysis
2. Fatigue (steel) and Serviceability (concrete) considerations
3. Rate of change of deterioration
4. Maintenance Impacts (prediction of accelerated deterioration)

Variables in the Study:

- *Interstate corridors of participation and control sections*
- *Configuration of 91k lb. trucks to be determined*
- *ADTT of participating 91k lb. trucks*

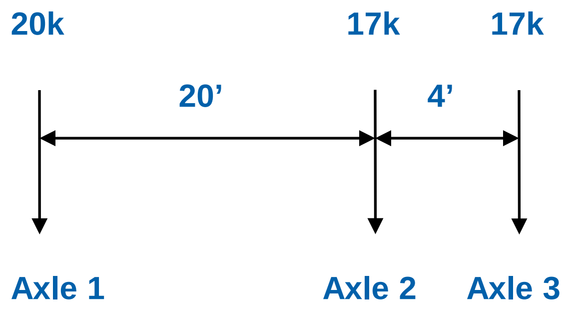
Bridge Inventory - Age



Strength evaluation through analysis

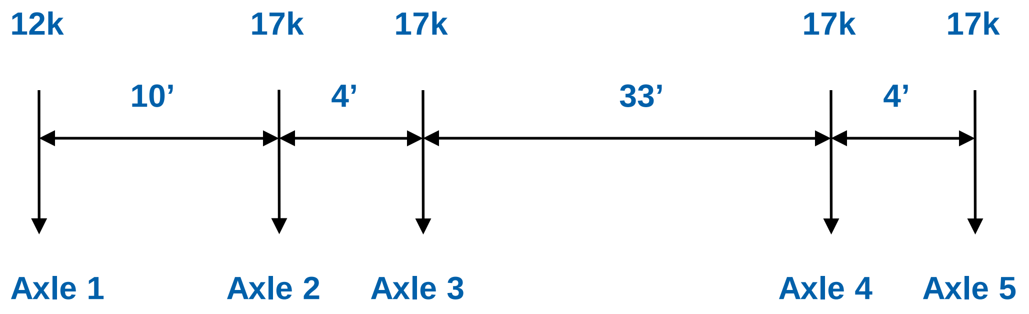
Current Virginia Legal Loads

VA Type 3 (Single Unit Truck)



GVW = 27 Tons, CG is 13.85’ from Axle 1

VA Type 3S2 (Truck and Semi Trailer)

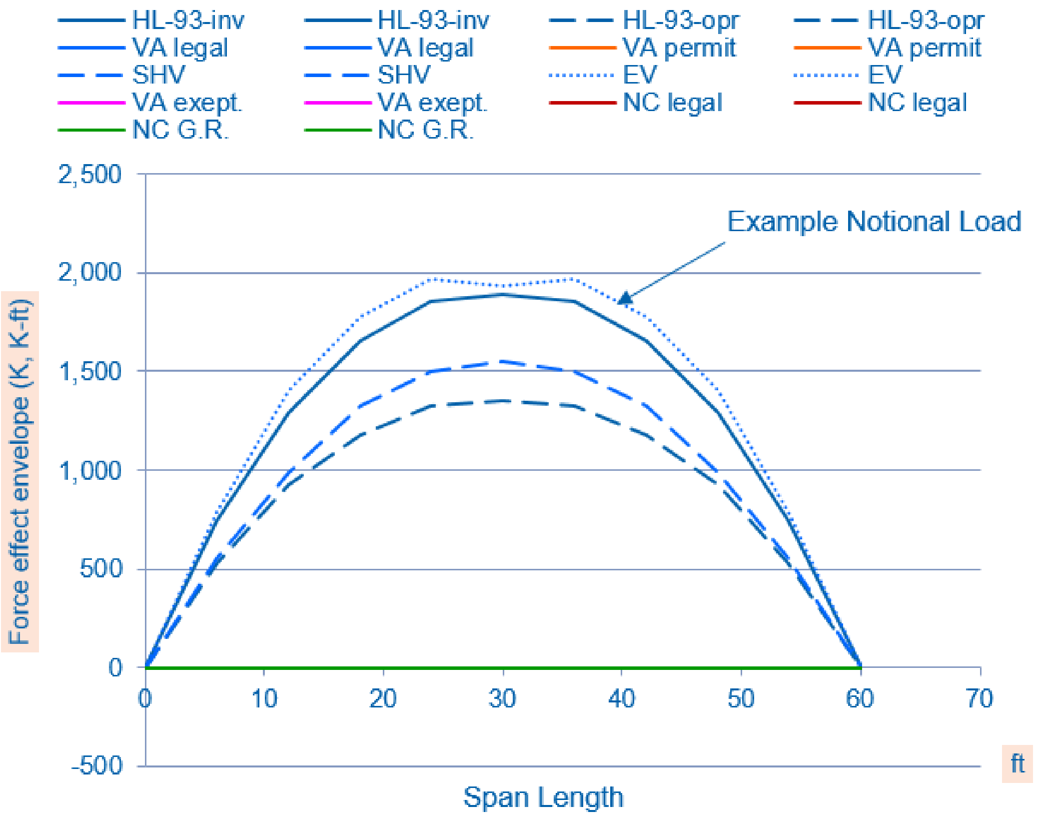


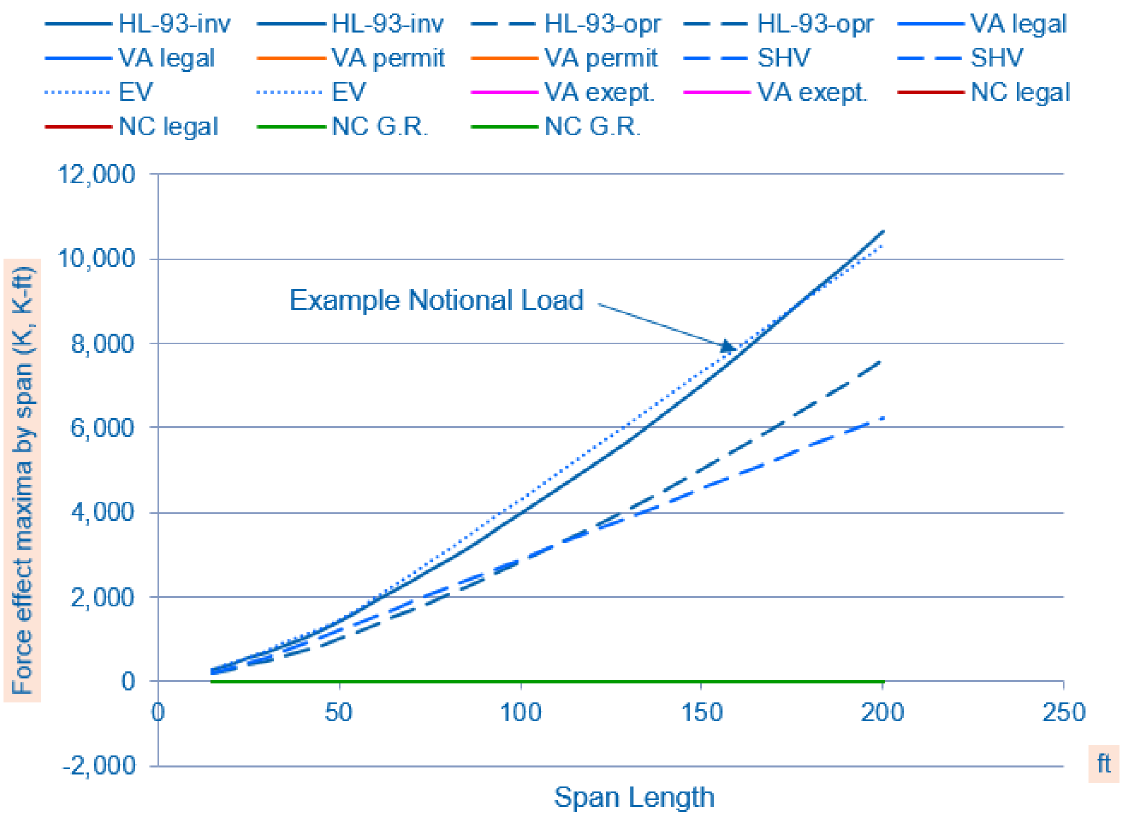
GVW = 40 Tons, CG is 25.92’ from Axle 1

Strength evaluation through analysis

1. Pilot study would define 91k lb. truck configuration requirements for participation
2. Engineers to determine notional loading to use for strength analysis that envelopes the 91k lb. 6 axle configuration
3. VDOT to select statistical sample set of bridges in participation and control interstate corridors for study

Strength evaluation through analysis





Actual vehicle force effects should be less than the notional load

Fatigue and Serviceability

Pilot will include analysis and physical inspection of details:

1. Engineers to determine analysis requirements for steel and concrete bridges to model fatigue (steel) and serviceability (concrete) limitations
2. Inspectors to conduct focused field inspections on relevant details including:
    - Areas of controlling stresses
    - Damaged areas
    - Connections
3. Determine if data results can be correlated

Rate of change of deterioration

VDOT to collect data to evaluate the rate of change of deterioration between bridges in participating and control corridors along the interstate system.

The primary area of focus will include decks and expansion joints since these surfaces are in direct contact with the increased number of axles and wheel loadings.

Other structural areas of focus will follow lines of live load distribution from decks to substructure foundation supports.

Rate of change of deterioration

Examples of methods and data to be collected:

1. **Expansion Joints – measure assembly and block out deterioration**
   - May utilize scaled high resolution video and/or imaging to measure square feet of concrete deterioration adjacent to expansion joint assembly (block out). Will use similar methodology to measure linear feet of expansion dam deterioration.
2. **Decks – measure cracking, delamination and spalling**
   - May utilize scaled high resolution video and/or imaging to measure linear feet of cracking
   - May utilize ground penetrating radar (GPR), infrared thermography and/or high resolution visual surveys to measure square feet of delamination/spalling

Rate of change of deterioration

Other structural areas of detailed inspection focus will include:

1. **Superstructure bearing assemblies – monitor for condition and movement beyond normal parameters**
2. **Substructure bearing seats and anchorages – monitor for movement, cracking and deterioration**

These areas of detailed inspection focus will supplement routine inspection practices which already capture inventory and element level conditions and associated member quantities.

Rate of change of deterioration

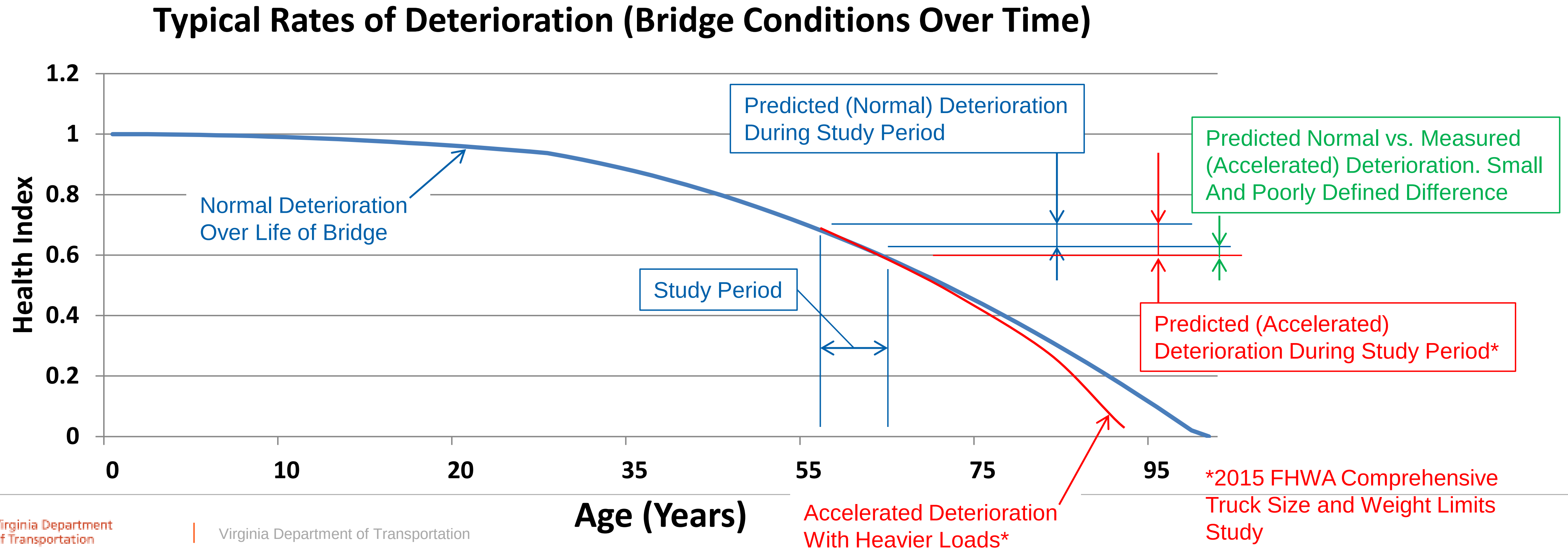
VDOT to study deployment of instrumentation to collect automated data to augment detailed field inspection data which may include mounting devices on superstructure and/or substructure members. Instrumentation may include:

- **Strain Gauges**
- **Deflectometers**
- **Accelerometers**

Engineers to study results for correlation and use for mathematical modeling.

Rate of change of deterioration

Bridge Conditions Deteriorate Slowly, So Changes to Condition (Predicted vs. Actual) May Be Minimal During the Observation/Study Period. Instrumentation Will Improve Understanding of Load Effects



Maintenance Impacts

Two main components of the Cost Evaluation (participation vs. control corridors):

1. **Effects on concrete decks**
   - Maintenance costs required to seal and patch decks
   - Maintenance costs on bridge deck expansion joints
   - Duration of anticipated service lives
2. **Effects on superstructures (beams and girders)**
   - Initial costs to strengthen / retrofit based on load rating analysis
   - Maintenance costs on girders (coating, repair)
   - Duration of anticipated service lives

DATA COLLECTION PLAN FOR EVALUATION

Mode Shift

Overview

Considerations

Data Sources

Considerations

Federal analyses focused on two types of modal shift:

1. **Truck—Rail**
2. **Truck—Truck (configuration shift)**

Factors influencing mode shift:

- **Commodity**
- **Length of haul**
- **Multistate participation**
- **Cost**

Considerations

Overall freight tonnage shipped by every mode

Load type (Truckload vs Less-than-truckload)

Truck counts

Truck- Vehicle-Miles Traveled

Changes in travel time reliability

Implementation of any other initiatives (E.g., Connected, Autonomous Vehicle operations)

Data Sources

- **Freight Analysis Framework (Federal Highway Administration)**
- ***Transearch (IHS Markit) (incl. Surface Transportation Board, Confidential Rail Waybill Sample)***
- **Weigh-In-Motion sensor (DMV, VDOT)**
- **Class Counts (VDOT)**
- ***Participating carrier questionnaire / survey***
    - ***Fleet ownership and composition***
    - ***Intermodal history***
    - ***Commodities***

DATA COLLECTION PLAN FOR EVALUATION

Compliance and Enforcement

Compliance and Enforcement

- I. Number of trucks?
- II. Type of credential offered?
- III. Enforcement needs?
- IV. Data needs?

COMMENTS FROM STAKEHOLDERS ON DATA NEEDS/CONSIDERATIONS

Next Steps

- Development of final report is underway
    - Draft will be distributed to stakeholders for review prior to next meeting
- Final Stakeholder meeting – November 9th, 10 AM - Noon