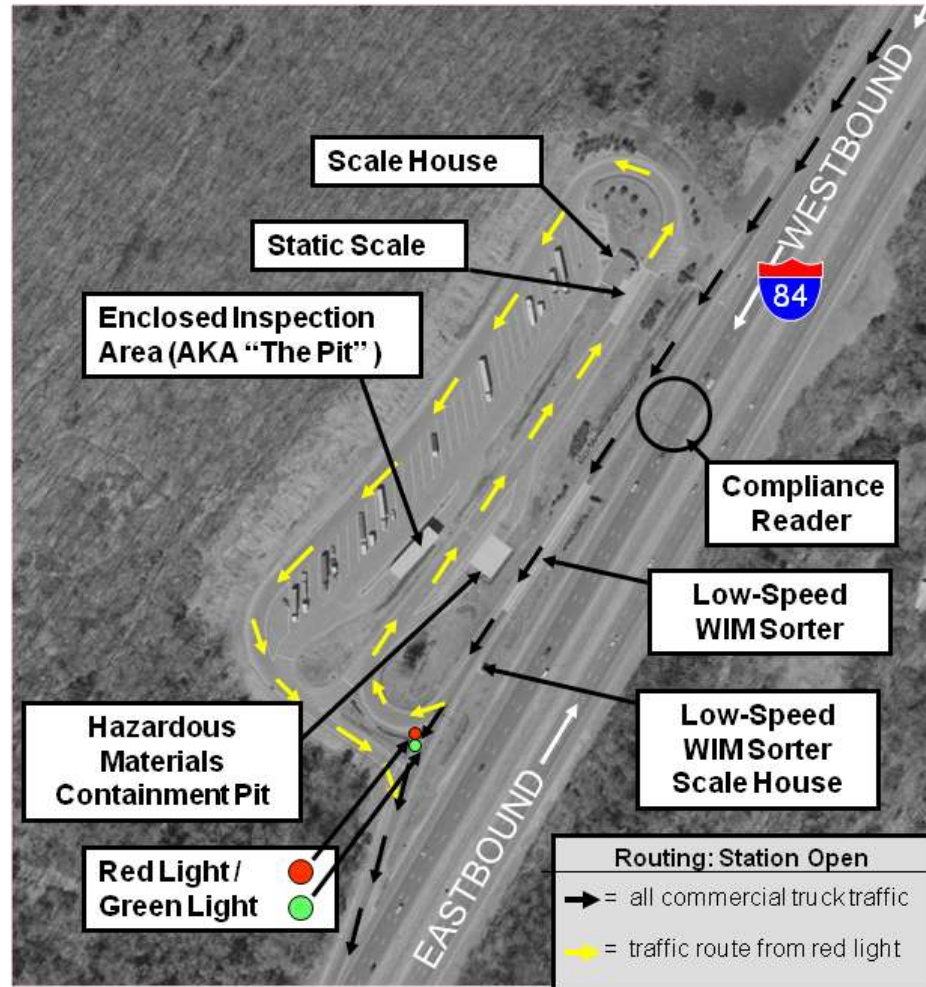
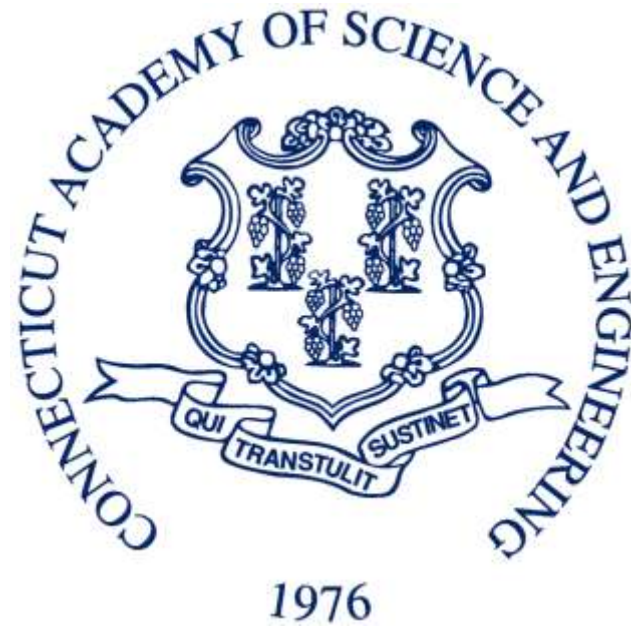


A STUDY OF THE WEIGH STATION TECHNOLOGIES AND PRACTICES





A Study of the Weigh Station Technologies and Practices

STUDY BRIEFING
November 21, 2008

INTRODUCTION



STUDY COMMITTEE

- **David Jones**, Transportation Specialist, FHWA
- **Tom Kearney**, Truck Size and Weight Team, FHWA
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STUDY MANAGEMENT TEAM

Study Management Team

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BRIEFING AGENDA

- **Study Scope and Objectives**
- **Findings and Suggestions**
- **Q & A**

STUDY PROBLEM STATEMENT

Configuration of Greenwich Weigh and Inspection Station and volume of commercial vehicles severely impacts the ability of the Station to operate effectively to assure commercial vehicle compliance with the state's weight and safety regulations and requirements



STUDY PROBLEM STATEMENT

- **Queue line of commercial vehicles rapidly extends into travel lanes on the highway creating a potential safety concern**
 - **Commonly occurs within a 90 second period**
 - **Station staff must close and open the Station throughout an operational shift**
 - ✓ **Undetected overweight commercial vehicles contribute to excessive road damage that result in increased maintenance and user costs associated with more frequent traffic delays and increased frequency of road repairs**

STUDY OBJECTIVES

- **Provide a literature-based and best practices review of the current state of knowledge regarding weigh and inspection station technologies**

STUDY OBJECTIVES (2)

- **Identify technologies and practices that have the potential to**
 - **Increase efficiency and effectiveness of weigh and inspection stations**
 - **Deter passage of overweight and unsafe vehicles across the state's highways**
 - **Increase transit efficiency for the large percentage of commercial vehicles that are compliant with Connecticut laws and regulations**
 - **Utilize information gathered through weigh system technologies for pavement design, highway maintenance & rehabilitation, & planning**

SUMMARY OF KEY FINDINGS AND SUGGESTIONS

Statewide Comprehensive Roadside Network

- **Develop a statewide comprehensive roadside network that includes high speed mainline WIM scales and electronic safety credential screening (E-Screening) for**
 - **Enforcement**
 - ✓ **Size and weight screening – mainline high-speed WIM**
 - ✓ **E-Screening**
 - ✓ **Safety inspection**
 - **Planning**
 - **Pavement Research**



Smart Roadside Initiative

- **FHWA Smart Roadside Initiative program should be utilized as a tool for designing and implementing system**
- **Locations**
 - **Permanent Weigh Stations**
 - **Virtual Weigh Stations**
 - **Additional locations required by planning and pavement design**

HIGHEST PRIORITY – GREENWICH WEIGH AND INSPECTION STATION



Project No. 56-290
Schematic Layout of I-95 NB Weigh Station
Greenwich, Connecticut



Benefits

- **Safer highways**
- **Better protection of the state's highways and road assets**
- **Enhanced pavement research and design by having an improved data collection and management system that provides accurate truck volume, classification and weight data**

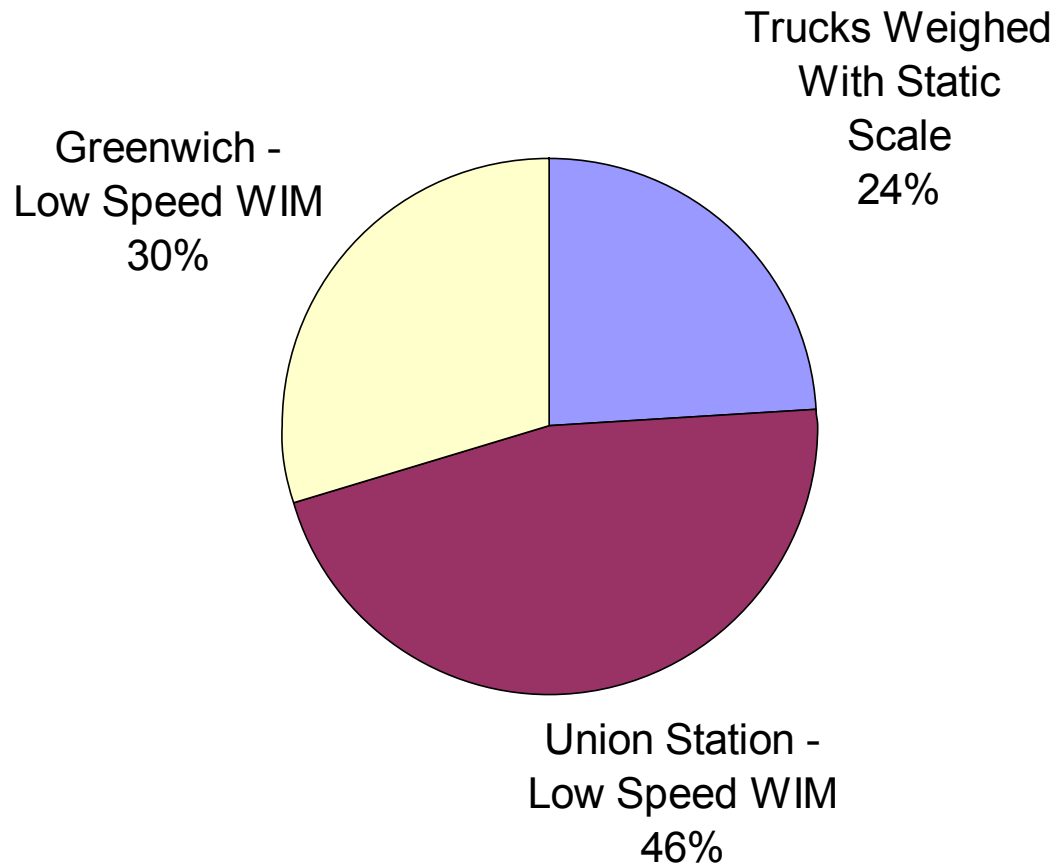


Benefits (2)

- **Possible reduction in premature failure of pavements**
- **Efficient movement of compliant commercial vehicles through the state**
- **Reduction in productivity losses due to congestion as a result of lane closures required for pre-mature highway maintenance and repair**
- **Improving air quality**



Basis for Suggesting Implementation of Comprehensive Roadside Network



Basis for Suggesting Implementation of Comprehensive Roadside Network (2)

Case Studies

- **Enforcement Benefits**
 - ✓ **Permanent Weigh and Inspection Stations**
 - Louisiana DOT
 - ✓ **Virtual Weigh and Inspection Stations**
 - Minnesota DOT
- **Data Management**
 - Netherlands

Implementation, Operation, and Governance

- **Establish multi-agency Task Force consisting of representatives from ConnDOT, DMV, and DPS**

Implementation, Operation, and Governance (2)

➤ Responsible for

- Leading the design, operation, and maintenance of the Comprehensive Roadside Network.
- Identifying annual goals
 - ✓ Suggested that one goal of the state's enforcement program should be a continual annual reduction in the number of citations/violations issued through a consistent enforcement effort that encourages compliance with weight and inspection requirements
- Full implementation of a Comprehensive Roadside Network will require a long-term plan with sufficient funding to meet each of the milestones identified by the Task Force.



Implementation, Operation, and Governance (3)

- **Long-Term Plan should include:**
 - **Identification of WIM scale & E-Screening locations**
 - ✓ **Permanent Weigh and Inspection Stations**
 - » **Review and consider retaining all permanent weigh and inspection station sites or converting some to virtual weigh and inspection stations**
 - » **Keep existing layouts or modify stations to take advantage of efficiency improvements through the installation of high-speed mainline WIM scales and E-Screening systems**
 - ✓ **Virtual Weigh and Inspection Stations**
 - ✓ **Pavement Research and Design Requirements**
 - ✓ **Planning Requirements**

Implementation, Operation, and Governance (4)

- **Long-Term Plan should include:**
 - **Selection of System Hardware**
 - ✓ **Compatibility with WIM scale and E-Screening technology used at Union Station or consideration of next generation technology for all systems**
 - ✓ **Promote and encourage the use of in-vehicle transponders for commercial vehicles to maximize participation in the E-Screening credential clearance system**

Implementation, Operation, and Governance (5)

- **Long-Term Plan should include:**
 - **Identification of WIM scale and E-Screening data applications and users**
 - ✓ **Provides basis for software requirements and design of a fiber optic / wireless communication system**
 - ✓ **Undertake a regional effort to have all northeastern states provide data to the national Safety and Fitness Electronic Record (SAFER) system**



Implementation, Operation, and Governance (6)

- **Long-Term Plan should include:**
 - **Funding Requirements**
 - ✓ **Installation Costs**
 - ✓ **Data management and software development**
 - ✓ **Operation and Maintenance**
 - **Prioritize**
Implementation of
Comprehensive
Roadside Network

System Implementation

Highest Priority is Greenwich Station

- **Install high speed mainline WIM and E-Screening system**
 - **Allows enforcement operations to focus efforts only on those vehicles suspected of being overweight or with credential or inspection safety issues**
 - **Design should be consistent with technology in use at Union Station because state has already invested in mainline WIM and CVISN (Commercial Vehicle Information Systems and Networks)**

System Implementation

Highest Priority is Greenwich Station (2)

- **Install high speed mainline WIM and E-Screening system (continued)**
 - **Important that the state develop one system that meets the needs of all six permanent weigh and inspection stations**
 - ✓ **Six individual systems using different types of technologies makes data communication difficult and there is no commonality concerning maintenance of the system's hardware and software.**

System Implementation

Highest Priority is Greenwich Station (3)

- **Consider lane re-configuration from the New York border through the area of the Station to create four travel lanes with the right lane serving as a “truck only” lane with all commercial vehicles being required to travel in the right lane until traveling beyond the Greenwich Station**

System Implementation

Highest Priority is Greenwich Station (4)

- Similar lane modifications such as adding a travel lane to the highway have been implemented on several Los Angeles, CA freeways and on the Tappan Zee Bridge in New York**
- Primary goals of adding a special purpose lane include improving operating efficiency and traffic safety**

System Implementation

Highest Priority is Greenwich Station (5)

- **Eliminate low-speed WIM scale following installation of high speed mainline WIM system & when the following have been achieved**
 - **High speed WIM systems provide a level of accuracy necessary for quality screening of vehicles**
 - **Station staff has confidence that the high-speed WIM systems can be operated consistently and effectively for vehicle screening to the same or similar level of that of low-speed WIM systems**
 - **Significant participation in the E-screening system is achieved through use of transponders by commercial vehicles**

System Implementation

Highest Priority is Greenwich Station (6)

- **Conduct the planned site feasibility study for the purpose of maximizing the efficiency of the Station**
 - **Consideration should be given to installing a hazardous materials off-loading area and an enclosed inspection facility, similar to those that are installed at the Union Station.**

System Implementation

Highest Priority is Greenwich Station (7)

- If installation of high-speed mainline WIM can not be accomplished, consideration should be given to seeking alternative locations for permanent and or virtual weigh and inspection stations in Fairfield

County

- Least attractive alternative is to maintain operations at the Greenwich Station under current conditions

Virtual Weigh and Inspection Stations

- **Use high speed mainline WIM scales and E-Screening at same locations where portable weight scales are currently being used as a screening tool for size and weight and safety/inspection information and enforcement**

Virtual Weigh and Inspection Stations (2)

- **Analysis of data collected should be used for determining where and when to set up enforcement activities**
- **Enforcement personnel must be able to access real-time data in a user friendly format so that they can effectively target commercial vehicles that are likely to be overweight and/or have safety violations**

Additional WIM Sites for Planning, Pavement Research and Other Applications

- **Consideration should be given to developing WIM sites at additional key locations, such as at port, rail, air cargo, and major distribution centers**
 - **Data would provide ConnDOT with a better understanding of commercial vehicle trip operations, including freight movements**



WIM Scale Technology

- **ConnDOT, DMV, and DPS have experience using quartz, bending plates, and load cell WIM scales**
 - **Most mature and proven technologies available**
 - **Difficult to quantify which of the technologies provides the most accurate estimates of a vehicle's static weight because site conditions are such an important factor in determining accuracy of WIM scales**



WIM Scale Technology (2)

- **Suggested that Connecticut invest in the quartz piezoelectric technology for new and replacement WIM scale installations taking into account installation, maintenance, safety, and cost**
 - **Suggestion should be verified as the analysis of data from the LTPP Phase 2 study results becomes available to see if this technology still provides the best overall characteristics compared to other WIM technologies**

WIM Scale Technology (3)

- **Suggested that the use of three rows of quartz piezoelectric sensors versus the standard two row configuration be considered**
 - **Configuration is more expensive for purchase and installation, but has the potential to reduce sensor life-cycle cost as a result of a reduction in highway smoothness necessary to attain required accuracy needed for enforcement applications**

WIM Scale Technology (4)

- **Bridge WIM scales are a promising non-intrusive technology**
- **Consideration should be given as a supplement to quartz piezoelectric WIM scales to provide a more comprehensive WIM network**
 - **Experience from research in Connecticut and other parts of the US and Europe should be used to determine when the development of bridge WIM technology is mature enough to meet Type III ASTM requirements for enforcement**

WIM Scale Accuracy

- **Accuracy requirements of the WIM system will vary depending on the application (i.e., enforcement, pavement design, planning, research)**

WIM Scale Accuracy (2)

- **WIM scales at a minimum should meet ASTM Type III requirements that are needed for the screening of commercial vehicles for enforcement purposes**
 - **WIM sensors must be able to provide consistent results in asphalt pavement under a wide range of temperature conditions**
 - **Proper site conditions and installation requirements must be met for the sensors to be able to perform as an effective screening tool**
 - ✓ **Maintenance must be included in agency's budget to ensure required accuracy**

WIM Scale Accuracy (3)

- **Development of a QA/QC system is imperative so that WIM-scale network consistently provides data of quality needed for effective enforcement, pavement design, planning and research**
- **Software should be developed or procured that will continually perform a statistical comparison of a commercial vehicle's static weight to the WIM scale's estimate of static weight**
 - **Requires that commercial vehicles be identified utilizing in-vehicle transponders or some other method of vehicle identification (e.g., cameras, inductor loops for measuring axle spacing)**

Data Management

- **Development of the comprehensive roadside network will require that software be developed and/or procured to meet a wide range of applications**
 - **Data collected should automatically be stored in a database management system and be available in a format that meets reporting requirements of all users**



Legislative Initiative

Amend Section 14-270c CT General Statutes

- Existing legislation provides requirements for number of shifts and hours of operation for weigh and inspection station operations, including portable operations
- Consider legislative initiative to eliminate legislatively mandated requirements
- Provide DMV/DPS authority to determine number of shifts and hours of operation for all weigh and inspection operations at permanent, portable, and if implemented, virtual weigh and inspection stations.



Legislative Initiative

Amend Section 14-270c CT General Statutes (2)

- **Analysis of data from WIM/E-Screening system network should be used to continually by Task Force to determine allocation of limited human resources for statewide weigh and inspection operations**
- **Flexible operating philosophy will help achieve enforcement system that serves as an effective incentive for carrier compliance**

CONCLUDING REMARKS

- **Development of a statewide network of high-speed mainline WIM scales that is integrated into a comprehensive E-Screening system will provide significant benefits to the state and the commercial carrier industry**

CONCLUDING REMARKS

Benefits

- **Carriers that consistently meet weight and safety regulations will be able to be able to bypass open weigh stations the majority of the time, thus increasing their operational efficiency**
- **Businesses and residents of Connecticut will benefit through better protection of the state's highway and road assets**
- **Accurate truck volume and weight data is needed in order to properly design pavements**

CONCLUDING REMARKS

Benefits (2)

- **Fewer overweight vehicles operating on the state's highways will significantly reduce the premature failure of pavements**
 - **Reduce productivity losses due to congestion as a result of lane closures required for highway maintenance and repair**

CONCLUDING REMARKS

Benefits (3)

- **Improving the safety of commercial vehicles and the safety of the state's highways**
 - **Less time will be required to statically weigh every truck, providing more time for safety inspections**

CONCLUDING REMARKS

Benefits (4)

- **Comprehensive approach will assure that each weigh station has the same emphasis on safety inspections with a consistently applied, multi-tiered MCSAP inspection program being utilized for all safety inspection operations, along with cursory walk around inspections utilized by DMV and DPS**
- **Improved air quality**

CONCLUDING REMARKS

Initial Investment

- **Purchase and installation of quartz WIM scale and controller**
- **Acquisition and installation of video cameras for confirmation of vehicle identification may be necessary**
 - **Determination of the exact number and location of WIM scale and E-Screening systems should be made jointly by DPS, DMV, and ConnDOT through the proposed program Task Force**

CONCLUDING REMARKS

Initial Investment (2)

- **Fiber optic/wireless communication network**
- **Data management and QA/QC program will need to be developed so that the WIM and electronic credential and safety data can be used to its fullest potential**

CONCLUDING REMARKS

Operational Expenses

- **Maintaining smooth pavement and other site conditions are critical for collecting accurate weight information**

CONCLUDING REMARKS

Regional Cooperation

- **Many commercial vehicles traveling over the state's highways are on interstate trips**
- **Suggested that an effort be made to develop a regional weight and inspection council for the purposes of sharing information**

CONCLUDING REMARKS

Regional Cooperation (2)

- Goal of integrating weight and inspection information and operational and enforcement best practices across state boundaries to further encourage the efficient passage of compliant commercial vehicles throughout the northeastern United States**



CONCLUDING REMARKS

- **Note: Appendix J - A Performance Audit – Overweight/Oversize Commercial Vehicles issued in 2003 by state’s Auditors of Public Accounts**
 - **Findings, suggestions & recommendations of this study report were developed independently and without knowledge of the recommendations included in the Auditor’s report**
 - **Auditors findings in many cases similar and supportive of this reports findings**



QUESTIONS

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