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# New Policies & Directions for Overweight, Heavier & Larger Vehicles: A Multi-Stakeholder Approach to Developing Effective Policies to Reduce the Impact Costs on Roads and Bridges

May, 2018



**C2SMART Center** is a USDOT Tier 1 University Transportation Center taking on some of today's most pressing urban mobility challenges. Using cities as living laboratories, the center examines transportation problems and field tests novel solutions that draw on unprecedented recent advances in communication and smart technologies. Its research activities are focused on three key areas: Urban Mobility and Connected Citizens; Urban Analytics for Smart Cities; and Resilient, Secure and Smart Transportation Infrastructure.

Some of the key areas C2SMART is focusing on include:

### **Disruptive Technologies**

We are developing innovative solutions that focus on emerging disruptive technologies and their impacts on transportation systems. Our aim is to accelerate technology transfer from the research phase to the real world.

### **Unconventional Big Data Applications**

C2SMART is working to make it possible to safely share data from field tests and non-traditional sensing technologies so that decision-makers can address a wide range of urban mobility problems with the best information available to them.

### **Impactful Engagement**

The center aims to overcome institutional barriers to innovation and hear and meet the needs of city and state stakeholders, including government agencies, policy makers, the private sector, non-profit organizations, and entrepreneurs.

### **Forward-thinking Training and Development**

As an academic institution, we are dedicated to training the workforce of tomorrow to deal with new mobility problems in ways that are not covered in existing transportation curricula.

Led by the New York University Tandon School of Engineering, C2SMART is a consortium of five leading research universities, including Rutgers University, University of Washington, the University of Texas at El Paso, and The City College of New York.

[c2smart.engineering.nyu.edu](http://c2smart.engineering.nyu.edu)

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## Executive Summary

The impact of overweight, heavier and larger vehicles on the deterioration of transportation infrastructure (i.e., pavement and bridges) is a significant and ongoing challenge. It has been a point of discussion in transportation policy circles for many years, and there is a need for a serious dialogue with all the stakeholders involved to inform optimal solutions.

The May 23, 2018 Stakeholder Forum brought together representatives from the trucking industry, government agencies, researchers and other stakeholders to establish an ongoing dialogue among multiple stakeholders to address and discuss some of the main issues related to this challenge.

### Key Outcomes from the Forum

- **Stakeholders were briefed on and provided feedback on current research** on the impact of overweight trucks and other vehicles on regional infrastructure. These included:
  - The weight of vehicles is going up, and increasingly these trucks are generally loaded most of the time which means there are more loads per mile than ever before. This puts substantial loads on pavement and bridges.
  - New strategies and tools have been developed for assessing the costs of heavy / overweight vehicles on pavement and especially bridges. These could inform permitting policies / pricing in states.
  - The additional costs to the construction of new bridges could be relatively low to make them much more resistant to heavy trucks, however, the main issue is how to deal with the damage cost on existing and old bridges.
- **Clear policy challenges were identified at the federal and state government level** including
  - the lack of sufficient research in several areas to make informed policy recommendations to Congress and other bodies; policy guidance provided for those that may not understand all the technical details is a key factor for success in this area,
  - existing regulations are often very old and do not reflect the current operating environment,
  - federal and state-to-state policies can vary greatly, and there are also many exceptions to federal and state regulations resulting in real challenges in achieving consistency and harmonization.
  - federal funding generally provides funding for capital construction but only limited funding for maintenance of transportation infrastructure.
  - the question of what costs should be borne by the general public / taxpayer versus the trucking industry is an important challenge.

- **Many gaps in information and research necessary to inform policy development were identified.** These included in part:
  - Varying data formats: There is a general lack of data on many issues and where there is data, the data sets from various sources vary in format, which can make putting the data together in a usable format very time intensive; additionally, there may be high uncertainty in available data.
  - Important data is not collected: In the area of highway safety and crash analysis, it is not currently possible to do a state-by-state crash analysis due to lack of data. When states collect truck data, pavement analyses and deterioration results are not included. There is no data on the impact of tire types.
  - Models that follow real-life processes and include multimodal systems are needed: These can be helpful but require appropriate data. Specific models and data needs include: an integrated mode and vehicle choice model; network data for all modes and vehicles; travel times from zip code to zip code; costs and rates from zip code to zip code; reliability estimates from zip code to zip code; estimates of value of time by commodity type; updated network data with flags that indicate the structural capacity of each link
  - Local road pavement distress: There is a need to predict pavement distress increase at local roads due to changes in truck size and weight limits
  - Truck loading and axle configuration impacts: There is a need to determine the impact of truck loading and axle configuration changes on unbound pavement layers, especially for low-volume roads
  - Multidisciplinary approach to evaluating impacts: Quantifying the impact of Overweight/Oversize (OW/OS) vehicles on pavement structures is a challenging task. A holistic evaluation approach is needed including a collaboration that brings several disciplines together.
  - Comprehensive information on truck loading: This should be open data so others can share as well.
  - Effects of overweight trucks on deterioration rates for bridges: This can inform bridge design and related standards.
  - Technology enhanced compliance: Compliance / enforcement methods using sensors and technology to detect overweight vehicles should be explored.
  - Trucker awareness of overweight status & compliance requirements: What is the awareness of truckers that they are overweight and their awareness of the process to comply with permitting regulations? What are potential strategies to improve truckers' understanding of both?
  - Wider economic impacts of regulations: In examining the impact of overweight trucks on infrastructure, it is important to understand the wider economic costs that governmental policies can have on shipping and the potential response from the industry to potential overweight permits/regulations. These include congestion impacts, shipping impacts, etc.

- **The trucking industry representatives had a diversity of concerns and input;** these included:
  - Need for uniformity across jurisdictions in regulations: Greater efficiencies could be realized with uniform national regulations: Current inconsistencies can result in:
    - Inefficient Rerouting: variability in state regulations can result in much rerouting
    - Inability to Comply: A truck may pick up material in one state and deliver it to another state with different regulations and be unable to comply with regulations in all jurisdictions.
  - Providing the trucking industry with better access to data on what facilities have restrictions (including height and weight restrictions) is important.
  - Focus should be placed on truckers without permits, not with permits: The percentage of the truck population that doesn't get permits is a very large number. A focus on monitoring those that do (e.g., with GPS tracking, etc.) unfairly puts a burden on the ones that have permits. The focus should be on those without permits.
  - Liability for overloading should not always be on the trucker: In some cases, the work consists of delivering material to and taking material out of a site. The trucks may be initially loaded on one site with a scale in compliance with weight limits; they then deliver at another site (e.g., a construction site) where they may be loaded with other material but without the use of a scale. These sites often look to max out the capacity of the truck which often results in overloading. The liability for overloading in this case should not fall on the trucker. Onsite scales, if feasible, may be a strategy.
  - Off-hour delivery should be explored to avoid congestion/overloading: Some of the overweight problem and traffic congestion could be alleviated by having trucks deliver at off-hours, but there are currently no incentives for companies to accept deliveries at those hours. A tax or other incentive may assist with this.
  - Parking locations for required driver breaks are lacking: The regulatory limitation on how many hours a driver can drive before taking a break / sleeping necessitates locations where drivers can take a break if needed. However, in many areas there are very few locations to do so. An effort should be undertaken to identify potential sites that could be developed for parking.
  - Overall, the nation's infrastructure is inadequate and more investment is needed.

## Potential Actionable Next Steps

Next steps identified include the following;

- **Improve Information Sharing:**
  - **Establish a User Group / Listserv:** Greater data sharing among the stakeholder community (especially sharing of data from local, state, federal agencies with the research community) should be advanced. The use of a user group or a listserv would

- allow stakeholders to list and share research and ideas. This effort could start with the community brought together by this initiative.
- **Establish a Resource Hub of Available Technology and Current Research:** An ongoing and curated resource on the best available technology for this arena should be established.
  - **Periodic Meetings of Stakeholders:** Continued discussion on this topic and bringing stakeholders from affected areas together to share their perspectives as well as being briefed on most current research
- **Communicate the Need for Additional Targeted Research:** There are key areas where additional research is needed. These are outlined above and in more detail throughout the report. These areas should be communicated to key stakeholders including the relevant TRB committee(s) and the FHWA.
  - **Explore Additional Potential Collaborative Activity:** These activities might include:
    - **Develop Recommendations on a Trucker Information & Compliance Initiative:** It was offered that most trucks don't know they are overweight. The challenge is how do we get them to know how heavy they are and how to comply? Strategies should be explored to see how to better inform truckers and facilitate permit compliance.
    - **Provide Input on NYC Smart Truck Plan:** New York City has a Smart Truck Plan and the NYC DOT would appreciate wider feedback on the plan. This initiative could assist in obtaining feedback from key stakeholders.
    - **Develop Recommendations on Data Uniformity Standards:** Greater uniformity in terms of content and formatting of agency data is important for enabling more effective and efficient research. This should be further explored and potentially specific recommendations should be developed and advanced with appropriate parties.
    - **Provide a Multi-Stakeholder Resource for Policy Guidance:** Policy guidance provided for those that may not understand all the technical and operational considerations is a key factor for success in this area.
    - **Identify Potential Exploratory / Pilot Projects:** Based upon needs of this arena.

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## Introduction

On May 23, 2018, C2SMART at the New York University Tandon School of Engineering and two of its collaborating partners, the Infrastructure Monitoring and Evaluation (RIME) Group at Rutgers University and the International Center for Enterprise Preparedness (INTERCEP), also at NYU, held a meeting to establish a dialogue with multiple stakeholders to address and discuss some of the main challenges related to overweight and heavy vehicles and their impact on transportation infrastructure. Appendix A includes the agenda for the meeting and the list of participants. Appendix B includes a list of references and resources relevant to the topic of the meeting that was prepared prior to the meeting for the participants.

The impact of overweight vehicles has been a point of discussion in transportation policy circles for over 30 years, but there is a need for a serious dialogue with all the stakeholders involved to come up with optimal solutions. States across the country face limited budgets to address serious problems with infrastructure maintenance needs and this requires effective solutions. One way to achieve optimal solutions is to engage stakeholders in a regional effort that can help everyone involved through the use of multi-party dialogue and collaborative problem solving.

C2SMART is a Tier 1 U.S. Department of Transportation (DOT) funded center that conducts research in various areas related to the use of technology and data to solve transportation problems. The center brings together expertise from a diversity of institutions.

The impact of overweight vehicles on transportation infrastructure is an area where the states of New York and New Jersey have similar questions and concerns since trucks do not stay in one state only, and C2SMART can play a role in addressing this regional problem. In this regard, it may leverage the use of sensors, analytics and monitoring with which the collective C2SMART institutions have significant capability.

The May 23, 2018 meeting brought together practitioners, government agencies, researchers and other stakeholders to begin a discussion about ideas and solutions and in order to inform optimal policies in this area. The following summarizes the presentations and subsequent dialogue that followed each presentation as well as outlining potential next steps. This report follows the sequence reflected in the agenda for the day (see Appendix A) with key topics being:

- Research on the Impact of Overweight Trucks and Vehicles on Regional Infrastructure
- Policy Challenges at the Federal Government Level
- Identifying Information & Research Gaps to Inform New Policies:
- The Charge to the Truck Size & Weight Limits Research Plan Committee of Transportation Research Board
- Industry Perspective
- Review and Discussion of Current Research on the Costs Impact of Overweight

- Roundtable Discussions & Stakeholder Input on Key Factors Informing Future Policies (Safety, Enforcement, Bridges, Pavements, Mode Shift)
- Next Steps

## Research on the Impact of Overweight Trucks and Vehicles on Regional Infrastructure

Presenters:

**Hani Nassif, P.E., Ph.D.**, Professor & Director, Rutgers Infrastructure Monitoring & Evaluation (RIME) Group, Dept. of Civil & Env. Engineering, Rutgers, The State Univ. of New Jersey

**Kaan Ozbay, Ph.D.**, Professor & Director, C2SMART Center (a Tier 1 USDOT UTC), Department of Civil and Urban Engineering & Center for Urban Science & Progress (CUSP), Tandon School of Engineering, New York University

Overweight trucks and vehicles have an impact on pavement and bridges with varying damage costs on different highways and infrastructure. Research conducted in this area has resulted in some important insights.

The first challenge was obtaining data since it was kept by different departments and offices that often use different formats. Available data are kept in different databases and it is very time consuming to bring together the data in a dataset that can be used. New Jersey has done a great job in terms of establishing and maintaining the weigh-in-motion stations across the state – there are 94 stations, which constitutes a significant network – and our research team had access to data from 1993.

The data showed a trend over last 20 years, namely that the average weight of vehicles is slightly increasing every year while the weight of the top 5% of heavy vehicles is increasing more rapidly. These trucks are generally loaded most of the time due to better freight logistics, which means there are more loads per mile than ever before. This trend is good for the economy. However, some pavement and bridges were not designed to handle these heavy loads.

The available research in this area tends to focus on the socioeconomic impacts of overweight and heavy vehicles on pavement, and our team also included the socioeconomic impacts on bridges. Weigh-In-Motion (WIM) station data was used to correlate causes of bridge and pavement deterioration and their socioeconomic effects. To assess the impact on bridges, the team reviewed and processed the bridge inspection reports, performed advanced simulation, and filtered and processed the entire WIM data over the last few decades. Similar approaches

were made for pavement by looking at the pavement condition. The results indicate that higher weights are associated with higher deterioration rates on both pavement and bridges. WIM stations are very well distributed, and the modeling suggests a 1.2% increase in damage per year, which is significant.

As mentioned earlier, a key element of this effort is to work with different datasets, and putting the data together in a unified data format is very time intensive. Our research team developed a web-based App, ASSISTME-WIM, as a module to conduct research. The tool includes a map interface that allows a user to analyze WIM data and permit data and to calculate damage costs associated with the overweight truck along a specific truck route. The App provides the number of bridges for a given truck route to calculate the bridge damage cost. Moreover, the length of the route and type of pavement dictates the cost of expected damage to the pavement along that route. This App also has some comprehensive analysis functionalities to create overweight heat maps that indicate where maximum damage is expected to take place along with where permits are required; this allows policymakers to analyze where the state should focus its efforts and to better understand maintenance and replacement needs.

To create this tool, the research team used the permit database obtained from NJDOT to quantify an estimated cost for each truck based on the truck information (weight, number of axle, spacing, etc.) as well as route information (number of bridges, types of pavements, etc.). The state does not charge on a per-mile basis and the tool allows users to see how damages vary depending on a number of factors. For example, an important consideration would be the incentives truck companies have to move from trucks with 4-5 axles (FHWA Class 8 or 9) to trucks with 6+ axles (FHWA Class 10) since that would reduce costs/impacts on infrastructure.

Average cost is misleading because heavier short trucks (e.g., 3 and 4 axles) do more damage than longer trucks (e.g., 6 or more axles) carrying the same gross vehicle weight and distributed over a larger number of axles. The 6-axle trucks are longer and the weight is distributed better, reducing the damage cost. Shifting to 6-axle trucks could reduce costs significantly and could lead to less need for permits. Trucks that distribute the weight better represents an important solution to reduce infrastructure impacts and throughout this dialogue it would be good to hear from different stakeholders as to what this shift would represent to the trucking industries and others.

## Policy Challenges at the Federal Government Level

**Crystal Jones**, Head of Program Delivery, Office of Freight Management and Operations, Federal Highway Administration, US DOT

The Office of Freight Management and Operations is relatively new - 20 years old – and it has a targeted niche and functional area: size and weight of freight vehicles. The Office looks at the overall supply chain and how goods are moving throughout the freight network. The Office is charged with state weight plans, as well as implementing the Fixing America's Surface Transportation (FAST) Act, funding and implementing the Highways Grants Program, and the Transportation Investment Generating Economic Recovery (TIGER) grant program. Research is also a big part of the work of this office, and it is focused on supporting the movement of freight on the nation's highways.

The laws that regulate freight movement are quite old, and the most important laws relate to truck weight. They focus on creating a safe driving environment. US DOT does not change weight regulations; Congress has the authority to do that.

Some key takeaway points about federal limits for truck size and weight include:

- The laws that regulate gross weight, axle weight and related characteristics were established in 1974.
- The Office of Freight Management and Operations conducts research to inform policy decisions regarding those laws.

The Weight Limits Study was designed to address differences in risk in trucks operating within limits and those operating above those limits. Unfortunately, the study showed that there are too many data gaps to make meaningful policy changes. More research is needed in this area. The Office of Freight Management and Operations is working with the Transportation Research Board (TRB) to inform a body of research in this area.

Similarly, in the area of highway safety and crash analysis, it is not currently possible to do a state by state crash analysis due to lack of data. When states collect truck data, they do not report pavement analyses and deterioration results are not included. There is no data on the impact of tire types, for example. These are elements that DOT is currently researching.

In the area of bridge analysis, the Office of Freight Management and Operations is interested in the potential analysis of heavier trucks and their interaction with decks, but there is no analytical approach or quantitative models that could address those impacts.

Do these data/research gaps mean we can't modify policy? Not necessarily. Through events like this one we can begin to address data gaps and promote discussion about research needs. The

Office of Freight Management and Operations is looking to collect information that wasn't available as part of the comprehensive truck axle and weight study. TRB will also look to fill some of these data gaps. DOT has established a firm commitment to continue working on improving data in this area.

The challenges are significant because we can't do much without Congressional action. If you look at base federal limits, based on commodities or vehicles, there are over 20 exceptions which means there are real challenges in achieving consistency and harmonization. About 30 states have grandfathered regulations based on state laws that may have existed before federal laws. The reality is that from a federal level there are limited opportunities to change policies, but we can be better positioned to inform better decisions and policy on a state level.

## Q&A

*Operations and maintenance: Sometimes states like New York have local money for infrastructure but maintenance is a challenge since there is limited staff. To what extent is there funding for operations and maintenance in addition to capital costs for projects such as WIM stations?*

Construction is the main focus. Perhaps the biggest opportunities with regard to operations and maintenance is to look to technology solutions or ITS deployment because if you include operations and maintenance as part of a capital project it probably won't work as well. Most of the projects are not standalone WIM projects but part of an ITS or technology project.

*There have been many truck weight size studies and they always say there is a need for more data. Data is available but states do not make it available in a useful form. But there is data. Has there been an effort to design a form that mandates that the data should be put it in a useful form and to specify what data to collect?*

In terms of data, the Office of Freight Management and Operations is not authorized to mandate those kinds of requirements. That's beyond what DOT can do.

There is a very good system in place to collect data on bridges. In terms of what needs to be collected it is up to the states and if they don't see a value for it they probably won't do it.

One issue we run into with bridge inventory data is that there is a field for lowest minimum clearance but if there is no place or field in the form for clearance on both ways the data will not be collected. Even when there are standards for data like WIM, there is a large amount of collection of WIM data. The data is not always collected in the same format. There are federal guidelines for how data should be formatted but one state used a format that no one else used and this created problems for analyzing data. Even in the presence of standards, you don't

necessarily get the data in the right format. So there has to be a way to verify how the data is being reported.

## Identifying Information & Research Gaps to Inform New Policies: The Charge to the Truck Size & Weight Limits Research Plan Committee of Transportation Research Board

*Presenter:*

**José Holguín-Veras, PhD**, William H. Hart Professor & Director of the Volvo Research and Educational Foundations Center of Excellence for Sustainable Urban Freight Systems and the Center for Infrastructure, Transportation, and the Environment at Rensselaer Polytechnic Institute

This research consists of using models that follow real-life processes and include multimodal systems. The disadvantage of this type of model is that they require commodity flows.

The models allow users to estimate where vehicles go and to account for choice of mode and choice of vehicle. There is a need to focus on choice of vehicle since not all trucks are created equal and roads are not created equal. There are differential impacts.

Government policies like fuel prices influence freight movement and choice. In terms of predictions, the challenge is there can be multiple policies as well as varying fuel prices and these factors interact and in order to determine optimal policies it is necessary to estimate how the truck industry will react to various policies and pricing.

To conduct research in this area, it was necessary to create a dataset with freight mode choice. As part of this research only truck and rail were considered since there was no data on waterways. No single data set contains all the necessary information and it required a lot of effort to put all the data together. This is a very time intensive effort.

In summary, some important research needs in this area include:

- Vehicle choice models
- An integrated mode and vehicle choice model
- Network data for all modes and vehicles
  - Travel times from ZIP code to ZIP code
  - Costs and Rates from ZIP code to ZIP code
  - Reliability estimates from ZIP code to ZIP code
  - Estimates of Value of Time by commodity type
  - Updated network data with flags that indicate the structural capacity of each link

## Q&A

*Is there a way to engage the trucking industries and the private sector to develop data and models?*

The first thing we do is engage the private sector when we start and consult with them because they have key knowledge. We then develop a web site for the models.

An important research need relates to the unit of analysis, focusing on zip codes is less useful in New York City (NYC) where there is a need to focus on neighborhoods. This is more useful for NYC.

*Presenter:*

**Wagdy Wassef, PhD**, Supervising Engineering Manager, Complex Bridge Group, WSP USA

This research work is on the potential impact of six FHWA-proposed heavy legal vehicles on bridges and the costs associated with upgrading the affected bridges. This discussion is about the impact of weight on bridges, not about safety issues.

The goals of the study presented were:

- Screen all bridges in the National Bridge Inventory (NBI) database
- Identify bridges that are expected not to have adequate load capacity to support various proposed trucks safely
- Estimate the cost of replacing the affected bridges by state for each load scenario
- Only the structural load capacity is considered. Fatigue and serviceability were not included in the scope of the study.
- Make assumptions - develop a process to identify bridges that could be affected

A table of load effect ratios was developed for simple spans of different lengths and for two-span continuous spans. The rating factor is a measure of the load capacity available for live load.

A bridge is considered to have adequate load capacity to support a proposed legal loads when it has an operating rating factor > 1.0 under this load at the operating rating level.

Some states have their own additional legal loads and those were not considered in this study.

Bridge replacement unit costs (two cases are considered):

- \$235 per sq foot (same as USDOT study)
- FHWA 2011 cost data for individual states x 1.04<sup>6</sup> to convert to 2017 dollars assuming 4% inflation. Unit cost is then multiplied by 2 to account for other project costs.

## Q&A

*Is the report available?*

It is not available online but it can be requested from NCHRP (NCHRP 20-07 Task 390).

*Presenter:*

**Imad L Al-Qadi, PhD**, Bliss Professor of Engineering, Director, Illinois Center for Transportation, Director, Advanced Transportation Research and Engineering Laboratory, Director, Smart Transportation Infrastructure Initiative, University of Illinois at Urbana-Champaign (participated remotely)

The impact of overweight and oversize on pavement structures may be grouped into five categories:

- Structural analysis and design
  - Contact stresses
  - Dynamic loading
- Local roads
  - Limited data availability
  - Data variability
  - Unbound Layers
- Platoons
  - Need to quantify the impact
- Incorporate uncertainties
  - WIM Data
  - Material characteristics
- Network level analysis
  - Higher load vs lower repetition

Structural design and analysis

- Increase load on truck, happens on lower part of pavement, and determine the proper technique to simulate realistic tire contact stresses/area and dynamic loading
- Develop performance prediction models that consider changes in truck size, weight limits, and axle configuration
- If we use current design techniques, we need to have a performance model prediction to allow us to consider what we observe in the field and then translate into expected damage in the field

Network level analysis

- Heavier vehicles develop higher pavement structural responses; however, load repetition is expected to decrease for a given quantity of goods carried

- There is a trade-off for increasing weight limits. It should be addressed by incorporating rehabilitation and maintenance costs and environmental impacts

#### Local roads

- There is a need to predict pavement distress increase at local roads due to changes in truck size and weight limits
- There is a need to determine the impact of truck loading and axle configuration changes on unbound pavement layers; especially for low-volume roads
- Issues: limited data availability and variability in local highway construction and maintenance practices – the data we have available on local roads is limited and the uncertainty in this data is higher

#### Incorporating uncertainties

- Pavement design and analysis have many uncertainty sources:
  - Material characteristics
  - WIM data collection
  - Climate modeling
- It is important to incorporate uncertainties into decision making process

#### Automated truck platooning

- 76.6% of vehicle miles are platoon-able but there is a trade-off
- According to NREL, 2017 - 6.4% energy saving: 1.5 billion gallons of petroleum, 1.53M metric tons of CO<sub>2</sub>

#### Summary

- Quantifying the impact of OW/OS vehicles on pavement structures is a challenging task
- A holistic evaluation approach is needed; including a collaboration that brings several disciplines together

## Trucking Industry Perspective

#### *Presenter:*

**Steven Todd**, Vice President, Specialized Carriers & Rigging Association

Our members move almost exclusively above weight limits so our perspective is important. The Specialized Carriers & Rigging Association (SCRA) has an official position of neutrality with respect to weight increases. Greater efficiencies could be achieved but we also acknowledge concerns about state of infrastructure and equipment concerns.

SCRA members are experienced in moving heavy equipment and employ the most experienced personnel and safest equipment.

Drivers are put through rigorous in-house training programs.

With regard to equipment, SCRA members have gone through considerable expense in getting the best equipment - superior to most other safe truck traffic - 100-200 thousand pounds. If weight limits are lifted, SCRA would encourage everyone to look at its procedures.

It would be better to do this at the federal level not at the state by state level. State variances are wide in terms of loads and weights and how these are managed. Spacing allowances also vary significantly. Provisions of overweight loads are also very variable.

State implementation of weight provisions results in trucks rerouting.

In summary:

- Greater efficiencies would be realized with uniform regulations - variability in state regulations can result in a lot of rerouting
- The nation's infrastructure is currently inadequate and more investment is needed

## Q&A

*You are neutral in terms of weight increase. Do your members have GPS tracking of their vehicles? Would they be opposed to being tracked with GPS so if they deviate from a route they could get a summons?*

The first concern of GPS tracking is the immense number of variables that could cause bells and whistles - many states grant us 0.5 to a little more than one mile of deviating from the route for food, safety, etc. We are never opposed to enforcement as such but we would need to sit down and look at the details of monitoring on route and off route. Texas is experimenting with lasers and other technologies. Law enforcement is very challenging when it comes to monitoring. For example, imagine what happens as trucks go from one state to another and these states have different allowances. It means more burden for law enforcement.

Law enforcement is a challenge we can't address with just more resources. We don't want to penalize the ones that want to do it right and get the permits. The percentage of truck population that doesn't get permits is a very large number and the burden should not be on the ones that have permits.

*Presenter:*

**Joseph Ferrara**, Association of NYC Concrete Producers; Vice President, Ferrara Concrete

Ferrara Bros. started as a family business in 1969 producing and delivering ready-mixed concrete. When the federal overweight laws were imposed in the mid-1980's mandating that the states lower maximum allowable truck weights, as part of the state legislation, New York City was granted authority to issue its own overweight permits – which it still does.

However, as of 2015, Ferrara Bros. became part of US Concrete, a national publicly held company, and has expanded through mergers and acquisitions of a few competitors. In addition, while other NYC concrete companies have grown as well in the last 35 years, the number of NYC issued permits has decreased. While there is a willingness on the part of the industry to obtain more permits to be compliant, there has been resistance at the NYC DOT to issue additional permits. Thus, many companies and trucks in the industry do not currently have any NYC Overweight permits. This has created an unlevel playing field as the companies who wish to be compliant cannot do so, while many other companies have never even attempted to comply.

The concrete industry is one of the few manufacturing businesses left in NYC. Concrete is manufactured using cement, sand, stone and water. After water, concrete is the second most consumed product in the world.

There are approximately 30 ready mixed concrete companies in NYC, with a total of approximately 900 trucks. Less than a third of them have (or have had) NYC permits. All construction projects – affordable housing to luxury high-rises as well as roads, bridges, sewers and tunnels – depend on timely deliveries of concrete without delay. As concrete is highly perishable, every single minute is critical when pouring and placing concrete.

At its peak, NYC DOT issued approximately 3,000 overweight permits and now there are less than 700 (Source: Response to FOIL request from NYC DOT). When the Overweight Permit system was initiated, concrete mixers only had 2 or 3 axles. Now most concrete mixers have 4 axles to better distribute the weight of the load. With a valid permit, a concrete mixer with the proper number and spacing of axles can legally carry about 11 to 12 cubic yards of concrete. Without a permit, the same truck can only carry approximately 4 ½ to 5 cu. yds of concrete. Thus, there would be double to triple the amount of trucks to deliver the same amount of concrete every single day.

There are over 800 bridges in NYC – some of which are in better condition than others. The member companies of the Association of NYC Concrete Producers (who are union employers) understand and wholeheartedly endorse NYC's interest in protecting its roads and bridges. However, by not allowing the renewal, transfer or expansion of permits, it stifles growth and is unfair, inequitable and harms NYC in a number of ways – (a) loss of revenue to NYC for permit

fees; (b) increased congestion; and (c) greatly decreased capacity – and enormously increased costs to deliver concrete to public and private sector construction projects.

While the 4 axle concrete mixers should alleviate any concern for potential damage to the infrastructure, the industry is also exploring novel ways to address the City's concern for its infrastructure by using GPS tracking on its trucks to avoid traveling on sensitive bridges or roadways through a pilot program with NYC.

*Presenter:*

**Patrick Hyland**, Executive Director, New York Metropolitan Trucking Association

The New York Metropolitan Trucking Association has similar concerns to those expressed by Joseph Ferrara. There are heavy construction and large-scale infrastructure projects throughout the region. Some of the businesses in this association have been operating for a long time. Some have permits but some of the newer ones do not.

The industry standard requires multiple runs per day, with a minimum of two per day. But most hope to get three runs per day. Occasionally there are four runs but this is rare.

The work consists of delivering material and taking material out of a site. The trucks may be initially loaded on one site with a scale in compliance with weight limits; they then deliver at another site (e.g., a construction site) where they may be loaded with other material but without the use of a scale. In terms of weight, these trucks can carry 80,000 pounds, but a lot of permits are for 50-60,000 pounds. These sites often look to max out the capacity of the truck which often results in overloading.

All the liability falls on truck owners. That means a lot of trucks are running out of compliance. They take this risk to get to work and complete their runs.

One important issue for the NY Metropolitan Trucking Association is uniform weight standards in the region. All liability should not fall on the truck owners. Often a truck will pick up material in one state and deliver it to another state and they are unable to comply with all jurisdictions. There should be uniform standards.

## **Q&A**

*Any thoughts on technology scales?*

The cost of construction would be higher and would require more trucks if everyone had to operate at weights of 50-60,000 pounds. There have been preliminary discussions with the NYC

current administration, but again all liability falls on the trucker. There is a need to look at a uniform standard.

In Australia they have a chain of responsibility law to protect the trucking industry from abuses since sometimes they are the weaker element in the supply chain. There would probably be opposition to something like that in NYC.

*There is talk of lack of shared liability. If it were feasible to enforce weight regulations, what kind of change would you anticipate in the construction materials industry? Would there be more trucks or would the material change?*

It would result in more trucks in NYC under the current situation. I have not heard of any development of equipment that would allow material change in the foreseeable future.

In other states there are booster axles or bridge axles. I don't know that that would work in the dense urban environment of NYC.

Permits are capped so if a company acquires a new company without permits, they can't get more permits. So they just take a chance on not getting tickets.

The law regulating weights is from 1986 and no new permits are granted over 80,000 pounds. These permits are expected to be phased out. But NYC doesn't have an enforcement mechanism. The NYPD fleet often has only one action per week.

*With regard to uniform weight standards, NYC has an issue with that because of its 400 year old infrastructure. Things like platooning don't apply to NYC.*

Class 7 and Class 5 vehicles are overweight in NYC but that's the nature of the business.

*Presenter:*

**John Bowlby**, Director of Safety & Human Resources, Carbon Express Inc.

Carbon Express Inc. does not have sleeper trucks and this saves about 5-6 thousand pounds per load. Their trucks are at 50,000 pounds. The fuller the tank the safer it is because there is less slosh.

The weight problem can be alleviated by having trucks deliver at off-hours. But there are currently no incentives for companies to accept deliveries at those hours. There could be a tax incentive to address this.

At other times there is too much traffic at I-95. A lower toll on the Tappan Zee bridge could alleviate some of this.

Trucks are mandated to have electronic logging devices (ELDs) in the trucks. Once a driver starts his 14 day clock starts. This is also relevant to the discussion about when deliveries can be made and whether the receiver can receive it during that time.

### **Comments from the audience**

*From a bridge perspective it is important to consider that there is a multiple-presence factor. It is possible to make a durability argument that fewer trucks even if heavier could be better.*

*NYC is currently working on its Smart Truck Management Plan. It would be beneficial to have a dedicated fund but there is no way of implementing it. TBTA reduced tolls on its bridges and it will be important to analyze the data when it is available to understand how trucks respond to price changes.*

*An important challenge for NYC is working with receivers. The issue is not the trucker but the receiver. If enough data is generated stakeholders can push for better legislation. It would really help to have more data.*

## **Review and Discussion of Current Research on the Costs Impact of Overweight Vehicles**

*Presenter:*

**Hani Nassif, P.E., Ph.D.**, Professor & Director, Rutgers Infrastructure Monitoring & Evaluation (RIME) Group, Dept. of Civil & Env. Engineering, Rutgers, The State University of New Jersey

With regard to the impacts of overweight vehicles on bridges, the discussion should not be only about weight. It is important to consider the cycle, the frequency of times the trucks go over a bridge.

New Jersey has a condition ranking for the concrete deck of bridges and this allows them to make a decision about when to replace the deck. For example, if the girder has a condition of 5 means it needs to be replaced as a structural element supporting the deck because that it is critical for the safety of the bridge. On the other hand, concrete decks are replaced when condition rating of 4 is observed.

The National Bridge Inventory has information about the service life of these bridges. Research conducted by this research team examined the NJ State route weighted-average deterioration rate compared to the Interstate weighted-average deterioration rate. In the latter the

deterioration rate has more to do with frequency and traffic; it is a combination of traffic and weight loads/overweight. It's not always that overweight vehicles are correlated with the damage but the data suggests that overweight vehicles are correlated with deterioration but it's not the same for all types of bridges.

Existing bridges in New Jersey were built in the 1950s - 1970s. For these bridges overload refers to more than one parameter, it includes overweight vehicles and the number of times the vehicles go over the bridges.

The strongest correlation with damage is trucks over 80,000 pounds. Bridges were designed for trucks below 80,000 pounds and above that weight the correlation with damage is much higher. However, this is not the case for steel bridges.

*Presenter:*

**Graziano Fiorillo**, Rutgers University

The research presented below is based on the report: ***Effects of Overweight Vehicles on New York State DOT Infrastructure***, Final Report (2015). See full reference in Appendix B.

The objective of this research was to develop a methodology to assess the cost to New York State highway bridges and pavement due to overweight vehicles. It considered the costs due to permitted overweight vehicles and also those that are not permitted (illegal overweight trucks). Both bridges and pavements were analyzed in this research work.

Methodology concept for bridges: The estimated cost is defined as Safety Margin Utilization (SMU) cost, and this includes the following components:

- Overstress SMU cost
- Girder fatigue SME cost
- Deck fatigue SMU cost

*Overstress SMU* estimates the cost to design and build bridges with nominal capacities that envelope the moment effects of overweight trucks. *Fatigue SMU* estimates the cost of reducing the design life of bridges for the fatigue limit state.

The conclusions of this research project include:

- The data indicate that about 11% of the trucks traveling on New York highways may be carrying divisible load permits, 1% may be carrying special hauling permits, and 6% may be illegally overweight.
- Because of the presence of reserve strength capacity in bridge design standards, most overweight trucks do not lead to bridge collapses but they increase the risk of failure by

reducing the built-in safety margin. For this reason, the cost allocation approach followed in this study is identified as “Safety Margin Utilization (SMU) cost”.

- The total SMU cost for New York state bridges is estimated to be \$95M per year due to all overweight vehicles. The effect of divisible permit vehicles is about \$50M per year, Special hauling permits is \$2M, and the cost due to illegally overweight vehicles is \$43M.
- NYS pavements are designed using the Equivalent Single Axle Load (ESAL) method while the number of maintenance cycles is determined using the Mechanical-Empirical Pavement Design Guide (MEPDG) method.
- The cost allocation study performed on the entire NYS pavement network shows that the overall cost due to overweight trucks is on the order of \$145 M per year divided into \$78 M/year for divisible permit trucks, \$7 M/year for special hauling trucks and \$60M/year for illegally overweight trucks.

The main objective of the New York Overweight study was to develop practical tools that would allow the New York State Department of Transportation (NYSDOT) personnel to analyze overweight trucks both at a corridor and network level. At this purpose, three software packages were deployed for the analysis of Weigh-In-Motion data, bridges and pavements, respectively, giving the user the flexibility of performing refined analyses on the corridors while using statistical methods at the network scale and a life-cycle approach for pavements.

Comparing to other studies such as the New Jersey Impact study, here the correlation between deterioration of bridges and overweight trucks was not directly addressed. Also, in the New Jersey study the research team looked at specific deterioration models, and the results suggested that the trigger point is not fatigue. However, when the mechanism of failure becomes so complicated with several failure modes that overlap it is difficult to identify a unique model that can correctly predict the behavior of the structure.

## Q&A

Have WIM stations graduated to urban environments where there is congestion and other factors?

WIM technology uses different types of sensors: piezo electric sensors, quartz sensors and others. They vary by cost. The sensors used are typically not highly accurate. On axle weight, it's about +/-20%. The technology just has not been there. In Korea, they have installed highly accurate sensors/algorithms and their goal is to do autonomous ticketing. In the next couple of years the technology will improve significantly - that is the hope.

*Presenter:*

**Imad L Al-Qadi, PhD**, Bliss Professor of Engineering, Director, Illinois Center for Transportation, Director, Advanced Transportation Research and Engineering Laboratory, Director, Smart Transportation Infrastructure Initiative, University of Illinois at Urbana-Champaign

More detailed information about the research summarized below can be found in the report titled ***Development of a Proposed Overweight Vehicle Permit Fee Structure in Illinois (2017)***. See Appendix B for the full reference.

The motivation to conduct this research is based on the following:

- Between 2013 and 2040, the amount of freight moved every day in the United States will increase from 38.2 to 51.5 million tons
- There is a need to provide a well maintained and functional infrastructure for safer mobility
- Maintenance and rehabilitation budgets are decreasing
- There is a need for up-to-date assessments of the impact of overweight vehicles on the highway system for permit fee calculation

Illinois has established a relatively comprehensive overweight permit fee system that takes into consideration gross vehicle weight, axle weight, and distance. However, most fees have not been revised in more than 30 years.

In this study, a proposed fee structure was developed to reflect current economic impact caused by overweight vehicles on pavements, bridges and highway safety.

The development of a data-driven fee followed these steps:

Step 1 - Develop databases: environmental factors, infrastructure condition and traffic characteristics

Step 2 - Use state of the art prediction/classification algorithms - prediction models

Step 3: Permit fee should consist of pavement fee, safety fee and bridge fee

A framework for bridge fees was developed using the National Bridge Inventory (bridge conditions and characteristics) and weight-in-motion data (vehicle weight distribution) to develop two scenarios:

- Scenario 1: with damaging trucks
- Scenario 2: without damaging trucks

The recommended fee formula is:

- Pavement:  $\$0.157/(\text{mile} \cdot \Delta \text{ESAL})$
- Bridge:  $\$0.0182/(\text{mile} \cdot \Delta \text{kips})$

- Safety: \$0.148/mile
- Fee: miles\*(0.148+0.157\*ΔESAL+0.0182\*Δkips)

There were many difficulties during the database analysis, including specific issues associated with bridges and number of lanes, and how these are calculated.

## Q&A

*How is the pavement model different from Mechanical-Empirical Pavement Design Guide (MEPDG) method?*

What we used was performance models based on axle load that were developed internally based on the data available to us. Transfer function used by MEPDG does not consider freezing index. We considered existing conditions for the pavements, divided pavement into high volume and low volume, so there are differences between the two approaches.

*What is the philosophical reason for your safety surcharge for this class of vehicle?*

The focus of this study is to consider whether operating an overweight vehicle has an impact on safety. And the answer according to the models is that yes, absolutely. Mathematical models were developed and the results found correlations with the condition of pavement.

*If you restricted those overweight trucks you may end up with more trucks? Is it worth it to replace four trucks with five trucks that are compliant?*

The probability of having a crash can be increased. If you have an overweight vehicle, there was an increase in the probability of a crash. If you hold freight constant then yes, safety remains the same.

*The formula makes sense from a policy and economic perspective, but as an agency, we can't take into account impact on traffic, we can only legally charge the administrative cost of issuing the permit. Can other states include social costs?*

In Illinois, there is an administrative cost and this has to be added to the equation, the goal of the equation is to provide the agency with the additional elements they should consider.

## Roundtable Discussions & Stakeholder Input on Key Factors Informing Future Policies

### Safety

The first roundtable discussion focused on safety issues. The meeting participants raised the following concerns and potential areas of improvement:

- The driver hour issue and the potential for off-hour deliveries could improve safety.
- The development of special lanes for trucks, like the ones available for buses.
- Oftentimes there are issues related to truck parking; they cannot find parking and truck parking facilities do not have enough capacity - this is something that New Jersey has an ongoing problem with.
- With the electronic logging device (ELD) mandate drivers run out of time and then have to hand over their load to someone else; when they swap out the load with another trucker this compounds the problems - 11 hours driving and 14 hour shift and 10 hour break.
- Consumer goods prices may go up because of lack of drivers, it will impact everyone.
- Truck drivers are in a quandary; they may violate the ELD mandate if they can't find a parking place; so one way or another they may be violating the law.
- Freight rates are going up for all of us; there is a lot of mode shift because of the driver shortage and increased cost structures. Connecticut will replace stacks down which will make traffic there more difficult, the rules in CT are different from those in NY.
- NYC has concerns about trucks parking overnight and where they should not be. Some are just passing through New York. It's a quality of life issue. Right now there is only one truck parking facility near JFK Airport and it is usually full. But part of the reason why it is full is that local fleets need the space; it's not necessarily due to trucks making deliveries. DOTs don't get into the business of truck parking as these facilities are expensive to maintain as they require patrolling, bathrooms, etc.
- If there was a process for off-hours deliveries and shipping, then you could address some of these concerns because trucks could be in and out of the city without the need for taking a half hour break in the city. It would lead to less congestion, etc.
- Does having an overnight shift increase costs for the trucking industry? It does, but it's more than made up for by not spending so much time stuck in traffic.

- The problem with off-hours deliveries is that it requires having receivers at off hours, like restaurants, but you need incentives for people to be there.
- A challenge is defining “What are off-peak hours?” There are also noise restrictions/noise pollution regulations and neighborhoods that do not like to have more trucks at these hours.
  - In NYC: Off-hours are 7 pm to 7 am. Noise is monitored and city has noise mitigation programs.
  - It doesn’t have to be after midnight.
- What percentage of truck and car accidents are caused by trucks? 75-80% are caused by car drivers. Another safety issue could be programs to teach auto drivers how to navigate around trucks.
  - The Truck’s Eye View Program was developed to train people how to drive bicycles and cars around trucks. That is the kind of education that NYC DOT is currently doing to promote awareness.
- A trusted vendors program can be implemented to that unattended deliveries can be made.

## Enforcement

The second roundtable discussion focused on enforcement issues. The meeting participants raised the following concerns and potential areas of improvement:

- Along the lines of enforcement is compliance, our members want to be compliant but legislation doesn’t allow us to be compliant. We are trying to partner with NYC to figure out how to be complaint. Without a permit the weight allowed is 56,000 pounds and with a permit it is 79,000 pounds. Yet the number of permits has been reduced. The New York City Commissioner has the authority to issue more permits. The fee is 7,000 dollars. A lot of members feel permits are being issued to increase the revenue stream to the city because one permit is easier to issue than the many equivalent car tickets to raise the same amount.
- The city has an interest in minimizing congestion, so more compliance means more trucks nowadays; if you don’t have a permit and are not in compliance a truck could carry 90,000 or 100,000 pounds, it doesn’t make a difference to them. Increased permits could be sold and this money could be used for maintenance.

## Bridges

*Presenter:*

**Richard Schaefer**, Chief Bridge Engineer, HNTB

With regard to how trucks relate to bridges, most of my work has been in New Jersey. An area that we analyzed is a population of bridges that carry some of the heaviest trucks. This work provides insights into the types of trucks on the roads and the impact they have these roads.

There was a case of a bridge that had just been rehabilitated and one of the four beams was cracking and a triple-axle came along with incredible stress.

Bridge engineers think of costs as materials (90%) and labor (10%). Materials is 10% of bridge deck. Concrete fatigues and trucks damage the bridge deck. A 10 inch deck might be a 100 year deck. The additional cost of going from a 9 inch to a 10 inch deck is relatively small and it makes a big difference.

Our design standards and our live load analysis suggest these structures are not lasting as long as expected, and these models have been outdated for over 10 years. With today's materials we should be able to do more.

Trucks are not moving empty at any time anymore, they are always loaded, and this is an issue for bridges.

We looked at a large set of WIM data, this led to changing load factor for fatigue; the numbers were low for today's traffic. We found that when they set up HL93, and still this load covers what we have today. New bridges should not be of concern. But what can we do about all the existing bridges if we allow heavier trucks to go on them?

Relative to floods, heavy trucks don't result in structural failure or collapse but over time they cause a lot of damage. We need to make sure we don't put existing bridges at risk.

Additional costs to new bridges could be relatively low to make them much more resistant to heavy trucks.

The design load model we use was based on what was running on highways.

## Pavements

*Are there any studies of asphalt and concrete for roads and how they perform?*

Yes, the New York State DOT experience is that there is no major difference and they use both equally. TRB has many studies in this area. Concrete may be better in a hot climate but here in NY the results are similar.

## Mode Shift

*Kaan Ozbay:* We did a study for New Jersey on mode shift in using short rails, short segments of rails that connect factories to larger railroads. If you lose those connections then the alternative is to switch to more trucks and the outcome is not that obvious; instead of shifting to trucks, the freight may shift to another state. If there is a shortage of drivers, this complicates things. This is an open topic for research.

The North Jersey Transportation Planning Authority (NJTPA) is working on freight, rail, and industry opportunities program. They are exploring the use of rail in the future. In this study we tried to identify opportunities along a rail corridor to identify opportunities in the future. People are moving forward in this direction of using more rail.

NYC has a “Vision Zero” goal; it’s not all about trucks. There are also cycling issues. NYC is exploring pedal assist electric cargo delivery; these could help with that last mile delivery of cargo. E-bikes could be part of the solution for that last mile cargo.

## Next Steps

At the end of the meeting there was a round robin where participants were asked to come up with a single sentence on what they thought could be a next step or an actionable action. These were the comments:

- From a bridge design point of view, we need to understand the deterioration of bridges due to overweight trucks; studies are not available to assess whether design standards should be changed.
- Comprehensive information on loading, open data so others can share as well.
- Using sensors and technology to detect overweight vehicles, figure out enforcement methods that can be used to regulate that the overweight.
- Data sharing and best available technology, such as the potential application of lasers used in Texas; insights on the use of that technology in this region.
- Before we come down hard on fees, etc., we need to get better permit compliance; most trucks don't know they are overweight. How do we get them to know how heavy they are and to comply? We have some permit data but we need more.
- More research is needed on the effects of overweight trucks on deterioration rates for bridges in different regions.
- Share data through the use of a user group or a listserv that could come out of this conference, this would allow stakeholders to list and share research and ideas.
- With regard to the truck parking issue, survey potential sites that could be developed for parking.
- In terms of discussing the impact of overweight trucks on infrastructure, it would be important to address the economic costs that would result for shipping and/or the response from the industry to mitigate the cost impacts of full compliance with overweight permits/regulations. These include congestion impacts, shipping impacts, etc.
- Continued discussion on this topic and bringing people from other affected areas to hear their perspectives.
- There are issues with enforcement at some regional facilities where there are restrictions on overweight vehicles that are causing structural issues. So enforcement and providing the trucking industry with better access to data on what facilities have restrictions would be an important development in this area and this would include height and weight restrictions.

- Policy guidance provided for those that may not understand all the technical details is a key factor for success in this area.
- Even though studies have shown there is a lack of data in areas pertinent to this area, that is no reason for inaction. This community should be prepared to make recommendations on how to fill data gaps and continue to make progress with data collection and databases.
- Having everyone in the room is great to hear different perspectives and to hear the latest research in this field.
- Another factor to consider is what is fair for public tax payers to pay and how we balance that with long-term needs.
- New York City has a Smart Truck Plan and it would be great to get feedback on the plan.

## Closing Remarks

### **Kaan Ozbay**

Thank you all for being here. This was more than what we had hoped for and hopefully this will continue so that we can all continue to learn more about what everybody in the region is doing.

Data is very important and this is something that has been mentioned a lot today. A potential future event could be a forum to bring data together. If we know what the data needs are, we can make sure the data are collected to inform policy.

The goal is to take these results and turn them into an actionable policy and to find ways to implement the findings as policies that are good for industry, agencies and tax payers.

### **Hani Nassif**

Thanks everybody for attending this meeting. We had some really interesting and thought provoking questions, and we want to have our collective work inform actionable policies. We need to have a champion to support legislative efforts.

We hope this meeting will be the first in a series of meetings and maybe the meetings can rotate to other institutions like Rensselaer Polytechnic Institute (RPI) and Rutgers University. A key item of discussion for a future meeting is how to harmonize the process of issuing truck permits. That could be a big item in the agenda that applies to both bridges and pavement.

## Appendix A: Meeting Agenda

### ***New Policies & Directions for Overweight, Heavier & Larger Vehicles:***

*A Multi-Stakeholder Approach to Developing Effective Policies to Reduce the Impact Costs on Roads and Bridges*

**May 23, 2018**

**New York University, Brooklyn NY**

#### **Forum Objective**

To convene transportation stakeholders to inform the development of new government policies to address the impacts of truck weight and size on transportation infrastructure. In particular, to discuss:

- current impacts of overweight trucks on transportation infrastructure
- potential impacts of the trend towards larger and heavier trucks
- current research and topics requiring further research
- potential multi-stakeholder collaboration to inform sound government policy development

***Forum is Hosted By***



C2SMART Center is a USDOT Tier 1 University Transportation Center taking on some of today's most pressing urban mobility challenges. Using cities as living laboratories, the center examines transportation problems and field tests novel solutions that draw on recent advances in communication and smart technologies. Our consortium includes New York University, Rutgers University, University of Texas at El Paso, University of Washington, and City College of New York.

***Participating Centers***



New York University's International Center for Enterprise Preparedness (INTERCEP) is the first academic center dedicated to organizational resilience and agility. The center maintains a global outreach with a special focus on multi-party collaboration including business-to-business and public-private partnerships.



Rutgers Infrastructure Monitoring and Evaluation (RIME) Group is a multi-modal transportation infrastructure research and education partnership focusing on the structural health monitoring, advanced concrete and innovative materials, traffic and transportation analysis, life cycle cost analysis, impact of overweight trucks on infrastructure, reliability-based code calibration, computer-aided modeling and analysis, etc.

9:00 am

### Welcome, Introductions & Overview of the Agenda

- **Bill Raisch**, Director, INTERCEP, a C<sup>2</sup>SMART Participating Center
- **Crystal Jones**, Head of Program Delivery, Office of Freight Management and Operations, Federal Highway Administration, US DOT
- **Round Robin Introduction of Participants**
  - *Name, Title, Organization and Core Reason for Attending*

9:20 am

### Opening Remarks

- **Hani Nassif**, P.E., Ph.D., Professor & Director, Rutgers Infrastructure Monitoring & Evaluation (RIME) Group, Dept. of Civil & Env. Engineering, Rutgers, The State Univ. of New Jersey
- **Kaan Ozbay**, Ph.D., Professor & Director, C<sup>2</sup>SMART Center (a Tier 1 USDOT UTC), Department of Civil and Urban Engineering & Center for Urban Science & Progress (CUSP), Tandon School of Engineering, New York University

9:40 am

### The Policy Challenge in Potential Changes to Truck Size & Weight Limits

- **Crystal Jones**, Head of Program Delivery, Office of Freight Management and Operations, Federal Highway Administration, US DOT

10:10 am

### Identifying Information & Research Gaps to Inform New Policies: *The Charge to the Truck Size & Weight Limits Research Plan Committee of Transportation Research Board*

- **José Holguín-Veras**, PhD, William H. Hart Professor & Director of the Volvo Research and Educational Foundations Center of Excellence for Sustainable Urban Freight Systems and the Center for Infrastructure, Transportation, and the Environment at Rensselaer Polytechnic Institute
- **Imad L Al-Qadi**, PhD, Bliss Professor of Engineering, Director, Illinois Center for Transportation, Director, Advanced Transportation Research and Engineering Laboratory, Director, Smart Transportation Infrastructure Initiative, University of Illinois at Urbana-Champaign (*participating remotely*)
- **Wagdy Wassef**, PhD, Supervising Engineering Manager, Complex Bridge Group, WSP USA
- **Jean Nehme**, PhD, Team Leader, Long Term Infrastructure Performance Program, Office of Infrastructure Research and Development, FHWA, USA (*Invited*)

10:55 am

### Break

11:10 am

### Understanding the Spectrum of Trucking / Freight Industry Perspectives, Concerns, Issues & Recommendations

New Policies and Directions for Overweight, Heavier & Larger Vehicles

- **Industry Representatives** Discuss TL / LTL / Short Haul / Long Haul / Tank Trucks
  - **Patrick Hyland**, Executive Director, NY Metropolitan Trucking Association
  - **Steven Todd**, Vice President, Specialized Carriers & Rigging Association
  - **Sean McAllister**, National Tank Truck Carriers; Controller, Carbon Express *(Invited)*
  - **Joseph Ferrara**, Association of NYC Concrete Producers; Vice President, Ferrara Concrete

**12:10 noon**      **Luncheon** (provided onsite)

**1 pm**              **Review and Discussion of Current Research on the Costs Impact of Overweight Vehicles**

- General Overview of Research
- A Case in Point: *Recent Project for the State of New Jersey with Potential for Wider Application*

**1:30 pm**              **Break**

**1:45 pm**              **Roundtable Discussions & Stakeholder Input on Key Factors Informing Future Policies**

- Bridges
- Pavements

**2:45 pm**              **Break**

**3:00 pm**              **Roundtable Discussions & Stakeholder Input on Key Factors Informing Future Policies**

- Safety
- Enforcement
- Mode Shift

**4:00 pm**              **Summary & Discussion of Next Steps**

- Confirming Stakeholder Perspectives
- Identifying Points of Consensus
- Needs for Further Information / Research
- Opportunities for Collaboration
- Follow-up Events

**4:30 pm**              **Closing & Informal Reception**

## Appendix B: References and Resources

### ***New Policies & Directions for Overweight, Heavier & Larger Vehicles: A Multi-Stakeholder Approach to Developing Effective Policies to Reduce the Impact Costs on Roads and Bridges***

#### **Impact of Freight on Highway Infrastructure in New Jersey**

Final Report

September 2015

Authors: Hani Nassif, Kaan Ozbay, Hao Wang, Robert Noland, Peng Lou, Sami Demiroglu, Dan Su, Chaekuk Na, Jingnan Zhao and Miguel Beltran

New Jersey Department of Transportation and Federal Highway Administration

#### **Impact of Freight on Highway Infrastructure in New Jersey**

Technical Brief

June 2016

New Jersey Department of Transportation and Federal Highway Administration

#### **Effects of Overweight Vehicles on New York State DOT Infrastructure**

Final Report

September 2015

Authors: Michel Ghosn, Graziano Fiorillo, Volodymyr Gayovyy, Tenzin Getso, Sallem Ahmed and Neville Parker

Department of Civil Engineering, The City College of New York/CUNY

[https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/C-08-13%20Final%20Report\\_Sept%202015.pdf](https://www.dot.ny.gov/divisions/engineering/technical-services/trans-r-and-d-repository/C-08-13%20Final%20Report_Sept%202015.pdf)

#### **Plan 2045: Maintaining the Vision for a Sustainable Region**

June 2017

New York Metropolitan Transportation Council (NYMTC)

<https://www.nymtc.org/Required-Planning-Products/Regional-Transportation-Plan-RTP/Plan-2045-Maintaining-the-Vision-for-a-Sustainable-Region>

### **Comprehensive Truck Size and Weight Limits Study**

Report to Congress

April 2016

U.S. Department of Transportation / Federal Highway Administration

[https://ops.fhwa.dot.gov/freight/sw/map21tswstudy/ctsw/ctswls\\_rtc\\_2016.pdf](https://ops.fhwa.dot.gov/freight/sw/map21tswstudy/ctsw/ctswls_rtc_2016.pdf)

### **Best Practices in Permitting of Oversize and Overweight Vehicles: Final Report**

February 2018

U.S. Department of Transportation / Federal Highway Administration

<https://ops.fhwa.dot.gov/publications/fhwahop17061/fhwahop17061.pdf>

### **Compilation of Existing State Truck Size and Weight Limit Laws**

Report to Congress

May 2015

U.S. Department of Transportation / Federal Highway Administration

[https://ops.fhwa.dot.gov/Freight/policy/rpt\\_congress/truck\\_sw\\_laws/truck\\_sw\\_laws.pdf](https://ops.fhwa.dot.gov/Freight/policy/rpt_congress/truck_sw_laws/truck_sw_laws.pdf)

### **Pilot/Escort Vehicle Operators Best Practices Guidelines**

February 2017

U.S. Department of Transportation / Federal Highway Administration

<https://ops.fhwa.dot.gov/publications/fhwahop16051/fhwahop16051.pdf>

### **Measuring the Impacts of Freight Transportation Improvements on the Economy and Competitiveness**

September 2015

Laurence O'Rourke, Eric Beshers and Daniel Stock

U.S. Department of Transportation / Federal Highway Administration

<https://ops.fhwa.dot.gov/publications/fhwahop15034/fhwahop15034.pdf>

## **Impact of Freight Movement Trends on Highway Pavement Infrastructure**

Final Report

April 2015

Shane Underwood and Sathish Kannan Nagarajan

National Transportation Center at Maryland (NTC@Maryland) / University of Maryland

<http://ntc.umd.edu/sites/default/files/document/research/NTC2014-SU-R-11%20Shane%20Underwood.pdf>

## **Development of a Proposed Overweight Vehicle Permit Fee Structure in Illinois**

February 2017

Authors: Imad Al-Qadi, Yanfeng Ouyang, Hadi Meidani, Osman Erman Gungor, Antoine Petit, Junjie Qiu, Hao Wang and Jingnan Zhao

ICT Project R27-152 - Validation and Revision of Fee Charged for Oversize/Overweight Vehicle Permits

FHWA and IDOT

<https://www.ideals.illinois.edu/bitstream/handle/2142/96285/FHWA-ICT-17-004.pdf?sequence=3&isAllowed=y>