Improving Freight System Performance in Metropolitan Areas NCFRP Report 33

Rensselaer Polytechnic Institute

CDM Smith

New York City Department of Transportation

HDR, Inc.

University of Westminster

Welcome
(José Holguín-Veras)

Acknowledgements

- Funded by the National Cooperative Freight Research Program
- The team wants to thank the following individuals and groups:
  - Dr. William Rogers, Project Manager, for his guidance and support
  - The NCFRP 38 Project Panel for the insightful input provided
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  - Mr. Michael Franchini and the staff at the Capital District Transportation Committee for their thorough review of the draft Planning Guide
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- The authors are: J. Holguín-Veras, J. Amaya, J. Wojtowicz, M. Jaller, C. González, I. Sánchez, X. Wang, D.G. Haake, S.S. Rhodes, S.D. Hodge, R.J. Frazier, M.K. Nick, J. Dack, L. Casinelli, and M. Browne

Outline of Presentation

- Introduction
- Overview of public sector initiatives
- Case studies
- Closing remarks
- Questions and answers

Introduction

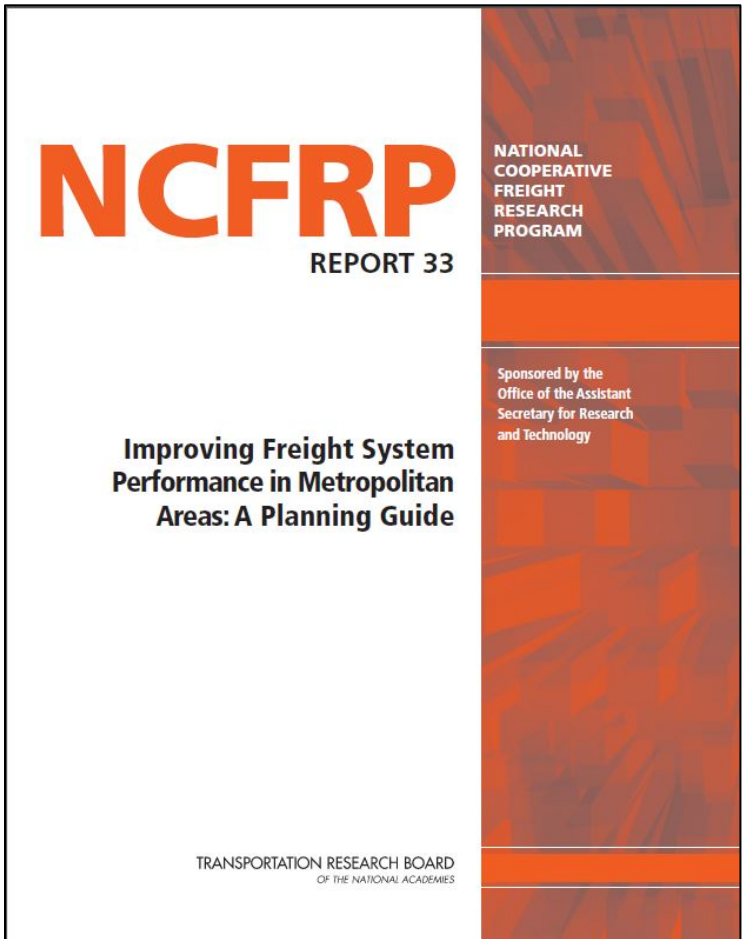
Why do we need this guide?

- The Good:
  - Freight is the physical expression of the economy, **impeding freight flows = impeding the economy**
  - Between 5-10% of GDP is related to freight / logistics
- The Bad:
  - Freight traffic is a major consumer of resources and a major producer of externalities: pollution, noise, accidents, etc.
- The Ugly:
  - **Freight is good, freight traffic creates problems**
  - There are no easy solutions, no Magic Bullets
    → Multi-prong approaches are needed...
  - The system is complex and not well understood
  - Solutions are complex and involve multiple stakeholders

Products:
Planning Guide, Initiative Selector, and Freight Trip Generation Estimator

Project Products

- Planning Guide: http://onlinepubs.trb.org/onlinepubs/ncfrp/ncfrp_rpt_033.pdf
- Interactive version: http://coe-sufs.org/wordpress/ncfrp33/
- Initiative Selector: http://coe-sufs.org/wordpress/InitiativeSelector/
- FTG Estimator: https://coe-sufs.org/wordpress/ncfrp33/appendix/ftg/
- Links available in the chat box...☺



Initiative Selector

- Objectives:
  - To provide suggestions about initiatives to consider
  - To provide a dynamic mechanism to explore the guide
  - To provide a tool that could be expanded over time
- Limitations:
  - The Initiative Selector is not a replacement for proper transportation decision making and planning...
  - Due to the lack of a database of documented experiences the search criteria are very general
  - Suggestions may not necessarily apply to local conditions...
- Produced in collaboration with the CoE-SUFS, see:

  http://coe-sufs.org/wordpress/InitiativeSelector/

Process to create the Initiative Selector

1. Characterized the various initiatives in terms of:
    1. Nature of the Problem: Congestion, Pollution, Noise, Safety
    2. Geographic Scope: Nation, State, City, Area, Corridor, Point
    3. Problem Source: Through Traffic, Urban Deliveries, Large Traffic Generators, Large Trucks...
    4. Investment required: Very High, High, Moderate, Low...
    5. Implementation time: Long, Medium, Short...
    6. Potential for unintended consequences: Very High, High, Moderate, Low, None...
2. It finds initiatives that match the search parameters
   See: http://coe-sufs.org/wordpress/InitiativeSelector/
3. Please help us improve it by providing feedback, sending us references, pictures, etc. etc.

Screenshots

Rensselaer

CITE Center for Infrastructure, Transportation, and the Environment

Initiative Se

This application has been co-funded by the Transportation Research Boa
Excellence for Sustainable Urban Freight Systems.

Page supports Google Chrome, Internet Explorer 11, Safari, and Mozilla browsers.

How to use this application:
Select aspects of the traffic problems you seek solutions to on the left.

Nature of the Problem

- [x] Congestion
- [ ] Inadequate Infrastructure
- [ ] Pollution
- [ ] Noise
- [ ] Safety
- [ ] Stakeholder Engagement
- [ ] Land Use

Geographic Scope

- [ ] Nation
- [x] City
- [ ] Area
- [ ] Corridor
- [ ] Point

Problem Source

- [ ] Through Traffic
- [x] All Traffic
- [ ] Large Trucks
- [x] Urban Deliveries
- [ ] Large Traffic Generators

Unique Solutions: 10

Show Selected Initiati

	Initiative
☐	Vehicle size and weigh restrictions
☐	Road pricing/ incentiv
☐	Parking pricing
☐	Certification programs
☐	Real-Time Information Systems
☐	Dynamic Routing
☐	Time slotting of delive Pick-ups for large traf generators
☑	Voluntary off-hour del program
☐	Staggered work hours program
☐	Mode shift program

Initiative 43: Voluntary Off-Hour Delivery Programs

Description: Programs that produce a shift of deliveries from regular hours (6:00 a.m. to 7:00 p.m.) to off hours (7:00 p.m. to 6:00 a.m.). As opposed to pricing and regulation schemes, this travel demand management initiative targets receivers as the key decision makers, seeking to convince them to accept deliveries during the less congested off hours through the use of incentives.

Targeted mode: Urban deliveries, large traffic generators (LTGs)	**Geographic scope:** City, area
Type of initiative: Freight demand management: voluntary off-hour deliveries (OHD) program	**Primary objective:** Reduce congestion and pollution

Expected costs and level of effort to implement: OHD programs require raising funds to provide incentives to receivers. Potential exists to implement a self-supported freight demand management system that uses the revenues raised by a small toll surcharge to finance the incentives. The implementation of the program—whether self-supported or not—requires a multi-layered, multi-stakeholder, collaborative approach to gain substantial business support and to accomplish a large shift to off hours.

Advantages:

- Reduce congestion
- Increase efficiency
- Environmental sustainability
- Improve reliability
- Enhance livability

Disadvantages:

- Low probability for unintended consequences:
  - May increase perceived noise impact
  - Increase operational costs
- Require fundraising to provide the incentives
- Require very high/high coordination among multiple stakeholders/jurisdictions

Examples:

- The City of New York OHD Program, New York, New York, United States (Holguín Veras et al. 2013b; Holguín Veras et al. 2014)

Source: New York City Department of Transportation

Related alternatives: 1. Low Noise Delivery Programs/Regulations; 2. Daytime Delivery Restrictions; 3. Daytime Delivery Bans; 4. Recognition Programs; 5. Certification Programs

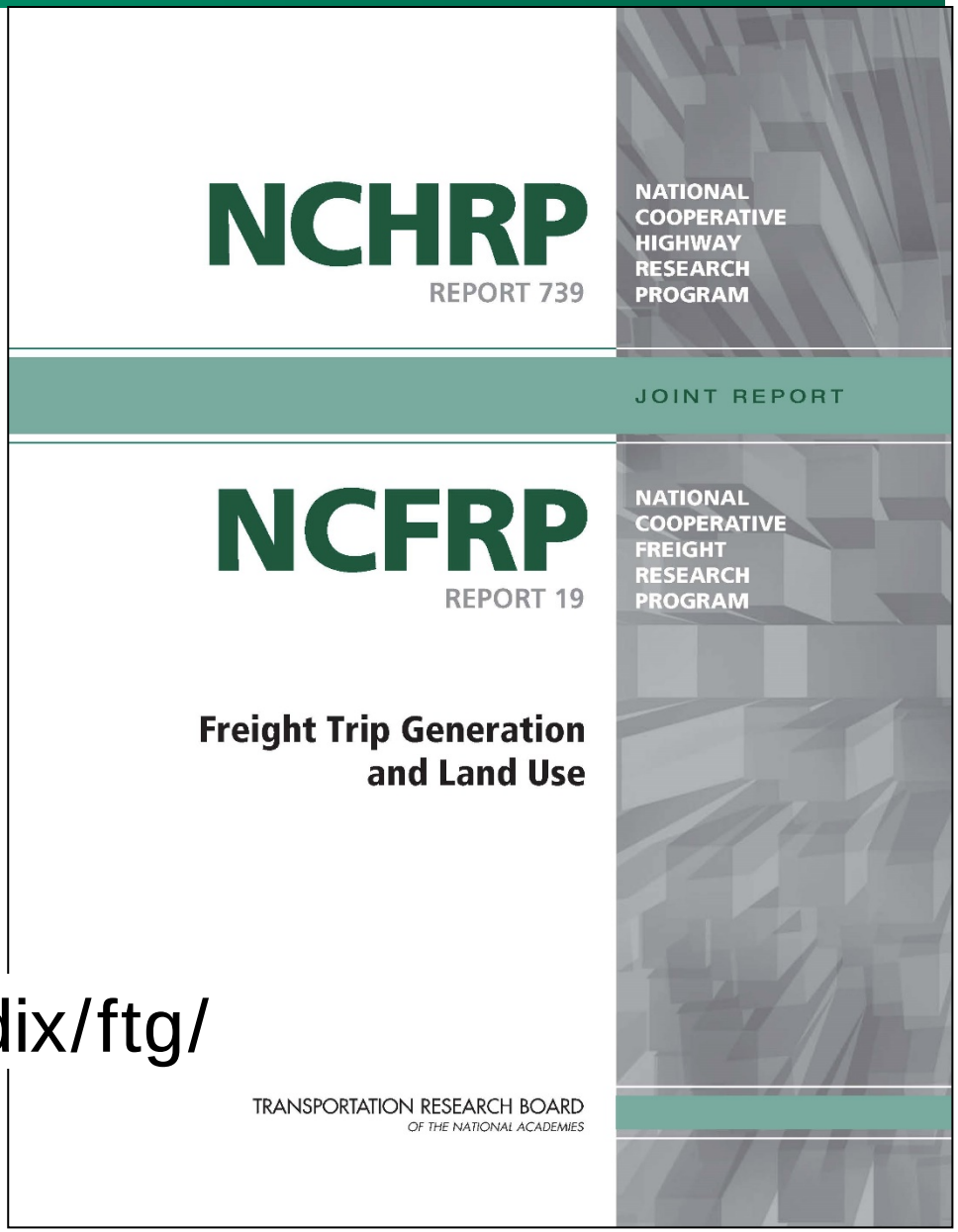
The Decision Making Process

Decision Making Process

Make sure you have the facts right...

A good place to start...

- NCFRP 19 Freight Trip Generation and Land Use
  - Establishment-level models
  - Economic based models
- Far from perfect, though better than most...
- Use data publicly available (ZIP code business data)
- FTG Software available at: https://coe-sufs.org/wordpress/ncfrp33/appendix/ftg/

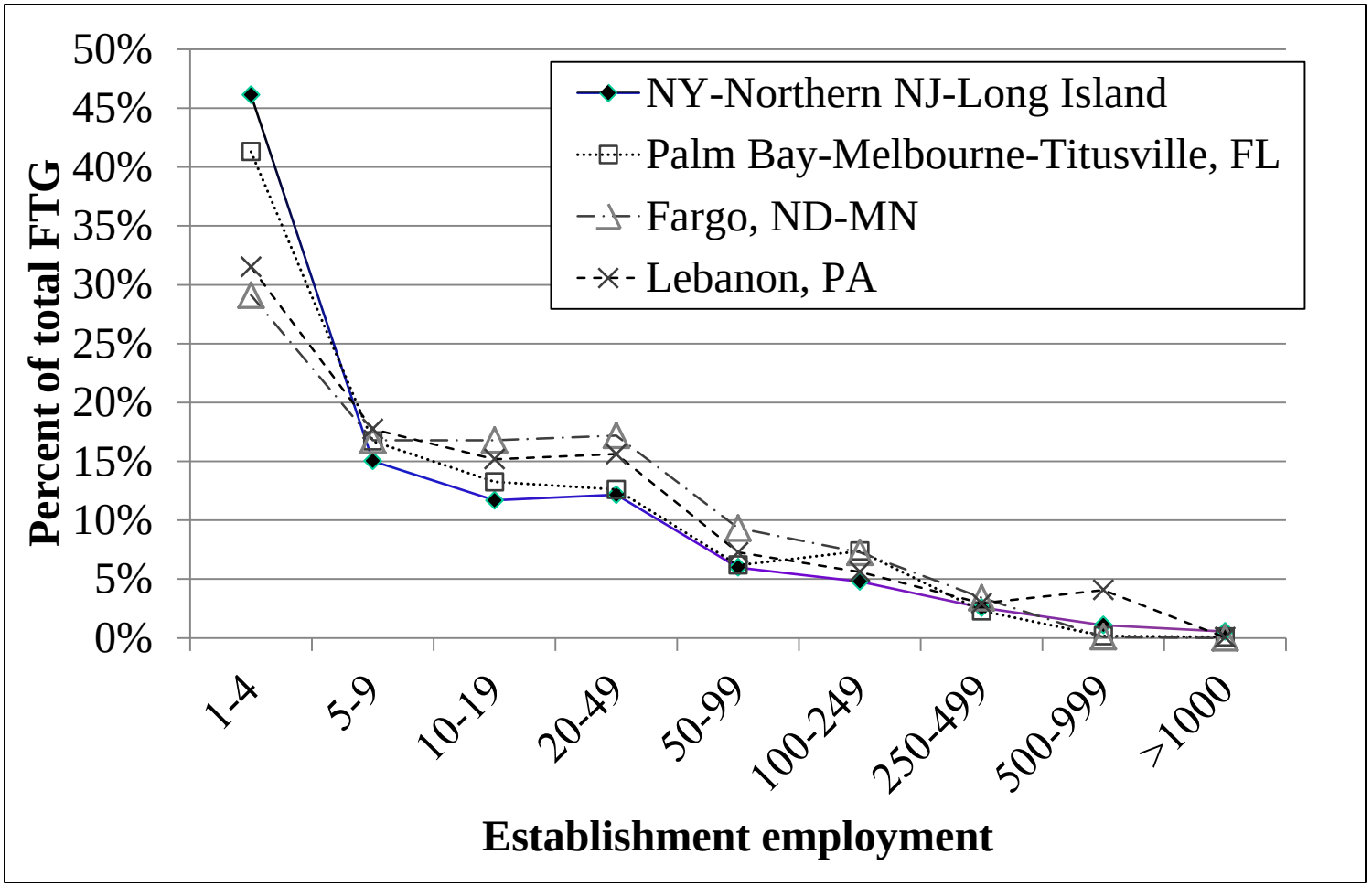


Freight Trip Generation (only Freight Intensive Sectors)

NAICS	Description	NY-North NJ-L.Island	Palm Bay-Melb...FL	Fargo, ND-MN	Lebanon, PA
44	Retail trade	39.06%	44.19%	34.85%	37.50%
42	Wholesale Trade	19.41%	11.04%	17.89%	13.57%
72	Accommodation / Food Services	15.72%	16.87%	13.97%	14.35%
23	Construction	11.47%	14.35%	16.14%	12.18%
31	Manufacturing	8.17%	8.80%	8.11%	15.35%
48	Transportation / Warehousing	6.16%	4.74%	9.03%	7.05%
Total freight trip generation (FTG) for FIS		1,024,477	25,682	15,515	10,285
Population		19,949,502	550,823	223,490	135,486
Number of establishments (Total)		545,197	13,597	6,709	4,272
Number of establishments (FIS)		235,325	5,893	3,317	2,185
Employment (Total)		7,568,043	172,925	119,626	79,543
Employment (FIS)		3,061,899	84,821	63,186	47,164
Establishments (FIS)/persons		0.012	0.011	0.015	0.016
Employment (FIS)/persons		0.153	0.154	0.283	0.348
FTG/employees (all sectors)		0.135	0.149	0.130	0.129
FTG/employees (FIS)		0.335	0.303	0.246	0.218
FTG/p		0.051	0.047	0.069	0.076
Averag					4.707
Averag					1.585

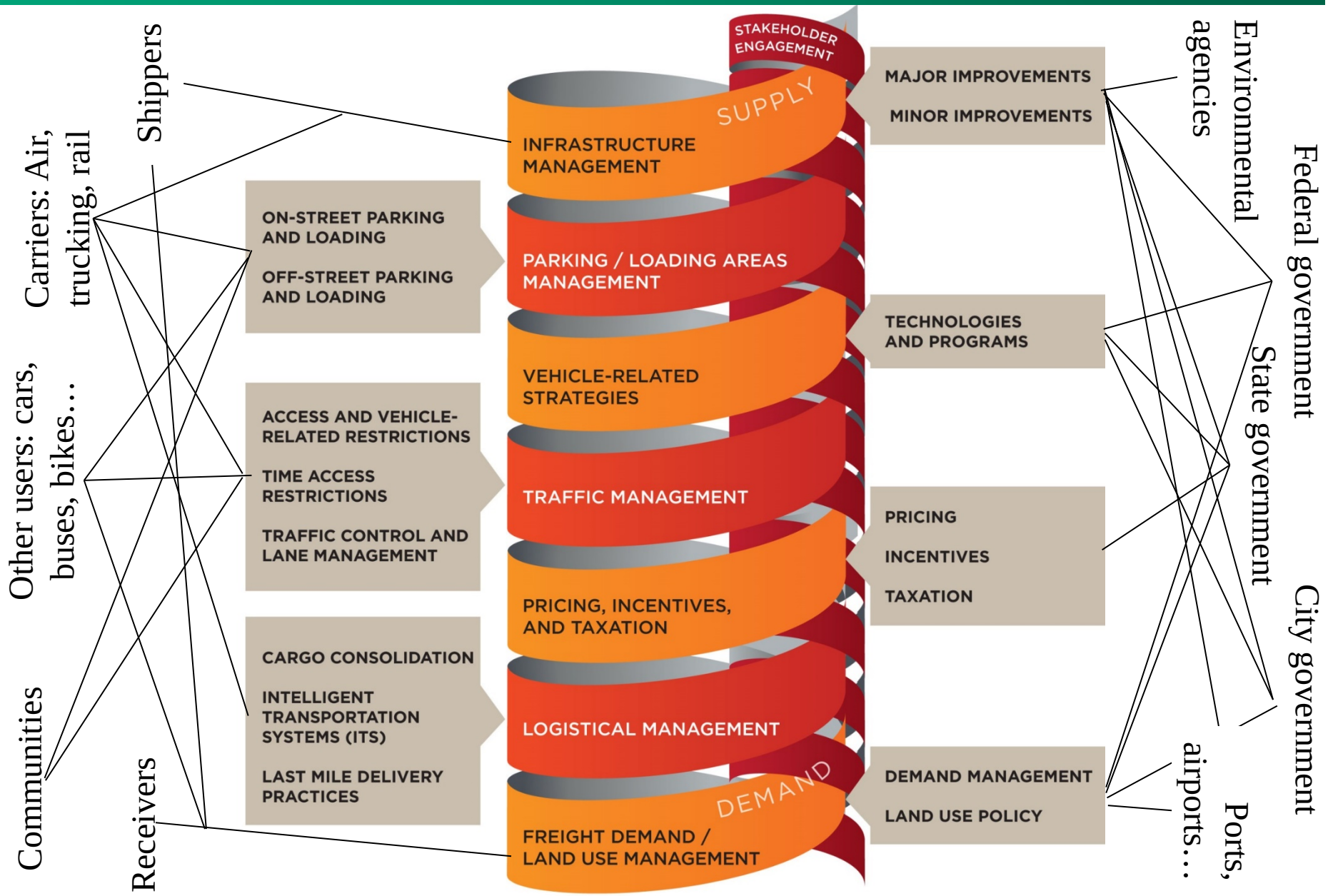
If deliveries to non-freight intensive sectors and households are included, these numbers would more than double

FTG vs. Establishment Size



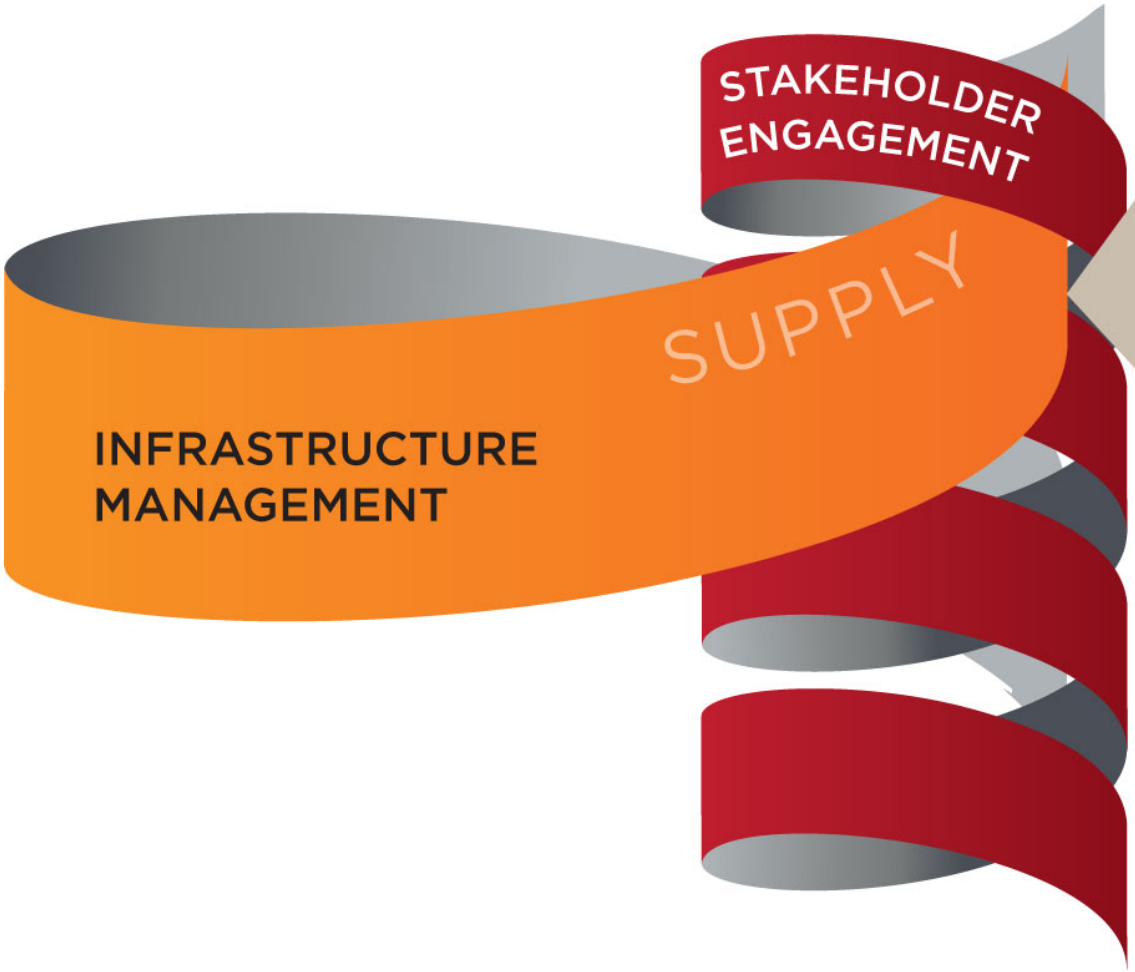
What Could the Public Sector do?

A lot, many initiatives underused, many actors...



Infrastructure Management
(Dan Haake)

Infrastructure Management



MAJOR IMPROVEMENTS

Ring Roads

New and Upgraded Infrastructure, Intermodal Terminals

Freight Cluster Development (Freight Village)

MINOR IMPROVEMENTS

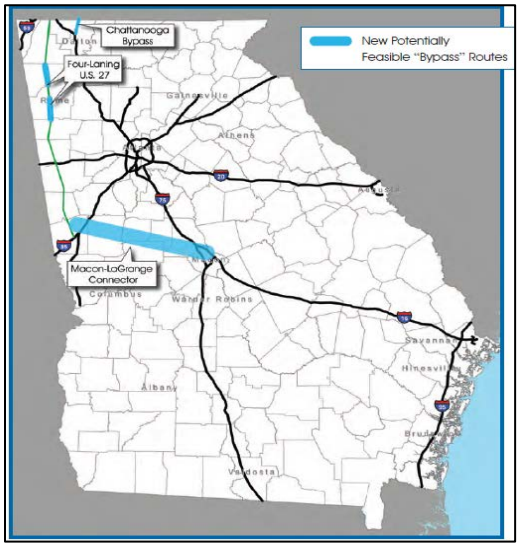
Acceleration / Deceleration Lanes

Removal of Geometric Constraints at Intersections

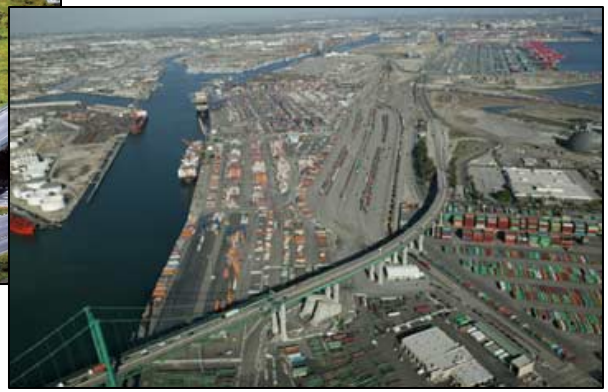
Ramps for Handcarts and Forklifts

Use infrastructure improvements to enhance freight, often necessary due to increases in truck size and traffic

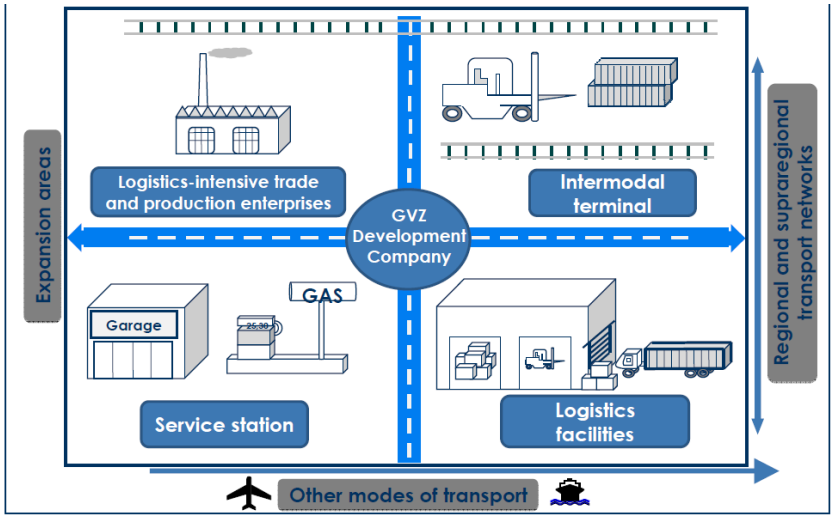
Infrastructure Management: Major



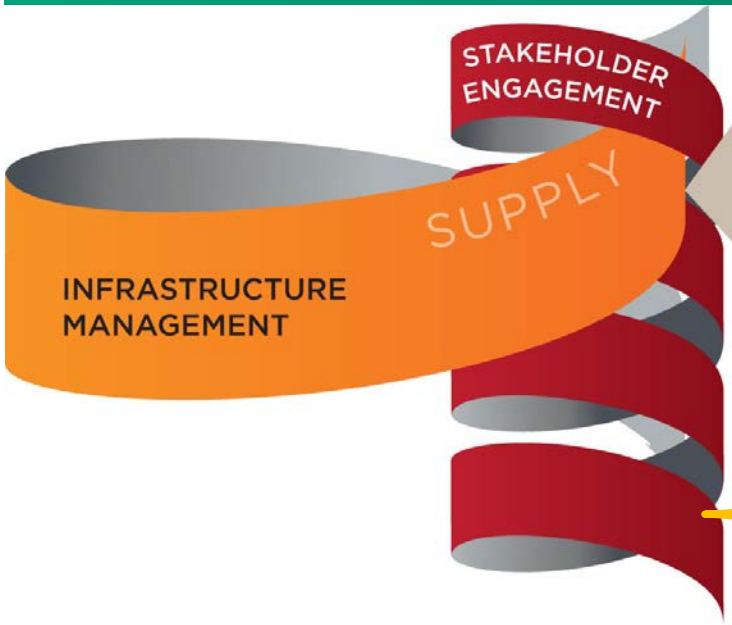
Atlanta, Georgia DOT Ring
Source: (Georgia Department of Transportation, 2011a)



Southern California Intermodal Terminals, California
Source: (The Port of Los Angeles, 2013)



Infrastructure Management: Minor



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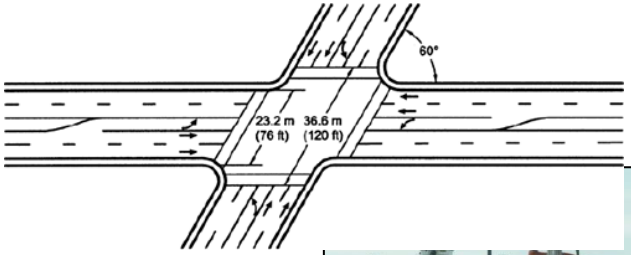

Source: (www.osha.gov)

Parking/Loading Areas Management
(Jeff Wojtowicz)

Parking/Loading Areas Management

ON-STREET PARKING AND LOADING

Freight Parking and Loading Zones
Loading and Parking Restrictions
Peak-Hour Clearways
Vehicle Parking Reservation Systems

OFF-STREET PARKING AND LOADING

Enhanced Building Codes
Timeshare of Parking Space
Upgrade Parking Areas and Loading Docks
Improved Staging Areas
Truck Stops/ Parking Outside of Metropolitan Areas

Improve the way parking is used to reduce: double parking, delivery time, conflicts with other users, etc.

Parking/Loading Area Management: On-Street

ON-STREET PARKING AND LOADING
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Southbound clearway hours

Northbound clearway hours

ParkHub.com

Parking/Loading Area Management: Off-Street

Land use	Floor area	Minimum number of bays
Office	General	1/5000 m^2
	Minimum	1 LR
	e.g., 5000 m^2	1 HR
	e.g., 20000 m^2	4 HR
Shop	General	1/2000 m^2
	Minimum	1 LR
	e.g., 2000 m^2	1 HR
	e.g., 10000 m^2	2 HR + 3 LR
Supermarket	General	1/1000 m^2
	Minimum	1 HR
	e.g., 1000 m^2	1 HR
	e.g., 2000 m^2	1 A + 1 HR
	e.g., 4000 m^2	2 A + 2 HR

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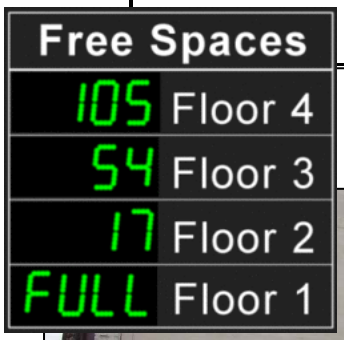
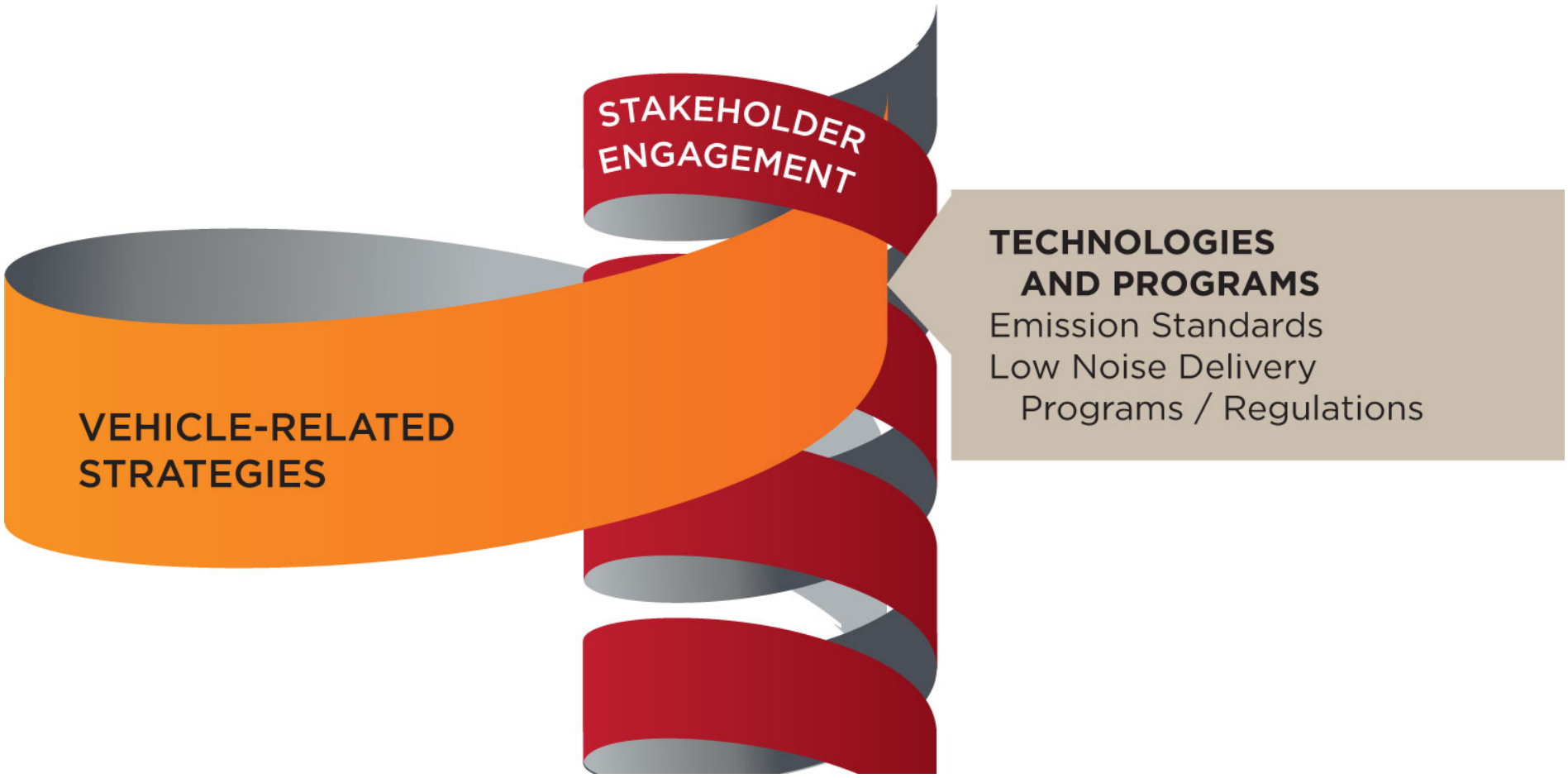


Vehicle Related Initiatives

Vehicle Related Strategies



Seek to improve environmental conditions by fostering use of technologies and practices that reduce the negative impacts related to freight vehicles

Vehicle Related Strategies: Emissions

Alternative fuels

Electric
Hybrid/Electric
Natural Gas (CNG and LNG)
Hydrogen

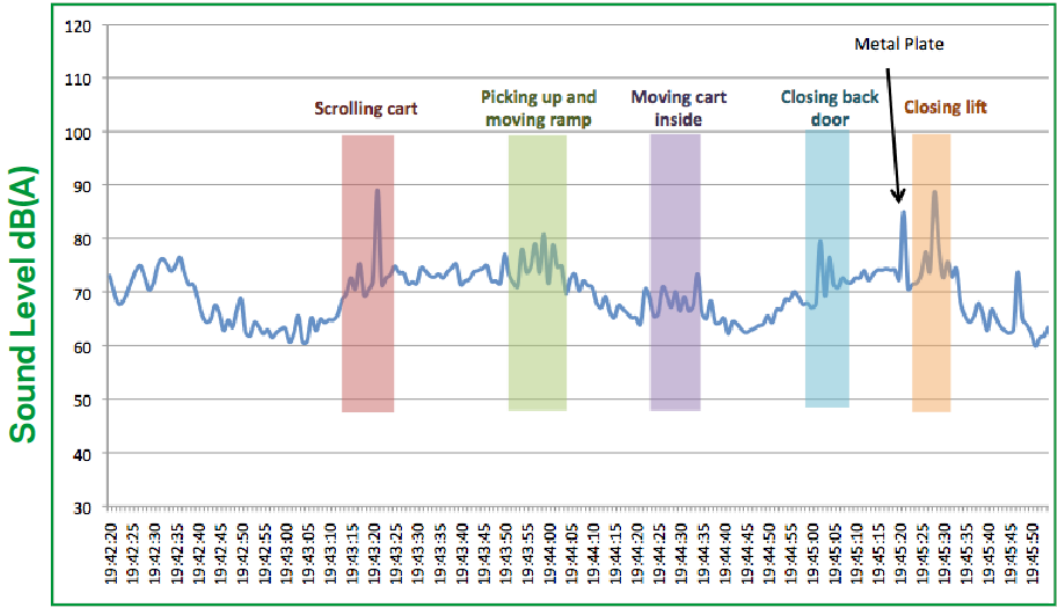
Vehicle design and components

Stop/start idling systems
Aerodynamics of power units and trailers
Emission control retrofits
Low resistance tires

- Emission Standards
  - Foster the use of vehicles producing less environmental impacts

Vehicle Related Strategies: Noise

Sample Noise Profile of a Delivery Truck



Measured at a distance of 20'

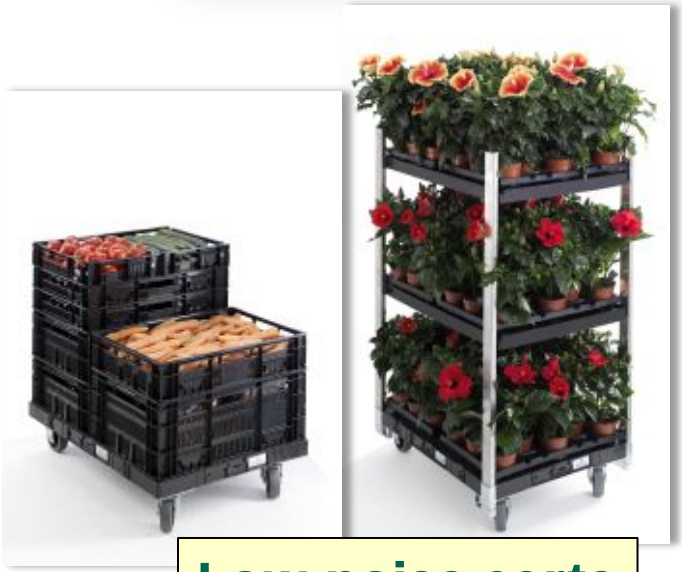
Piek

Vehicle Related Strategies: Noise

Electric / alternative fuel trucks

Low noise lift platforms

Noise absorbing coatings



Low noise carts

Traffic Management

Traffic Management

ACCESS AND VEHICLE-RELATED RESTRICTIONS
Vehicle Size and Weight Restrictions
Truck Routes
Engine-Related Restrictions
Low Emission Zones
Load Factor Restrictions

TIME ACCESS RESTRICTIONS
Daytime Delivery Restrictions
Daytime Delivery Bans
Nighttime Delivery Bans

TRAFFIC CONTROL AND LANE MANAGEMENT
Restricted Multi-Use Lanes
Exclusive Truck Lanes (Dedicated Truck Lanes)
Traffic Control

Define the conditions under which freight vehicles can circulate in the network

Traffic Management: Access & Vehicle-Related Restrictions

- Use restriction(s) to limit access of freight vehicles target area
- The nature of restrictions varies in terms of:
  - Vehicle: size, weight, load factor, cargo type, engine type
  - Time of travel
- Not well received by carriers, due to operational changes and higher costs
- Research has clearly shown that these restrictions could lead to counter-productive effects in terms of congestion, and pollution

Traffic Management:
Access & Vehicle-Related Restrictions

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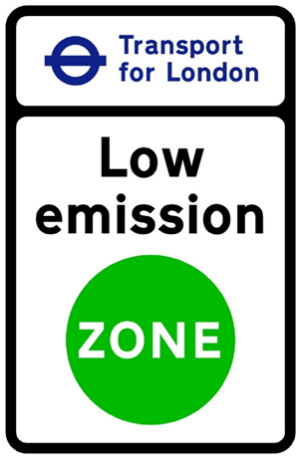

Image courtesy of Courtesy of TfL

Traffic Management: Time Access Restrictions

- Impose restriction(s) on the times at which freight activity can take place
- Intent: reduce freight traffic during the congested times of the day in specific sections of a city
- Building owners and receivers **also** impose delivery time restrictions
  - Relaxation of such delivery windows can reduce congestion spreading peak truck traffic

Traffic Management: Time Access Restrictions

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TRAFFIC CONTROL AND LANE MANAGEMENT
- Restricted Multi-Use Lanes
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- Traffic Control

<u>Examples</u>:
Beijing, Shenzhen, and Changsha in China, and Rome, Italy

Traffic Management: Traffic Control and Lane Management

- Promote effective use of available road capacity
- Try to optimize the allocation of lane right-of-ways
- Often used to improve lane utilization, mobility, safety,
- Could reduce travel delays and improve reliability

Traffic Management: Traffic Control and Lane Management

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Pricing, Incentives, and Taxation (José Holguín-Veras)

Pricing, Incentives, and Taxation

PRICING
Road Pricing
Parking Pricing

INCENTIVES
Recognition Programs
Certification Programs
Operational Incentives for
Electric / Low Emission
Vehicles

TAXATION
Taxation

Use monetary signals
to achieve public goals

Pricing, Incentives, and Taxation

TRANSPORT FOR LONDON | Plan a journey | Status updates | Maps | Fares & payments | M

Terms & conditions > FORS

FORS

The Fleet Operator Recognition Scheme (FORS) is a free, voluntary scheme operated by TfL. It encourages sustainable best practice for road freight operators who deliver in, and service, London or who intend to do so. FORS promotes safe working practices, legal compliance and safety of road freight operations in London.

US EPA Certified SmartWay®

Logistical Management

Logistical Management

CARGO CONSOLIDATION
Urban Consolidation Centers

INTELLIGENT TRANSPORTATION SYSTEMS (ITS)
Real-Time Information Systems
Dynamic Routing
Vertical Height Detection Systems

LAST MILE DELIVERY PRACTICES
Time Slotting of Pick-Ups & Deliveries at Large Traffic Generators
Driver Training Programs
Anti-Idling Programs
Pick-up/Delivery to Alternate Locations

Focuses on altering the way deliveries are made, from the logistical point of view

Logistical Management: Cargo Consolidation

CARGO CONSOLIDATION
Urban Consolidation Centers

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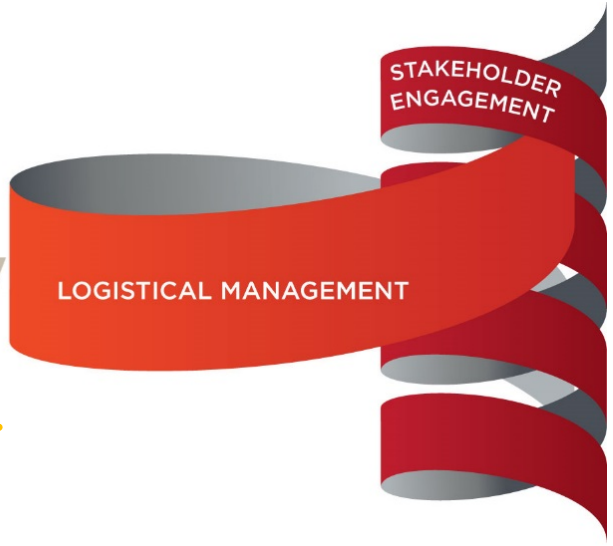
Appealing concept... though not fail-proof... out of more than 150 trials, less than 20 are in operation

Logistical Management: ITS

Source: Iowa Department of Transportation, 2014



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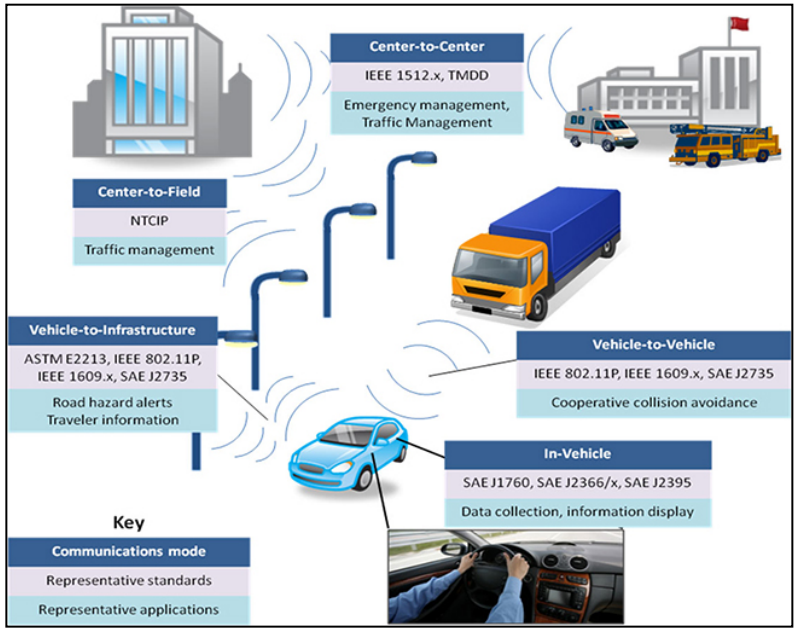

Source: Traffic Tech Group, 2013)

Logistical Management: Last Mile Delivery

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Urban Consolidation Centers

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Pick-up/Delivery to Alternate Locations

Source: Hong Kong Environmental Protection Department, 2011

Source: FREILOT, 2010

Demand/Land Use Management

Demand/Land Use Management

DEMAND MANAGEMENT

Voluntary Off-Hour Delivery Program

Staggered Work Hours Program

Receiver-Led Delivery Consolidation Program

Mode Shift Programs

LAND USE POLICY

Relocation of Large Traffic Generators (LTGs)

Integrating Freight into Land Use Planning Process

Focuses on modifying the demand, instead of logistical activities or the traffic

Voluntary Off-Hour Delivery Program

Basic Concept

- To induce a shift to deliveries made during the off-hours (7PM to 6AM), by providing incentives to receivers for their commitment to accept off-hours deliveries (OHD)
- Purpose: reduce congestion and pollution during daytime hours

Examples:

- PierPass Program, California
- OHD, New York City

PIERPASS

Current Status...

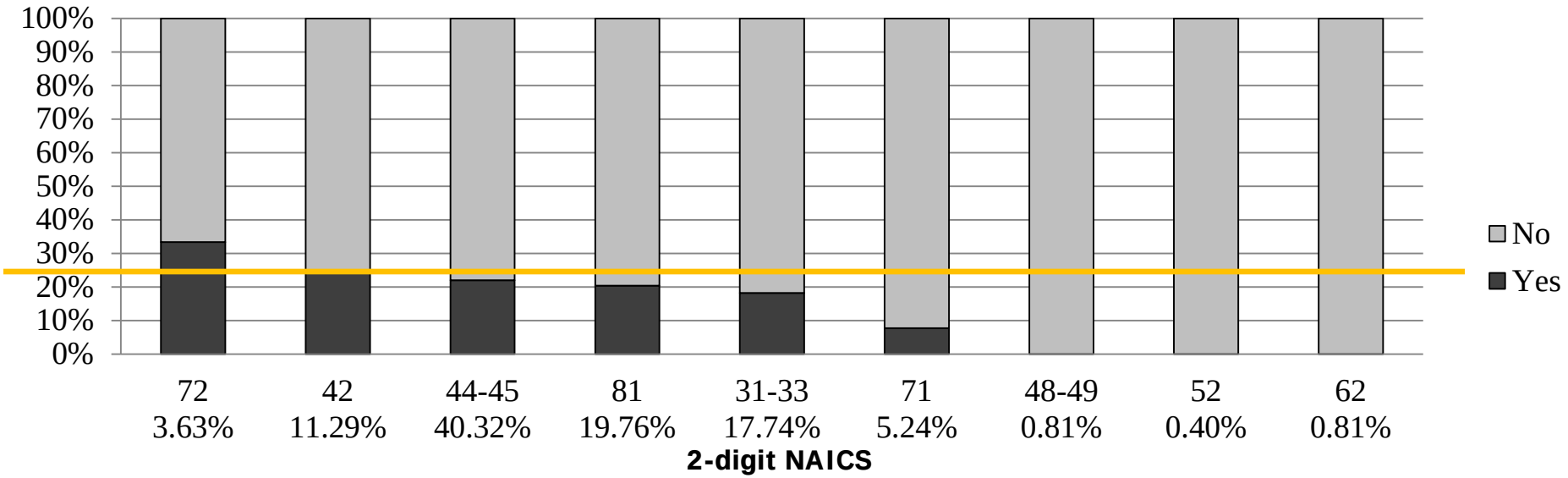
- More than 400 participants (+4% of food sector):
  - Sysco: 31 OHD routes/week (18% of their routes, 171) delivering to 140 unassisted off-hour delivery customers
  - Wakefern: 5 OHD routes/day (25% of their total)
  - Duane Reade: Approximately 120 of their 160 Manhattan stores receive OHD on a regular basis
  - Dunkin Donuts: 72 stores out of 121 in Manhattan
  - Beverage Works (Red Bull) has approximately 130 routes in the NY Metro, 22% are OHD
  - Waldorf Astoria
- Has led to successful pilots all over the world: Sao Paulo, Copenhagen, Brussels, with more pilots being planned: Washington, Orlando, Sydney, Stockholm...

Delivery and Servicing Plans (DSPs)

- A framework to manage freight / service trips
- Movement to and from individual buildings (including retail shops, offices etc.)
- Focus on the receivers in the supply chain
- DSPs developed in London and used in planning for the 2012 Olympic Games
- 20% reduction in freight trips!

Would it work in the US?

- Survey collected data from 248 receivers (Manhattan), and inquired about the interest on “asking your vendors to reduce the number of individual deliveries that your company receives through consolidation”



Notes: (1) NAICS 72: Accommodation / food services; NAICS 42: Wholesale trade; NAICS 44-45: Retail trade; NAICS 81: Other services; NAICS 31-33: Manufacturing; NAICS 71: Arts / entertainment / recreation; NAICS 48-49: Transportation / warehousing; NAICS 52: Finance / insurance; and, NAICS 62: Healthcare / social assistance.
(2) Percentages under the NAICS code indicate the proportion in the sample.

Stakeholder Engagement (Dan Haake)

Stakeholder Engagement

STAKEHOLDER ENGAGEMENT

Designate a 'Freight-Person' at Key Agencies

Create a Freight Advisory Committee (FAC)

Educate Elected Officials

Create a Technical Advisory Committee (TAC)

Create a Freight Quality Partnership (FQP)

Successful implementation requires active involvement and participation of key stakeholders

Freight Policy

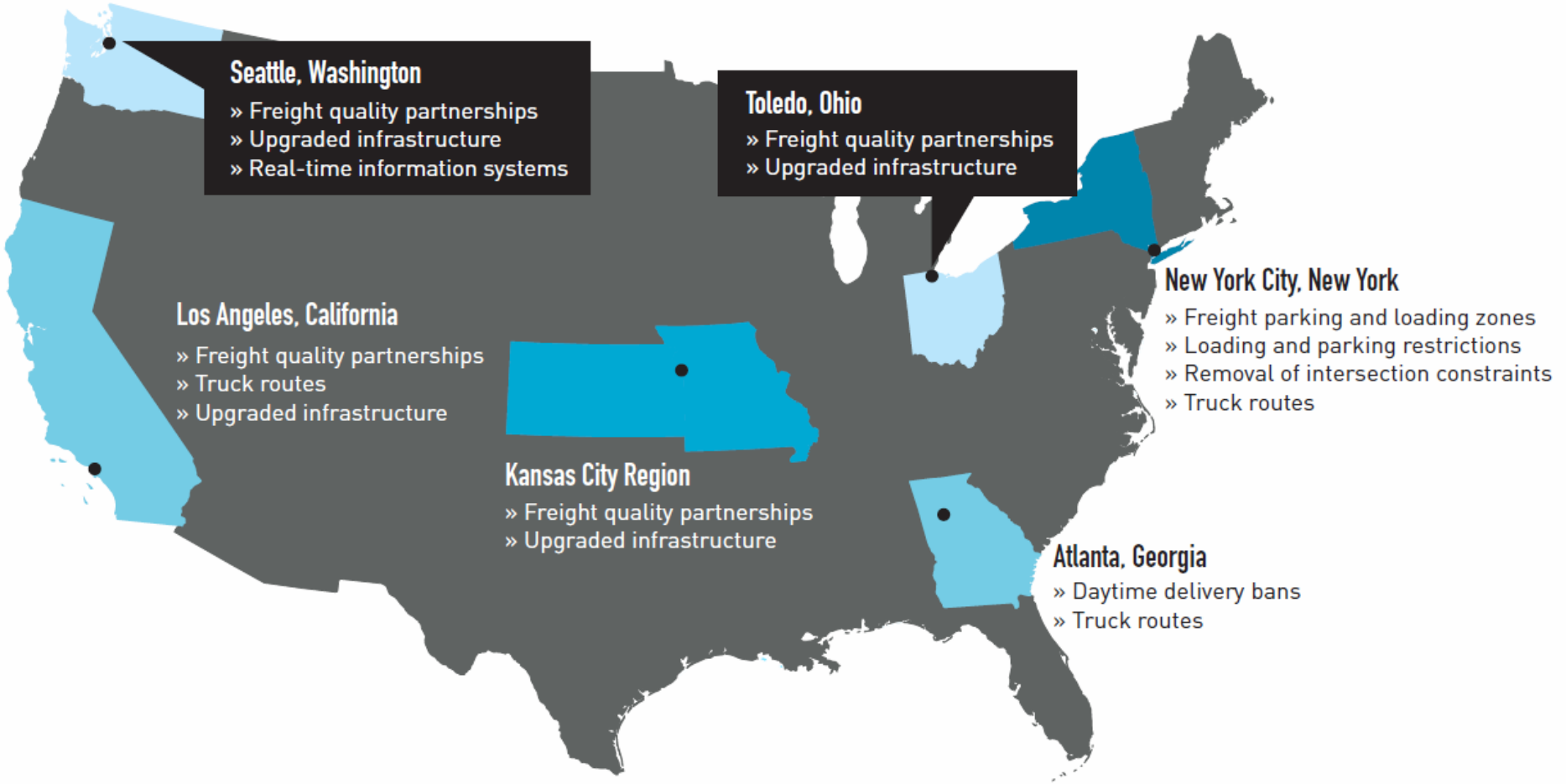
- Successful implementation requires:
  - Understanding freight activity and commerce
  - Engaging private sector
  - Educating decision makers on freight logistics
  - Disseminating best practices
  - Defining an implementation path considering the concerns of all stakeholders

STAKEHOLDER ENGAGEMENT

Designate a 'Freight-Person' at Key Agencies
Create a Freight Advisory Committee (FAC)
Educate Elected Officials
Create a Technical Advisory Committee (TAC)
Create a Freight Quality Partnership (FQP)

Case Studies

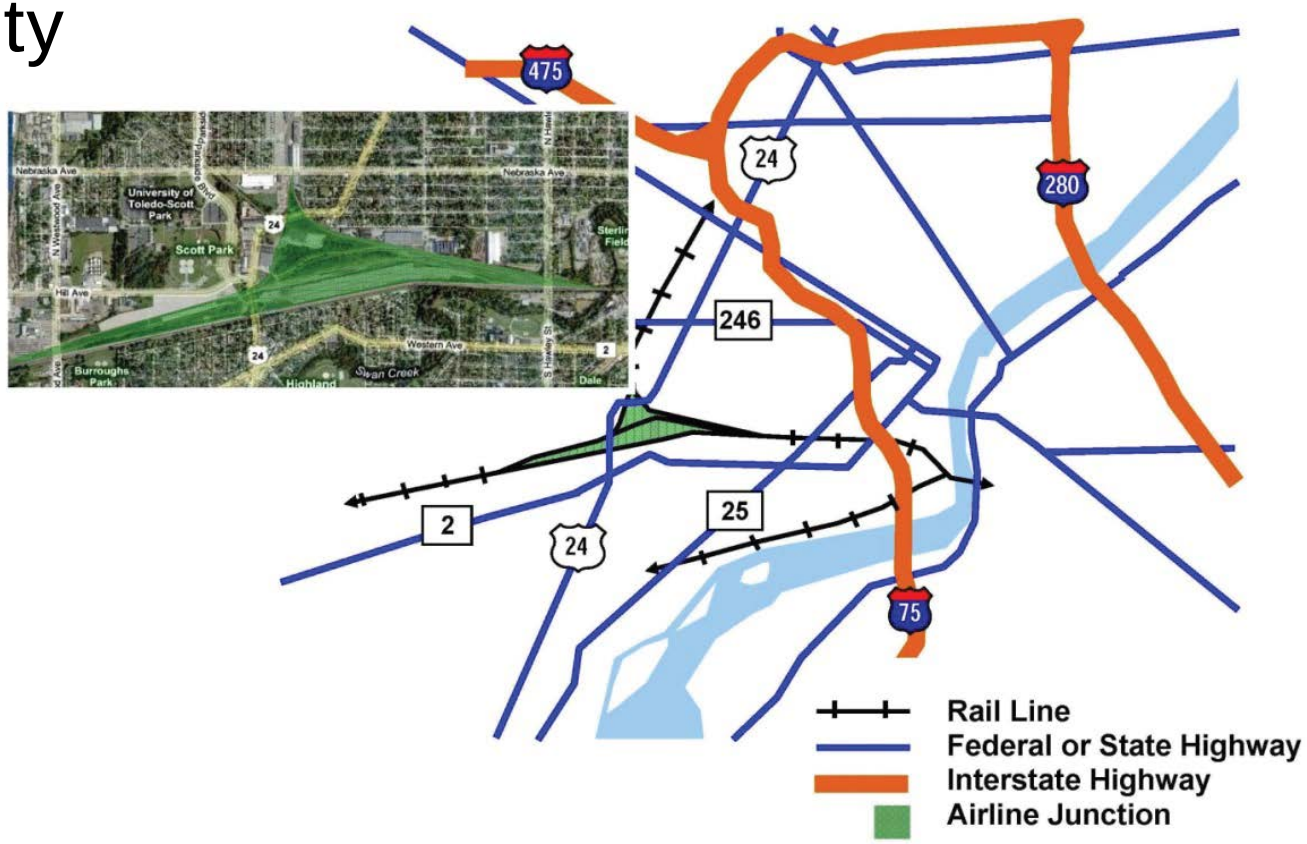
Case Studies Presented in NCFRP 33



Case Study #1: Toledo's Airline Yard

Proactive Partnership and Infrastructure

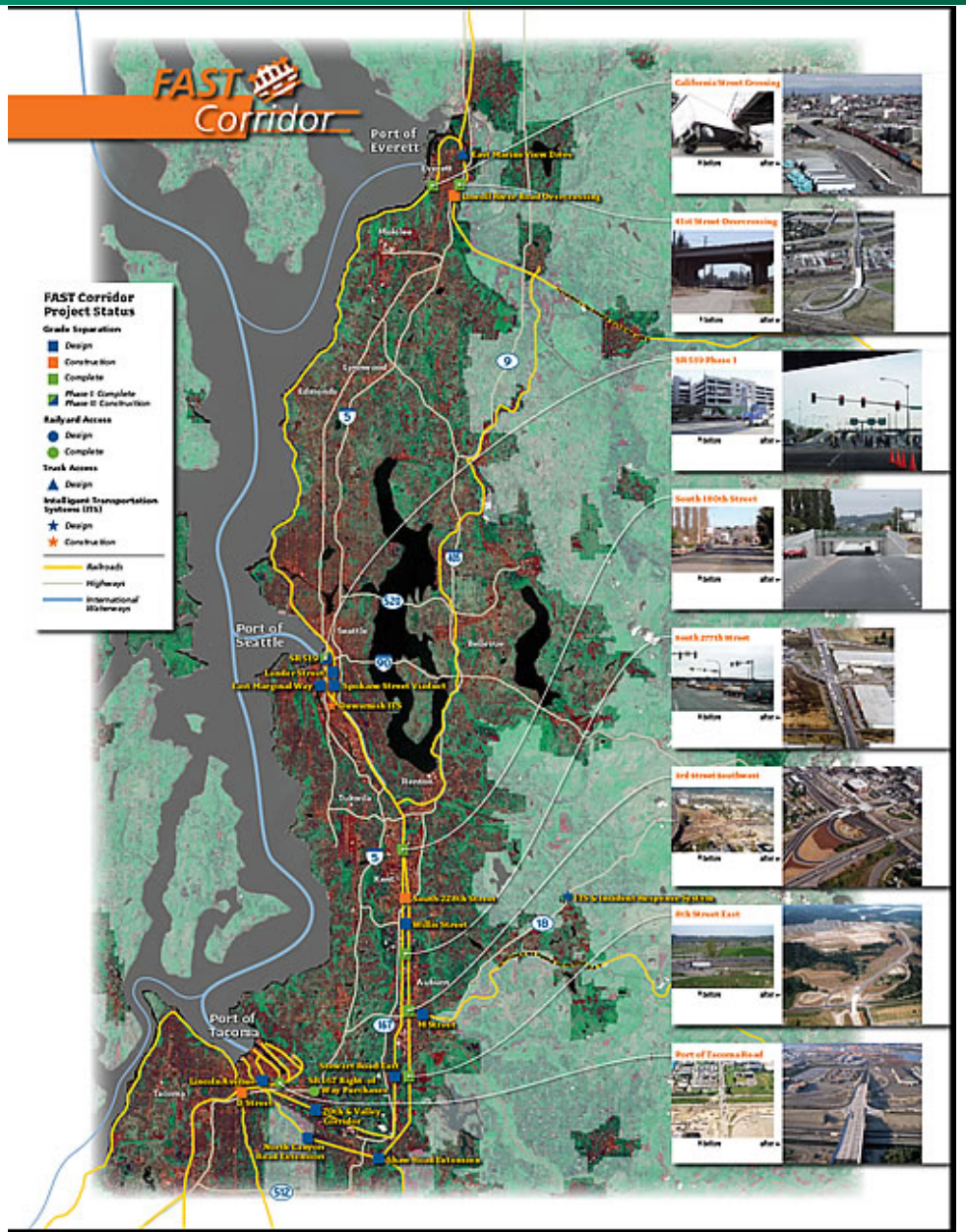
- Toledo Region
- Joint Intermodal Task Force
- Reverse Public/Private Partnership
- Doubled Capacity



Case Study #2: FAST Corridor

Long-Term Success Story

- 20+ year partnership
- Versatility
- ISTEA/TEA-21
  - Changing funding environment
- Regional Thinking
- 20 of 25 projects completed



Closing Remarks
(José Holguín-Veras)

Final Thoughts

- Improving freight system performance is important
- There is a wide range of initiatives
  - There are no magic bullets, multi-prong approaches are key
  - The history is clear, traditional approaches have not reduced congestion, why do we keep using them?
  - Every situation is different, local conditions matter...
- Some under-utilized initiatives have great transformative potential, e.g., freight demand management
- The NCFRP 33 materials are an entry point...
  - Research and experimentation are needed
  - Technical training is needed to foster widespread changes

We Need to ...

- Undertake a holistic transformation of supply chains, inducing changes in receivers behavior
- Manage freight demand
- Obtain fine-level detail on freight activity at the block and neighborhood level to find appropriate solutions
- Embrace collaborative approaches involving all key stakeholders, there is a space for collaboration
- Transform existing freight policy and embrace innovation in urban freight

Thanks!
Questions?

Reference Materials:

Planning Guide: PDF version
http://onlinepubs.trb.org/onlinepubs/ncfrp/ncfrp_rpt_033.pdf

Planning Guide: Interactive version
http://coe-sufs.org/wordpress/ncfrp33/

Initiative Selector:
http://coe-sufs.org/wordpress/InitiativeSelector/

Freight Trip Generation Estimator:
https://coe-sufs.org/wordpress/ncfrp33/appendix/ftg/

Improving Freight System Performance in Metropolitan Areas NCFRP Report 33

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