

# Talking Freight

## August 17, 2011

# NCFRP

## 15

Understanding  
Urban Goods  
Movements

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PREPARED FOR THE  
**TRANSPORTATION RESEARCH BOARD**

PREPARED BY  
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# Today

- The study
- The products – tools you can use
- What you can do



# NCFRP 15: Urban Goods Movements

Purpose: Identify ways to accommodate and expedite goods movement within urban areas

- produce a single source document
- geared to local officials

Product: Guidebook for local decision makers

Status: Editing – estimated TRB release early fall

<http://trb.org/Publications/PubsNCFRPPublications.aspx>



# Issues / Findings

- Transportation community may not understand
  - Land use and zoning is controlled by local governments
- Freight not priority for local planning offices
- MPOs, DOTs understand freight and economy
  - Need to reach out at local level
  - Through project provide the tools



# Four Products

- Guidebook
- Executive Summary
- Resource CD
  - (includes 2 ppt w/ speaker notes)
- Final report



# Executive Summary and Overview



**PREPARE FOR A GROWING ECONOMY**

80% of goods originate or terminate in major urban areas.

Freight investments increased to keep pace with our growing economy. The investment of \$1.5 billion in freight on average from 2007 to 2010.

By 2020...  
 - Freight movement in the U.S. will increase to 27%  
 - There will be 3.5 million to 4 million trucks on the road in 2020  
 - U.S. urban areas are expected to grow by 30% (US Census Bureau)

**Why is the guidebook is for?**

1. Local area regional decision makers who will use the guidebook to inform public decisions making and avoid difficult and expensive transportation infrastructure and/or revenue constraints.
2. The academic and research community.
3. The academic and research community.
4. Private transportation planning and management groups for urban areas.

**COMMUNITY DEPENDS ON FREIGHT**

There's about one last mile you drive in a major U.S. city. Think about the last mile of your commute. Think about the last mile of your grocery trip. Think about the last mile of your commute. Think about the last mile of your grocery trip. Think about the last mile of your commute. Think about the last mile of your grocery trip.

**BAKERY SUPPLY CHAIN**

Harvest Field → Grain Elevator → Flour Mill → Regional DC → Bakery

**Most urban food or grocery businesses operate:**

- 1 to 2 day supplies of produce and fresh foods
- 2 day supplies of dairy
- Up to 7 day supplies of dry goods

**HOW TO USE THE GUIDEBOOK**

Local area decision makers often create strategies for urban goods movement that don't take into account the urban goods movement. This guidebook provides a framework for urban goods movement that takes into account the urban goods movement. This guidebook provides a framework for urban goods movement that takes into account the urban goods movement.

**RECEIVE AUTHORIZATION** (p. 17)  
**GET ORGANIZED** (p. 19)  
**DEVELOP LOCAL POLITICAL AND POLICY ENVIRONMENT** (p. 21)  
**DEVELOP BASELINE INFORMATION** (p. 23)  
**IDENTIFY STAKEHOLDERS AND CONDUCT INTERVIEWS** (p. 25)  
**SUMMARIZE THE ISSUES** (p. 27)  
**REVIEW AND EVALUATE REGULATIONS** (p. 29)  
**ENGAGE AND GAIN SUPPORT** (p. 31)

**CONSTRAINTS ON URBAN GOODS MOVEMENT**

- Access Issues:** Trucks, to get from "backbone roads"
- Regulatory Issues:** No truck permit through main squares
- Operational Issues:** Drivers' behavior, traffic blocking, driving behavior

**SOLUTIONS TO URBAN GOODS MOVEMENT CONSTRAINTS**

- Access Solutions:** Truck routes to accommodate large trucks
- Operational Solutions:** Driver behavior, truck routes to accommodate large trucks

**RESOURCE MATRIX**

**Urban Goods Movement Programs and Potential Solutions**

Program/Solution	Access	Operational	Regulatory	Support
Truck routes to accommodate large trucks	High	High	Low	Low
Driver behavior training	Low	High	Low	Low
Truck routes to accommodate large trucks	High	High	Low	Low
Driver behavior training	Low	High	Low	Low
Truck routes to accommodate large trucks	High	High	Low	Low
Driver behavior training	Low	High	Low	Low

**FREIGHT MOVEMENT IN THE CITY**

**Negotiating the "Last Mile"**

Freight movement in congested urban areas are the most difficult to manage. This guidebook provides a framework for urban goods movement that takes into account the urban goods movement. This guidebook provides a framework for urban goods movement that takes into account the urban goods movement.

**SOLUTIONS YOU CAN USE**

- ATLANTA, GA** - Change in the road use to allow for urban goods movement.
- BALTIMORE, MD** - Creating freight routes to support growing population.
- CHICAGO, IL** - Harmonizing freight regulations across the city.
- HOUSTON, TX** - Negotiating the "Last Mile" with local area decision makers.
- LOS ANGELES, CA** - Negotiating the "Last Mile" with local area decision makers.
- MINNEAPOLIS, MN** - Negotiating the "Last Mile" with local area decision makers.
- PHOENIX, AZ** - Negotiating the "Last Mile" with local area decision makers.
- RICHMOND, VA** - Negotiating the "Last Mile" with local area decision makers.
- ST. LOUIS, MO** - Negotiating the "Last Mile" with local area decision makers.

# Executive Summary and Overview

- Goal
  - Quickly capture attention of decision makers
- Outcome
  - Being a champion for goods movement issues in urban area
  - Assigning staff to do further research
  - Assigning staff to review and change regulations

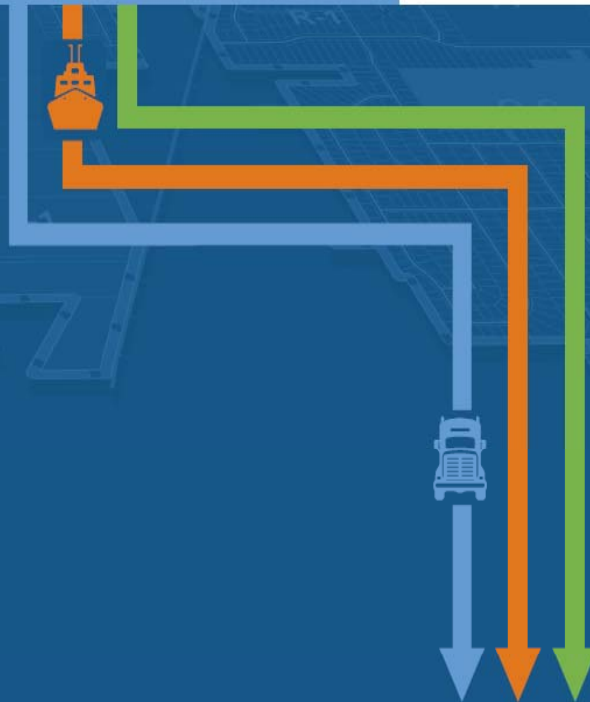






# NCFRP 15

## GUIDEBOOK: Understanding Urban Goods Movements



PREPARED FOR THE  
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# Guidebook

- Focuses on consumer goods
  - Urban pick-up and delivery for end user
- Explains land use decisions impact
  - Urban commercial motor vehicle movement for goods delivery
- Recommends how to accommodate and expedite



# Guidebook Contents

1. The Importance of Urban Goods Movement in the Urban Environment
2. Moving Urban Goods: It's all about Supply Chains
3. Using Freight Data for Planning
4. Regulations Impacting Urban Goods Movement
5. Putting it all together: A process for Evaluating and Addressing the Impacts
6. Case Studies
7. How to get more information - Resource CD

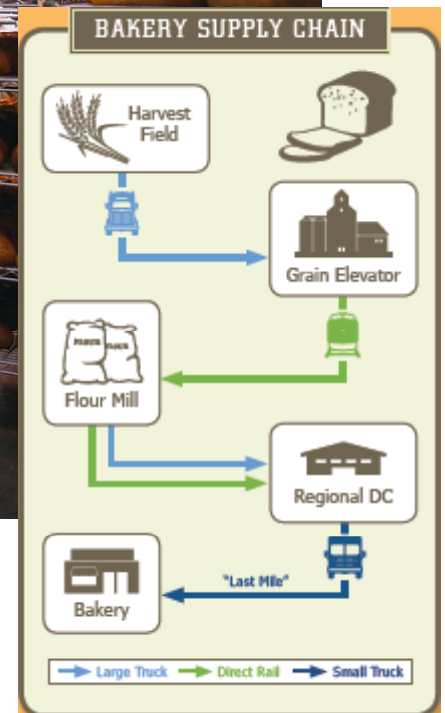


## **Lesson 1:**

# **The Importance of Goods Movements in an Urban Environment**



# Your Community and QOL Depends on Freight



# Keeping grocery store shelves stocked

- 2 day: eggs and dairy
- 1-3 days: produce and frozen food
- 7 days: dry goods





# The Importance of Goods Movement in the Urban Environment

## Freight is the economy in motion

It supports:

- Job creation and economic growth
- Access to markets



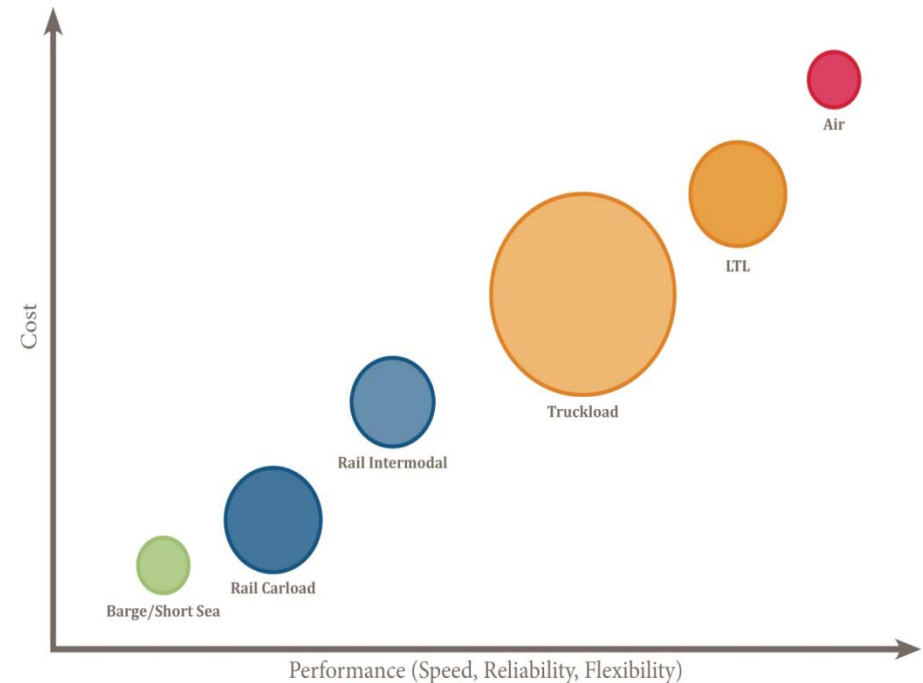
# Urban goods movement / freight is important

- In 2010, in US
  - approximately 55 tons of freight / person was moved
- By 2040 estimates ...
  - 70 tons/person – a 27% increase
  - for every 2 trucks there will be 3
- 65% of US goods originate or terminate in urban areas
  - the value of these goods is 81% of all US goods movements



# How, why, where, who moves goods

- How goods move
- Who moves goods
- What moves
- Why and where
- Congestion and costs
- The “last mile”



# Key message

- Freight mobility is a key issue to support economic development and QOL
- It is important to regional competitiveness to understand the transportation needs of major employers



## **Lesson 2:**

# **Moving Urban Goods: It's all about Supply Chains**

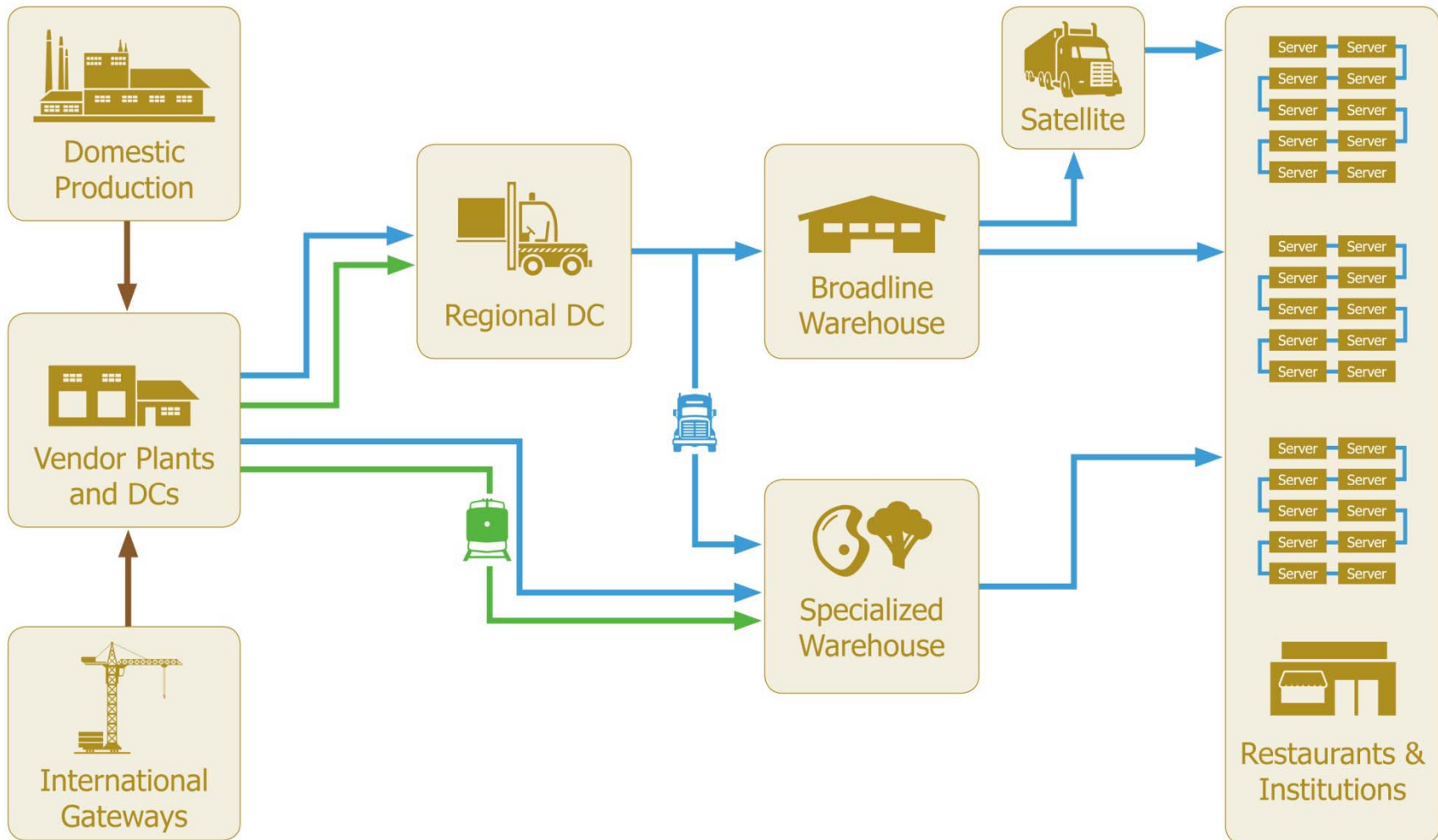


# Supply Chains Case Studies

1. Soft Drink Beverages
2. Gasoline & Petroleum Fuels Supply Chain
3. Food Services Supply Chain
4. Urban Wholesale Food Supply Chain (Produce)
5. Supermarket Grocery Supply Chain
6. Big Box Retail Supply Chain
7. Retail Drug Store Supply Chain
8. Apparel Retail Supply Chain
9. Pharmaceutical and Biotechnology Supply Chain
10. Aggregate-Based Construction Materials Supply Chain
11. Hospital Supply Chain
12. Waste & Recyclables Supply Chain



# SUPPLY CHAIN: FOOD SERVICES



→ Truck    → Direct Rail    → Various Modes

# Supply chain lessons

## Issues

- Delivery trucks made weekdays deliveries (T-F) around a 3-4 hour window to 10 to 12 stops, driver unloads by hand
- Routing and scheduling of trucks is a daily challenge

## Urban Impediments

- Congestion / weather delays
- Limited parking space for deliveries

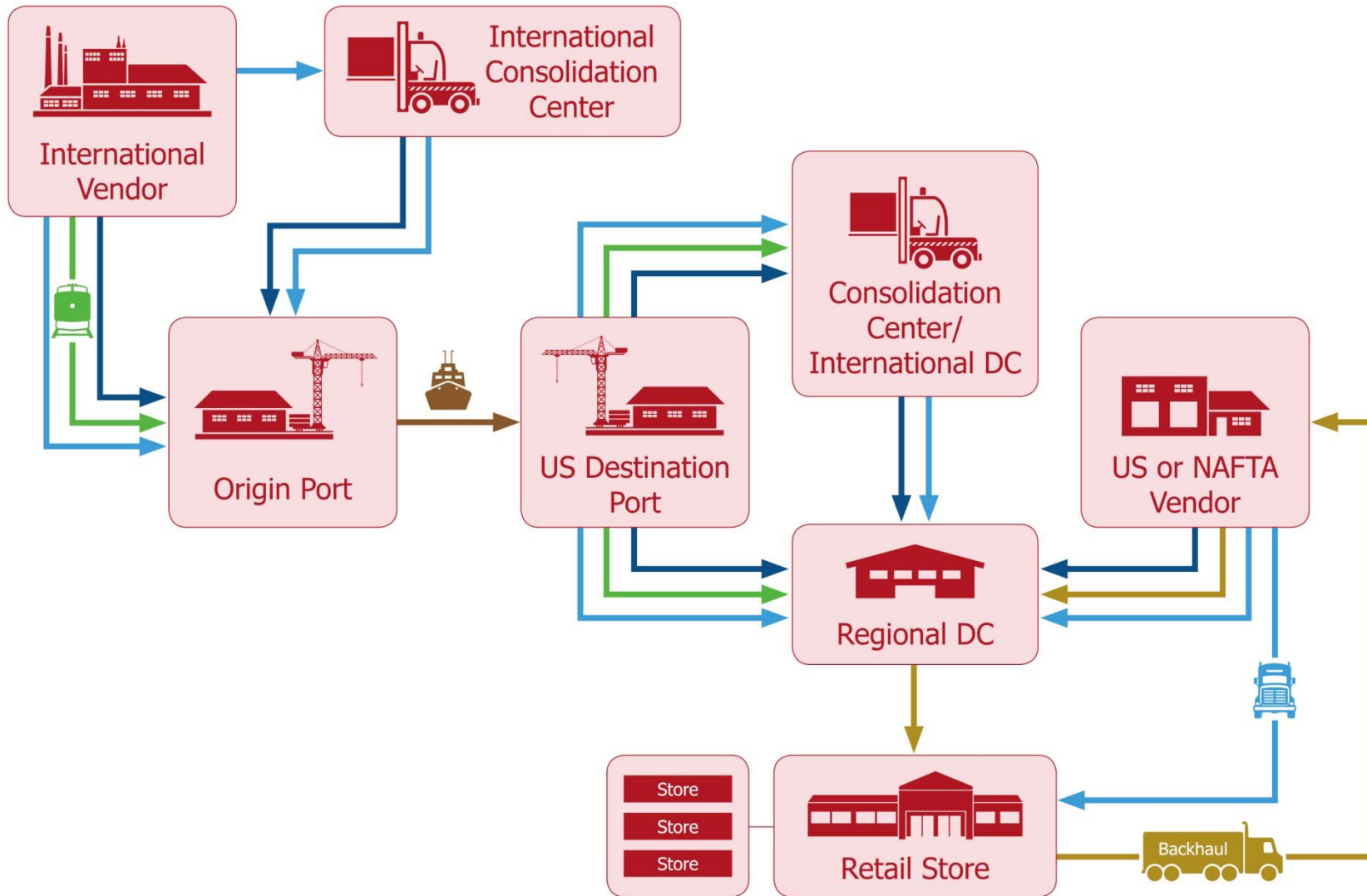
## Local solutions / improvements

- Permitting after hour deliveries
- Parking enforcement





# SUPPLY CHAIN: BIG BOX RETAIL



Truck    Direct Rail    Intermodal Rail    Ship    Private Fleet



# Supply chain lessons

## Issues

- Private sector wants to minimize miles traveled
- Diverse products to DC then single trip to store
- Have reduced packaging to save weight
- Just-in-time; limited space for inventory

## Urban Impediments

- Congestion

## Local solutions

- Consistent regulations (e.g. for delivery time, bridge and truck size and weight limits)
- Allowing nighttime deliveries



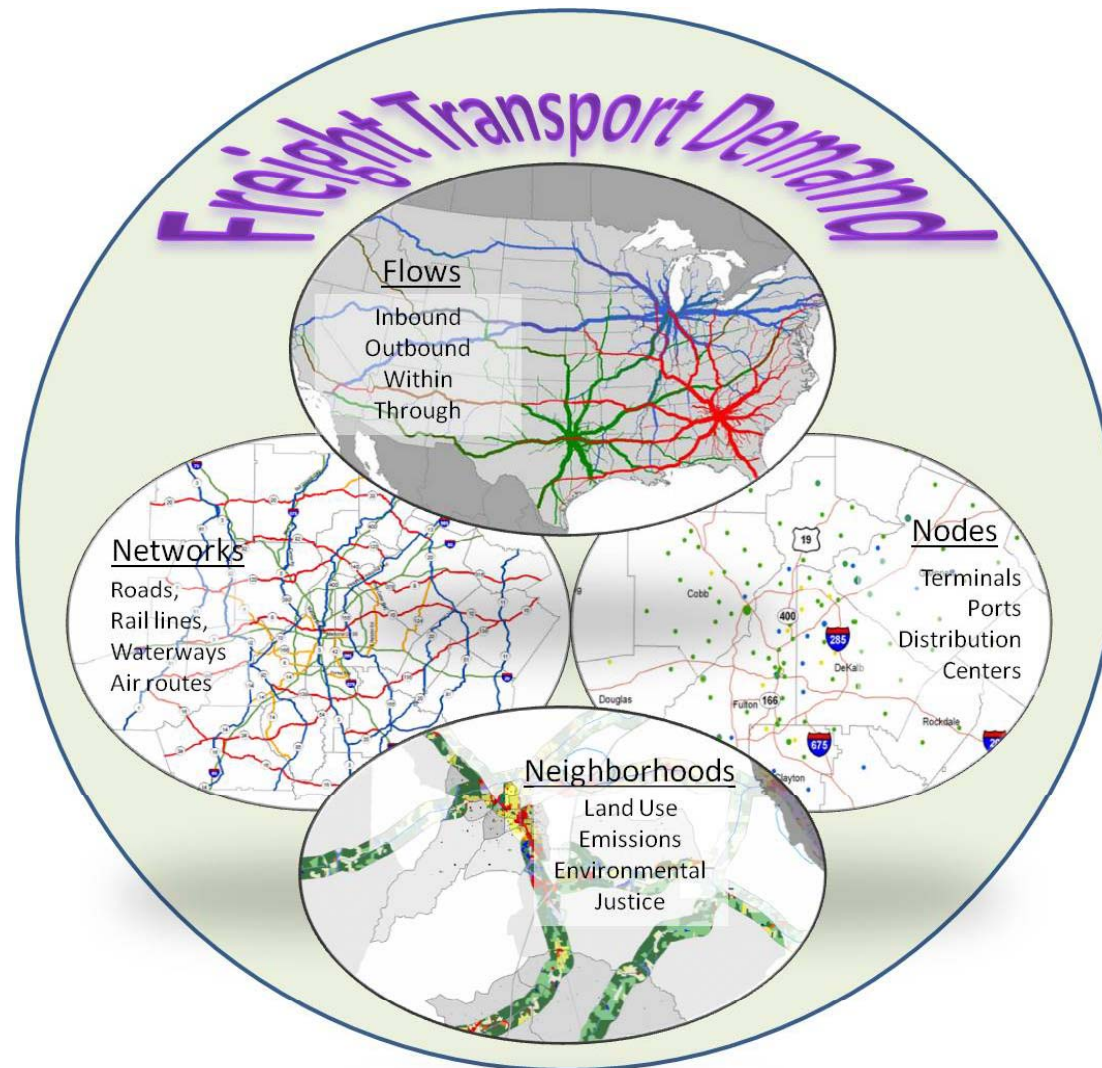
Supply Chain & Channel	Goods	Facilities & Geography	Modes	Staging & Urban Delivery	Performance
Soft Drink Beverages (Industrial Production)	Broad range of beverage products in different packaging types, including soft drinks, juices, and purified and flavored water.	<ul style="list-style-type: none"> <li>• Production Facilities</li> <li>• Distribution Centers</li> <li>• Retail Destinations (supermarkets, convenience stores, restaurant, vending machine)</li> </ul>	<ul style="list-style-type: none"> <li>• Truck</li> <li>• Rail</li> <li>• Pipeline</li> </ul>	<ul style="list-style-type: none"> <li>✓ Production</li> <li>✓ Potentially some cross-shipping of product components</li> <li>✓ Transfer to regional DC</li> <li>✓ Delivery to retail destinations along a stem route</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>• Achieve full utilization from each vehicle while meeting all customer delivery time windows</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>• Lack of available parking in urban locations</li> </ul> <p><u>Performance Enhancement Strategies</u></p> <ul style="list-style-type: none"> <li>• Greater time flexibility, allowing for more nighttime operations</li> </ul>
Gasoline & Petroleum Fuels (Industrial Production)	Products include gasoline of various grades, plus diesel, jet fuel and kerosene.	<ul style="list-style-type: none"> <li>• Origins</li> <li>• Refineries (Manufacturing Point)</li> <li>• Tank Farms (Staging Point)</li> <li>• Convenience Stores/ Gas Stations</li> </ul>	<ul style="list-style-type: none"> <li>• Truck</li> <li>• Pipeline</li> <li>• Ocean Carrier</li> <li>• Rail</li> </ul>	<ul style="list-style-type: none"> <li>✓ Inbound transport from Refinery to Tank Farm</li> <li>✓ Transfer from Tank Farm to Delivery Truck</li> <li>✓ Outbound delivery to final product destination (convenience store/gas station)</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>• Replenishment precision to avoid retails and runouts</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>• Inefficient/unsafe siting of gas station loading point access</li> <li>• Nighttime delivery restrictions</li> </ul> <p><u>Performance Enhancement Strategies</u></p> <ul style="list-style-type: none"> <li>• Highly automated reordering process</li> <li>• Proper design of physical layout of gas stations that allows for separation of uses and separation of access/egress</li> <li>• Greater time flexibility, allowing for more nighttime operations</li> </ul>
Pharmaceuticals & Biotechnology (Industrial Production)	The broad category of pharmaceuticals and biotechnology. The pharmaceutical industry is comprised of brand-name drugs and manufacturers of generic drugs. A few pharmaceutical companies provide both the branded and generic drugs.	<ul style="list-style-type: none"> <li>• Production Plants</li> <li>• Distribution Centers</li> <li>• Wholesaler</li> <li>• Customer location</li> </ul>	<ul style="list-style-type: none"> <li>• Truck</li> <li>• Air</li> </ul>	<ul style="list-style-type: none"> <li>✓ Manufacturing/Transport Between Plants for Various Manufacturing Stages</li> <li>✓ Purchase by wholesaler</li> <li>✓ Distribution by wholesaler to customers locations, including pharmacies and hospitals</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>• Speed of delivery, security, transparency and minimal exposure to environmental risks such as temperature extremes are all crucial for drug transport</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>• Traffic congestion in urban areas slows the delivery of product to customer facilities</li> <li>• Constrained truck maneuvering space in dense urban environments</li> </ul> <p><u>Performance Enhancement Strategies</u></p> <ul style="list-style-type: none"> <li>• Using air transport for most long distance hauls</li> <li>• Moving product from larger delivery vehicles to smaller configurations before entering more dense urban environments</li> </ul>
Food Services (Retail Distribution)	Distribution has two main types: broadline, which offers a comprehensive line of restaurant supply products, or specialized distribution, which supply meat and produce or give dedicated service to certain chain restaurants.	<ul style="list-style-type: none"> <li>• Source Material Origins</li> <li>• Warehouse Facilities <ul style="list-style-type: none"> <li>◦ Satellite Warehouses</li> </ul> </li> <li>• Distribution Centers</li> <li>• Restaurant customers</li> </ul>	<ul style="list-style-type: none"> <li>• Truck</li> <li>• Rail</li> <li>• Ocean Carrier</li> </ul>	<ul style="list-style-type: none"> <li>✓ Inbound transport of vendor supplies to company warehouse facilities.</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>✓ Inbound transport of vendor supplies to regional DC</li> <li>✓ Outbound transport of goods to restaurant customers <ul style="list-style-type: none"> <li>• Multi-stop deliveries during early morning hours</li> </ul> </li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>• Efficient routing and completion of multi-stop delivery routes, accounting for customer time delivery windows</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>• Congested traffic conditions cause delays</li> <li>• Lack of adequate, available parking near customer delivery locations</li> </ul> <p><u>Performance Enhancement Strategies</u></p> <ul style="list-style-type: none"> <li>• Early morning departures</li> <li>• Nighttime deliveries</li> <li>• Use of satellite yards</li> </ul>

## **Lesson 3:**

# **Using Freight Data for Planning**



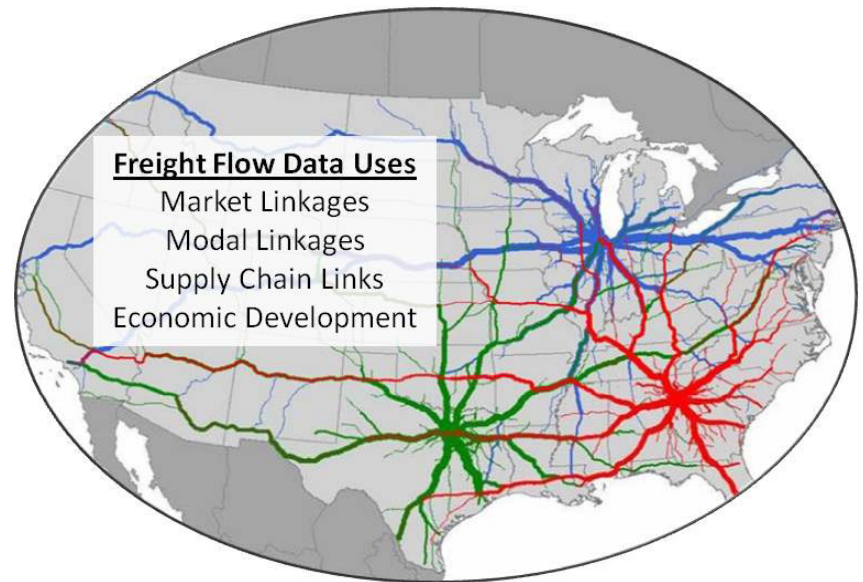
# Good planning requires good data



Sources: IHS Global Insight and Wilbur Smith Associates

# Freight Flow Data

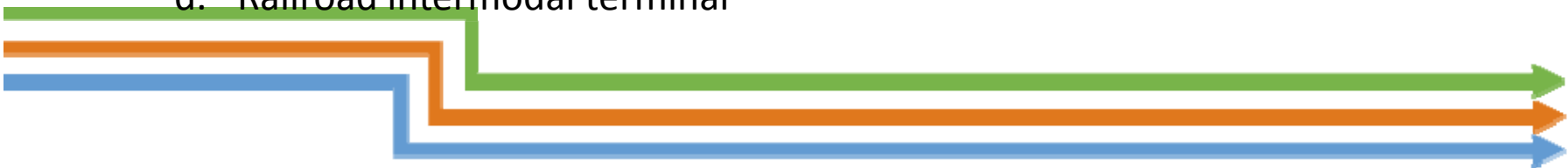
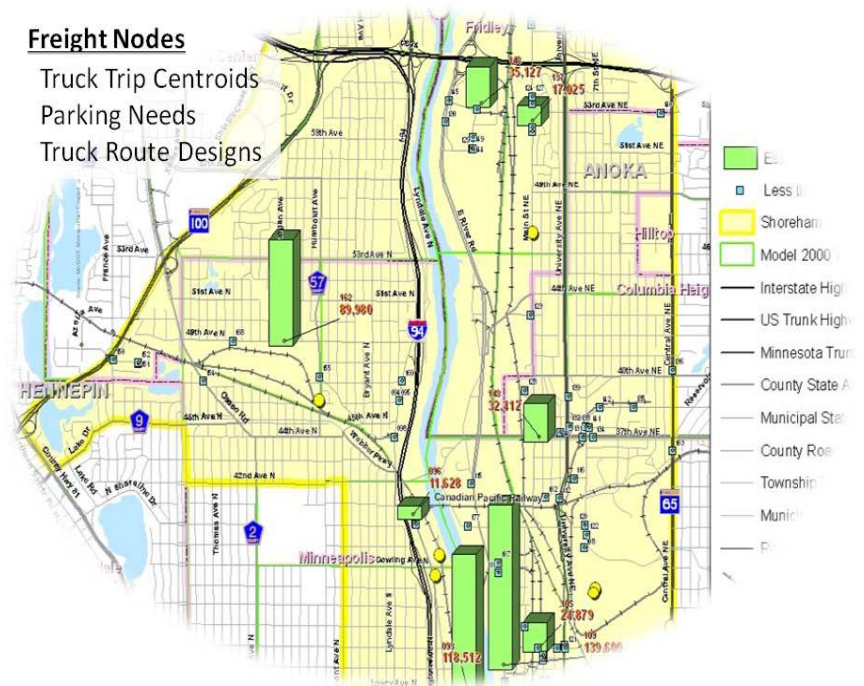
- Commodity Flow Survey (Bureau of Transportation Statistics - BTS)
- Freight Analysis Framework (Federal Highway Administration – FHWA)
- Railroad Waybill (Surface Transportation Board)
- TRANSEARCH® (IHS Global Insight).





# Freight nodes

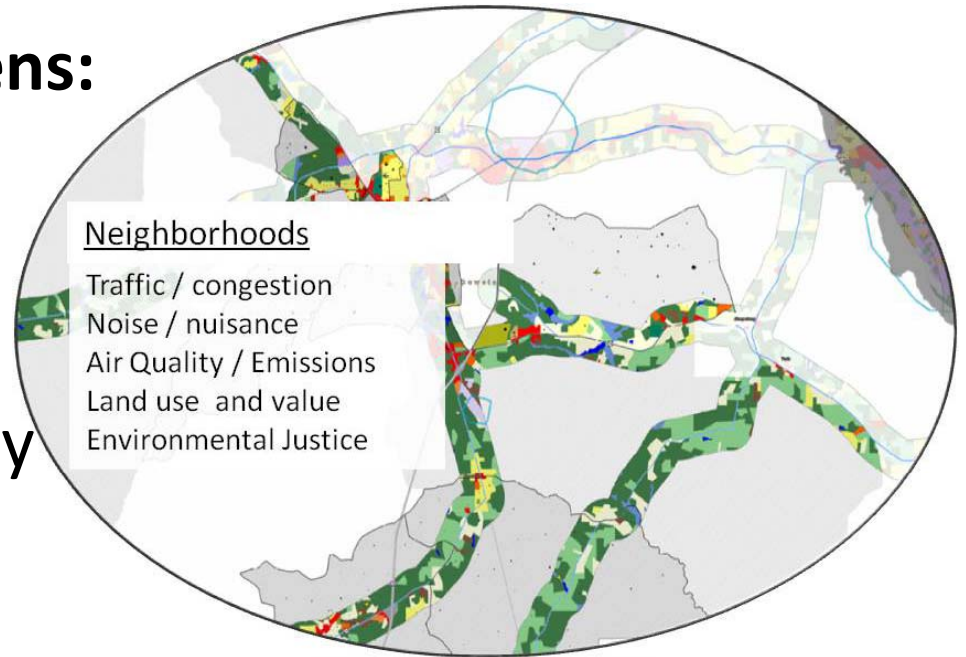
- Endpoints that generate or receive freight flows
  - Key points of production, consumptions or intermediate handling for goods
- Examples:
1. Production/Consumption Node
    - a. Manufacturing facilities
    - b. Waste transfer sites
    - c. Cement plant
    - d. Retail store, center or mall
  2. Goods Handling Node
    - a. Postal distribution center
    - b. Warehouse / distribution center
    - c. Truck terminal / sorting facility
    - d. Railroad intermodal terminal



# Neighborhoods

## Issues of concern to citizens:

- Safety and security
- Traffic impacts and congestion
- Emissions and air quality
- Noise and vibrations
- Land use and value
- Environmental justice





## Lesson 4:

# Regulations and Conditions Impacting Urban Goods Movements

- This section assumes planners know what their regulations are and does not go into a lot of detail



# Regulations that make a difference:

- Design Standards
- Land Use and Zoning
- Urban Truck Regulations
- Parking and Loading Zones
- Delivery Windows/Time of Day Restrictions
- Truck Size and Weight Regulations



# Common Issues

- Set back ordinances
- Parking ordinances
- Urban geometric design issues
  - turning radius
  - height/width clearances that often affect the ability of large vehicles to maneuver safely among other motorists
  - at-grade crossing clearance and distance of rail lines from parallel highway corridors,
- Construction delay
- Signal timing in heavy-use truck corridors
- Access management for commercial vehicles



# Urban Design Standard



# Parking Ordinances



# Bridge Geometrics





# Roadway Geometrics



# Construction Delays



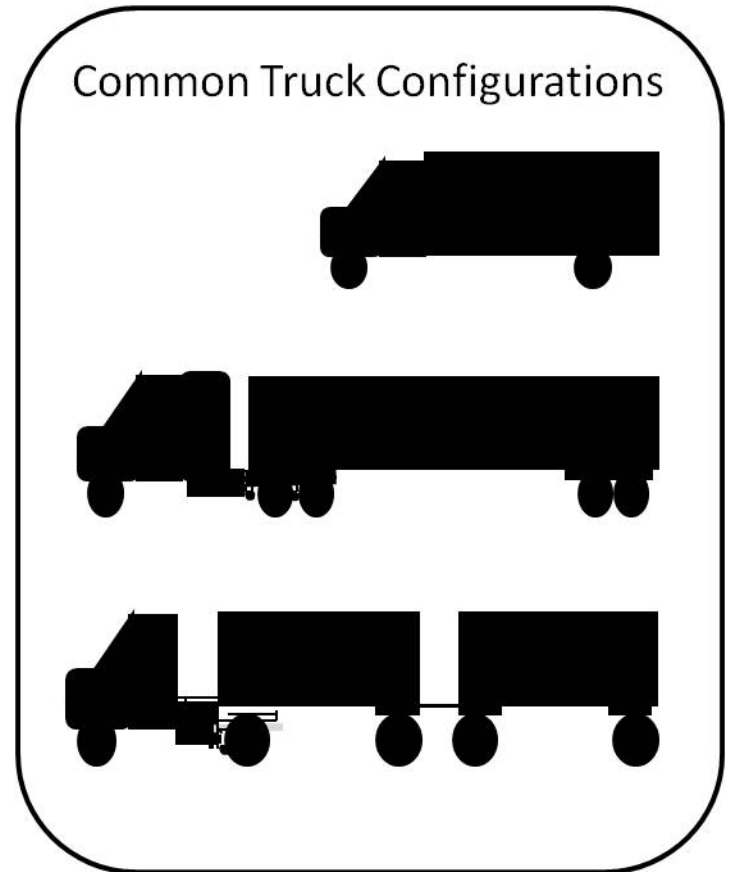


# Urban Trucking Regulation

At the urban level regulations over commercial vehicle operations fall into several categories:

- Route restrictions
- Commercial vehicle parking regulation / curbside Access
- Size and weight regulation
- Emission controls

Common Truck Configurations



# Commercial Vehicle Route Restrictions / Truck Routes

- To facilitate freight movements, truck routes should be:
  - Designated
  - Designed
  - Operated and maintained to accommodate trucks
- Serve the following purposes:
  - Increase freight transit reliability
  - Reduce congestion and provide congestion relief due to incidents on major arterials
  - Improve safety



## **Lesson 5:**

# **Putting it all Together: a Process for Evaluating and Addressing the Impacts**

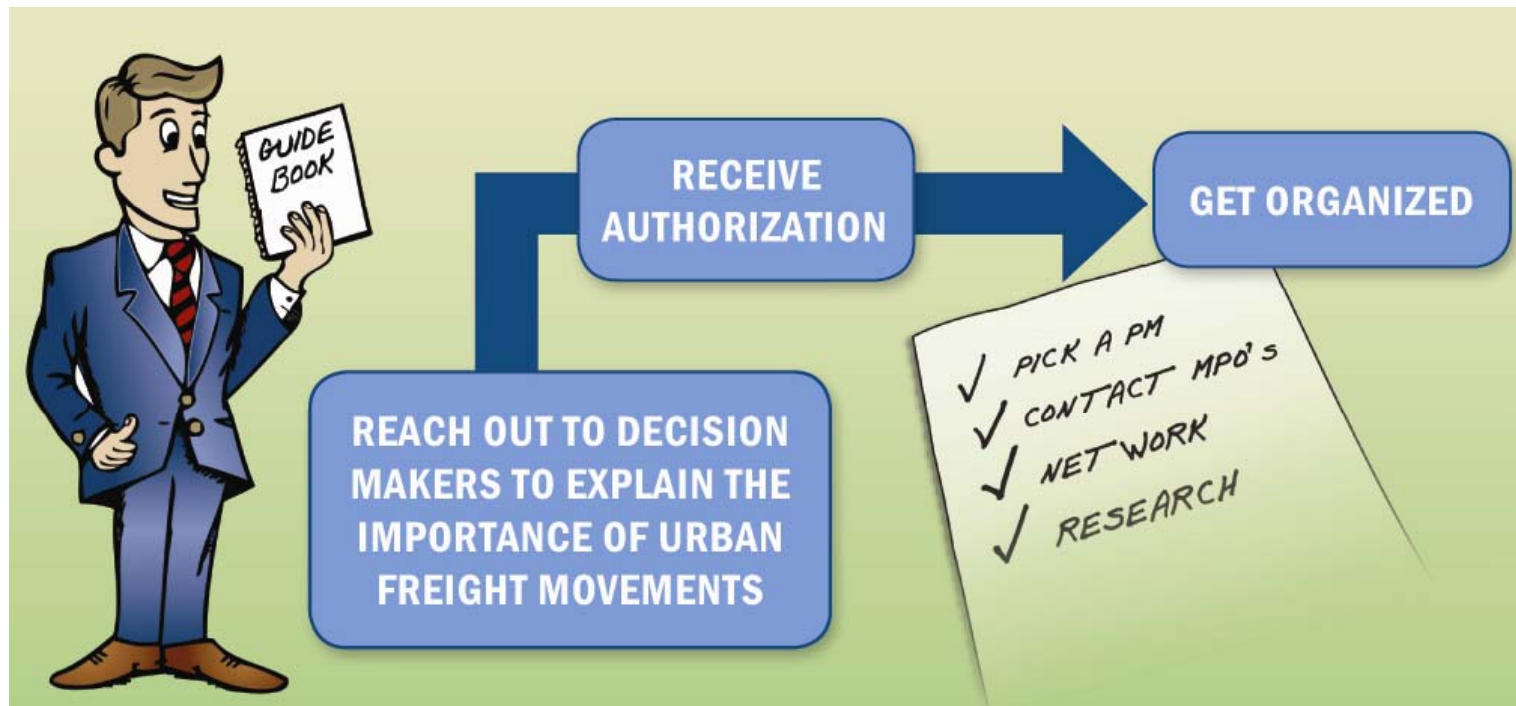


# Follow the planning process....

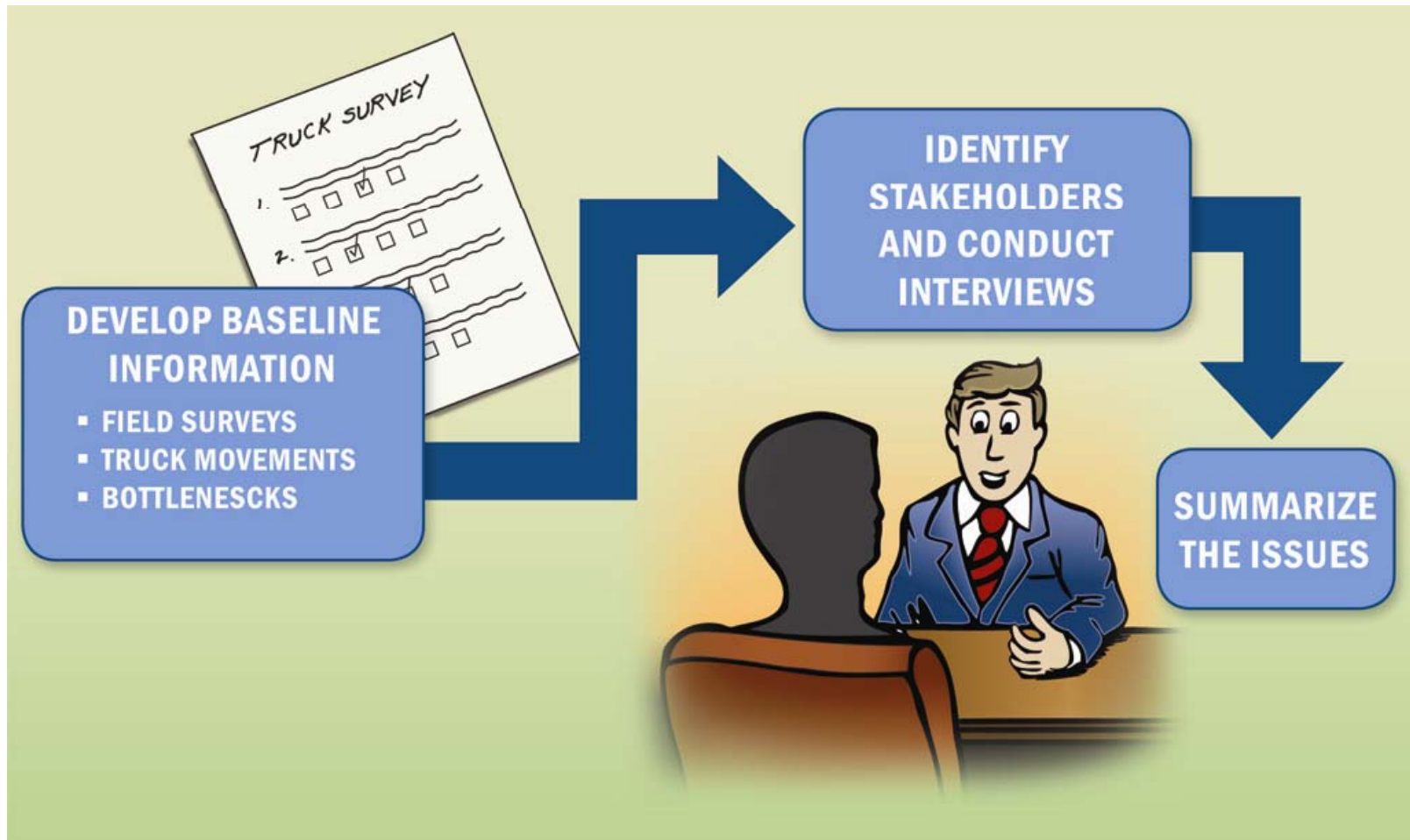
- Understand the political environment – you need support to begin
- Get organized
- Develop baseline information
  - Field surveys: Identify stakeholders and conduct interviews
  - Inventories
- Review and evaluate current regulations
- Summarize the issues, problems and their locations
- Education, outreach and gaining support
- Identify potential solutions and strategies to improve urban goods movements



# Follow the planning process....



# Follow the planning process....







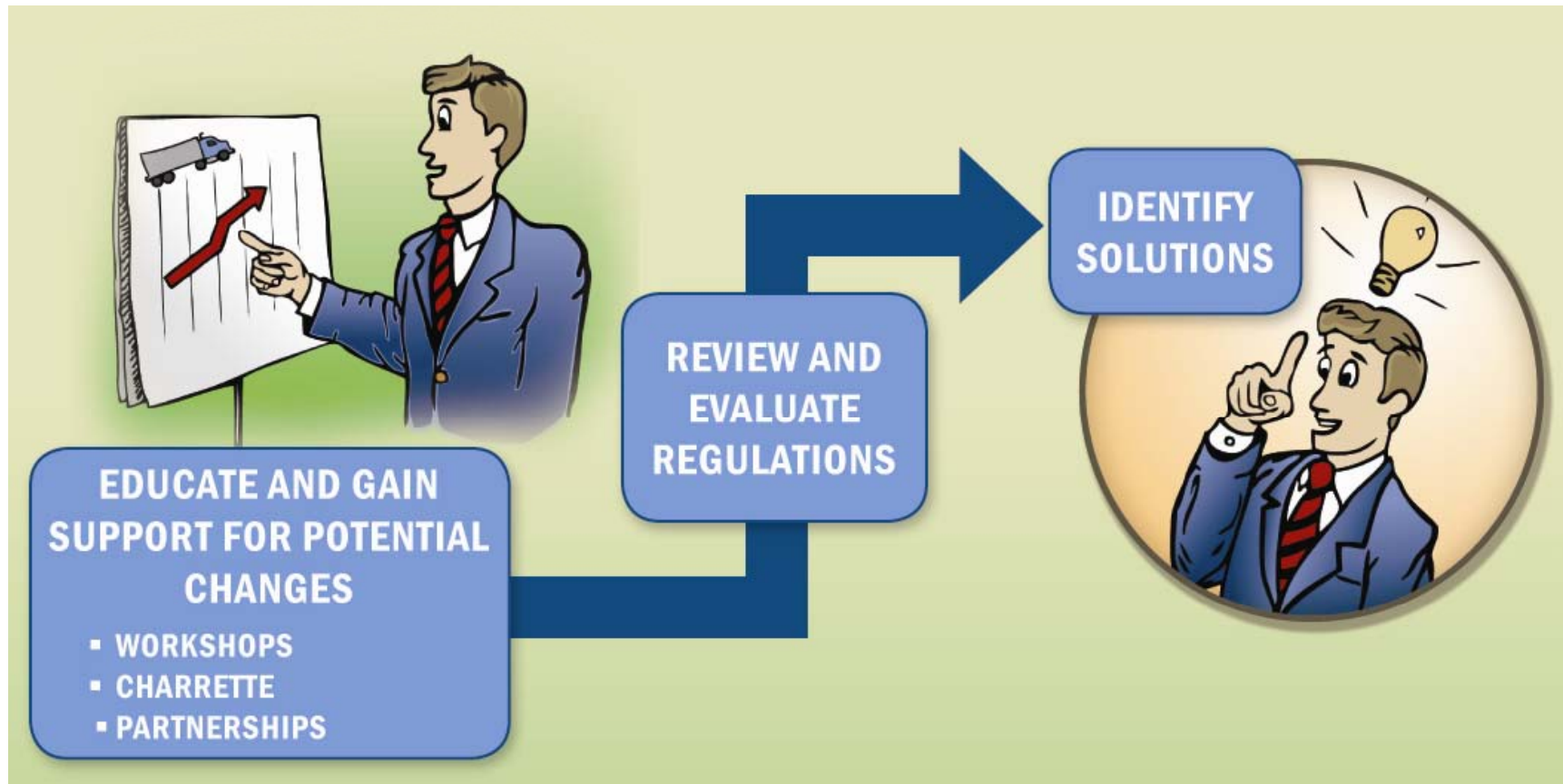
**F R E I G H T**

*Professional Development*

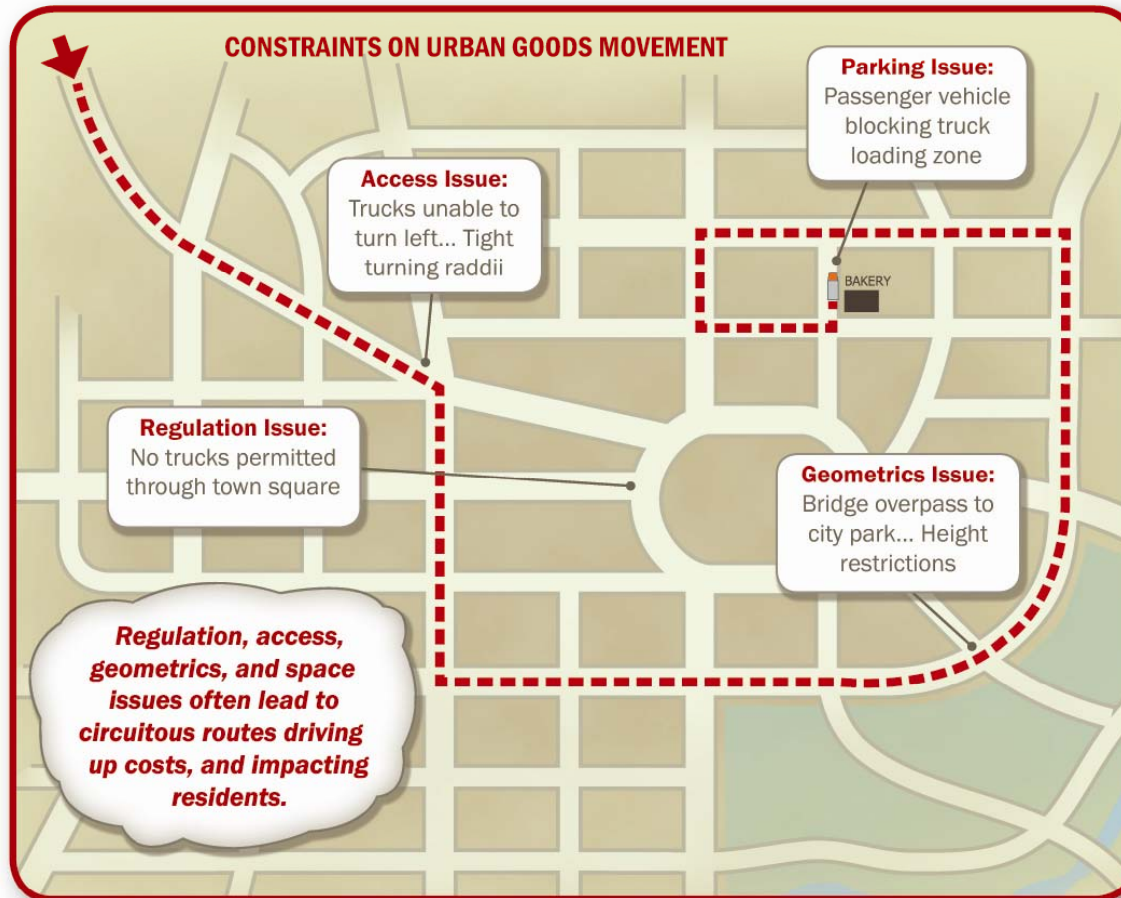
**Engaging  
the Private  
Sector in  
Freight  
Planning**



# Follow the planning process....



# Identify problems



# Identify solutions



# Define the problems – identify solutions

RESOURCE MATRIX		POTENTIAL SOLUTION												
		Designate truck routes	Improve signage	Designate / add truck parking	Enforce parking and truck routing regulations	Review design standards for new construction to accommodate freight needs	Work with businesses to set pick-up / delivery schedule	Modify regulations designating pick-up / delivery hours	Use cell phones to schedule pick-up / delivery times	Improve roadways and bridges to accommodate trucks	Evaluate "last mile" needs	Work with freight industry stakeholders, local chamber or economic development staff	Work with MPO or state DOT freight staff	Conduct education and outreach on impact of freight
PROBLEM	trucks on residential streets	x	x		x	x	x			x	x	x		
	trucks cutting through private property or parking lots to access pick-up / delivery locations	x	x		x					x	x	x	x	
	trucks not having direct routes for pick up or delivery	x	x	x					x	x	x	x	x	
	trucks circling blocks; no parking available				x	x	x	x	x					
	double parking		x	x	x	x	x		x					
	passenger cars / dumpsters in truck loading zones		x		x									x
	congestion	x		x	x	x	x	x	x		x			
	trucks driving over curbs, hitting items near corners	x			x				x	x				
	trucks having inadequate space to backup or turn	x			x	x			x	x				
	conflicts business and industry uses	x				x					x	x		
	noise, dust, light pollutions from freight uses	x			x							x		x
	freight improvement projects not receiving priority										x	x	x	x

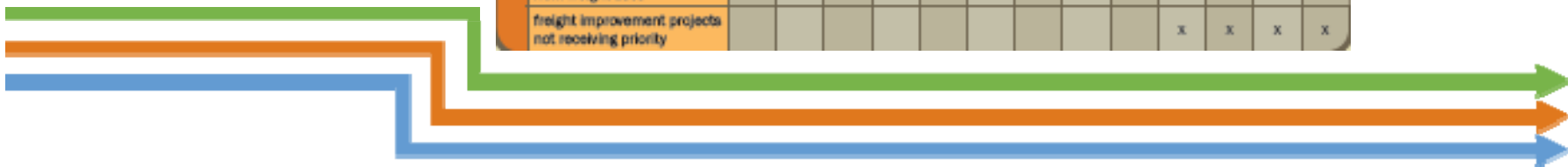
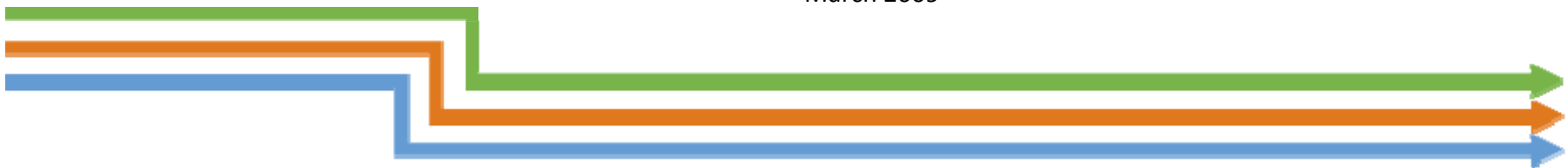






Photo from LA Guidebook A Tool kit for Goods Movement Ch 3. p.1, March 2009





# Parking Enforcement



# Example Solutions

- Air quality
  - Reduce congestion
  - Consistent speed
  - Fuels
- Traffic and safety
  - Scheduling or appointments
  - Incentives to operate in off-peak hours
  - Reduce empty truck loads



**Case studies:**

**Examples in the Guidebook**



# Case studies

1. **Atlanta: Effectively Managing Truck Traffic in the Urban Environment**
2. **Baltimore: The Maritime Zone Overlay District (MIZOD)**
3. **Toronto: Harmonizing of Loading Area Regulation across a Mega-City**
4. **Washington, D.C.: Commercial Vehicle Regulation**
5. **Nashville: Vanderbilt Medical Center – Freight Consolidation**
6. **London: Reducing Freight Impacts via Out-of-Hours Deliveries**
7. **Bristol: Reducing Freight Impacts through Consolidation Centers (U.K.)**
8. **New York City: Commercial Vehicle Regulation and Off-Peak Delivery**
9. **Buffalo: Brownfield Redevelopment for a Logistics Hub**



# New York Case Study



**100 years of commercial vehicle regulations**



# Problem - Enforcement





# Problem - Truck routing, signage



**Only 5% of streets were designated as truck routes**  
**Signage inconsistent**

# Approach and actions



- Conducted truck study
- Created Office of Freight Mobility
- Identified problem and potential solutions

# Approach and actions

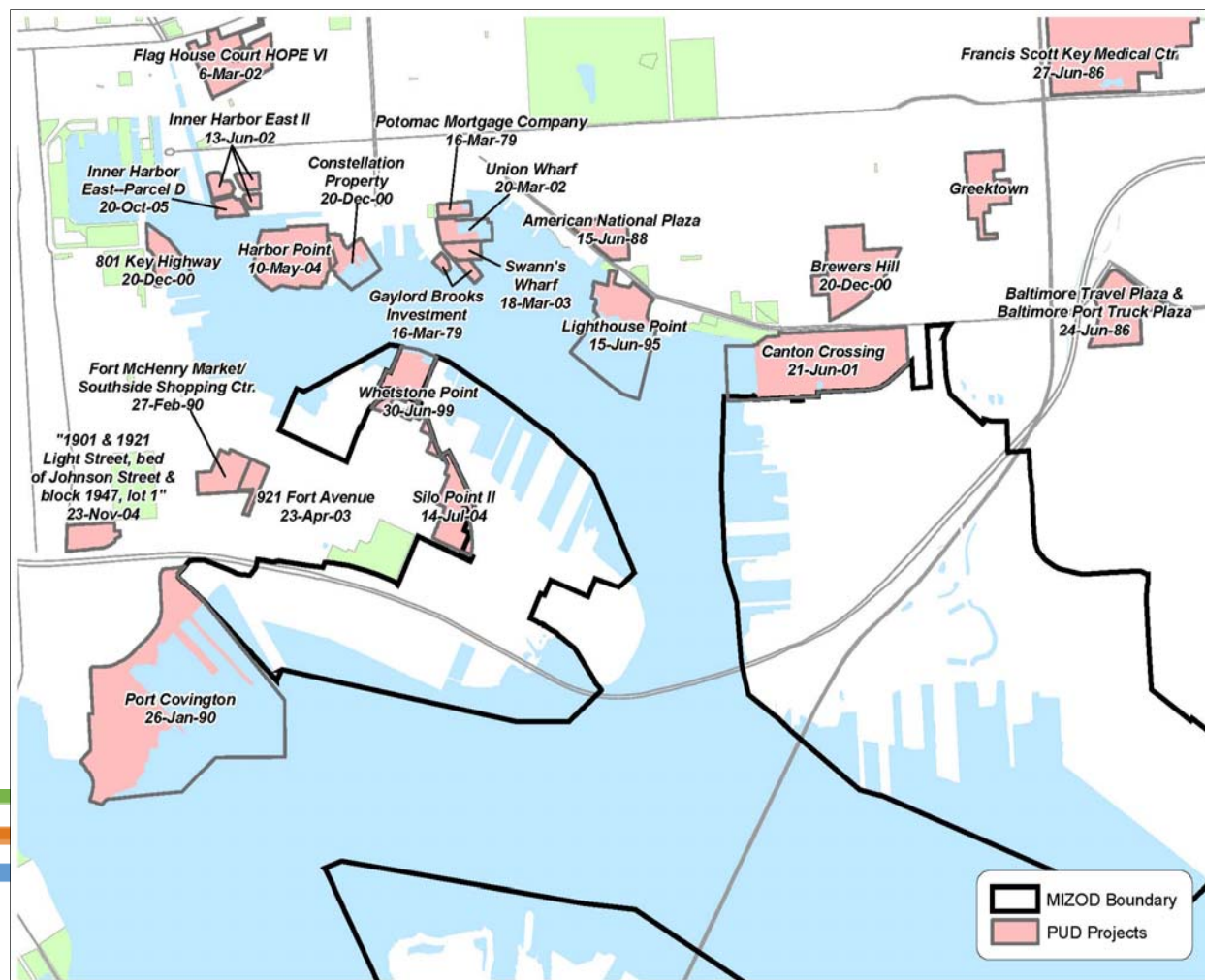


- Communicate mission; identify champion
- Developed an action agenda / programs
  - NYPD Truck enforcement program - educate officers
  - Truck route signage pilot
  - Delivery windows program
  - Off-hours delivery program



# Baltimore Case Study: Overlay Zone

Boundaries and Dates of Adoption of Planned Unit Developments around the MIZOD



# Resource CD



# Resource CD includes:

- PowerPoint presentations
- Literature review
- Additional data, information and in-depth analysis
- Glossary
- How to examples
- Examples from other states





# Your challenge

- Reach out to local land use planners
- The Guidebook provides tools
  - 2 PowerPoints with speaker notes
  - Supply chain diagrams
  - 8 page Executive Summary

**You can make a difference**





# NCFRP 15A

## GUIDEBOOK: Understanding Urban Goods Movements

Thank  
you

[srhodes@wilbursmith.com](mailto:srhodes@wilbursmith.com)

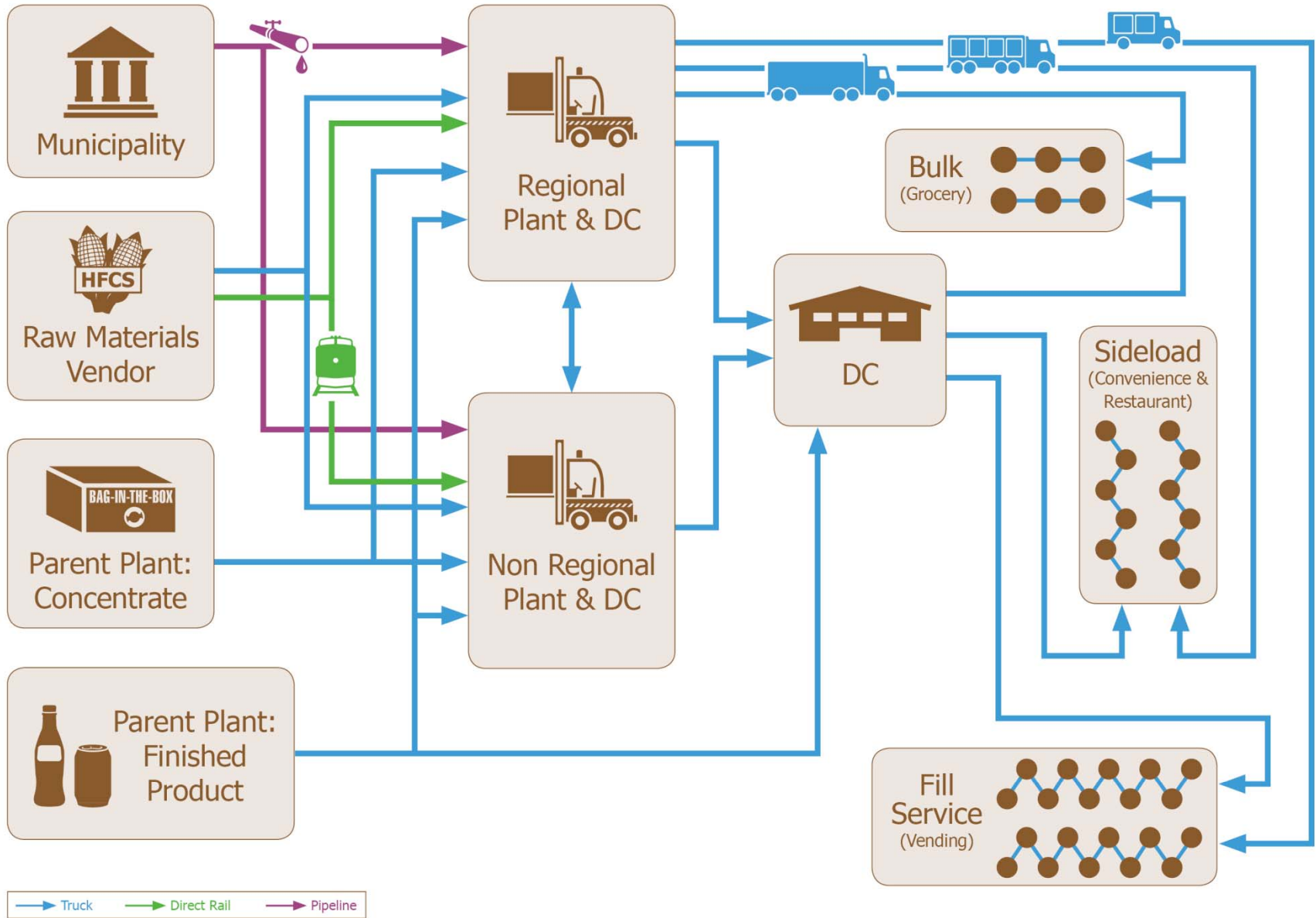


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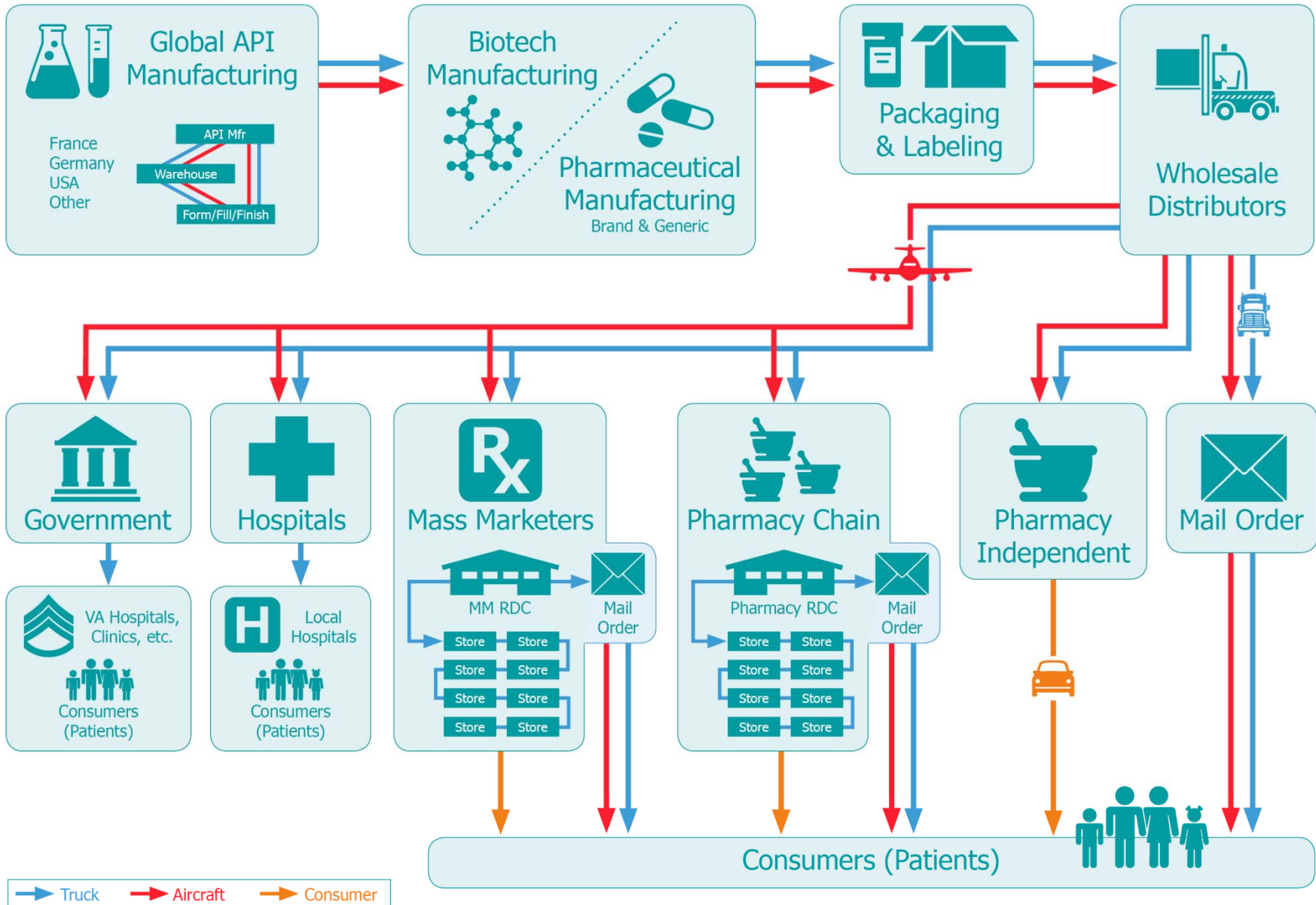


# SUPPLY CHAIN: SOFT DRINK BEVERAGES



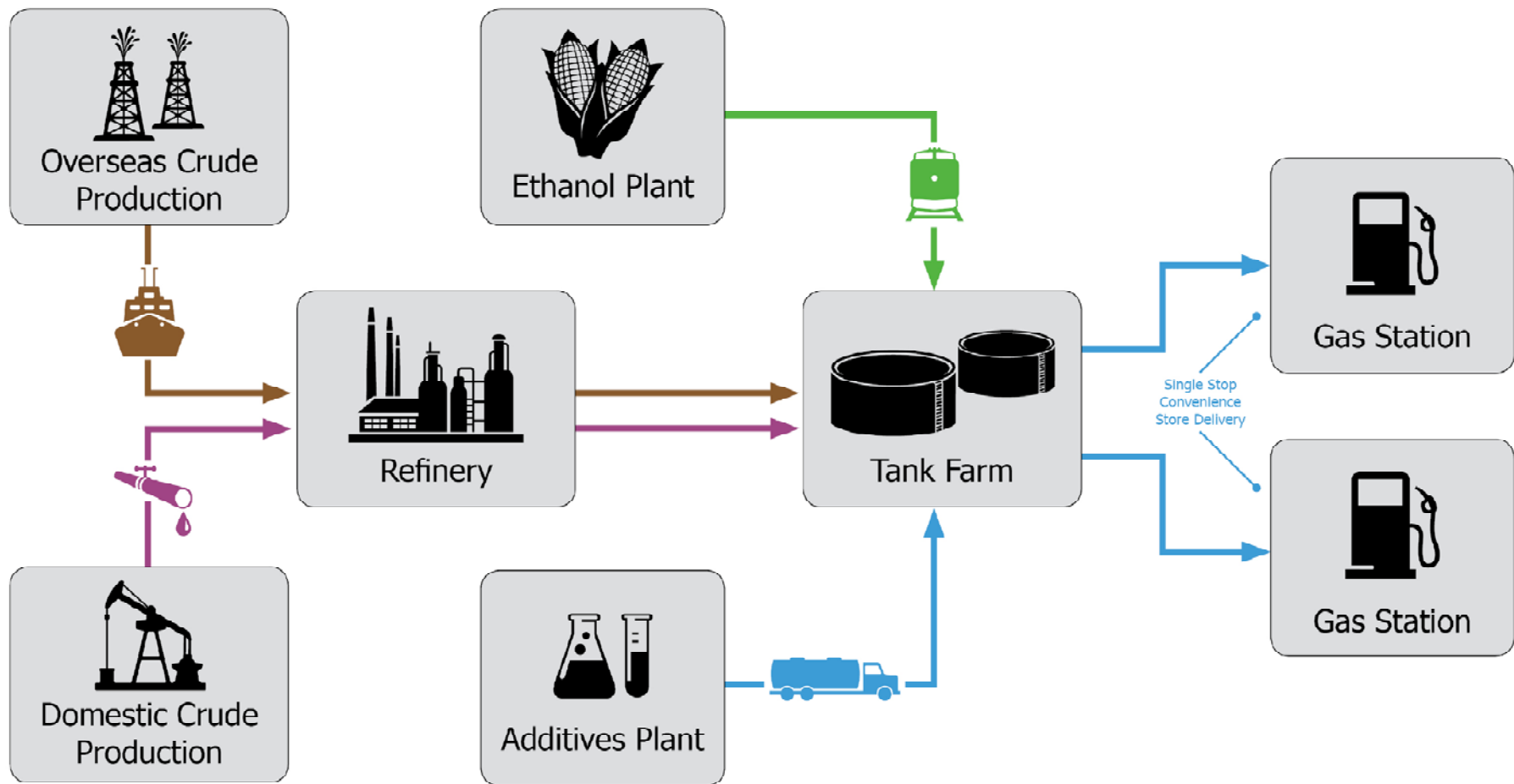


# SUPPLY CHAIN: PHARMACEUTICAL & BIOTECH



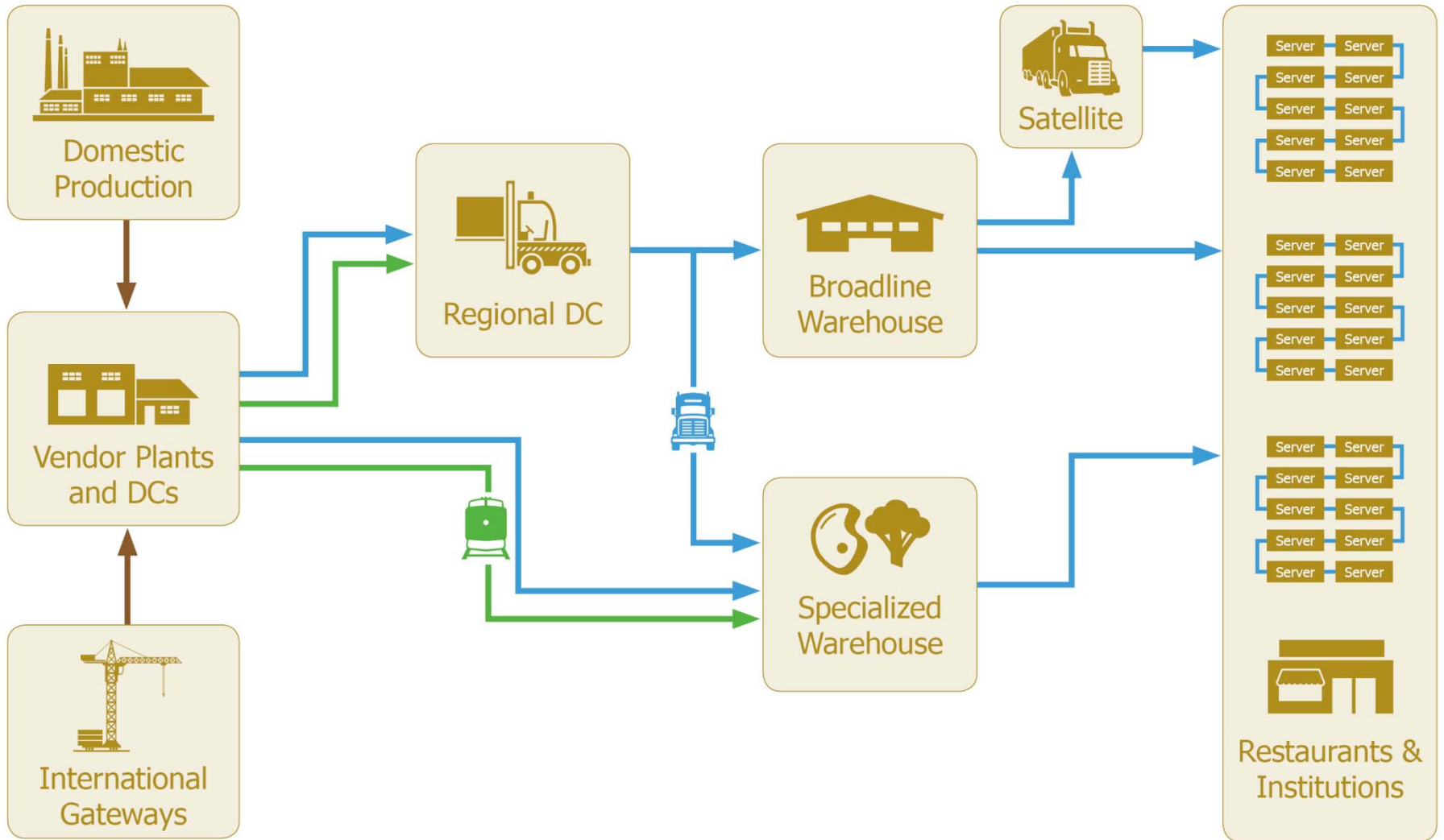


# SUPPLY CHAIN: GASOLINE & PETROLEUM FUELS





# SUPPLY CHAIN: FOOD SERVICES

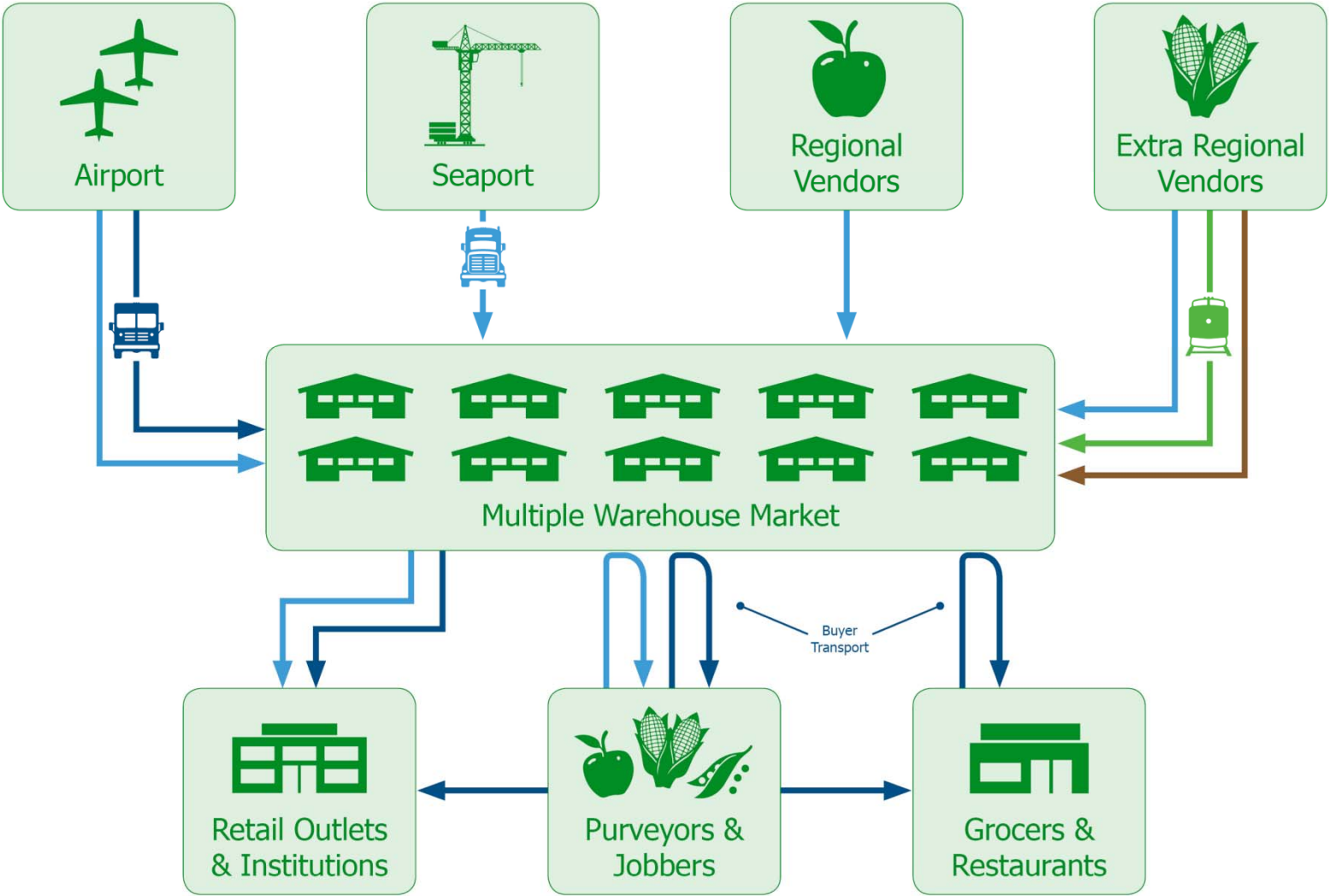


→ Truck    → Direct Rail    → Various Modes





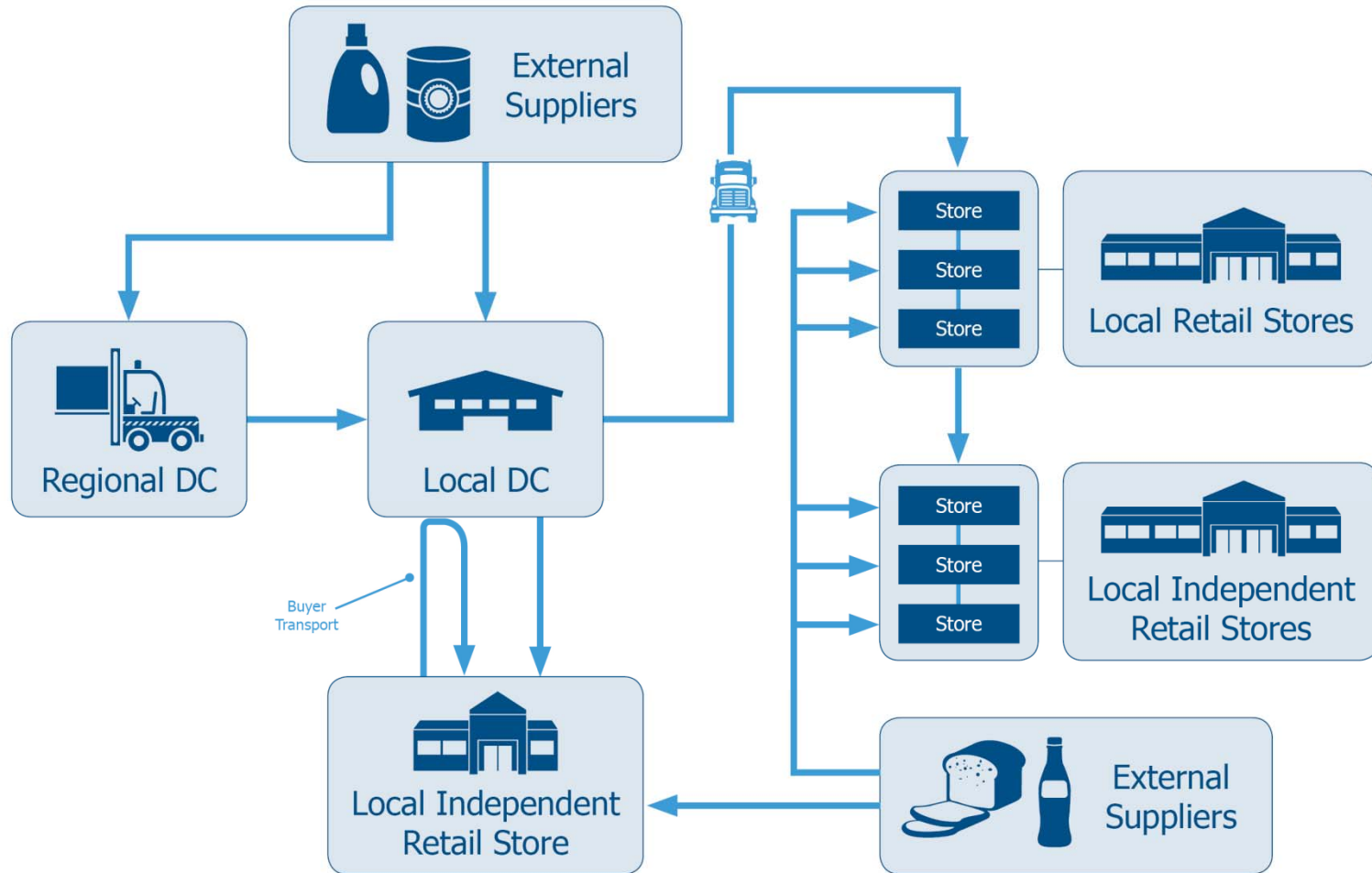
# SUPPLY CHAIN: URBAN WHOLESALE FOOD



 18 Wheeler  
  Small Truck/Van  
  Direct Rail  
  Intermodal Rail



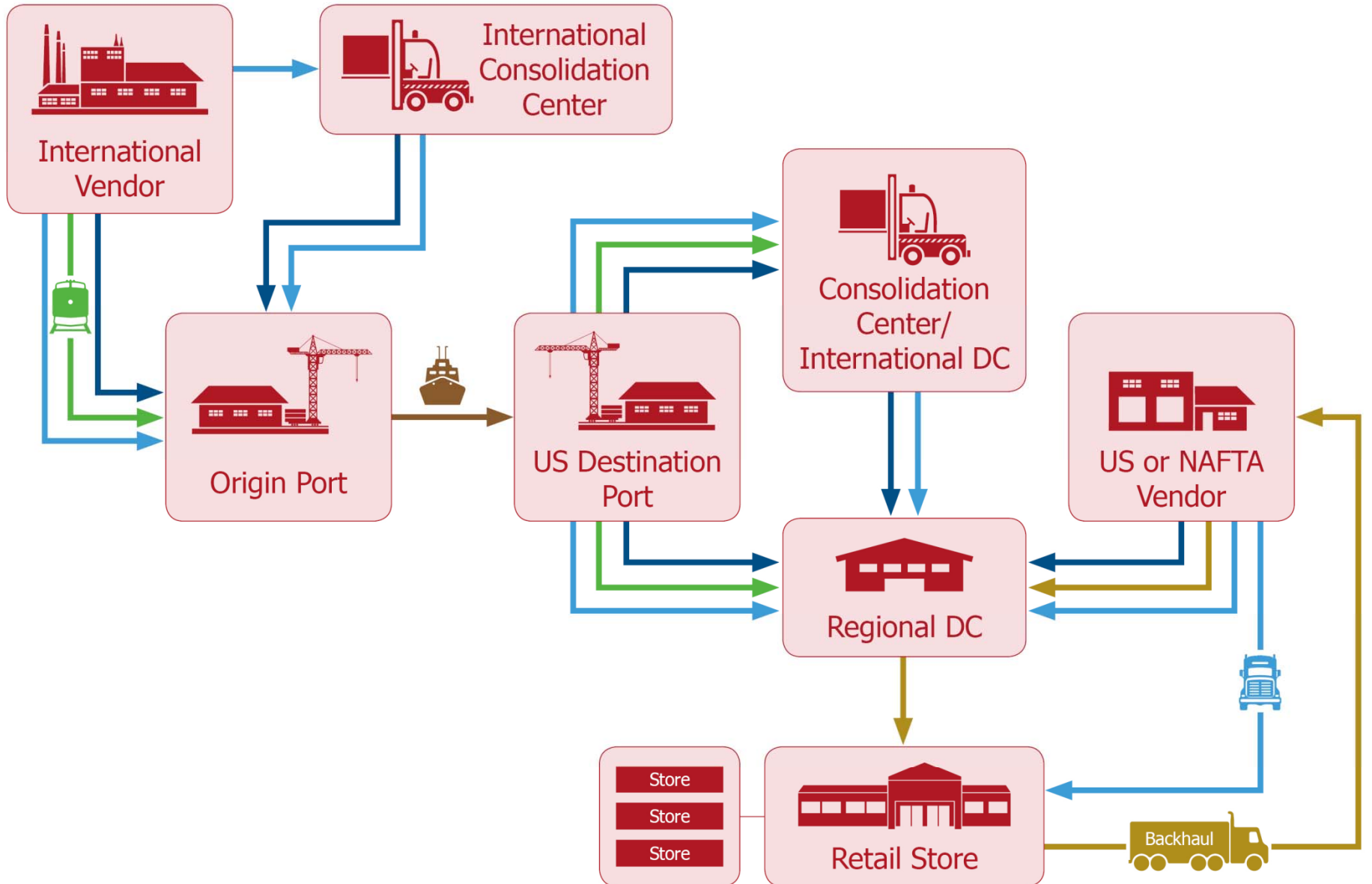
# SUPPLY CHAIN: SUPERMARKET GROCERY



→ Truck

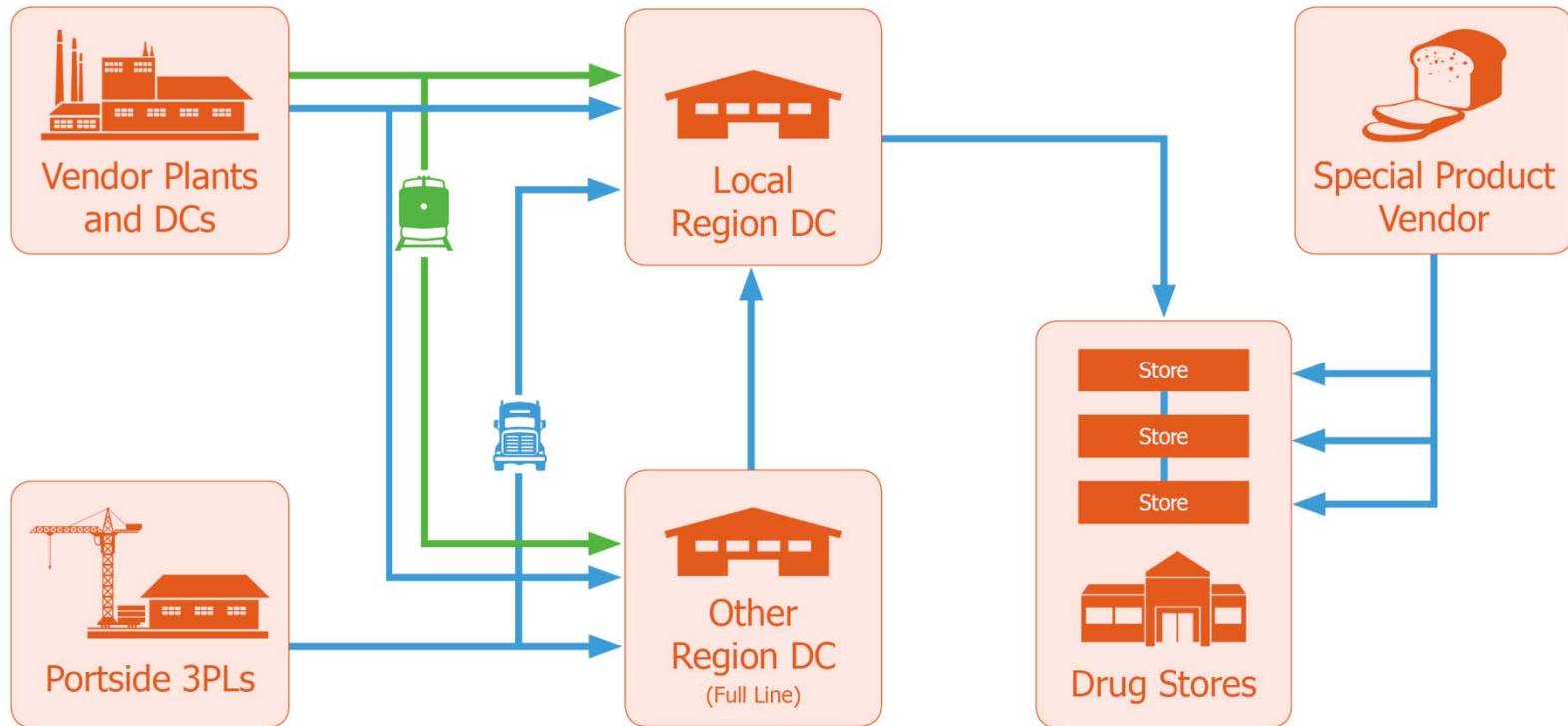


# SUPPLY CHAIN: BIG BOX RETAIL





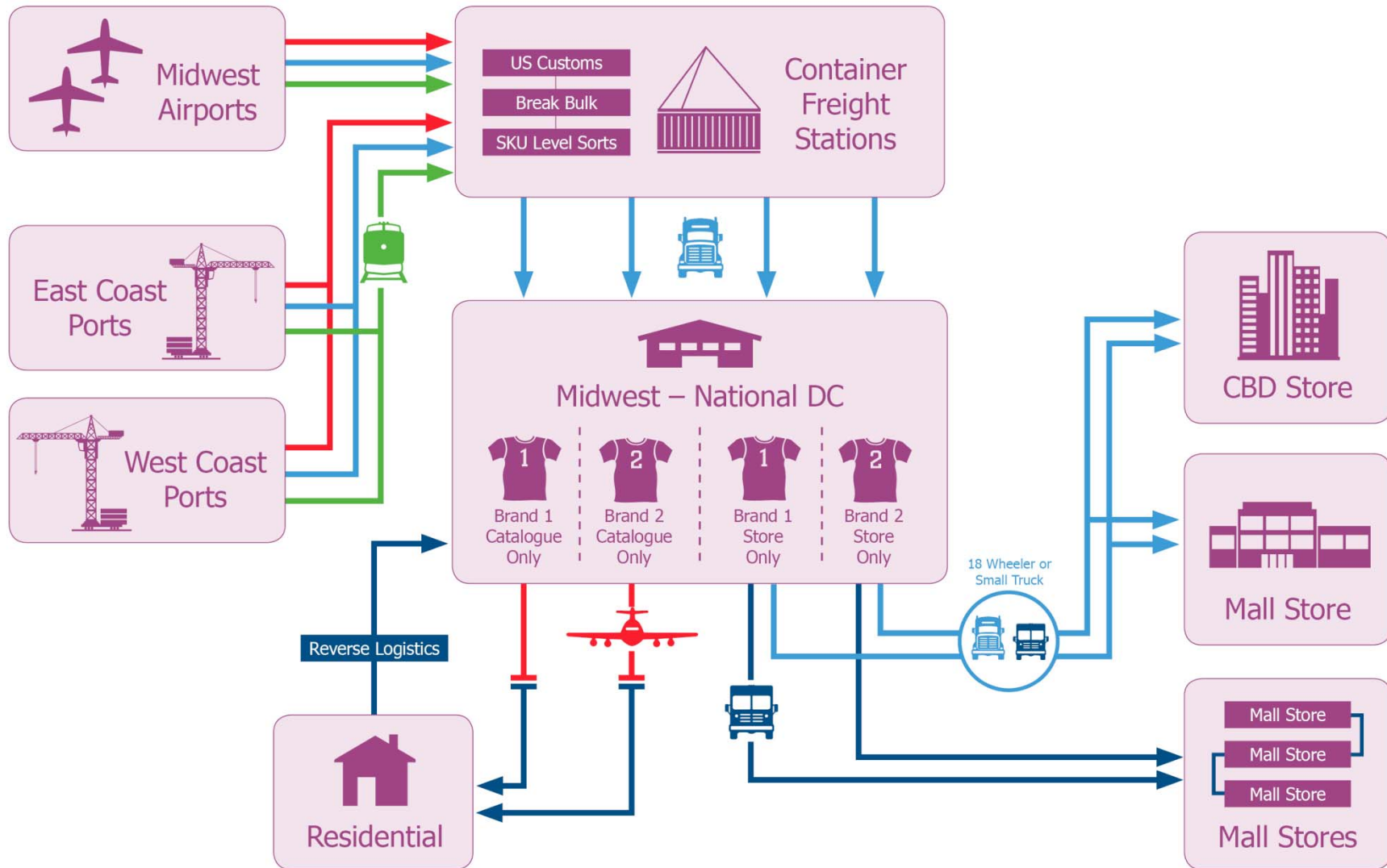
# SUPPLY CHAIN: RETAIL DRUG STORE



→ Truck → Intermodal Rail



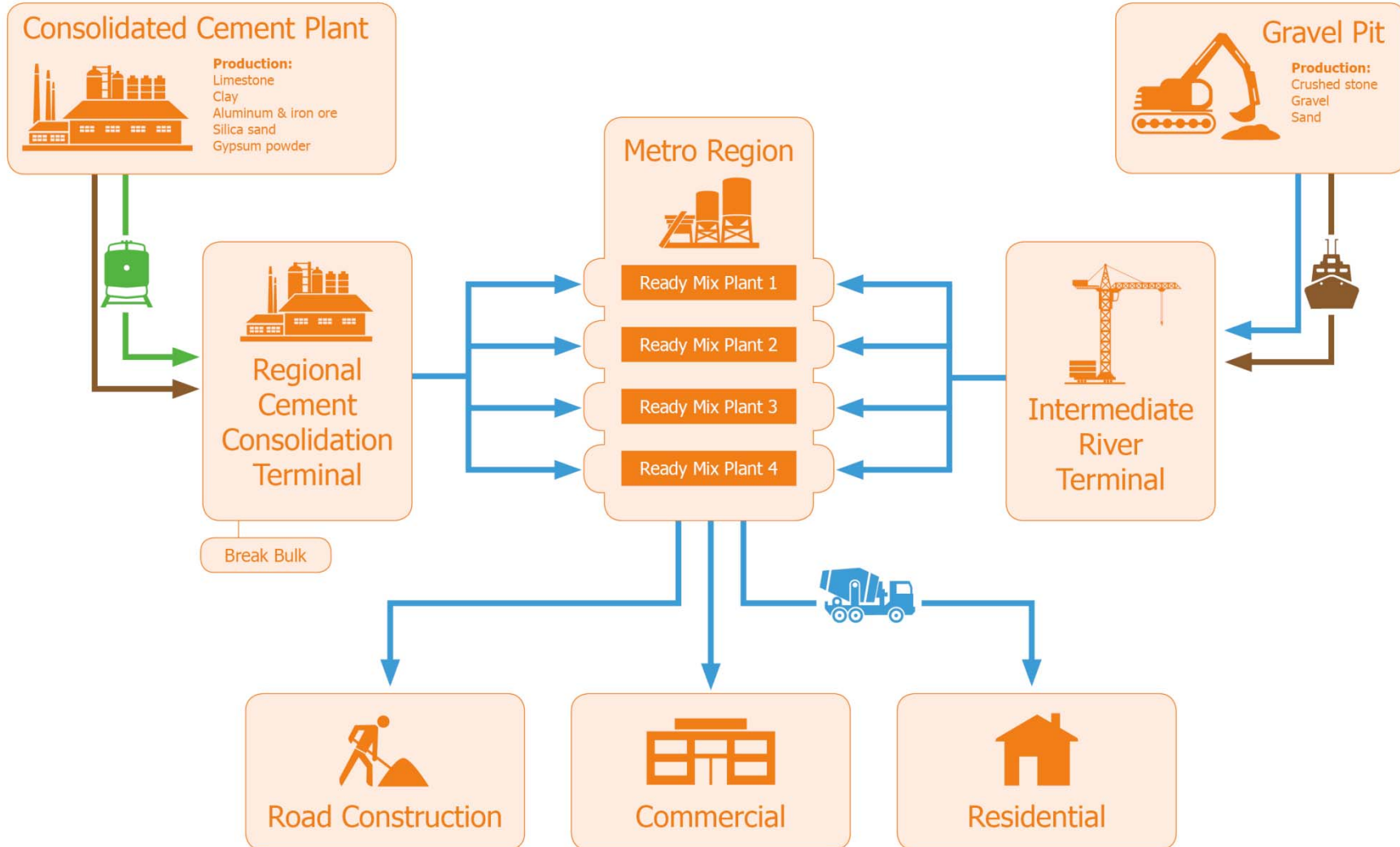
# SUPPLY CHAIN: APPAREL RETAIL



→ 18 Wheeler    → Small Truck    → Aircraft    → Intermodal Rail



# SUPPLY CHAIN: CONSTRUCTION MATERIALS

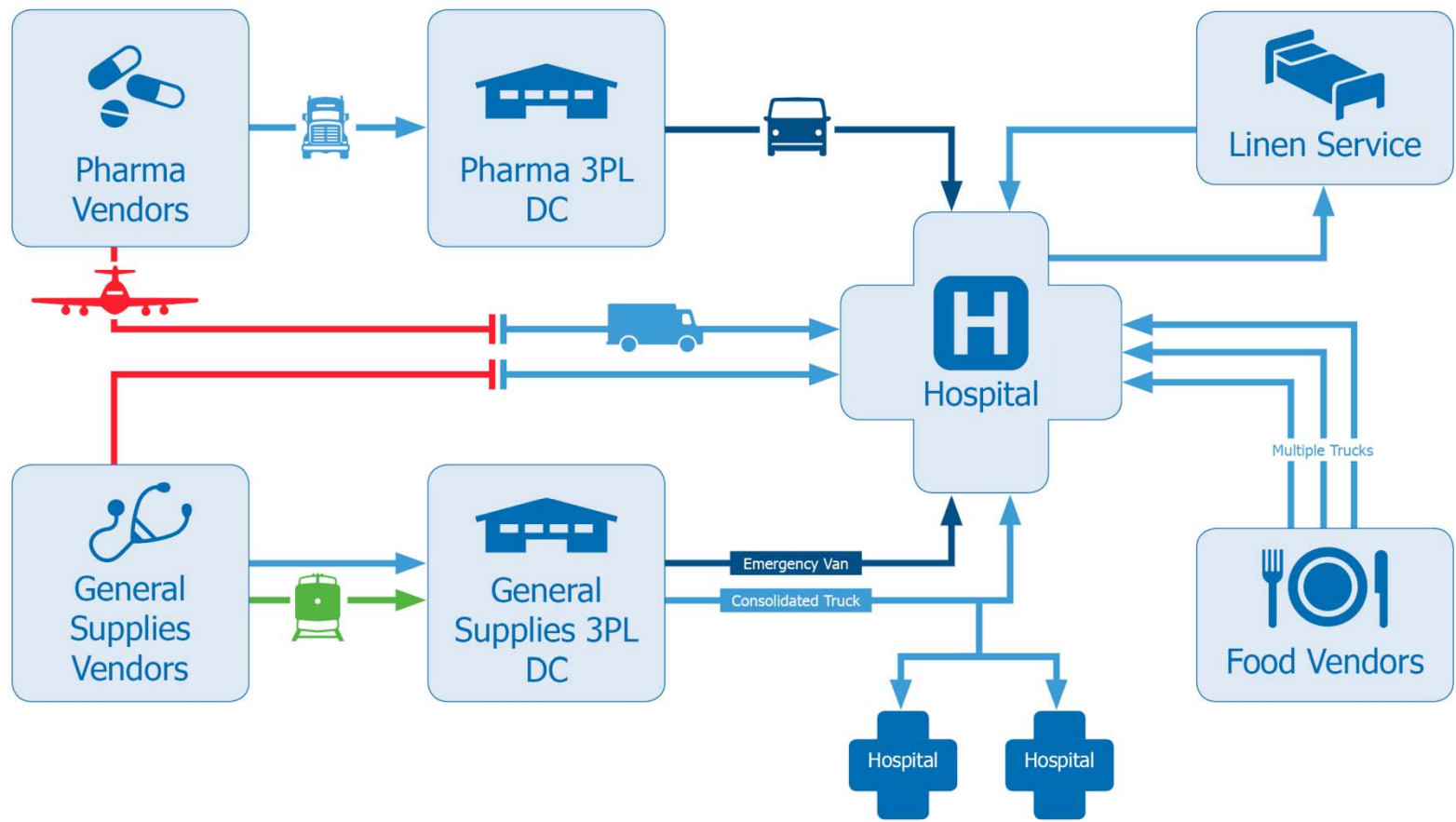


→ For-Hire Truck    → Barge    → Direct Rail





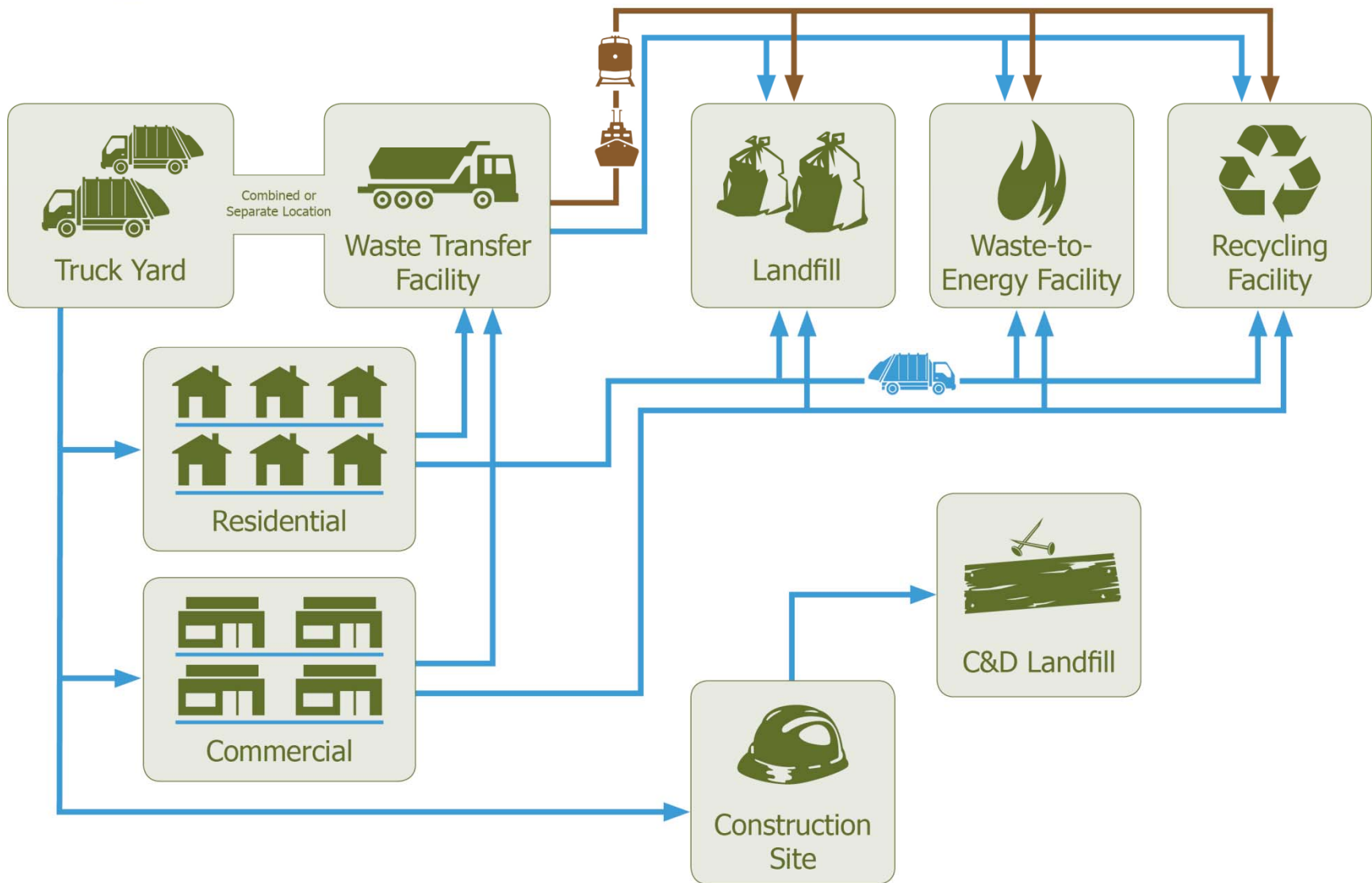
# SUPPLY CHAIN: HOSPITAL



Truck   Aircraft   Direct Rail   Van



# SUPPLY CHAIN: WASTE & RECYCLABLES



→ Truck    → Barge/Direct Rail

Supply Chain & Channel	Goods	Facilities & Geography	Modes	Staging & Urban Delivery	Performance
Soft Drink Beverages (Industrial Production)	Broad range of beverage products in different packaging types, including soft drinks, juices, and purified and flavored water.	<ul style="list-style-type: none"> <li>Production Facilities</li> <li>Distribution Centers</li> <li>Retail Destinations (supermarkets, convenience stores, restaurant, vending machine)</li> </ul>	<ul style="list-style-type: none"> <li>Truck</li> <li>Rail</li> <li>Pipeline</li> </ul>	<ul style="list-style-type: none"> <li>✓ Production</li> <li>✓ Potentially some cross-shipping of product components</li> <li>✓ Transfer to regional DC</li> <li>✓ Delivery to retail destinations along a stem route</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>Achieve full utilization from each vehicle while meeting all customer delivery time windows</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>Lack of available parking in urban locations</li> </ul> <p><u>Performance Enhancement Strategies</u></p> <ul style="list-style-type: none"> <li>Greater time flexibility, allowing for more nighttime operations</li> </ul>
Gasoline & Petroleum Fuels (Industrial Production)	Products include gasoline of various grades, plus diesel, jet fuel and kerosene.	<ul style="list-style-type: none"> <li>Origins</li> <li>Refineries (Manufacturing Point)</li> <li>Tank Farms (Staging Point)</li> <li>Convenience Stores/ Gas Stations</li> </ul>	<ul style="list-style-type: none"> <li>Truck</li> <li>Pipeline</li> <li>Ocean Carrier</li> <li>Rail</li> </ul>	<ul style="list-style-type: none"> <li>✓ Inbound transport from Refinery to Tank Farm</li> <li>✓ Transfer from Tank Farm to Delivery Truck</li> <li>✓ Outbound delivery to final product destination (convenience store/gas station)</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>Replenishment precision to avoid retails and runouts</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>Inefficient/unsafe siting of gas station loading point access</li> <li>Nighttime delivery restrictions</li> </ul> <p><u>Performance Enhancement Strategies</u></p> <ul style="list-style-type: none"> <li>Highly automated reordering process</li> <li>Proper design of physical layout of gas stations that allows for separation of uses and separation of access/egress</li> <li>Greater time flexibility, allowing for more nighttime operations</li> </ul>
Pharmaceuticals & Biotechnology (Industrial Production)	The broad category of pharmaceuticals and biotechnology. The pharmaceutical industry is comprised of brand-name drugs and manufacturers of generic drugs. A few pharmaceutical companies provide both the branded and generic drugs.	<ul style="list-style-type: none"> <li>Production Plants</li> <li>Distribution Centers</li> <li>Wholesaler</li> <li>Customer location</li> </ul>	<ul style="list-style-type: none"> <li>Truck</li> <li>Air</li> </ul>	<ul style="list-style-type: none"> <li>✓ Manufacturing/Transport Between Plants for Various Manufacturing Stages</li> <li>✓ Purchase by wholesaler</li> <li>✓ Distribution by wholesaler to customers locations, including pharmacies and hospitals</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>Speed of delivery, security, transparency and minimal exposure to environmental risks such as temperature extremes are all crucial for drug transport</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>Traffic congestion in urban areas slows the delivery of product to customer facilities</li> <li>Constrained truck maneuvering space in dense urban environments</li> </ul> <p><u>Performance Enhancement Strategies</u></p> <ul style="list-style-type: none"> <li>Using air transport for most long distance hauls</li> <li>Moving product from larger delivery vehicles to smaller configurations before entering more dense urban environments</li> </ul>
Food Services (Retail Distribution)	Distribution has two main types: broadline, which offers a comprehensive line of restaurant supply products, or specialized distribution, which supply meat and produce or give dedicated service to certain chain restaurants.	<ul style="list-style-type: none"> <li>Source Material Origins</li> <li>Warehouse Facilities <ul style="list-style-type: none"> <li>o Satellite Warehouses</li> </ul> </li> <li>Distribution Centers</li> <li>Restaurant customers</li> </ul>	<ul style="list-style-type: none"> <li>Truck</li> <li>Rail</li> <li>Ocean Carrier</li> </ul>	<ul style="list-style-type: none"> <li>✓ Inbound transport of vendor supplies to company warehouse facilities.</li> <li>OR</li> <li>✓ Inbound transport of vendor supplies to regional DC</li> <li>✓ Outbound transport of goods to restaurant customers <ul style="list-style-type: none"> <li>Multi-stop deliveries during early morning hours</li> </ul> </li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>Efficient routing and completion of multi-stop delivery routes, accounting for customer time delivery windows</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>Congested traffic conditions cause delays</li> <li>Lack of adequate, available parking near customer delivery locations</li> </ul> <p><u>Performance Enhancement Strategies</u></p> <ul style="list-style-type: none"> <li>Early morning departures</li> <li>Nighttime deliveries</li> <li>Use of satellite yards</li> </ul>
Urban Wholesale Food (Retail Distribution)	Wide variety of fresh fruits and vegetables from international and national origins, sold in	<ul style="list-style-type: none"> <li>Product Origins</li> <li>Terminal Markets</li> <li>Customer destinations</li> </ul>	<ul style="list-style-type: none"> <li>Truck</li> <li>Rail</li> <li>Ocean</li> </ul>	<ul style="list-style-type: none"> <li>✓ Inbound transport of product from supplier to terminal market</li> <li>✓ Sorting and storage at terminal market</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>Perishable nature of product necessitates on-time delivery of inbound produce, careful monitoring and storage of product, and prompt</li> </ul>

Supply Chain & Channel	Goods	Facilities & Geography	Modes	Staging & Urban Delivery	Performance
	bulk.	(restaurants, etc)	Carrier <ul style="list-style-type: none"> <li>Air</li> </ul>	<ul style="list-style-type: none"> <li>Direct purchase by customers during evening</li> <li>Outbound transport directly by customers at night</li> </ul> OR <ul style="list-style-type: none"> <li>Outbound transport managed by wholesalers during early morning</li> </ul>	<p>delivery of outbound produce to customers.</p> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>Traffic and weather delays</li> <li>Terminal market facility accessibility</li> </ul>
Supermarket (Retail Distribution)	Approximately 2,000 different product lines. Primary products handled are “dry goods” (canned goods and boxed product), as well as frozen foods such as meats, pizza, other prepared items. Bread, chips, and beverages are exclusively private label.	<ul style="list-style-type: none"> <li>Regional facilities/Distribution Centers</li> <li>Retail Stores</li> <li>Wholesale Customers</li> </ul>	<ul style="list-style-type: none"> <li>Truck</li> </ul>	<ul style="list-style-type: none"> <li>Supplier products delivered to regional facilities</li> <li>Transported from regional facilities to specific distribution centers via one-way over the road service</li> <li>Distributed outward to local retail and wholesale destinations</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>Consistently low fleet idle run times</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>Traffic congestion in metropolitan areas cause delays</li> <li>Lane closures, ramp closures and merging lane issues causes delays and additional truck miles</li> <li>Physical access to store or customer delivery locations may be blocked by structures</li> <li>Lack of rest stops makes it harder for drivers to take breaks when needed</li> </ul>
Big Box Retailer (Retail Distribution)	An extremely wide variety of consumer products, ranging from food and household goods to electronics and prescription medications.	<ul style="list-style-type: none"> <li>Vendors</li> <li>Distribution Centers</li> <li>Retail Stores</li> </ul>	<ul style="list-style-type: none"> <li>Trucks</li> </ul>	<ul style="list-style-type: none"> <li>Inbound transport of vendor supplies to regional DC facilities</li> </ul> OR <ul style="list-style-type: none"> <li>Inbound transport of vendor supplies to consolidation/deconsolidation center and then onward to DC.</li> <li>Outbound transport of goods to retail locations <ul style="list-style-type: none"> <li>Typically one delivery per trip, planned to fit at least one round-trip in a day</li> </ul> </li> <li>Sometimes empty delivery truck will transport vendor inbound goods back to DC on backhaul</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>Prompt inbound delivery from vendors</li> <li>Minimize vehicle miles traveled</li> <li>Minimize petroleum usage</li> <li>Prompt outbound delivery to retail stores</li> </ul> <p><u>Common Risks to Performance</u></p> <ul style="list-style-type: none"> <li>Unreliable vendor supply deliveries</li> <li>Traffic congestion encountered during store delivery trips</li> <li>Inconsistent laws and restrictions, including bridge regulations, size/weight restrictions, and noise ordinances.</li> </ul> <p><u>Performance Enhancement Strategies</u></p> <ul style="list-style-type: none"> <li>Constantly seek greater efficiencies in product packaging, loading of goods in trucks and trip routing</li> <li>Split large metropolitan areas into two separate service areas to enable more access to key locations</li> <li>Piloting and fully implementing transport energy efficiency innovations</li> </ul>
Retail Drug Store (Retail Distribution)	In addition to pharmacy are extensive selections of consumer goods: cosmetics, personal care items, cleaning products, stationery, magazines and books, candies and snacks, seasonal specialties, convenience foods and beverages.	<ul style="list-style-type: none"> <li>Product Origins (Domestic &amp; International)</li> <li>Distribution Centers</li> <li>Retail Stores</li> </ul>	<ul style="list-style-type: none"> <li>Truck</li> <li>Rail</li> <li>Air</li> </ul>	<ul style="list-style-type: none"> <li>Inbound transport of goods from vendors to DC</li> <li>Outbound transport of goods from DC</li> </ul>	<p><u>Performance Expectations</u></p> <ul style="list-style-type: none"> <li>Prompt inbound delivery from vendors with tight unload time windows</li> <li>Prompt outbound retail store deliveries with tight unload time windows</li> <li>Avoid significant oversupply or undersupply of products at a retail location</li> </ul>



Supply Chain & Channel	Goods	Facilities & Geography	Modes	Staging & Urban Delivery	Performance
Retail Apparel (Retail Distribution)	Specialty apparel through several different brands.	<ul style="list-style-type: none"> <li>• Container Freight Station</li> <li>• Distribution Centers</li> <li>• Product Destinations (Retail Stores, direct to customers)</li> </ul>	<ul style="list-style-type: none"> <li>• Truck</li> <li>• Ocean Carrier</li> <li>• Air</li> <li>• Rail</li> </ul>	<ul style="list-style-type: none"> <li>✓ Unload containers at port/airport</li> <li>✓ Transfer through CFS</li> <li>✓ Transfer to regional DC</li> <li>✓ Sorted for customer delivery</li> <li>✓ Outbound delivery to standalone stores, stores in malls, or directly to online/catalogue customers.</li> </ul>	<u>Common Risks to Performance</u> <ul style="list-style-type: none"> <li>• Traffic Congestion</li> <li>• Constrained delivery times</li> <li>• Limited dock space at store delivery locations</li> </ul>
Aggregate-based Construction Materials (Service Provision)	Broad range of aggregate-based materials for the residential, commercial and road construction industries, including cement and ready-mix concrete.	<ul style="list-style-type: none"> <li>• Cement Production Plant</li> <li>• Cement Terminal</li> <li>• Ready-mix concrete plant</li> <li>• Construction site</li> </ul>	<ul style="list-style-type: none"> <li>• Truck</li> <li>• Rail</li> <li>• Barge</li> </ul>	<ul style="list-style-type: none"> <li>✓ Transport of cement from production plant to cement terminal.</li> <li>✓ Transport of cement from cement terminal to ready-mix concrete plant.</li> <li>✓ Transport of aggregates to ready-mix concrete plant</li> <li>✓ Combine cement and aggregates to produce ready-mix concrete</li> <li>✓ Time-sensitive delivery of ready-mix concrete to construction sites.</li> </ul>	<u>Performance Expectations</u> <ul style="list-style-type: none"> <li>• Optimal siting of production facilities to both (1) keep bulk transport costs low and (2) enable extremely rapid delivery of the final ready-mix concrete product</li> </ul> <u>Common Risks to Performance</u> <ul style="list-style-type: none"> <li>• Local regulations and mitigation requirements constrain facility siting options</li> <li>• Freight bottlenecks and general congestion, particularly during the time-sensitive delivery of ready-mix concrete</li> </ul>
Hospital (Service Provision)	Four major types: general medical care supplies ranging from IV solution to bandages and diagnostic equipment, pharmaceuticals, food, and a miscellaneous group of which laundry is a major component.	<ul style="list-style-type: none"> <li>• General Supplies 3PL Distribution Center</li> <li>• Pharmaceutical Supplies 3PL Regional Distribution Center</li> <li>• Hospital Facility</li> </ul>	<ul style="list-style-type: none"> <li>• Truck</li> <li>• Rail</li> <li>• Air</li> </ul>	<ul style="list-style-type: none"> <li>✓ Hospital Supply Orders</li> <li>✓ Supply Delivery via 3PL <ul style="list-style-type: none"> <li>• General Supplies</li> <li>• Pharmaceuticals</li> <li>• Food</li> <li>• Miscellaneous</li> </ul> </li> </ul>	<u>Performance Expectations</u> <ul style="list-style-type: none"> <li>• Established fill rate target that implies that hospital should almost never be out of stock of medical supplies</li> <li>• Supply deliveries expected on a fixed schedule</li> </ul> <u>Common Risks to Performance</u> <ul style="list-style-type: none"> <li>• Traffic congestion in the dense urban areas surrounding the hospitals causes delays and affects maneuverability</li> <li>• Neighborhood opposition to truck traffic and noise during all hours of the day</li> </ul> <u>Performance Enhancement Strategies</u> <ul style="list-style-type: none"> <li>• 3PLs periodically re-examine hospital's handling process and inventory procedures</li> </ul>
Waste & Recyclables (Service Provision)	All types of household and commercial waste are collected, often organized into the broad categories solid waste and recyclable waste.	<ul style="list-style-type: none"> <li>• Waste collection location (residential &amp; commercial)</li> <li>• Waste Transfer Station</li> <li>• Final Disposal Site <ul style="list-style-type: none"> <li>◦ Landfill</li> <li>◦ Mixed Waste Recycling Facility</li> <li>◦ Waste-to-Energy Facility</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Truck</li> <li>• Rail</li> <li>• Barge</li> </ul>	<ul style="list-style-type: none"> <li>✓ Waste collection</li> <li>✓ Transport directly to landfill, recycling facility, or waste-to-energy facility</li> </ul> OR <ul style="list-style-type: none"> <li>✓ Transport to Waste Transfer Facility and then onward to landfill, recycling facility, or waste-to-energy facility</li> </ul>	<u>Performance Expectations</u> <ul style="list-style-type: none"> <li>• Keep vehicles moving constantly through route, with minimal collection and disposal wait times</li> </ul> <u>Common Risks to Performance</u> <ul style="list-style-type: none"> <li>• Weight Restrictions</li> <li>• Impeded access to collection sites</li> <li>• Nighttime restrictions</li> </ul> <u>Performance Enhancement Strategies</u> <ul style="list-style-type: none"> <li>• Greater time flexibility, allowing for more nighttime operations</li> </ul>